Baffinland Iron Mines Corporation

TERRESTRIAL ENVIRONMENT MITIGATION AND MONITORING PLAN

BAF-PH1-830-P16-0027

FOR REVIEW PURPOSES ONLY

Rev

Prepared By:
Department:
Title:
Date:
Signature:

Approved By:
Department:
Title:
Date:
Signature:

TABLE OF CONTENTS

1 INTRODUCTION 6
1.1 Purpose and Scope 6
1.2 Relationship to Other Management Plans 6
1.3 Corporate Policies 7
1.4 Regulatory Requirements 7
1.4.1 Applicable Legislation 8
1.4.2 Land Use Planning 9
2 PLANNING 10
2.1 Objectives 10
2.2 Consideration of Inuit Qaujimajatuqangit and Local Knowledge 10
2.3 Principles of Adaptive Management 12
2.3.1 Defining the Adaptive Management Process 12
2.3.2 Adaptive Management Checklist for Environmental Management 12
2.4 Thresholds 15
2.4.1 Inuit-Identified Thresholds 15
2.4.2 Effect Predictions 15
2.5 Monitoring Framework 15
2.5.1 Monitoring Principles 15
2.5.2 Holistic and Robust Data Analysis 15
3 TERRESTRIAL ENVIRONMENT | POTENTIAL EFFECTS AND MITIGATIONS 17
3.1 Vegetation 17
3.1.1 Effects Pathways 17
3.1.2 Mitigations 17
3.2 Birds (Including Raptors and Migratory Species) 18
3.2.1 Effects Pathways 18
3.2.2 Mitigations 18
3.3 Terrestrial Wildlife (Including Caribou and Wolves) 23
3.3.1 Effects Pathways 23

3.3.2 Mitigations 23

4 TERRESTRIAL ENVIRONMENT | MONITORING COMPONENTS 29

4.1 Disturbance Factors 34

4.1.1 Climate 34

4.1.2 Helicopter Overflights 34

4.1.3 Traffic (Tote Road and Rail) 34

4.1.4 Dustfall 34

4.1.5 Noise 34

4.2 Response Factors 35

4.2.1 Vegetation 35

4.2.2 Birds (Including Raptors and Migratory Species) 37

4.2.3 Terrestrial Wildlife (Including Caribou and Wolves) 40

5 DATA ASSESSMENT AND RESPONSE FRAMEWORK 47

5.1 Framework 47

5.2 Trigger Action Response Plan 47

5.3 Mitigation Toolkit 54

5.4 Reporting 54

6 REVIEW OF PLAN EFFECTIVENESS 55

6.1 Annual Review of Compliance and Unanticipated Effects 55

6.2 Scheduled Updates 55

7 ROLES AND RESPONSIBILITIES 57

8 REFERENCES 59

TABLES

Table 1.1 Relationship to Other Management Plans 6
Table 2.1 Objectives and Performance Indicators 10
Table 2.2 Incorporation for Adaptive Management in this Plan 13
Table 3.1 Recommended Setback Distances for Activity near Active Bird Nests 20
Table 4.1 Timeline for Terrestrial Environment Monitoring at the Project (Disturbance Factors) 31
Table 4.2 Timeline for Terrestrial Environment Monitoring at the Project (Response Factors) 32
Table 4.3 Vegetation Monitoring: Vegetation Abundance AND Composition 35
Table 4.4 Vegetation Monitoring: Vegetation HEALTH (Soil/Lichen-Metals) 36
Table 4.5 Vegetation Monitoring: Exotic Invasive Vegetation and Natural Revegetation 37
Table 4.6 Migratory Bird Monitoring: Peregrine Falcon and Gyrfalcon Nesting 38
Table 4.7 Migratory Bird Monitoring: Common Eider, King Eider, and Red Knot Nesting 38
Table 4.8 Migratory Bird Monitoring: Songbirds and Shorebirds 39
Table 4.9 Wildlife Monitoring: Direct Habitat Loss 40
Table 4.10 Wildlife Monitoring: Incidental Observation and Project Mortality 40
Table 4.11 Caribou Monitoring: Indirect Habitat Loss 41
Table 4.12 Caribou Monitoring: Habitat Use during Calving 42
Table 4.13 Caribou Monitoring: Movement 44
Table 4.14 Caribou Monitoring: Harvest-related Mortality 44
Table 4.15 Caribou Monitoring: Health Contaminants and Body Condition 45
Table 4.16 Wolf Monitoring: Den Sites 46
Table 5.1 Terrestrial Environment Trigger Action Response Plan 48
Table 5.2 Terrestrial Environment - Moderate and High Action Pre-Defined Responses 54
Table 6.1 Plan Review Schedule 55
Table 7.1 Roles and Responsibilities 57

FIGURES

Figure 3-1. Known/identified area for moulting snow geese 22
Figure 3.2 Caribou Decision Framework – Tote Road 26
Figure 4.1 Overview of Terrestrial Environment Monitoring Components. 30
Figure 6.1 Annual Review of Plan Effectiveness 56
Figure C-1: Sample Plot Distribution along Vegetation transect 90
Figure C-2: point quadrat method is used to measure percent plant cover 91
Figure C-3: Profile of ground cover and Point Quadrat Measurement. 91
Figure C-4: Datasheet for Vegetation Abundance Monitoring. 95
Figure C-5: Datasheet for Vegetation and Soil Base Metals Monitoring 101
Figure C-6: Wildlife Log Data log 122

APPENDICES

Appendix A Corporate Policies
Appendix B Concordance Table with Applicable Permits and Licences
Appendix C Monitoring Details and Methods
Appendix D Terrestrial Environment Working Group | Terms of Reference

1 INTRODUCTION

1.1 PURPOSE AND SCOPE

This Terrestrial Environment Mitigation and Monitoring Plan (TEMMP, the Plan) describes the approach by Baffinland Iron Mines Corporation (Baffinland) to manage and monitor potential effects of the Mary River Project (the Project) on the terrestrial environment. The Plan addresses the requirement that the Project (Nunavut Agreement, Section 12.5.5) does not *unduly prejudice* the integrity of terrestrial wildlife and vegetation in the Project area. The TEMMP provides guidance to protect and limit disturbances to vegetation, birds, and terrestrial wildlife from Project activities; its objectives are to:

- Detect Project-related short and long-term effects on the terrestrial environment
- Evaluate the accuracy of impact predictions
- Assess the effectiveness of mitigation measures
- Identify the need for additional mitigation measures.

Any railway references throughout this document are not applicable to the northern railway operation (i.e., that was relevant to the Phase 2 Proposal). General references to Railway references have been kept in this document to address the southern railway — which is applicable to the current approved Project, but is not being constructed at this time.

1.2 RELATIONSHIP TO OTHER MANAGEMENT PLANS

The Plan is intended to be used with other Plans and Guidance Documents (Table 1.1) within Baffinland's Environmental Management System.

TABLE 1.1 RELATIONSHIP TO OTHER MANAGEMENT PLANS

Referenced Management Plan	Information Provided by Referenced Plan
Adaptive Management Plan	Describes the generic approach to adaptive management on the Project, including management plans. Includes objectives, indicators, thresholds and responses (OITRs) related to the Project.
Air Quality and Noise Abatement Management Plan	Describes air quality and noise abatement measures relevant to vegetation, birds and wildlife habitat.
Emergency Response Plan	Describes mitigation measures related to wildlife.
Environmental Protection Plan	Provides relevant environmental protection measures.
Human Resource Management Plan	Describes Baffinland's Policy for restrictions on wildlife harvesting for non-Inuk employees.
Oil Pollution Emergency Plan — Milne Port	Describes mitigation measures related to wildlife.
Polar Bear Safety Plan	Describes mitigation for polar bear interactions.

Referenced Management Plan	Information Provided by Referenced Plan
Roads Management Plan	Describes mitigation for managing dust along project roadways and specifically the Tote Road, including the application of dust suppressants.
Railway Emergency Response Plan, DRAFT	Establishes the framework and procedures to respond to potential environmental safely and effectively, health and safety emergencies related to rail operations,
Railway Operations and Maintenance Management Plan, DRAFT	Provides procedures and guidance for operations of Railway, including considerations regarding wildlife interactions with the railway.
Spill Contingency Plan	Describes mitigation measures in the event of a spill related to protecting wildlife.
Surface Water and Aquatic Ecosystems Management Plan	Describes mitigation measures related to surface water quality, relevant to vegetation and wildlife habitat.
Waste Management Plan	Describes mitigation measures for waste to reduce interactions with wildlife.

1.3 Corporate Policies

Baffinland has two corporate policies that apply to environmental management:

- **Sustainable Development (SD) Policy** — identifies Baffinland's commitment internally and to the public to operate in an environmentally responsible, safe, fiscally responsible and respectful of the cultural values and legal rights of Inuit.
- **Health, Safety and Environment (HSE) Policy** — describes the company's commitment to achieving a safe, healthy and environmentally responsible workplace.

All employees and contractors must comply with these policies, provided in Appendix A.

1.4 Regulatory Requirements

This Plan outlines the Project's policies and procedures to ensure compliance with the relevant terms, conditions and regulations outlined in the following regulatory instruments and Inuit Agreements:

- Commercial Lease - Q13C301 (Commercial Lease) with the Qikiqtani Inuit Association (QIA)
- Inuit Impact Benefit Agreement (QIA and Baffinland, 2018)
- Project Certificate No. 005 issued by the Nunavut Impact Review Board (NIRB)

Tables of concordance with these three regulatory approvals are provided in Appendix B. An Inuit Stewardship Plan (ISP) will also be developed by the QIA pursuant to Commitment 19 of Appendix B of the Project Certificate. The Project must abide to a wide range of legislation, guidelines and other requires; where applicable, these guidelines and requirements have been adopted in the TEMMP. Descriptions for key legislation, land use plans and management guidance documents related to the management and protection of vegetation and wildlife are provided hereafter.

1.4.1 Applicable Legislation

1.4.1.1 Species at Risk Act

The *Species at Risk Act* (SARA) is federal legislation that "*provides for the legal protection of wildlife species and the conservation of the biological diversity*" (Government of Canada, 2018). The SARA is designed to prevent the extirpation and/or extinction of wildlife species through formal protection measures identified through a species recovery planning process. The plans are designed to identify actions that will lead to the recovery of species of conservation concern. Schedule 1 of the SARA lists the status of species of conservation concern under four risk categories: extirpated, endangered, threatened and species of special concern. Listed SARA species (cf. CESCC, 2016) are protected from "*killing, harming, harassing, capturing, taking, possessing, collecting, buying, selling or trading*" (Government of Canada, 2018). Recovery or management plans are required for listed species.

1.4.1.2 Migratory Birds Convention act

The *Migratory Birds Convention Act* (Section 5) provides "*for the protection of migratory birds through the Migratory Birds Regulations*" (Government of Canada, 1994). The Act protects migratory populations, individuals and their nests (1994, c. 22, s. 4; 2005, c. 23, s. 3) through the prohibition of:

- Possession of a migratory bird or nest
- The purchase, sale or exchange of migratory birds or nests
- Deposition of substances into waters that is harmful to migratory birds, or in a location where the substance can enter waters, without appropriate authorizations.

1.4.1.3 Nunavut Agreement

The Nunavut Land Claims Agreement (NLCA) is a modern treaty that was signed in 1993 by representatives of the Government of Canada, Tunngavik Federation of Nunavut, and the government of the Northwest Territories (Government of Canada and Inuit of the Nunavut Settlement Area, 1993; CIRNAC, 2020). The NLCA provides the Tunngavik Federation of Nunavut with aboriginal title to the Nunavut settlement area—a land area of approximately 350,000 square kilometres (Nunavut Tunngavik, 2019). The Tunngavik Federation of Nunavut also has ownership of waters and land-fast ice that fall within their area of traditional use. The NLCA consists of 42 chapters that focus on a range of aspects, such as: wildlife management; harvesting rights; lands, water and environmental management regimes; public sector employment and contracting; and heritage resources. Some of the identified rights of Indigenous Peoples include the right to harvest wildlife, the right to negotiate with industries for social and economic benefits from non-renewable resources, as well as the right to have equal representation of Inuit in decision-making processes related to resource management and land use (CIRNAC, 2020). The NLCA guarantees Inuit federal royalties from resource-extraction projects and allows for Inuit to self-govern. The goals of the NLCA are to provide Inuit with financial compensation and economic opportunities related to development; to provide clarity of land ownership and the use of land and resources; to provide harvesting rights; to provide the rights to participate in decision-making concerning the harvesting of wildlife; to encourage the cultural preservation of Inuit; and to encourage self-reliance (Nunavut Tunngavik, 2019). The Government of Nunavut, Department of Environment (GNDoE) is the lead Government of Nunavut (GN) Agency in fulfilling Government obligations concerning wildlife in Nunavut.

Section 5.2.1 (i) of the *Nunavut Agreement* states that the government retains the ultimate responsibility for wildlife management.

1.4.1.4 Nunavut Wildlife Act

The *Nunavut Wildlife Act (GN, 2005)* and applicable regulations that came into effect in July 2015 are territorial legislation established to manage wildlife and habitat in Nunavut, including the conservation, protection and recovery of species at risk. The *Nunavut Wildlife Act* applies to all terrestrial and aquatic wildlife and their habitat. The Government of Nunavut, Department of Environment (GNDoE) has a legislated mandate for managing terrestrial species in Nunavut and is responsible for fulfilling the GN responsibilities under federal legislation and national and international agreements and conventions.

1.4.2 Land Use Planning

1.4.2.1 North Baffin Regional Land Use Plan

The North Baffin Regional Land Use Plan (NPC, 2000) applies to the northern part of the Project area, roughly from the Mine Site north. The primary purpose of the land use plan is to ensure the well-being of the communities and permanent residents of the North Baffin Planning Region while still considering the interests of all Canadians. The land-use plan addresses concerns with the conservation of vegetation and wildlife and includes vision statements related to mining effects. All discussion related to terrestrial wildlife in the Land Use Plan is centred on the sustainability of caribou and assurances that Project effects do not hinder the sustainable harvest of caribou. Relevant to the Project, the Caribou Protection Measures (Appendix I of North Baffin Regional Land Use Plan; NPC, 2000) restrict the location of any operation that will block or divert seasonal migrations and any activities that will interfere with seasonal migrations, and that those activities must cease until migrating caribou have passed. Adaptations of these caribou protection measures to make them specific to north Baffin Island caribou were discussed between Baffinland and the QIA in January 2014. The discussions resulted in enhancements to measures that were included in the January 2014 update of the TEMMP and a commitment to adapt to changing caribou presence in the Project area as the herd numbers are expected to increase in the future.

1.4.2.2 Nunavut Planning and Project Assessment Act (NuPPAA)

The Nunavut Planning and Project Assessment Act (NuPPAA) is a federal statute that was implemented in 2014 and adds to the environmental impact assessment regime outlined in Articles 11 and 12 of the NLCA (Dylan and Thompson, 2020). The NuPPAA contains provisions that regulators must follow during the environmental assessment process, including the incorporation of Inuit Qaujimajatuqangit (IQ). NuPPA allows for a single-window entry point, which means that all proposed projects must be submitted to the Nunavut Planning Commission (NPC) for review prior to any development (CIRNAC, 2015). As per the NuPPAA, the NPC must then determine whether the proposed developments conform with Nunavut land use plans (CIRNAC, 2015). If the NPC determines that the project plans conform with the land use plans, then a commercial production lease is granted and the project can begin compiling the necessary data to develop an environmental impact statement (EIS; Dylan and Thompson, 2020).

2 PLANNING

2.1 OBJECTIVES

This Plan is intended as a framework for gathering the necessary information to prevent or avoid adverse environmental effects from the Project and identify need for additional mitigation measures, if necessary. Based on predictions from the Project-specific FEIS (Refer to Volume 6: Terrestrial Environment; Baffinland, 2012b) and Project commitments (Refer to Appendix B: Concordance Table with Applicable Permits and Licenses), the primary objectives of the Plan (along with associated performance indicators) are listed in Table 2.1.

TABLE 2.1 OBJECTIVES AND PERFORMANCE INDICATORS

	Objective	Performance Indicator(s)
Vegetation	The Project will not result in impacts to vegetation growth in the Regional Study Area (RSA) greater than those predicted in the FEIS	• Percent cover of plant "functional groups" (i.e., deciduous shrubs, evergreen shrubs, forbs, graminoids, lichens, mosses)
	Project activities will result in an insignificant increase in metals uptake in vegetation or surficial soils at the RSA scale, as per the FEIS.	• The concentration of Contaminants of Potential Concern (COPCs) in lichen and concentration of COPCs in surficial soil
	No introduction of exotic invasive plant species because of Project activities.	• The occurrence of exotic invasive plant species on the land
Birds	The Project will have an insignificant effect on cliff-nesting raptor occupancy and reproductive success.	• Peregrine Falcon and Rough-legged Hawk nest site occupancy and reproductive success.
Wildlife	The Project will have an insignificant effect on caribou movements across Project infrastructure	• Caribou movement deflections.
	The Project will not preclude caribou range use expansion as the population increases and the herd occupies range east and west of the transportation corridor.	• Caribou density • Proportion of collared caribou showing distinct directional movement that does not cross transportation corridor.
	The Project will have an insignificant effect on regional caribou distribution.	• Change in effective habitat based on caribou collar data analysis (i.e., RSPF).
	The Project will cause minimal direct mortality to caribou.	• Project-related caribou mortality

2.2 CONSIDERATION OF INUIT QAUJIMAJATUQANGIT AND LOCAL KNOWLEDGE

Baffinland views Inuit Qaujimajatuqangit as central to the successful planning and operation of the Project. IQ is reflective of the Inuit knowledge transferred from generation to generation and captures knowledge of relationships and morality, core values and worldviews, as well as environmental knowledge. As identified in the Mary River

Project Inuit Impact and Benefit Agreement (IIBA), IQ is beneficial for the Project and provides critical insights into the environmental, ecological, cultural and socioeconomic dimensions of the Project.

Given the importance of IQ, Baffinland developed an IQ Framework to guide its integration and use. The IQ Framework supports collaboration and decision-making throughout the life of the Project and is not limited to the approach or methods associated with an individual IQ study. The purpose of the IQ Framework is to identify procedures and provide guidance on the following;

- The processes through which IQ can be shared with Baffinland
- Schedule and timing for gathering and integration of IQ
- Roles and responsibilities of parties involved
- Processes and mechanisms through which IQ informs Project related decision-making

The IQ Framework also defines commonly used terms to support communication between parties and identifies the relationship between the IQ Framework and other management and monitoring plans, including the QIA's Inuit Stewardship Plan. For a greater understanding of the Projects general approach towards consideration of IQ, please refer to the IQ Framework.

In addition to the general pathways that IQ has and will inform this Plan, there are several initiatives with specific relevance to this Plan worth noting here:

- Annual Dust Audit. The Annual Dust Audit, as required by Term and Condition 187 of the Project Certificate is supported by a Dust Audit Committee, comprised of representatives from each of the five (5) North Baffin communities. The Dust Audit Committee supports an annual audit of dust mitigation and monitoring across the Project, and drives recommendations that are submitted to Baffinland on an annual basis. These recommendations, as adopted have been and will be integrated into this Plan.
- North Baffin Hunters and Trappers Organizations membership in the Terrestrial Environment Working Group. Baffinland has agreed to resource the participation of 2 members of the MHTO and 1 member from each of the 4 remaining North Baffin HTO's in the Terrestrial Environment Working Group, where dust and caribou management are discussed as a standard agenda component.
- Project Certificate 005, Appendix B Commitments. Baffinland and QIA agreed to several commitments aimed at increasing the role of IQ in dust monitoring and mitigation. These include commitments by Baffinland to
    - resource and annual snowpack sampling and monitoring through the Inuit led dust monitoring program
    - resource the development of a snow quality metric, integrating traditional knowledge, as part of the development of Inuit OITRs related to dust.
    - resource a study of North Baffin caribou based on Inuit Qaujimjatuqangit, to be led by the QIA in conjunction with HTOs

- implement additional mitigation measures within interim Project Protection Zones, to be delineated and agreed by Baffinland and QIA (with input from the TEWG) based on existing IQ, western science, historical data, and project monitoring to date
- Jointly approve with the QIA the adaptive management components of this Plan that relate to dust through a bilateral Adaptive Management Plan Working Group

2.3 Principles of Adaptive Management

Adaptive management is a planned and systematic process for continuously improving environmental management practices by learning about their outcomes. Adaptive management provides flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project.

Adaptive strategies are implemented when unanticipated adverse effects are observed, or if effects exceed identified thresholds. The management and mitigation of unanticipated adverse effects are most effective when collaboration between Baffinland, local stakeholders and regulators is employed. If effects to the atmospheric environment exceed identified thresholds, Baffinland will implement a corresponding response as contained within the Trigger Action Response Plan (TARP; Section 5), or a reasonable alternative.

2.3.1 Defining the Adaptive Management Process

Baffinland has developed a draft Adaptive Management Plan (AMP) that provides the framework by which adaptive management is to be incorporated into Project operations (Baffinland, 2022b). The Project-wide adaptive management process begins with a planning phase, followed by iterative phases of implementing and monitoring the actions included in the plan(s), evaluating the effectiveness of actions included in the plans based on results of monitoring and other feedback mechanisms, and adjusting management strategies and actions and responses based on monitoring. The cycle begins anew with implementation and monitoring of a revised plan, which integrates the outcomes of the previous cycle. This cycle can occur, in real-time or over an extended period according to the nature of the situation or area of focus. In this way, a properly designed and well-implemented adaptive management process progressively diminishes uncertainty, as management strategies and processes are refined throughout a project's operational lifecycle.

Monitoring and responding to effects in the short-term is addressed in a Trigger Action Response Plan (TARP) described in Section 5. The TARP identifies the pre-defined actions to be taken should threshold levels be exceeded. A series of escalated actions to be implemented are detailed in Section 5. Longer term review of and response to monitoring data is addressed in an annual review of plan effectiveness in Section 6. The latter includes an annual comparison of project effects against impact predictions made in the Final Environmental Impact Statement (FEIS; Baffinland, 2012) and the addendums (Baffinland 2013, 2018, 2020, 2022a).

2.3.2 Adaptive Management Checklist for Environmental Management

Table 2.2 presents an adaptive management checklist identifying how adaptive management has been incorporated into the current revision of the Plan.

TABLE 2.2 INCORPORATION FOR ADAPTIVE MANAGEMENT IN THIS PLAN

Adaptive Management Phases	Components	Questions to Guide Decision-Making	Status of Management Plan (i.e., complete, in progress, undergoing revisions)
Plan	Objectives	Are objectives clear and key desired outcomes defined? Do they include Inuit objectives?	In Progress Objectives are identified in Section 2.1. Inuit Objectives will need to be developed and will be integrated into Section 2.1 (first as Interim Inuit Objectives, replaced by Inuit Objectives once the Inuit Stewardship Plan is initiated).
	Indicators	Are performance indicators adequately identified? Do they include Inuit defined indicators?	In Progress Performance indicators are identified in Table 2.1 and described in Section 4. Inuit Indicators will need to be developed (first as Interim Inuit Indicators, replaced by Inuit Indicators once the Inuit Stewardship Plan is initiated).
	Identification of Thresholds	Are thresholds for specific responses identified (i.e., early warning triggers, action levels, quantitative metrics or qualitative descriptions)?	In Progress Performance indicators and thresholds are described in Section 4 and Section 5. Additional thresholds tied to Inuit Objectives and Indicators will be established through QIA-Baffinland engagement on the timeline identified above.
	IQ Integration / Influence	Are mechanisms for IQ integration/influence identified?	In Progress Integration of IQ will be clarified in the next draft of the Plan through the AMP Working Group and later firmed up through inputs by the Inuit Committee.
Implement and Monitor	Management Strategies and Responses	Are management strategies and response options clearly identified?	In Progress Baffinland Mitigation and Monitoring Strategies are described in Section 3 and Section 4. The Data Assessment and Response Framework is described in Section 5, including a development of a Threshold Action Response Plans (Table 5.1). These will be augmented through the work of the AMP Working Group and later inputs by the Inuit Committee.
	Resourcing	Are all phases of the adaptive management cycle properly resourced (in accordance with Inuit Agreements) to be fully implemented?	In Progress Resourcing in accordance with Inuit Agreements will need to be discussed through the AMP Working Group, with annual work plans and budgets developed.

Adaptive Management Phases	Components	Questions to Guide Decision-Making	Status of Management Plan (i.e., complete, in progress, undergoing revisions)
	Monitoring	Does the monitoring program provide the information needed to determine the effectiveness of management strategies and responses?	In Progress Baffinland's Monitoring Strategy is described in Section 4. The role of Inuit monitors as per the Inuit Stewardship Plan needs to be established and integrated into this Plan.
	Timeline for implementation	Is the possibility that rapid response may be necessary considered in the implementation plan/process?	In Progress Trigger action response plans (TARPs) is presented in Section 5 (Table 5.1). This includes the identification of low, moderate, and high action responses that correspond to low, moderate, and high-risk conditions.
Evaluate and Learn	Review Data and Feedback	Is the process for reviewing and evaluating management effectiveness (based on monitoring data and feedback) articulated?	In Progress The Review of Plan Effectiveness is presented in in Section 6; Roles and Responsibilities are presented in Section 7.
	Additional Mitigation	Are mechanisms for determining the need for additional mitigation described?	In Progress The Data Assessment and Response Framework is described in Section 5, including a development of a Threshold Action Response Plans (Table 5.1).
	The Input of IQ Holders	Are opportunities identified for IQ holders to review results and provide input into adaptive management responses/mitigations?	In Progress To be discussed at the AMP Working Group and later with the Inuit Committee.
Adjust	Unanticipated Effects or Issues	Is it apparent how unanticipated effects or issues will be actioned and resolved?	Pending Approval Section 6 (Figure 6.1 in particular) describes the process for incorporating repeat noncompliance and unanticipated effects into plan updates.
	Reporting	Are the reporting mechanisms for new / revised strategies and response actions established?	Section 6 describes the process for reporting mechanisms for new/ revised strategies. A review schedule of the Plan is provided in Table 6.1.
	Scheduled Updates	Is the frequency of scheduled updates to the management	In Progress A review of the Plan is provided in Table 6.1.

Adaptive Management Phases	Components	Questions to Guide Decision-Making	Status of Management Plan (i.e., complete, in progress, undergoing revisions)
		plan identified?	

2.4 THRESHOLDS

Adaptive management includes short-term and longer-term review and response cycles (Section 2.3). Threshold-based adaptive management allows Baffinland's environment department to make ongoing adjustments to management approaches as new information on thresholds is gathered. Thresholds are defined as part of the Data Assessment and Response Framework (Section 5) that includes a Trigger Action Response Plan (TARP) with thresholds and pre-defined actions to be taken should threshold levels be exceeded. Thresholds may be informed by Inuit thresholds and/or effect predictions from the Final Environmental Impact Statement (FEIS).

2.4.1 INUIT-IDENTIFIED THRESHOLDS

Inuit thresholds related to dust will be developed and proposed by the QIA through the Inuit Stewardship Plan. Once made available and agreed to, they will be included in this Plan as needed.

2.4.2 EFFECT PREDICTIONS

The effects predictions from the FEIS and addendums can be used for comparison to assess the extent to which Project impacts align with what was anticipated as described in Section 6.1 (Annual Review of Compliance and Unanticipated Effects). Baffinland may also identify the need for further adaptive management measures when unanticipated adverse effects or effects that exceed FEIS predictions occur.

2.5 MONITORING FRAMEWORK

2.5.1 MONITORING PRINCIPLES

The Monitoring Framework's objectives provide guidance for the development of Project monitoring principles:

- Compare Project effects against predictions made in the impact assessment;
- Monitor and evaluate the effectiveness of mitigation measures;
- Identify unanticipated adverse effects;
- Consult Inuit on their perspectives to identify alignment or gaps between scientific monitoring and IQ;
- Gather supplementary data (if/where required) to inform adaptive management measures.

2.5.2 HOLISTIC AND ROBUST DATA ANALYSIS

An underlying principle of the TEMMP is to provide data and analyses that are meaningful, informative, robust and useful for decision-making and adaptive management. Programs should be evaluated holistically (i.e., being interconnected and with reference to the whole) rather than distinctly and/or independently from one another. That

said, individual programs may be completed per different frequencies and timelines during the life of the Project. Timing and frequency will depend on the nature of the data capture (i.e., some features may not exist in sufficient quantify to provide a robust evaluation of potential Project effects) and practicality (i.e., the effort required to collect sufficient data may be unreasonable when there is a very low likelihood for a Project effect and/or interaction). Annual updates to the TEMMP will also consider regional monitoring efforts and/or research initiatives conducted by other agencies, universities and institutes, and/or non-governmental organizations, etc., who have a jurisdictional interest and/or responsibilities for monitoring in the Project area (i.e., GN), as appropriate.

3 TERRESTRIAL ENVIRONMENT | POTENTIAL EFFECTS AND MITIGATIONS

Mitigation refers to the elimination, reduction, or control of potential adverse effects of the Project on the environment. Effective Project mitigation incorporates a combination of Project design, implementation of best management practices, development of management plans, implementation of emergency response programs, and provision of training, education and awareness. The following subheadings potential effects pathways and mitigations (both general and specific) applicable to vegetation, birds (including raptors and migratory species) and terrestrial wildlife (including caribou and wolves).

3.1 VEGETATION

3.1.1 EFFECTS PATHWAYS

Vegetation will be affected by physical disturbance (i.e., major earthworks and operations within the Project footprint) as well as exhaust emissions and dust deposition (i.e., associated with travel and operations) and potential changes to localized surface water quantity and quality (i.e., associated with changes in grading and topography). Dustfall and exhaust emissions are considered the primary source of Contaminants of Potential Concern (COPC) that may affect vegetation abundance and health. There is also a potential for contamination of soil and vegetation due to accidents and malfunctions (i.e., spills and chemical leaks). Meanwhile, shipping materials and equipment to the Project will increase potential for introduction of exotic invasive species (i.e., via seeds, vegetative material, and foreign soils); whereas traffic along transportation corridors (i.e., to/from Milne Port and Steensby Port) can facilitate their proliferation at the Project.

3.1.2 MITIGATIONS

Mitigation measures for vegetation are (1) limiting the Project footprint and associated disturbance area, (2) managing emissions and dust, (3) managing surface water and effluent discharge, and (4) controlling materials and equipment arriving at the Project (i.e., being clean and free of foreign soil and vegetative materials). Specifically:

- Project activities and travel will be limited to the Project Development Area (PDA), using established corridors. Offsite travel will be restricted (unless authorized for approved Project related activities).
- All equipment arriving new on-site are investigated for exotic invasive plant potential (i.e., soil in tires, entrapped vegetation). Before initial use in Project areas, equipment and supplies are cleaned of dirt potentially containing plant seeds not naturally occurring in the area.
- Natural revegetation and recolonization will be the only pathway for revegetation at the Project (i.e., no direct seeding and/or introduction of foreign seed) during interim and final reclamation.
- Dustfall and exhaust emissions will be managed in accordance with the Air Quality and Noise Abatement Management Plan and the Roads Management Plan.
- Surface water will be managed in accordance with the Surface Water and Aquatic Ecosystems Management Plan.
- Accidents and malfunctions (i.e., spills and chemical leaks) will be managed in accordance with the Spill Contingency Plan, Oil Pollution Emergencies Plan — Milne Port, and Environmental Protection Plan.

3.2 Birds (Including Raptors and Migratory Species)

3.2.1 Effects Pathways

Individual and local populations of birds within the Zone of Influence (ZOI) will be affected by the Project due to direct loss of habitat (associated with construction and operations within the Project footprint) and indirect loss of habitat (associated with sensory disturbance adjacent to the Project footprint). The potential for bird mortality is also increased due to (1) collisions with Project infrastructure (equipment, ships, aircraft, and facilities); (2) greater hunter usage and/or predator abundance within the ZOI, and (3) incidental health effects caused by dust deposition and exhaust emissions as well as interactions related to accidents and malfunctions (i.e., spills and chemical leaks).

3.2.2 Mitigations

The Project will abide by the following management plans as they relate to birds and bird habitat:

- Air Quality and Noise Abatement Management Plan (BAF-PH1-830-P16-0002)
- Surface Water and Aquatic Ecosystems Management Plan (BAF-PH1-830-P16-0026)
- Waste Management Plan (BAF-PH1-830-P16-0028)
- Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011)
- Emergency Response Plan (BAF-PH1-840-P16-0002)
- Spill Contingency Plan (BAF-PH1-830-P16-0036)
- Oil Pollution Emergencies Plan — Milne Port (BAF-PH1-830-P16-0013)
- Environmental Protection Plan (BAF-PH1-830-P16-008)

Other general mitigation measures for birds within the RSA include:

- Enforcement of a no-hunting policy for Project personnel.
- Project personnel orientation for best practices regarding waste management and wildlife interactions
    - Workers should not disturb, harass, or feed wildlife
    - Orientation to emphasize avoidance of identified nests and large concentrations of foraging or moulting birds.
- If/where required, installation of deterrents (i.e., flagging) prior to the commencement of nesting to discourage birds from nesting in areas likely to be disturbed by construction/clearing activities during the nesting season[1].
- Pre-clearing inspections of active Project areas to be completed to prior to any land clearing during the nesting season in accordance with the Environmental Protection Plan.
    - Any nests (or indicated nests) identified via a no-disturbance buffer zone (refer to Table 3.8) to be abided until the young have fledged and left the area.

[1]Baffinland prepared a bird deterrence review that was reviewed at the TEWG May 21, 2013. There was no feedback from the group on what would prove practical solutions prior to the 2014 construction season. Although active nest surveys were completed, deterrents were not erected. There were no apparent nesting attempts by birds in the cleared areas.

- If setbacks are not feasible, nest-specific guidelines and procedures to be applied to ensure bird nests and their young are protected (Section 3.2.2.3).

- Applying avoidance strategy if Species at Risk or their nests and eggs are encountered during Project activities.
  - Project personnel will establish no-disturbance buffer zones[2] based on the species-specific nest setback distances outlined in Table 3.8.

- Bird sightings — particularly raptors or large concentrations of birds — to be reported to on-site environmental supervisor and relayed to Project biologists and recorded in the wildlife logs.
- Temporary communication towers (i.e., using guy wires) to be fitted with bird diverters to minimize the risk of bird collisions. Lighting to be reduced (if/when possible) to minimize visual attractants for birds or other wildlife.
- If/where practical, implementation of stop work policy when wildlife in the area may be endangered (i.e., at risk of immediate injury or death) by work being conducted.

Migratory Bird Mortality Reporting Procedure

Should Project-related mortality of a migratory bird (or birds) occur, ECCC has requested that notice be sent to regional Conservation Officers for further investigation:

Northern region
Nunavut
PO Box 1870
Suite 301, 933 Mivvik St.
Iqaluit, NU X0A 0H0
Telephone: 867-975-4636
Fax: 867-975-4645
Email: ec.nupermisscf-cwspermitnu.ec@canada.ca

[2]Setbacks and stop-work procedures will be applied in 'new disturbance' areas. These procedures may not apply should birds establish themselves in proximity to active construction and operations (i.e., after pre-clearing and associated avoidance procedures). If/where practicable, Project personnel will still seek to avoid encroachment and minimize potential disturbance of nesting species.

TABLE 3.1 RECOMMENDED SETBACK DISTANCES FOR ACTIVITY NEAR ACTIVE BIRD NESTS

Species Group	Recommended Setback Distances (m)		Exceptions/Comments
	Pedestrians /ATVs	Roads/Construction/ Industrial Activities	
Songbirds	30	100	N/A
Shorebirds [a]	50	100	For nests of American Golden Plover or Ruddy Turnstone setbacks should be increased to 150 m for Pedestrians/ATVs and 300 m for Roads/Construction/Industrial Activities. For nests of Black-bellied Plover, Whimbrel or Red Knot, setbacks should be increased to 300 m and 500 m, respectively.
Terns/Gulls	200	300	For nests of Ross's Gull setbacks should be increased to 500 m for Pedestrians/ATVs and 750 m for Roads/Construction/ Industrial Activities. For Ivory Gull nests, a 2 km setback should be applied to all activities.
Ducks	100	150	N/A
Geese	300	500	N/A
Swans/Loons/Cranes	500	750	N/A
Cliff-nesting Raptors	500	500	N/A
Ground-nesting Raptors	400	400	Includes Short-eared Owl.

[a] In case of uncertainty during species identification, the higher setbacks should be applied for all shorebird species. Where several species may be nesting, setbacks for the most sensitive species should be applied.

N/A Not applicable.

3.2.2.1 PREDATION

Mitigation measures specific to bird nest predators (i.e., foxes, gulls, jaegers) include:

- Waste will be managed in accordance with the Waste Management Plan.
- Completion of periodic audits to evaluate waste management practices' effectiveness per the Baffinland Environmental, Health, and Safety (EHS) Management System
- Buildings and facilities designed to avoid/eliminate denning, roosting and nesting sites (i.e., installation of bird spikes on horizontal surfaces, particularly near heat sources, and buildings to reduce the number of sheltered surfaces where nests could be established).
- Implementation of regular surveillance of Project facilities and waste disposal sites to determine if/where predator deterrence may be required and evaluate effectiveness of predator control strategies.

3.2.2.2 AIRCRAFT MANAGEMENT

Mitigation measures specific to aircraft interactions with birds include:

- Subject to safety requirements, all Project-related aircraft to maintain a minimum cruising altitude of:
  - 650 m above ground level during point-to-point travel in areas likely to have migratory birds present

- 1,100 m vertical and/or 1,500 m horizontal distance from observed concentrations of migratory birds
- 1,100 m vertical and/or 1,500 m horizontal distance over known/identified areas for moulting snow geese (Figure 3.1) during the moulting period (July–August)[3].

- Pilots required to collect and submit tracklogs for all helicopter flights within the RSA; Baffinland to monitor compliance.
- Aircraft approach and departure flight paths to be developed and implemented; helicopter pads (Milne Port and Steensby Inlet Port) to reduce potential for bird strikes.
- Pilots to be informed of minimum cruising altitude guidelines; Employees to report improper flight practices

3.2.2.2.1.1 Aircraft Mitigation Exceptions

Flight height data points are designated "compliant" when elevation requirements are achieved; otherwise, data are designated as "non-compliant". Pilots may also provide appropriate discretionary rationale for deviating from flight heights, designated as "compliant with rationale", for example:

- Weather
- Slinging
- Geophysical survey
- Other surveys
- Staking
- Short distance flights where the time between take-off and landing does not allow enough time to gain 650 m above ground level (magl)
- Drop off/pick up
- Demobilization
- Site inspections (e.g., Regulatory inspections)
- Sampling
- Evacuations; Search and rescue

3.2.2.3 Nest Management

During the nesting season (26 May to 18 August; ECCC, 2018), appropriately qualified environmental staff will be notified if/when a nest is identified within the setback distance of a work area. A work stoppage will be implemented followed by establishment of buffer/setback until fledging occurs. A Project biologist will monitor each case/sighting (i.e., in a manner that does not cause added disturbance to the nest) to inform feasibility of potential Project activity. To prevent thermoregulatory stress to eggs, incubating adults should not be disturbed/flushed from their nests. Table 3.8 provides the setback distances recommended for tundra-nesting species that will be applied within the Project area.

Additional guidance (depending on Project circumstances) includes:

- If the recommended buffer cannot be maintained, specific guidelines and procedures tailored to the environmental setting and Project activity will be developed and issued to all Project personnel to minimize disturbance to the nest.
- Appropriate setback buffers and specific guidelines and procedures will be applied for Species at Risk observed nesting within 750 m of Project activities.

[3] Besides environmental monitoring and research surveys, no other Project activities will occur in this area during the moulting period. For the remainder of the migration and breeding season, air traffic is required to maintain a minimum of 650 m above ground level and refrain from excessive hovering or circling within this key site.

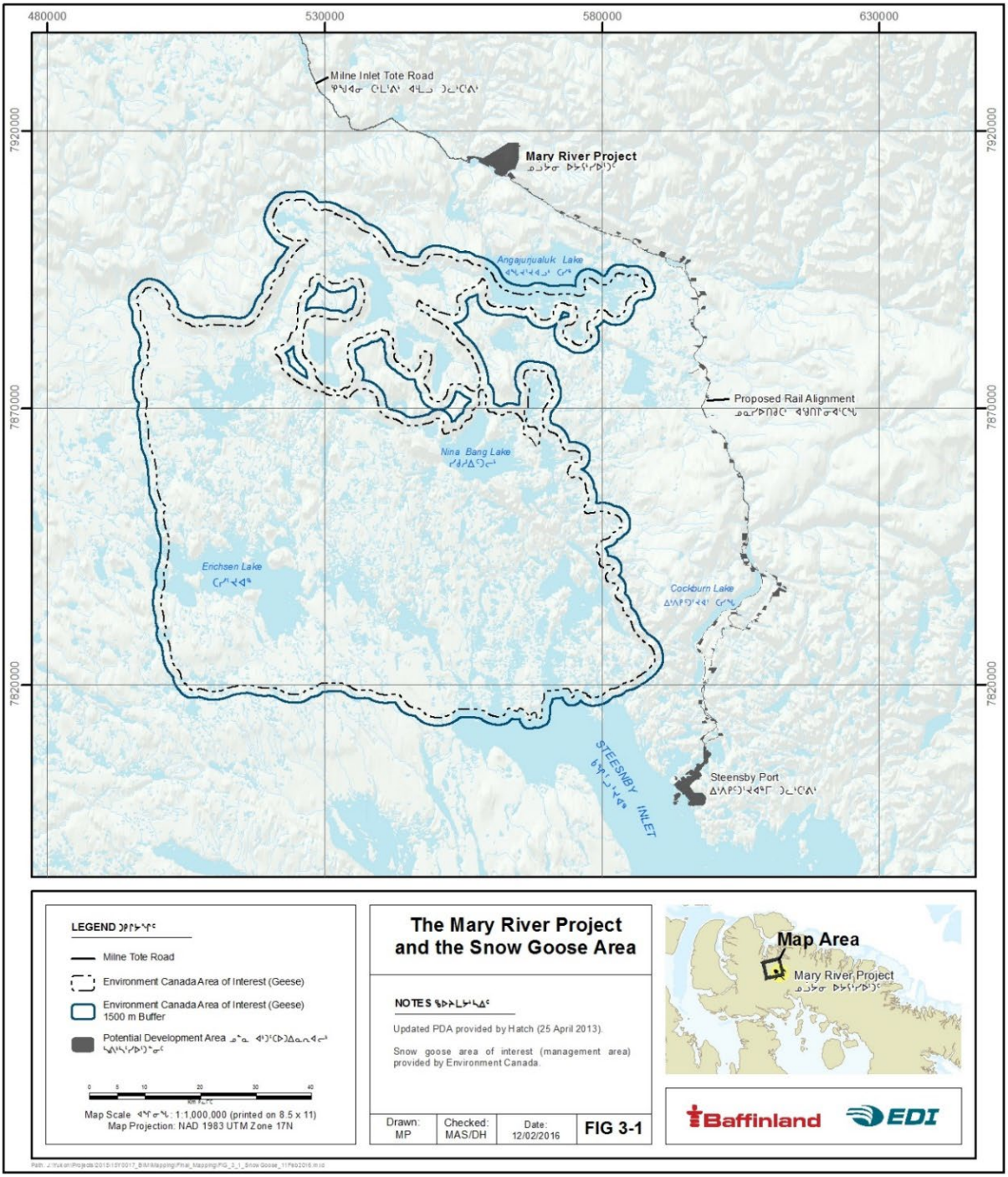


FIGURE 3-1. KNOWN/IDENTIFIED AREA FOR MOULTING SNOW GEESE

- Due to nesting site specificity for peregrine falcon and other cliff-nesting raptors (i.e., being subject to re-used year over year), a nest-specific assessment and management plan can be developed for every known cliff-nesting raptor nest site within 1 km of Project activities. A 500 m no-disturbance buffer will be implemented during the nesting period.

3.3 Terrestrial Wildlife (Including Caribou and Wolves)

3.3.1 Effects Pathways

Caribou, wolves and other terrestrial wildlife will be affected by the Project due to direct loss of habitat (associated with construction and operations within the Project footprint) and indirect loss of habitat (associated with sensory disturbance adjacent to the Project footprint). Caribou — a keystone species in the north Baffin Island ecosystem — was identified as the terrestrial wildlife Key Indicator because of its ecological and social significance. Caribou were consistently identified as a species of great significance to local communities as a key component of Inuit diet and culture (GNDoE, 2010). Other species, particularly carnivores (i.e., wolves), rely on caribou population size and distribution for survival.

3.3.2 Mitigations

General mitigations and management plans for birds within the RSA (Section 3.2.2) also apply to terrestrial wildlife.

In addition, Baffinland maintains an active employee and site personnel induction program designed to increase personnel awareness of 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 are provided with Baffinland's Waste Management Policy and Guidelines and are instructed on the purpose and benefits of avoiding wildlife, where possible.

- Project areas will be kept clean of food scraps and garbage and disposed of in accordance with Baffinland's Waste Management Guidelines. Feeding wildlife is prohibited.
- Wildlife attempting to approach personnel will be deterred by shouting, chasing, and using noisemakers such as bear bangers. Should deterrents be ineffective, the site Environmental and Health and Safety Supervisors advise on appropriate steps and procedures.
- All wildlife interactions at the Project will be documented via wildlife logs and annual reports.
- Potential interactions with polar bear will be managed in accordance with the Polar Bear Safety Plan.
- Location(s) of wolf and fox dens were previously identified in years outlined in Table 4.1. Den surveys are no longer being completed due to insufficient sample sizes as determined during baseline studies (refer to Section 4.2.3.3). All site personnel and Project activities will adhere to the avoidance procedures (Section 3.3.2.1)
    - Dens will be surveyed when wolves and foxes are being found in adequate numbers, allowing for a sufficient sample size. A 2 km avoidance buffer will be maintained until they are no longer occupied (in consultation with a qualified biologist.).
    - Deterrence (described above) will be a primary method of mitigating interactions. Due to the high incidence of rabies in foxes on Baffin Island, foxes that exhibit aggressive behaviour to humans

(regardless of deterrence measures) are presumed to be rabid. The Environmental Superintendents will advise for dispatching a likely rabid fox by lethal shot[4].

3.3.2.1 HABITAT

Caribou, wolves and other terrestrial wildlife may experience sensory disturbances due to the Project, and the likelihood for habituation to Project activities is understood only with a low level of precision. Sensory disturbances that impact habitat effectiveness within a ZOI can only be partially mitigated. Per the Environmental Protection Plan (refer to Section on Caribou Protection Measures), mitigation measures that will reduce the likelihood of reduced habitat effectiveness for caribou include:

- Limitation of sensory disturbances (if/where possible) throughout the year. For example, by restricting blasting when migrating caribou and other wildlife may be negatively affected.
- Avoidance of active caribou calving sites (as identified by observations from area hunters, Project biologists or observed by aircraft pilots) between May 15 and July 15. Where possible, there will be no increase in construction or operational activity within 3 km of the calving sites during this period.
- Restricting non-essential activities between May 15 and July 15 (i.e., construction activities will be planned to avoid this area during the calving season) in the Cockburn Lake Area (identified during baseline studies as having the highest occurrence of caribou calving sites),
- Deferring Project activity if any females (one or more) are observed within 3 km of a Project activity location (such as drilling or road construction) from May 15 through July 15.
    - Should a female caribou (or a female with a calf or calves) approach within 3 km of Project activities (between May 15 and July 15), the animals will be observed on the ground. If it is obvious that they are being disturbed, the activity will cease until they have moved away by at least 3 km.
    - If caribou approach a Project activity site before work commences, the animals will be observed on the ground, and if it is obvious that they are being disturbed (i.e., hesitating to cross work site, running in the opposite direction, visibly agitated), work will not commence until they have moved on. If caribou approach a Project site while work is in progress, caribou will be observed for signs of disturbance. If the caribou are disturbed, the activity will be modified or cease until the caribou have moved away or they are guided away from the worksite.
- Wildlife monitor will be present on-site during the calving season (i.e., when the potential for caribou encounters will increase) to monitor cow/calf behaviour in relation to traffic, designate a temporary no-stopping zone, guide traffic, and document measures taken to reduce sensory disturbance to calving caribou.

[4]In the rare situation where a lethal shot is necessary, approval to proceed will be provided by the Environmental Superintendent. Only personnel trained in the use of firearms will be authorized for this activity. This task will be conducted so that site personnel, equipment and infrastructure are not endangered. If rabies is suspected, a body shot will be taken, and the carcass will be handled to avoid direct physical contact. Samples, as required for a rabies determination, will be sent to a lab, and the carcass will be incinerated.

3.3.2.2 MOVEMENT

Mitigation measures that will reduce the likelihood of the Project being a barrier to caribou movement include the following.

- During winter, snow management activities will maintain a snowbank height less than 1 m with smooth tops along the railway and Tote Road. In collaboration with the Terrestrial Environment Working Group (TEWG), Baffinland will consider additional suggestions for snowbank management. This will permit caribou to cross the transportation corridor without being blocked by steep snowbanks. In addition to reducing the barrier effect, this snow management practice will also likely reduce drifting snow. Baffinland will also consider, in consultation with the TEWG, a monitoring program of snowdrifts along the railway embankment, should one be developed for future operations.
- Identified trail crossings along the railway and the Tote Road where the physical structure might be a barrier to caribou movement will be constructed of finer fill material to replicate natural trail conditions, preventing leg entrapment, and gentler gradients to reduce the visual barrier of the embankments. Any additional (i.e., beyond those already identified) trail crossings identified during construction or operation will also be modified with gentler slopes and finer fill if caribou deflections are detected. In the context of caribou movement monitoring, deflection is defined as "caribou that fail to cross the Railway or Tote Road after approaching it."
- Wildlife signage could be posted at trail crossings along the Tote Road. Railway operators will be made aware of the crossing areas along the railway, and daily observations will be reported so operators are aware of a potential presence at crossing sites and other areas.
- Rail operators may use train horns to alert wildlife of approach danger.
- A surveillance system along the railway corridor will be used 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.
- Based on IQ knowledge provided by hunters and elders and/or site-staff observations, if migratory caribou start to move through the RSA, then the leading caribou will be allowed to cross over the Tote Road and railway undisturbed so that others will follow.
- Truck drivers will be provided with wildlife awareness training, including known crossing locations. Drivers will operate in accordance with the Caribou Decision Framework for Tote Road (Figure 3.2) and for Rail (Figure 3.3).
- All site personnel entering and exiting the Tote Road will notify site dispatch and/or security. Notifications to road users will include mandatory wildlife reporting (Appendix C-14 — Wildlife Monitoring: Incidental Observations and Project Mortality Wildlife Log).

Additional mitigation measures specific to railway operations will be developed. They may include:

- Requirement that railway operators report any caribou sighting along the railway.
    - Implementing indeterminant stoppages if large groups of migratory caribou move through the area.
    - High cars (i.e., trucks adapted to travel on rails) to be used to monitor for wildlife presence along the rail corridor ahead of train transits during periods when substantial wildlife movement is expected to occur across the railway corridor.

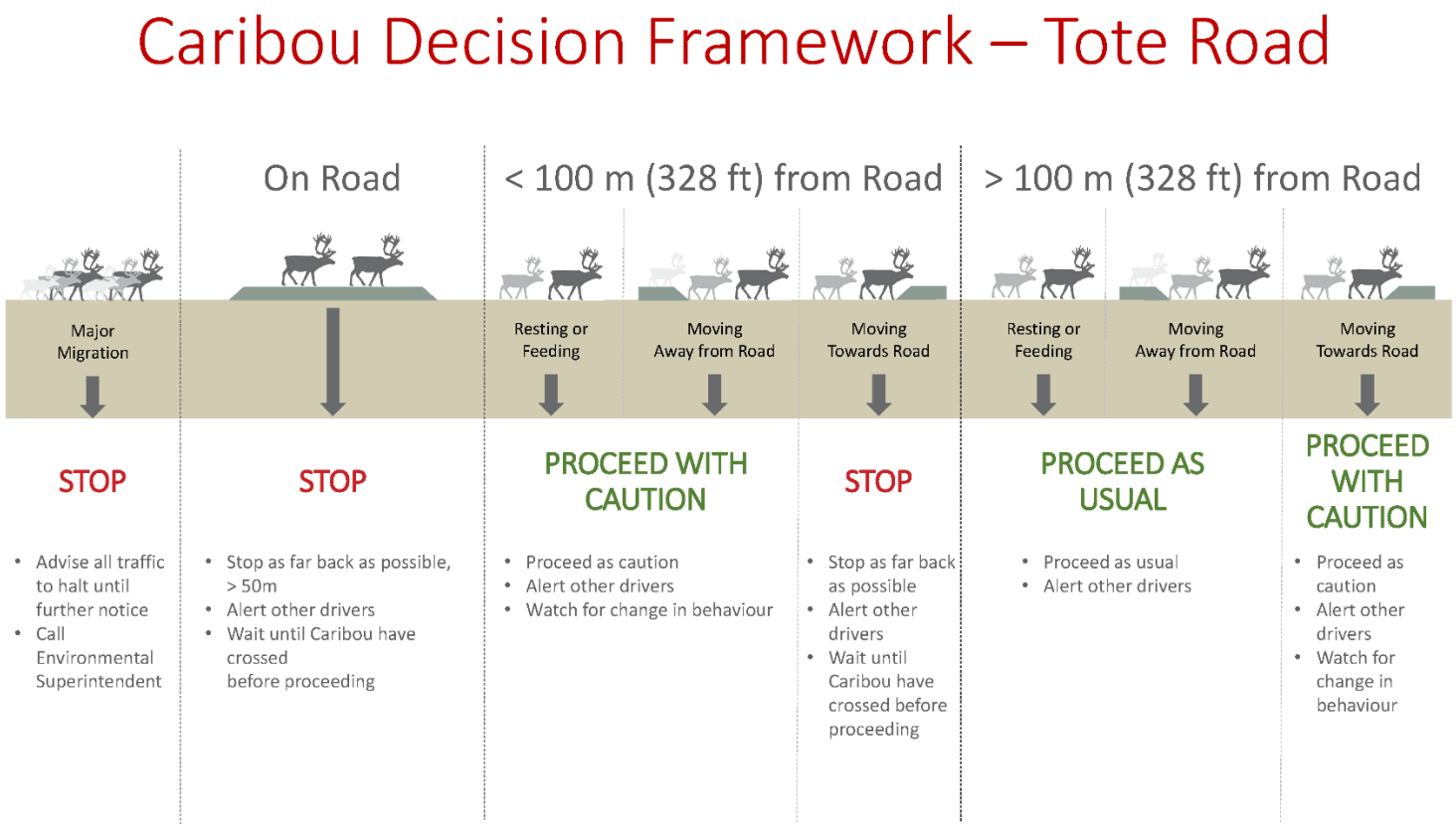


FIGURE 3.2 CARIBOU DECISION FRAMEWORK – TOTE ROAD

- Wildlife can be diverted from movement (barring the "wildlife right-of-way" policy), or train schedules can be modified to allow for distinct large migratory movements.

3.3.2.3 MORTALITY

The threshold for caribou mortality due to the Project is zero. Any Project-related caribou mortality will trigger an investigation into the cause of the incident and potential contributing factors (direct and/or indirect). Depending on the outcome of the investigation, additional mitigation actions may be implemented. If caribou mortality increases due to Project activities, the effects will be mitigated via increased traffic controls, including seasonal traffic limitations of both the Tote Road 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.

Mitigation measures implemented to reduce the likelihood of the Project increasing caribou mortality risk include:

- Implementation of a wildlife right-of-way policy along Project travel corridors (roads and railway).
- Notification to Site security dispatch for all site personnel entering and exiting the Tote Road. Notifications will include mandatory wildlife reporting (Appendix C-14 Wildlife Monitoring: Incidental Observations and Project Mortality Wildlife Log).
    - When caribou are observed on or along travel corridors, a "caribou advisory" will be issued via the site radio network to alert operators that caribou are in the area and to maintain vigilance while driving in accordance with Baffinland's Caribou Decision Framework (Figure 3.2).
- Mandatory reporting and documentation of all mortalities and near misses, with follow-up investigations for any/all mortality events.
- Speed limits along Project roads set at a maximum of 55 km/hr, in combination with the Caribou Decision Framework – Tote Road (Figure 3.2). Slow speeds and vehicle operator response to animal presence intended to allow caribou time exit road corridor and reduce potential for collision.
- Any carcasses will be removed from transportation corridors to discourage further interactions (i.e., by scavengers).
- Implementation of no-hunting policy for Project personnel (notwithstanding the accommodation provided for traditional Inuit activities) in accordance with the Human Resource Management Plan.
- Where practical, implementation of work stoppage when wildlife in the area may become endangered (i.e., risk of physical injury or death[5]) by the work being undertaken.

3.3.2.4 HEALTH

The primary pathway of Project-related health effects on caribou is expected to be dustfall and ingestion of vegetation that accumulates dust. Dust suppression and other mitigation measures related to air quality are detailed in the Air Quality and Noise Abatement Management Plan.

[5] As per Project Condition No. 61, the term "endangered" was defined by the TEWG as at risk of physical injury or death.

3.3.2.5 Aircraft Management

Refer to aircraft mitigations listed in Section 3.2.2.2.2.

3.3.2.6 Traffic Management

Animals, including caribou, have right-of-way at all crossings. Traffic must slow down and keep a distance from the animals to the extent possible. If necessary, traffic cede right-of-way to enable crossings of groups or to allow groups of caribou paralleling the transportation corridor to move into the adjacent habitat. Caribou occurrence at and/or in the vicinity of the Project (especially along traffic corridors) will be monitored on the ground. Behavioural observations will be used to determine if caribou have been disturbed or displaced by construction or traffic. More specific guidance is provided in the Caribou Decision Framework (Figure 3.2).

4 TERRESTRIAL ENVIRONMENT | MONITORING COMPONENTS

The TEMMP addresses multiple Valued Ecosystem Components (VECs) via ongoing data collection and monitoring (Figure 4.1). Terrestrial Environment Monitoring Components account for two inter-related environmental aspects:

- Disturbance Factors — Project environmental setting, activities and inputs (Section 4.1)
    - Climate
    - Helicopter Overflights
    - Traffic (Tote Road and Rail)
    - Dustfall
    - Noise
- Response Factors — Potential effects on the receiving environment and VEC key indicators (Section 4.2):
    - Vegetation
        - Abundance and Composition (Caribou Forage Species)
        - Health (Soil/Lichen-Metals, COPCs)
    - Birds
        - Raptors
        - Sea Birds
        - Migratory Birds
    - Terrestrial Wildlife
        - All Wildlife
        - Caribou
        - Wolves

If/where possible, monitoring design and data-capture facilitate cross-referencing between monitoring components to better inform determination of cause and effect, and support more effective corrective actions. The TEMMP focuses on and provides greater detail regarding monitoring of response factors, including description of potential effect(s) pathways, Project mitigations and monitoring approach (goals and objectives, indicator and thresholds, and monitoring scope and frequency). Whereas methods and analytical approaches for disturbance factors are described in each respective Terrestrial Environment Annual Monitoring Report.

Table 4.1 and Table 4.2 summarize the global timeline (past and future) for each Terrestrial Environment Monitoring Component related to disturbance factors and response factors. The Data Assessment and Response Framework (Section 5) then defines thresholds, as well as the assessment and decision-making framework (Trigger-Action Response Plan; Section 5.2) in response to potential Project-related effects. Additionally, Tables 4.2 to 4.15 describe the monitoring frequency of specific programs.

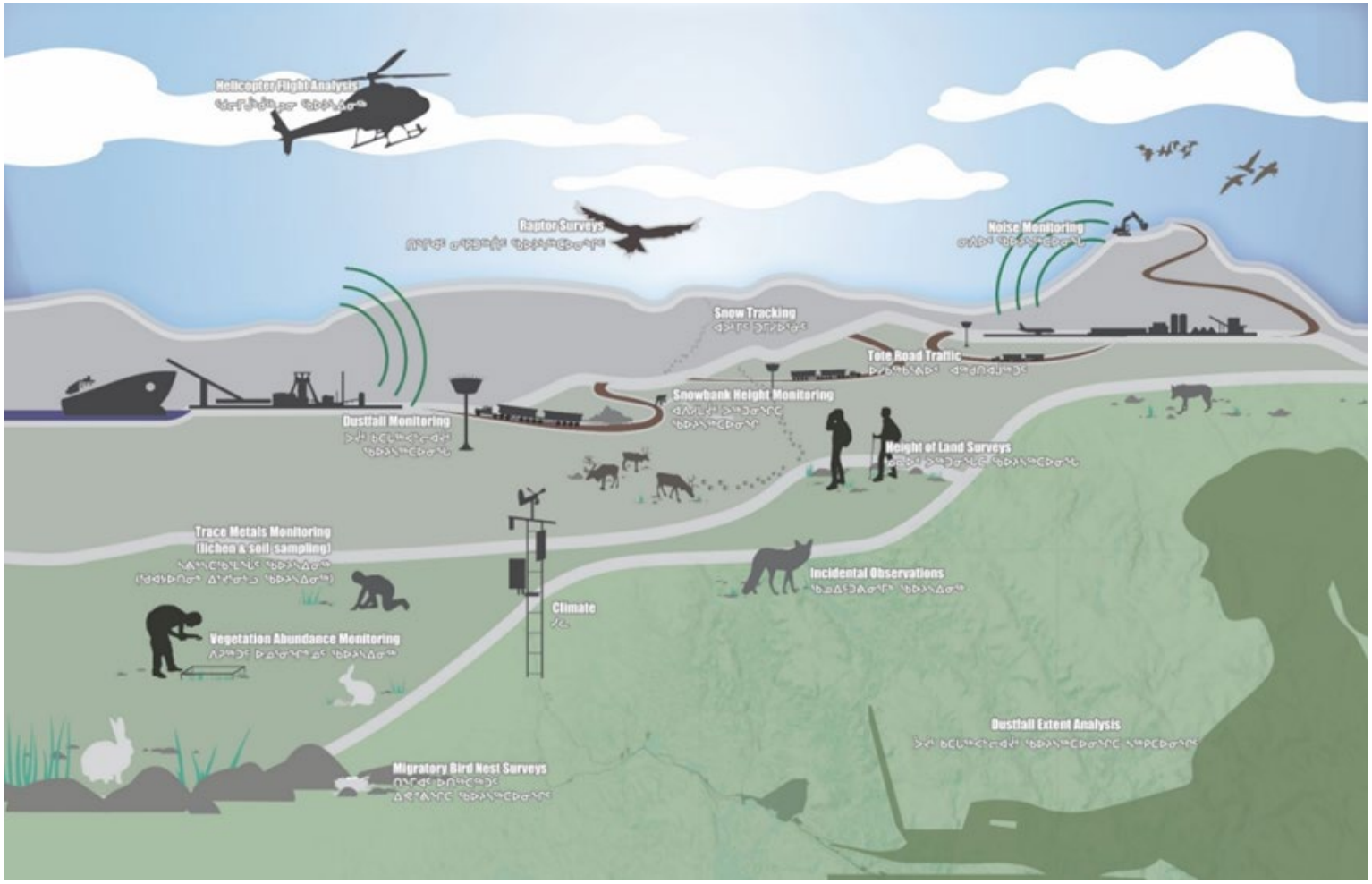


FIGURE 4.1 OVERVIEW OF TERRESTRIAL ENVIRONMENT MONITORING COMPONENTS.

TABLE 4.1 TIMELINE FOR TERRESTRIAL ENVIRONMENT MONITORING AT THE PROJECT (DISTURBANCE FACTORS)

Monitoring Component		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023*
Climate	Weather Monitoring	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Traffic	Traffic										■	■	■	■	■	■	■	■	■	■
	Helicopter Flight Height Analysis											■	■	■	■	■	■	■	■	■
Noise	Noise Monitoring																■		■	
Dust	Passive Dustfall								■	■	■	■	■	■	■	■	■	■	■	■
	Dustfall Extent Imagery Analysis																■	■	■	■

*Program scheduled for 2023 field season

TABLE 4.2 TIMELINE FOR TERRESTRIAL ENVIRONMENT MONITORING AT THE PROJECT (RESPONSE FACTORS)

Monitoring Component		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023*
Vegetation	Vegetation Abundance Monitoring								■	■	■	■	■	■		■	■	■	■	■
	Rare Plants	■	■	■	■						■					■	■			■
	Exotic Invasive Vegetation Monitoring and Natural Revegetation										■					■	■			■
	Ecosystem Classification	■	■	■	■												■			
	Normalized Difference Vegetation Index Analysis																■			
Birds	Active Migratory Bird Nest Surveys (AMBNS)									■	■	■	■	■	■	■	■	■	■	■
	Cliff-Nesting Raptor Occupancy and Productivity Surveys	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Communication Tower Surveys										■	■								
	Roadside Waterfowl Surveys								■	■	■									
	Staging Waterfowl Surveys											■								
	Tundra Breeding Bird PRISM (Program for Regional and International Shorebird Monitoring) Plots								■	■					■					
	Bird Encounter Transects									■										
	Coastline Nesting and Foraging Habitat Surveys								■	■	■									
	Red Knot Surveys										■					■				

*Program scheduled for 2023 field season

TABLE 4.2. TIMELINE FOR TERRESTRIAL ENVIRONMENT MONITORING AT THE PROJECT (RESPONSE FACTORS)

Monitoring Program		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023*
Wildlife	Aerial Caribou Survey								■											■
	Height of Land (HOL) caribou surveys								■	■	■	■	■	■	■	■	■	■	■	■
	Snow Track Surveys										■	■	■	■	■	■	■	■	■	■
	Snowbank Height Monitoring										■	■	■	■	■	■	■	■	■	■
	Hunter and Visitor Logs								■	■	■	■	■	■	■	■	■	■	■	■
	Wildlife Observations, Incidents, and Mortality Logs																■	■	■	■
	Caribou Fecal Pellet Collection								■	■	■						■			
	Caribou Water Crossing Surveys										■									
	Carnivore Den Survey			■	■	■	■				■									

*Program scheduled for 2023 field season

4.1 Disturbance Factors

4.1.1 Climate

Climate is monitored at the Project via meteorological stations at the Mine Site and Milne Port. Climate data — compiled and compared with historical data — is used to contextualize other datasets and analysis. Data capture includes mean monthly air temperature, wind speed and headings, and precipitation.

4.1.2 Helicopter Overflights

Helicopter overflights are monitored at the Project. Data capture is based on flight tracklog (including flight descriptors and pilot notes) with point data provided in feet above sea level and converted to metres above sea level (masl). A Digital Elevation Model (DEM) is used to estimate ground-level elevation above sea level, which provided elevation data to calculate the helicopter tracklog's altitude above ground level in metres (magl).

4.1.3 Traffic (Tote Road and Rail)

Traffic along the Tote Road is monitored and recorded by Site Security at the Project. Site Security provide tracklogs for ore haul traffic and non-haul vehicle traffic (i.e., transits related to personnel transfer, equipment, and fuel). These data are then compared with the projected ore haul and non-haul vehicle transits. Data capture includes daily mean and total transits for ore haul, non-haul vehicle and combined vehicle transits. If constructed and in operation, rail traffic will be monitored and recorded in an appropriate manner (as above).

4.1.4 Dustfall

Dustfall is monitored during Project construction, operation, and closure via permanent passive dustfall monitoring stations at Milne Port, the Mine Site and along the Tote Road. Dustfall monitoring is intended to determine the areal extent of dustfall at the Project and inform and cross-reference potential trends regarding vegetation abundance and health (Sections 3.2.1). Data capture includes total insoluble dustfall, fixed and volatile components, and COPC (all units mg/dm²/day). Refer to Air Quality and Noise Abatement Management Plan for further details. Recently, dustfall has been evaluated via dustfall extent imagery analysis using available Landsat data.

4.1.5 Noise

Noise was monitored during Project construction and operation in 2020 and 2022 using specialized sound/audio recorders distributed at Milne Port, the Mine Site and along the Tote Road. Audio recordings and spectrograms were reviewed to classify the sound source for all impulsive sound events that were grouped as: Geophony – naturally occurring, non-biological sounds (i.e., wind and rain); Biophony – sounds emitted by non-human organisms (i.e., birds and insects); and Anthrophony—sounds emitted from human-made sources (i.e., vehicles, machinery, and aircraft). Data capture included sound profiles expressed in decibels (dB).

4.2 Response Factors

4.2.1 Vegetation

4.2.1.1 Vegetation Abundance and Composition

Vegetation abundance and composition is monitored during Project construction, operation, and closure. Potential changes in vegetation abundance and composition are addressed via long-term monitoring plots in a habitat types selected to represent caribou forage, comparing areas in proximity to Project infrastructure (at varying distance categories) versus reference/control areas within the RSA. Data capture includes composition and percent cover of plant functional groups. Monitoring locations are (to the extent possible) situated in proximity to permanent dustfall stations (Section 4.1.4) to facilitate potential cross-referencing of data trends. Monitoring will occur every 3–5 years; additional investigation may be triggered by the monitoring outcomes. Tables 4.2 summarizes the goals/objectives, thresholds and scope of monitoring for vegetation abundance and health. Detailed information regarding vegetation monitoring procedures is presented in Appendix C-1 — Vegetation Monitoring: Vegetation Abundance and Composition; performance indicators and thresholds are detailed in Table 5.1.

TABLE 4.3 VEGETATION MONITORING: VEGETATION ABUNDANCE AND COMPOSITION

Indicator	Vegetation Abundance and Composition
Monitoring Category	Environmental Effects Monitoring
Design Type	Before-After-Control-Impact (BACI)
Measurable Parameter	Changes in vegetation abundance and composition.
Key Project Interactions	Dust, effluent, and air emissions released into the environment have the potential to impact vegetation abundance and composition. Dust and other contaminants may affect the quality and quantity of vegetation (i.e., changes in plant composition and abundance) in proximity to the Project. If contaminants are taken-up by plants and ingested by wildlife or humans, pathway may affect the health of individuals.
Goal	Project will not result in significant changes in vegetation abundance and/or health
Objective	To evaluate vegetation abundance and composition over the life of the Project.
Threshold	Refer to Trigger-Action Response Plan (Section 5.2) Refer to Appendix C-1
Scope of Monitoring Work	Regional monitoring: Monitoring every 3–5 years comparing areas in proximity to Project infrastructure (at varying distance categories) versus reference/control areas within the RSA. Additional investigation may be triggered by the monitoring outcomes. Vegetation abundance and health based on long-term monitoring plots (representing caribou forage).
Status	Active/Ongoing
Agency/Partner Participation	None required

4.2.1.2 VEGETATION HEALTH (SOIL/LICHEN-METALS)

Vegetation health is monitored during Project construction, operation, and closure. Monitoring of vegetation health is comprised of evaluation of COPC (metals) concentrations in soil and vegetation (i.e., lichen). Potential changes in COPCs are addressed via long-term collection of soil and vegetation samples for analysis by an accredited laboratory, again comparing areas in proximity to Project infrastructure (at varying distance categories) versus reference/control areas within the RSA. Data capture includes base metal concentrations (mg/kg) for a suite of metals with emphasis on COPCs. Monitoring locations are situated in proximity to permanent dustfall stations (Section 3.4) to facilitate potential cross-referencing of data trends. Monitoring will occur every 3–5 years; additional investigation may be triggered by the monitoring outcomes. Table 4.3 summarizes the goals/objectives, thresholds and scope of monitoring for vegetation abundance and health. Detailed information regarding vegetation monitoring procedures is presented in Appendix C-2 — Vegetation Monitoring: Vegetation Health (Soil/Lichen-Metals); performance indicators and thresholds are detailed in Table 5.1.

TABLE 4.4 VEGETATION MONITORING: VEGETATION HEALTH (SOIL/LICHEN-METALS)

Indicator	Vegetation Health
Monitoring Category	Environmental Effects Monitoring
Design Type	Before-After-Control-Impact (BACI)
Measurable Parameter	Changes in COPC concentrations in soil and/or vegetation
Key Project Interactions	Dust, effluent, and air emissions released into the environment have the potential to impact vegetation health. Dust and other contaminants may affect the quality and quantity of vegetation (i.e., changes in plant composition and abundance) in proximity to the Project. If contaminants are taken-up by plants and ingested by wildlife or humans, pathway may affect the health of individuals.
Goal	Project will not result in significant changes in COPC concentrations in soil and/or vegetation
Objective	To evaluate COPCs (metals) in soil and vegetation over the life of the Project.
Threshold	Refer to Trigger-Action Response Plan (Section 5.2) Refer to Appendix C-2
Scope of Monitoring Work	Regional monitoring: Monitoring every 3–5 years comparing areas in proximity to Project infrastructure (at varying distance categories) versus reference/control areas within the RSA. Additional investigation may be triggered by the monitoring outcomes. COPC (metals) in soil and vegetation addressed via long-term collection of soil and vegetation samples for analysis of constituents.
Status	Active/Ongoing
Agency/Partner Participation	None required

4.2.1.3 EXOTIC INVASIVE VEGETATION

Exotic invasive vegetation is monitored during Project construction, operation, and closure. Disturbed areas are prone to colonization by ruderal species (i.e., early establishers), including exotic invasive vegetation. If exotic invasive plant species are identified, the individuals and/or populations will be destroyed and, to the extent possible,

entry pathways will be evaluated. Monitoring will occur every 3–5 years; additional investigation may be triggered by incidental observations of exotic invasive plant species. Table 4.4 summarizes the goals/objectives, thresholds and scope of monitoring for exotic invasive vegetation. Detailed information regarding dustfall monitoring procedures is presented in Appendix C-3 — Vegetation Monitoring: Exotic Invasive Vegetation and Natural Revegetation. Performance indicators and thresholds are detailed in Table 5.1.

TABLE 4.5 VEGETATION MONITORING: EXOTIC INVASIVE VEGETATION AND NATURAL REVEGETATION

Indicator	Exotic Invasive Plant Species
Monitoring Category	Surveillance
Design Type	Regularly occurring inventory and observation
Measurable Parameter	Presence/occurrence of exotic invasive plant species
Key Project Interactions	Introduction of exotic invasive plant species
Goal	Project will not introduce exotic invasive plant species to the RSA
Objective	To monitor and mitigate introduction potential exotic invasive plant species within and adjacent to the Project footprint To evaluate natural revegetation of disturbed areas of the Project footprint
Threshold	Refer to Trigger-Action Response Plan (Section 5.2) Refer to Appendix C-3
Scope of Monitoring Work	Local monitoring: Monitoring every 3–5 years focusing on disturbed areas within and adjacent to the Project footprint (i.e., prone to colonization by ruderal species). Additional investigation may be triggered by the monitoring outcomes.
Status	Active/Ongoing
Agency/Partner Participation	None required

4.2.2 Birds (Including Raptors and Migratory Species)

4.2.2.1 Monitoring Peregrine Falcon and Gyrfalcon

Peregrine falcon and gyrfalcon (key indicators for cliff-nesting raptor species) are monitored during Project construction and operation. Monitoring is comprised of aerial survey during the nesting period and before fledging. Nest site occupancy and productivity relative to distance of the nest site to project infrastructure are then modelled to determine potential Project-effects. Monitoring occurred annually between 2005-2020, as outlined in Table 4.2. Based on findings, additional/follow-up investigations were not warranted or recommended. Table 4.5 summarizes the goals/objectives, thresholds and scope of monitoring for peregrine falcon and gyrfalcon. Detailed information regarding dustfall monitoring procedures is presented in Appendix C-4 — Migratory Bird Monitoring: Peregrine Falcon and Gyrfalcon Nesting. Performance indicators and thresholds are detailed in Table 5.1.

TABLE 4.6 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	Project will not result in a significant change in 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	Local monitoring: 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).
Status	Complete
Agency/Partner Participation	Local monitoring: Arctic Raptors Inc.

4.2.2.2 COMMON EIDER, KING EIDER, AND RED KNOT

Baffinland is supporting baseline research by Environment Climate Change Canada and Canadian Wildlife Services (ECCC-CWS) examining the potential interactions between marine shipping and seabirds and seaducks (i.e., eiders). Nest densities for Common Eider, King Eider, and Red Knot were surveyed along the Port Sites and appropriate control shorelines over three consecutive years to evaluate sensory disturbance from Project activities and wake effects from shipping. Table 4.6 summarizes the goals/objectives, thresholds and scope of monitoring for common eider, king eider and red know nesting. Detailed information are provided in Appendix C-5B — Migratory Bird Monitoring: Shipping Activity on Seabirds and Seaducks. Based on findings, additional/follow-up investigations were not warranted/recommended.

TABLE 4.7 MIGRATORY BIRD MONITORING: COMMON EIDER, KING EIDER, AND RED KNOT NESTING

Indicator	Common Eider, 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	Project will not result in a significant change in eider and red knot nesting density
Objective	To evaluate number of eider and red knot nests at the port sites

TABLE 4.7 MIGRATORY BIRD MONITORING: COMMON EIDER, KING EIDER, AND RED KNOT NESTING

Threshold	<20% decrease (relative to control) in nesting within the Steensby Port ZOI over three consecutive years of monitoring.
Scope of Monitoring Work	Local monitoring Pre- and post-disturbance surveys of eider and red knot nesting densities within and adjacent to the port site and control areas.
Status	Complete
Agency/Partner Participation	ECCC-CWS

4.2.2.3 MIGRATORY SONGBIRDS AND SHOREBIRDS

Baffinland is supporting baseline research by ECCC-CWS examining potential effects on migratory songbirds and shorebirds at the Project. Monitoring is comprised of 20 standardized plots — applying methods from the Program for Regional and International Shorebird Monitoring (PRISM) — surveyed during the nesting period and before fledging within the RSA. Monitoring occurs every 5 years (Table 4.7). Detailed information is provided in Appendix C-6 — Migratory Bird Monitoring: Songbirds and Shorebirds.

TABLE 4.8 MIGRATORY BIRD MONITORING: SONGBIRDS AND SHOREBIRDS

Indicator	Songbirds and Shorebirds
Monitoring Category	Baseline Research & Monitoring
Design Type	PRISM Plots
Measurable Parameter	Abundance and density
Key Project Interactions	Habitat loss and sensory disturbance due to Project activities
Goal	Project will not significantly change songbird and shorebird abundance and density within the RSA.
Objective	Baseline documentation of songbird and shorebird distribution and abundance in the Eastern Arctic.
Threshold	Not Applicable
Scope of Monitoring Work	Regional Monitoring: 20 standardized PRISM surveyed during the nesting period and before fledging within the RSA. Monitoring will occur every 5 years
Status	Active/Ongoing
Agency/Partner Participation	ECCC-CWS

4.2.3 Terrestrial Wildlife (Including Caribou and Wolves)

4.2.3.1 All Wildlife Species

To ensure that Project effects on all wildlife species are minimized, Baffinland monitors and annually reports on the amount of direct habitat loss resulting from the Project footprint (Table 4.8). Baffinland also tracks incidental wildlife observations made by Project personnel within the PDA (Table 4.9).

TABLE 4.9 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)
Goal	Quantify direct habitat loss in the Project footprint
Objective	Habitat loss limited to the amount identified in the Project description
Threshold	All species
Scope of Monitoring Work	Local monitoring: Measure area of Project disturbance on an annual basis.
Status	Active/Ongoing
Agency/Partner Participation	None required

TABLE 4.10 WILDLIFE MONITORING: INCIDENTAL OBSERVATION AND PROJECT MORTALITY

Indicator	All species
Monitoring Category	Surveillance
Design Type	Not Applicable
Measurable Parameter	Wildlife mortality
Key Project Interactions	Wildlife mortality due to Project activities and indirect habitat loss associated with the Project.
Goal	Track wildlife observations and Project-related mortality within and adjacent to the Project footprint
Objective	Every Project-related mortality of caribou will be reviewed to determine if further action is needed. Other species are dealt with on a species-by-species basis.
Threshold	All species
Scope of Monitoring Work	Local monitoring: Log of wildlife observations within the RSA. Record of collisions and all other observed wildlife mortalities within the RSA.
Status	Active/Ongoing
Agency/Partner Participation	None required

4.2.3.2 CARIBOU

4.2.3.2.1 CARIBOU HABITAT

Caribou habitat will be monitored during Project construction, operation, and closure. Monitoring is comprised of (1) assessment of indirect habitat loss (resulting from sensory disturbances) and (2) observation/evaluation of calving behaviour within the RSA. Monitoring of indirect habitat loss occurs at both the local level by tracking incidental observations of caribou by Project personnel, and at the regional level via aerial surveys or other studies (i.e., satellite collaring) conducted by the GNDoE. Table 4.10 summarizes the goals/objectives, thresholds and scope of monitoring for indirect habitat loss. Detailed information regarding dustfall monitoring procedures is presented in Appendix C-7 — Caribou Monitoring: Indirect Habitat Loss. Performance indicators and thresholds are detailed in Table 5.1.

TABLE 4.11 CARIBOU MONITORING: INDIRECT HABITAT LOSS

Indicator	Caribou
Monitoring Category	Surveillance
Design Type	Observational (aerial surveys, collar data)
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 (i.e., 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 and evaluate the ZOI as suitable data are made available.
Threshold	The size of the ZOI will be equal to that used in the impact assessment and caribou occurrence within the ZOI equivalent to the prediction made in the Project Impact Assessment.
Status	Pending
Scope of Monitoring Work	Addressing this target requires regional-level surveys. Local monitoring: Continuous log of caribou observations from staff to document occurrence and maintain a record of flight paths and cruising altitudes of aircraft within ZOI. Regional Monitoring: • Baffinland and the GNDoE will develop a MOU related to regional caribou monitoring. 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. • A GN and Baffinland-sponsored caribou satellite collaring program will assist with the determination of long-term caribou distribution patterns.
Agency/Partner Participation	Local monitoring: Baffinland employees, QIA, Pond Inlet, Igloolik, Arctic Bay HTOs Regional monitoring: GNDoE

Note:
Initial surveys conducted during Project construction and early operation determined that there were not enough caribou present to warrant ongoing aerial surveys, i.e., until densities increased to support robust analyses of caribou response (cf. EDI,

2022)[6]. Monitoring of habitat use during the calving season can include one or a combination of surveys (refer to Table 4.10, Table 4.11 and Table 4.12) within the ZOI:

- Aerial surveys of known calving sites within the ZOI during construction and initial years of operation to document occurrence.
- Height of land surveys during the calving season to examine caribou use near the Project footprint.
- Behavioural monitoring during the calving season — to be conducted in association with the height of land surveys and/or other observations of caribou along Project infrastructure (i.e., Tote Road, railway).
- Wildlife monitor on site during the calving period to detect any calving activity near the Tote Road and railway.

At the regional level, collar data from a GN and Baffinland-sponsored caribou satellite collaring program could inform calving distribution and movement patterns. Additionally, periodic consultation will be conducted with local HTOs to provide information on the relative abundance of caribou in and around the RSA. When data are available, a periodic analysis of distribution and movement patterns will be provided in annual reports, including a periodic evaluation of the measured ZOI.

TABLE 4.12 CARIBOU MONITORING: HABITAT USE DURING CALVING

Indicator	Caribou
Monitoring Category	Baseline Research and Surveillance
Design Type	Observational (aerial surveys, height of land surveys, collar data) and opportunistic (behavioural observations)
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
Status	Pending
Scope of Monitoring Work	Local monitoring: 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 the calving season and construction activities. Monitoring during construction and post-construction to document occurrence, particularly in the vicinity of Cockburn Lake. Wildlife monitor will be on site to detect calving activities near the road. If a caribou is found to be calving near Tote Road mitigation measures will be implemented. Regional Monitoring: Long-term calving distribution patterns as identified by a GN-sponsored caribou satellite collaring program. Collar data will inform regional calving distribution.

[6] To help define caribou monitoring at the regional level, Baffinland (in coordination with the GN) is committed to developing a MOU that outlines a collaborative approach to mutually sponsoring regional-level information needs. The monitoring components of this MOU will be incorporated as the TEMMP is periodically reviewed and revised. Methods for regional-level analyses of indirect habitat loss (i.e., ZOI estimation) will be determined based on advice provided by the TEWG when available caribou data are adequate to support robust statistical analyses.

TABLE 4.12 CARIBOU MONITORING: HABITAT USE DURING CALVING

Agency/Partner Participation	Local monitoring: Baffinland employees, QIA, Pond Inlet, Igloolik, Arctic Bay HTOs Regional monitoring: GNDoE

4.2.3.2.2 CARIBOU MOVEMENT

Caribou monitoring will include a program to observe Project effects on caribou movement within the ZOI. When data are available, a periodic analysis of distribution and movement patterns will be provided in annual reports. Specifically, the program will monitor (when caribou numbers are sufficient for robust analyses):

- The effects of railway infrastructure and operations on caribou movements through seasonal track surveys for the first 3–5 years of operation (or when caribou numbers are sufficient for robust analyses) in key movement areas, and remote motion-sensing cameras set up at select trails that cross or approach the railway
- The effects of the Tote Road, particularly road maintenance activities (i.e., snowbanks) and road traffic, on caribou movements through snow track surveys, snowbank height monitoring, and remote motion-sensing cameras set up at select trails that cross or approach the road
- The effectiveness of the Caribou Decision Framework (Figure 3.2) in facilitating caribou movement across the road and preventing caribou mortality
- The effects of the Tote Road and railway on caribou movements at water crossings (first step will be additional baseline data collection to confirm the location and use of the water crossings identified in the terrestrial baseline[7])

If deemed necessary during railway operation, additional monitoring of caribou movements could involve regular monitoring of the identified trails to document 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 regularly (i.e., once a month when daylight allows sufficient visibility) to count the number of caribou in the area (Table 4.12).

Additionally, during the technical review process of the Terrestrial Mitigation and Monitoring Plan, dash-mounted cameras within Project vehicles were suggested as a means of monitoring caribou response to road traffic. However, dash-mounted cameras are not being considered for implementation at this time due to: 1) excessive data management issues that would result from all the camera footage, with caribou being observed only rarely on the footage; and 2) the limited field of view of the cameras would mean that the cameras would only capture caribou response when caribou were either on the road, or immediately adjacent to the road.

[7] The potential for Project interaction with water crossings was evaluated in the 2014 Terrestrial Environment Annual Report. The potential for interaction is low to nil and the Project is unlikely to affect inland water crossings, should they occur.

TABLE 4.13 CARIBOU MONITORING: MOVEMENT

Indicator	Caribou
Monitoring Category	Baseline Research and Surveillance
Design Type	Observational
Measurable Parameter	Movement in the ZOI
Key Project Interactions	Road and railway structure and operations may act as a filter or barrier to the 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 Road/Railway and other Project infrastructure
Threshold	Less than 10% deflection of approaches to Railway and infrastructure; Embankments (road or rail) will impose a barrier to fewer than 10% of existing caribou trails.
Status	Pending
Scope of Monitoring Work	Local monitoring: Have an on-site wildlife monitor to implement seasonal caribou track surveys; these can be ground-based (snow machine) to observe movement during early winter and spring seasons. Trail monitoring using remote motion-sensing cameras and documenting fresh tracks at select trails that cross or approach the Road/Railway. Monitor response of caribou to railway bridge and tunnels. In conjunction with snow track surveys, monitor snowbank heights maintained at <1 m; monitor the use of snowbanks by caribou along the Tote Road. Monitor and document effectiveness of the Caribou Decision Tree. Monitor caribou use of water crossings. Regional Monitoring: Long-term movement patterns as identified by a GN and Baffinland-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 GN.
Agency/Partner Participation	Local monitoring: QIA, Pond Inlet, Igloolik, Arctic Bay HTOs, Baffinland employees Regional monitoring: GNDoE

4.2.3.2.3 CARIBOU MORTALITY

Project-related caribou mortality is tracked along with mortalities of other wildlife species as part of general wildlife monitoring (Section 4.2.3.1). Caribou mortality as an indirect result of the Project will be monitored by tracking the number of caribou harvested by hunters passing through and visiting the Project accommodations. To gather further information, a regional hunter harvest study could be partly sponsored by Baffinland and conducted in collaboration with local HTOs, the GNDoE, the QIA, or the Nunavut Wildlife Management Board (NWMB) (Table 4.13).

TABLE 4.14 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

TABLE 4.14 CARIBOU MONITORING: HARVEST-RELATED MORTALITY

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	No reduction in the caribou Total Allowable Harvest due to Project-related impacts[8]
Status	Ongoing
Scope of Monitoring Work	Local monitoring: Log of hunters passing through and using the camp, inclusive of harvested caribou numbers. Regional Monitoring: Potential Baffinland-sponsored multi-year hunter harvest study, which includes a summary of annual caribou harvest and, if possible, harvest locations.
Agency/Partner Participation	Local monitoring: QIA, Pond Inlet, Igloolik, Arctic Bay HTOs, Baffinland employees (i.e., train conductor) Regional monitoring: GNDoE, NWMB

4.2.3.2.4 CARIBOU HEALTH

While changes to the health of the caribou population due to Project activities are not anticipated, there is insufficient baseline knowledge to predict how caribou health might be affected by consumption of vegetation with dust deposition. Therefore, several programs have been developed to monitor caribou health in response to the Project. The Vegetation Health monitoring program (Section 4.2.1.2) is an integral component to this monitoring and will identify if there is a potential pathway for metals uptake. Should that pathway be revealed, additional monitoring programs can investigate metal concentrations in caribou tissues and body condition measurements as a part of a regional caribou health monitoring program (Table 4.14). Given that this monitoring would have to be conducted at a regional level, it is likely that it would be led by the GNDoE. Baffinland could contribute to that program. This program has been part of ongoing discussions in the TEWG, but as of 2023 a regional health monitoring program has not been initiated.

TABLE 4.15 CARIBOU MONITORING: HEALTH CONTAMINANTS AND BODY CONDITION

Indicator	Caribou
Monitoring Category	Surveillance
Design Type	Opportunistic sample collection
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
Status	Ongoing

[8] QIA suggested wording as per comments on TEMMP in 2021.

TABLE 4.15 CARIBOU MONITORING: HEALTH CONTAMINANTS AND BODY CONDITION

Scope of Monitoring Work	Regional Monitoring: 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: QIA, Pond Inlet, Igloolik, Arctic Bay HTOs, GNDoE, NWMB

4.2.3.3 WOLVES

During baseline studies, one wolf den was identified within the Mary River RSA; due to insufficient sample size, a monitoring program investigating variability in den occupancy is not currently feasible. However, monitoring can track the annual occupancy of identified dens when wolves are found in adequate numbers and interacting with the Project enough to warrant further monitoring. Following the principles of adaptive management, determining whether there are adequate numbers will be based on feedback from participants in the TEWG, community feedback and other regional monitoring data as it is available. Should additional dens be identified within 10 km of Project infrastructure, the monitoring program can be revisited (Table 4.15).

TABLE 4.16 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 activities that create sensory disturbances and/or temporarily reduce the effectiveness (usefulness) of habitats adjacent to the Project footprint potentially resulting avoidance of habitats or disturbance to denning wolves.
Goal	The Project will have a not significant effect on wolf den sites
Objective	Allow wolves to den undisturbed within the ZOI
Threshold	No threshold currently
Status	Pending
Scope of Monitoring Work	Local monitoring: Aerial surveys of known den sites within a 10 km radius of the mine site to document occupancy, opportunistic documentation of other den sites. 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: QIA, Pond Inlet, Igloolik, Arctic Bay HTOs, GNDoE Regional monitoring: GNDoE

5 DATA ASSESSMENT AND RESPONSE FRAMEWORK

5.1 FRAMEWORK

Monitoring data collected through the TEMMP requires a systematic data evaluation process with pre-determined management responses per monitoring outcomes. This process is based on the following steps:

Step 1 — Data Management and Evaluation

Step 1 examines data trends — applying appropriate quality assurance and quality control (QA/QC); comparisons with baseline values, TEMMP thresholds, and/or reference values; and ancillary analysis such as Exploratory Data Analysis (EDA) and Statistical Data Analysis (SDA) — to evaluate change or effect. This determination/evaluation is also weighed based on professional judgement.

If Step 1 does not detect change or effect, no further action is required.

If Step 1 detects change or effect, proceed to Step 2.

Step 2 — Determining Whether the Observed Change is Project-Related

Step 2 determines if the change or effect is Project-related vs. associated with natural variability or other causes, with emphasis on identifying leading causes and interactions. As described above, this may involve EDA (i.e., to visualize overall data trends and spatial patterns) and SDA (i.e., to evaluate/quantify spatial extents and patterns of change), as well as comparisons with baselines and references values.

If Step 2 determines that observed change or effect is not Project-related, no management response is required.

If Step 2 determines that observed change or effect is (or likely is) Project-related, proceed to Step 3.

Step 3 — Determine Action Level

Step 3 attributes the necessary level of action to address the observe change or effect. As defined in the Trigger Action Response Plan (Section 5.2), there are three (3) levels of action (low, moderate, and high) with pre-determined responses commensurate to the risk rating.

5.2 TRIGGER ACTION RESPONSE PLAN

The Trigger Action Response Plan (TARP) identifies thresholds and pre-defined actions to be taken should threshold levels be exceeded are detailed in Table 5.1 for the Terrestrial Environment indicators.

TABLE 5.1 TERRESTRIAL ENVIRONMENT TRIGGER ACTION RESPONSE PLAN

Project Activity	Objectives	Performance Indicators	Monitoring Program / Plan	Condition Status / Threshold			Pre-defined Response(s)		
				Low Risk	Moderate Risk	High Risk	Low Risk	Moderate Risk	High Risk
Dustfall	Dustfall will not result in impacts to the vegetation and habitat outside of the PDA greater than those predicted in the FEIS[9]	Annual dust deposition	Passive dustfall collection program	Details are provided in the Air Quality and Noise Abatement Management Plan (AQNAMP)					
Project footprint, dustfall and emissions	The Project will not result in impacts to vegetation growth in the RSA greater than those predicted in the FEIS[10]	Percent cover of plant "functional groups" (i.e., deciduous shrubs, evergreen shrubs, forbs, graminoids, lichens, mosses)	Vegetation abundance monitoring program	Statistically significant ($p<0.05$) change in mean percent cover of one or more plant functional groups within 30 m of the PDA due to Project-related effects[11] for two consecutive sampling years. OR Statistically significant ($p<0.05$) change in percent cover of one or more plant functional groups due to Project-related effects within 100 m of the PDA	Greater than 25% change in mean percent cover of one or more plant functional groups due to Project-related effects within 30 m of the PDA for any sampling year OR Statistically significant ($p<0.05$) change in mean percent cover of one or more plant functional groups within 100 m of the PDA due to Project-related effects for two consecutive sampling years.	Greater than 50% change in mean percent cover of one or more plant functional groups due to Project-related effects within 30 m of the PDA for any sampling year OR Greater than 25% change in mean percent cover of one or more plant functional groups within 100 m of the PDA due to Project-related effects for two consecutive sampling years.	Env't Dept: Continue scheduled monitoring until trends are established. Env't Dept: If low risk status/threshold is triggered again in the next scheduled program (but moderate is not), investigate trends over time and consider any uncertainties (e.g., differences in program timing, effort, methods, environmental variables, IQ input) as a desktop study. Env't Dept: Consider refinement to a Moderate Risk status/threshold if appropriate based on the results of the trend analysis.	Env't Dept and relevant Operations: Investigate trends over time and consider any uncertainties (e.g., changes in operational processes, potential sources, confounding influences) in a formal Response Plan; Initiate component-specific targeted studies, including risk evaluations to understand the need and scale of mitigation, as part of response planning. Env't Dept and Relevant Operations: Continue monitoring to confirm effects are linked to the Project, to assess the effectiveness of mitigations, and evaluate the need for additional monitoring and mitigation. Responsible Dept(s): Implement a moderate-action response from Mitigation Toolkit (or new mitigation identified through an investigation) based on targeted studies' outcomes. Env't Dept and Relevant Operations: Develop candidate list of suitable High Action Responses if High Risk Threshold surpassed.	Will be developed concurrent with the High Risk status/threshold development a formal Response Plan. Responsible Dept(s): Implement High Risk Status/ Threshold response in Mitigation Toolkit if the causal effect or likely relationship is determined.
Dustfall and emissions	Project activities will result in a not	The concentration of Contaminants of	Vegetation and soils base metals	Statistically significant ($p<0.05$) increase from baseline values in the	Exceedance of CCME soil quality guidelines and/or	Mean concentration of one or more COPCs over any	Env't Dept: Continue scheduled monitoring until trends are	Env't Dept and Relevant Operations: Investigate trends over	Will be developed concurrent with the High

[9] Total of 447 6 km² terrestrial area outside of PDA affected by annual dust deposition (303.0 km² Low, 138.0 km² Moderate, 6.7 km² High deposition), as per 2013 Addendum to FEIS (Table 6-3.5). Annual Total Suspended Particulates (TSP) deposition levels were predicted to exceed 50 g/m²/year within the PDA, with TSP levels decreasing to background outside of the PDA (EDI, 2018. Mary River Project — Phase 2 Proposal Technical Supporting Document No. 09: Vegetation Baseline and Impact Assessment. Prepared for Baffinland Iron Mines Corporation, Oakville, Ontario. 189 pp.)

[10] Less than 2% decrease in wetlands, less than 1% decrease in other vegetation community types within PDA in relation to the RSA. Effects on vegetation abundance and diversity will be indistinguishable from natural variation, limited to the PDA, and not significant at the RSA scale.

[11] Whether or not an effect is Project-related will be determined by comparing post-construction monitoring results to baseline data and reference site data. Monitoring results that are significantly different from baseline and reference sites, have a mechanism for change due to the Project, and cannot be attributed to natural causes or natural variation, may be deemed to be Project-related.

Project Activity	Objectives	Performance Indicators	Monitoring Program / Plan	Condition Status / Threshold			Pre-defined Response(s)		
				Low Risk	Moderate Risk	High Risk	Low Risk	Moderate Risk	High Risk
	significant increase in metals uptake in vegetation or surficial soils at the RSA scale, as per the FEIS[10].	Potential Concern (COPCs)[12] in lichen and concentration of COPCs in surficial soil	monitoring program	mean concentration of one or more COPCs over any study area (Mine Site, Milne Port, or Tote Road) in the Near distance class (within 100 m of the PDA) due to Project-related effects[11], but below Canadian Council of Ministers of the Environment (CCME) soil quality guidelines and/or available lichen indicator values[13], for two consecutive sampling years OR Exceedance of CCME soil quality guidelines and/or lichen indicator values for one COPC at a single sample site in any Project area or distance class in any sampling year. OR Statistically significant ($p<0.05$) increase from baseline values in the mean concentration of one or more COPCs over any study area (Mine Site, Milne Port, or Tote Road) in the Far distance class (101–1,000 m of the PDA) due to Project-related effects, but below Canadian Council of Ministers of the Environment (CCME) soil quality guidelines and/or available lichen indicator values	lichen indicator values for more than one COPC at more than one sample site in any Project area or distance class in any sampling year OR Mean concentration of one or more COPCs over any Project area in the Near distance class (within 100 m of the PDA) exceeds CCME soil guidelines and/or lichen indicator values in any sampling year.	study area (Mine Site, Milne Port, or Tote Road) in the Far distance class (101–1,000 m of the PDA) exceeds CCME soil guidelines and lichen indicator values in any sampling year due to Project related effects AND Negative effects on vegetation health are quantified within 101–1,000 m of the PDA as a Project-related effect	established. If necessary, repeat sampling to eliminate uncertainty due to potential lab or sampling errors — continued implementation of dust dispersion mitigation measures outlined in the AQNAMP. Env't Dept: If Low Risk status/threshold is triggered again in the next scheduled program (but Moderate is not), investigate trends over time and consider any uncertainties (e.g., differences in program timing, effort, methods, environmental variables, IQ input) as a desktop study.	time and consider any uncertainties (e.g., changes in operational processes, potential sources, confounding influences) in a formal Response Plan; Initiate component-specific targeted studies, including risk evaluations to understand the need and scale of mitigation, as part of response planning. Env't Dept and Relevant Operations: Continue monitoring to confirm effects are linked to the Project, assess the effectiveness of mitigations, and evaluate the need for additional monitoring and mitigation. Env't Dept and Relevant Operations: Implement a moderate-action response from the Mitigation Toolkit (or new mitigation identified through an investigation) based on targeted studies' outcomes. Env't Dept and Relevant Operations: Develop candidate list of suitable High Action Responses if High Risk Threshold surpassed.	Risk status/threshold development a formal Response Plan. Responsible Dept(s): Implement High Risk Status/ Threshold response in Mitigation Toolkit if the causal effect or likely relationship is determined.

[12] Contaminants of Potential Concern (COPCs) were selected based on considering several factors, including baseline metal concentrations in soils and vegetation, metals present in the Mary River ore, and the level of risk associated with each element. Additional details on COPC selection are included in the TEMMP (Appendix B, Section 4-2).

[13] CCME agricultural soil quality guidelines were chosen as indicators of potential COPC toxicity in the soil. In the absence of standardized thresholds for metal toxicity in lichen applicable to the Project, indicator values were selected from peer-reviewed literature as a starting point from which to assess potential Project effects to vegetation health. Indicator values are predictive and indicate the potential for initial adverse effects to vegetation health, not a threshold past which acute toxicity occurs. As data continue to be collected through the vegetation and dustfall monitoring programs, indicator values may be revised to improve the understanding of the dose-response relationship between metals and lichen. Additional details on soil quality guidelines and lichen indicator values are included in the TEMMP (Appendix B, Section 4-2).

Project Activity	Objectives	Performance Indicators	Monitoring Program / Plan	Condition Status / Threshold			Pre-defined Response(s)		
				Low Risk	Moderate Risk	High Risk	Low Risk	Moderate Risk	High Risk
Transportation of supplies to the site from outside of Nunavut	No introduction of exotic invasive plant[14] species because of Project activities.	The occurrence of exotic invasive plant species on the land	Exotic invasive plant species monitoring	A single occurrence (individual plant or small patch) of one exotic invasive plant species within the PDA.	Multiple occurrences (individuals or patches found at more than one location or several patches at a single site) of one exotic invasive plant species OR Occurrences of more than one exotic invasive plant species within the PDA.	Multiple infestations (large patches with numerous individuals persisting for more than one year) of one or more exotic invasive plant species throughout the Project area.	Env't Dept: Destroy all exotic invasive plants and plant material present following methods outlined in the TEMMP. Conduct targeted monitoring in the following season to verify the removal. If the entry pathway can be determined and technically feasible, operational mitigations will be employed to reduce the possibility of further introduction.	Env't Dept: Destroy all exotic invasive plants and plant material present following methods outlined in the TEMMP. Conduct targeted monitoring in infested areas in the following years. Destroy any remaining exotic invasive plants detected during follow-up monitoring. Continue targeted monitoring until two consecutive years of no occurrences. If the entry pathway can be determined, and it is feasible, operational mitigations will be employed to reduce the possibility of further introduction.	Env't Dept: Destroy all exotic invasive plants and plant material present following methods outlined in the TEMMP. Develop further response concomitant with the High Risk status/threshold Development response plan. Responsible Dept(s): Implement High Risk Status/Threshold response in Mitigation Toolkit if the causal effect or likely relationship is determined.
Transportation corridor physical structure and transportation activities	The Project will have a not significant effect on caribou movements across Project infrastructure[15]	Caribou movement deflections.	Snow track surveys Monitoring at structures built to facilitate movement or other crossing areas	25% deflection[16] of approaches to the transportation corridor observed through snow track survey program[17]. AND The snow embankments are >1 m high at 10% of caribou tracks, and the embankments are >2 m high and slope steeper than 26° (2:1) at 10% of existing caribou trails.	50% deflection of approaches to the transportation corridor observed through snow track survey program. AND The snow embankments are >1 m high at 10–25% of caribou tracks, and embankments are >2 m high and slope steeper than 26° (2:1) at 10–25% of existing caribou trails.	≥ 75% deflection of approaches to the transportation corridors observed through snow track survey program. AND The snow embankments are >1 m high at >25% of caribou tracks, and embankments are >2 m high and slope steeper than 26° (2:1) at >25% of existing caribou trails.	Env't Dept: Continue to monitor caribou movement via existing local and regional programs until trends are established. Env't Dept and relevant Operations: Follow the caribou decision tree and maintain snowbank heights below 1 m to facilitate caribou movement across transportation corridors. Env't Dept: If Low Risk status/threshold is triggered again in the next scheduled	Env't Dept and Relevant Operations: Ensure drivers follow appropriate rules and mitigations (i.e., speed limits, caribou decision tree) and review if necessary. Consider additional mitigations at caribou trail crossing points (e.g., caribou overpass or underpass) Env't Dept and relevant Operations: Adjust slopes on embankments that are posing a barrier to caribou movement where technically feasible.	Will be developed concurrent with the High Risk status/threshold development a formal Response Plan. Responsible Dept(s): Implement High Risk Status/ Threshold response in Mitigation Toolkit if the causal effect or likely relationship is determined.

[14] Exotic species are species found outside of their natural range where they have not historically been found, often because of human activity. The term 'invasive' is reserved for the most aggressive species that reproduce rapidly and can cause substantial changes to the areas where they are introduced, such as outcompeting and displacing native plant species.

[15] Historical telemetry data and Inuit knowledge indicate that all the caribou historically did not exhibit whole herd migrations as do other barren ground populations. Therefore, seasonal migration movements may not be a management issue associated with the transportation corridor. However, planned monitoring will assess this issue and, if substantial numbers of caribou do develop seasonal movement patterns, indicators, and monitoring/response plans will be developed to address this issue. It is expected that a small proportion of the caribou population will have home ranges that are near the road, and those individuals may adapt their home range location and local movement patterns relative to the road.

[16] Deflection, defined by the Terrestrial Environment Working Group, is "caribou that fail to cross the North Railway or Tote Road after approaching it" (Terrestrial Environment Mitigation and Monitoring Plan)

[17] The sample size necessary to determine if deflections are having a population-level impact (as opposed to individual animal responses) will be like the sample sizes necessary for effective collar monitoring program. As of January 2021, the sample size required for this study is being developed (and was presented to the TEWG in December 2020).

Project Activity	Objectives	Performance Indicators	Monitoring Program / Plan	Condition Status / Threshold			Pre-defined Response(s)		
				Low Risk	Moderate Risk	High Risk	Low Risk	Moderate Risk	High Risk
	The Project will not preclude caribou range use expansion15 as the population increases and the herd occupies range east and west of the transportation corridor.	Caribou density AND The proportion of collared caribou showing distinct directional movement that does not cross transportation corridor.	Aerial surveys AND Regional collaring data analyses[18]	25%[19] of "directional"[20] caribou do not cross the transportation corridor observed over three years of caribou collar analyses	50% of "directional" caribou do not cross the transportation corridor observed over three years of caribou collar analyses	75% of "directional" caribou do not cross the transportation corridor observed over three years of caribou collar analyses	program (but Moderate is not), investigate trends over time and consider any uncertainties (e.g., differences in program timing, effort, methods, environmental variables, IQ input) as a desktop study.	Env't Dept and Relevant Operations: Investigate trends over time and consider any uncertainties (e.g., changes in operational processes, potential sources, confounding influences) in a formal Response Plan; Initiate component-specific targeted studies, including risk evaluations to understand the need and scale of mitigation, as part of response planning. Env't Dept and Relevant Operations: Continue monitoring to confirm effects are linked to the Project, assess the effectiveness of mitigations, and evaluate the need for additional monitoring and mitigation. Env't Dept and Relevant Operations: Implement a moderate-action response from the Mitigation Toolkit (or new mitigation identified through an investigation) based on targeted studies' outcomes. Env't Dept and Relevant Operations: Develop candidate list of suitable High Action Responses if High Risk Threshold surpassed.	
Project operations that generate outdoor sensory disturbances	The Project will have a not significant effect on regional caribou distribution.	Change in effective habitat based on caribou collar data analysis (e.g., RSPF).	Regional collaring data model analysis Height of Land surveys	5% effective habitat[21] loss of north Baffin Island caribou range as determined by collar analysis and RSPF model AND No significant changes to caribou distribution — caribou observed	10% effective habitat loss as determined by collar analysis AND Caribou visibly disturbed and displaced at a local level by Project activities, However, they still calve	15% effective habitat loss as determined by collar analysis AND	Env't Dept: Continue supporting caribou collaring and local area surveillance programs. Env't Dept: Continue the height of land and incidental caribou monitoring. Continue implementing mitigations to minimize potential disturbance to caribou (e.g., the caribou decision	Env't Dept: Continue supporting caribou collaring and local area surveillance programs. Responsible Dept(s): Develop operational mitigations to further reduce disturbance to caribou during the calving season.	Will be developed concurrent with the High Risk status/threshold development a formal Response Plan.

[18] Baffinland would support a caribou collaring program only if supported by the affected communities' Hunter and Trapper Organizations/Associations.

[19] Thresholds for low, medium and high to be refined as caribou collaring program data analysis proceeds. Application of behavioural response indicators are contingent on securing necessary permits and MHTO support for running a collaring program.

[20] Directional movement will be defined using collar movement data and GIS-based current practices at the time of analyses.

[21] Effective caribou habitat is defined as the combination of dynamic abiotic (e.g., topography, microclimate) and biotic (e.g., lichen cover, conspecific density) conditions that support the life history requirements of caribou. Effective habitat can be estimated with resource selection (probability) functions — a fundamental assumption being that the selection probability by caribou is directly proportional to habitat quality. The product of the selection probability and a unit of area equals the amount of effective habitat. Loss of effective habitat is determined by accounting for external (anthropogenic) forces that may degrade actual, or perceived, habitat quality when compared to baseline conditions. It is calculated as the difference in total effective habitat pre- and post-disturbance.

Project Activity	Objectives	Performance Indicators	Monitoring Program / Plan	Condition Status / Threshold			Pre-defined Response(s)		
				Low Risk	Moderate Risk	High Risk	Low Risk	Moderate Risk	High Risk
				calving with similar[22] distribution as baseline studies with no changes to caribou health.	and use habitat of comparable quality within the RSA (may require regional monitoring) with no changes to caribou health.	Caribou displaced extensively by Project activities at a regional level; calving habitat effectiveness is significantly reduced; calving success is reduced and/or caribou health is impacted.	tree for drivers, reducing Project-related noise). Env't Dept: If Low Risk status/threshold is triggered again in the next scheduled program (but Moderate is not), investigate trends over time and consider any uncertainties (e.g., differences in program timing, effort, methods, environmental variables, IQ input) as a desktop study.	Env't Dept and Relevant Operations: Investigate trends over time and consider any uncertainties (e.g., changes in operational processes, potential sources, confounding influences) in a formal Response Plan; Initiate component-specific targeted studies, including risk evaluations to understand the need and scale of mitigation, as part of response planning. Env't Dept and Relevant Operations: Continue monitoring to confirm effects are linked to the Project, assess the effectiveness of mitigations, and evaluate the need for additional monitoring and mitigation. Env't Dept and Relevant Operations: Implement a moderate-action response from the Mitigation Toolkit (or new mitigation identified through an investigation) based on targeted studies' outcomes. Env't Dept and Relevant Operations: Develop candidate list of suitable High Action Responses if High Risk Threshold surpassed.	Responsible Dept(s): Implement High Risk Status/ Threshold response in Mitigation Toolkit if causal effect or likely relationship is determined.
Transportation corridor physical structure and transportation activities	The Project will cause minimal direct mortality to caribou.	Project-related caribou mortality	Wildlife encounter reporting and investigations	One Project-related caribou mortality in a single year	>2 project-related caribou mortalities in three consecutive years OR >5 project-related caribou mortalities in a single year	>5 project-related caribou mortalities in three consecutive years	Env't Dept: Investigation and corrective actions on individual incident basis.	Env't Dept: Increased investigation detail to test the root cause of project-related caribou mortality. Possible change to specific activities if warranted.	Will be developed concomitant with the High Risk Status/ Threshold Development response plan. Responsible Dept(s): Implement High Risk Status/ Threshold response in Mitigation Toolkit if the causal effect or likely relationship is determined.

[22] Baseline information on caribou calving locations were informed entirely by Inuit Knowledge. That knowledge is described and illustrated in Section 2.1.4 — Seasonal Habitats, Mary River FEIS Appendix 6F, *Mary River Project Wildlife Baseline 2006–2011.* Baffinland expects that consideration of caribou distribution during calving will be more qualitative than quantitative and based on observations from a combination of site monitoring, hunter observations, caribou collar data, and aerial surveys while considering the historical distribution information from knowledge holders.

Project Activity	Objectives	Performance Indicators	Monitoring Program / Plan	Condition Status / Threshold			Pre-defined Response(s)		
				Low Risk	Moderate Risk	High Risk	Low Risk	Moderate Risk	High Risk
Project operations that generate outdoor sensory disturbances	The Project will have a not significant effect on cliff-nesting raptor occupancy and reproductive success.	Peregrine Falcon and Rough-legged Hawk nest site occupancy and reproductive success.	Raptor productivity surveys AND Raptor occupancy surveys	Mean brood size <1.0 in one year when occupancy is <0.4[23]. AND A statistically significant decline in occupancy, (as measured by average rate of change (λ), in one year)	Mean brood size <1.0 in two consecutive years when occupancy is <0.4. AND A statistically significant decline in occupancy, (as measured by average rate of change (λ), in two consecutive years)	Mean brood size <1.0 in three consecutive years when occupancy is <0.4. AND A statistically significant decline in occupancy, (as measured by average rate of change (λ), in three consecutive years)	Env't Dept: Continue regular raptor monitoring program until trends are established. Continue to follow general mitigations as per Project Certificate and TEMMP. Env't Dept: If Low Risk status/threshold is triggered again in the next scheduled program (but Moderate is not), investigate trends over time and consider any uncertainties (e.g., differences in program timing, effort, methods, environmental variables, IQ input) as a desktop study.	Env't Dept and Responsible Depts: Revisit Project components that may have effects on raptors and adapt mitigations and management, as necessary. Sponsor a 3rd-party study to investigate potential Project-related mechanism(s) affecting raptors. Env't Dept and Relevant Operations: Investigate trends over time and consider any uncertainties (e.g., changes in operational processes, potential sources, confounding influences) in a formal Response Plan; Initiate component-specific targeted studies, including risk evaluations to understand the need and scale of mitigation, as part of response planning. Env't Dept and Relevant Operations: Continue monitoring to confirm effects are linked to the Project, assess the effectiveness of mitigations, and evaluate the need for additional monitoring and mitigation. Env't Dept and Relevant Operations: Implement a moderate-action response from the Mitigation Toolkit (or new mitigation identified through an investigation) based on targeted studies' outcomes. Env't Dept and Relevant Operations: Develop candidate list of suitable High Action Responses if High Risk Threshold surpassed.	Will be developed concomitant with the High Risk Status/Threshold Development response plan. Responsible Dept(s): Implement High Risk Status/ Threshold response in Mitigation Toolkit if causal effect or likely relationship is determined.
TBD	Inuit Objectives TBD	Inuit Indicators TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

[23] The combination of brood size and occupancy for Rough-legged Hawks accounts for the natural interannual variation in occupancy.

5.3 MITIGATION TOOLKIT

Table 5.2 outlines Moderate and High Action Pre-Defined Responses in the event of an exceedance of a moderate- or high-risk threshold. These responses are not exhaustive and may be supplemented depending on the outcomes of adaptive management investigations.

TABLE 5.2 TERRESTRIAL ENVIRONMENT - MODERATE AND HIGH ACTION PRE-DEFINED RESPONSES

Terrestrial Environment
Emissions and Noise Controls for Vegetation Impacts: • Redesign engineering controls • Spray (or respray piles) with approved dust suppressant • Research for alternate dust suppression products • Evaluate surface watering and sprinkler system options via mister trucks or trailers • Evaluate surface watering and dust suppressant application frequency • Where applicable, install or redesign conveyor shrouding for fugitive dust • Review of new technology and solutions available on the market for dust control • Investigate feasibility of switch to lighter distillate fuels for operation equipment Reduction or cessation of activity: • Adapt production rate to environmental conditions • Modify timing or frequency of operational activities (i.e. blasting frequency)
Rail Based Source Controls for Wildlife Impacts: • Adjust Train Operational Speed in Areas Identified as High-Risk Crossing (Temporarily or permanently) • Construct dedicated caribou crossings • Adjust slope at additional locations along the railway • Replace embankment fill type at additional locations along the railway • Use of Hi-Rail Vehicles Intermittently • Increase use of horn Reduction or cessation of activity: • Adjust Train Trip Frequency intermittently • Temporary stoppage of rail operations during migratory movements
Air Based Source Control for Wildlife Impacts • Refinement of Overflight Site-Specific Guidelines (i.e. timing and frequency) ○ Avoidance of sensitive wildlife areas (as identified) ○ Reduction in air-based travel, as practicable
Assessment and/or Monitoring (General) • Update country food risk assessment • Development of site-specific risk based guidelines • Hiring of year-round designated caribou monitors • Investigate feasibility of available wildlife detection technology • Increase BIM employee and contractor training on EPP and associated measures
Negotiation of compensation

5.4 REPORTING

Monitoring outcomes will be reported annually and submitted to the NIRB and other applicable regulatory bodies on an agreed schedule. Final reporting (including responses to supplementary information requests, should they arise) will be made available via the Baffinland Document Portal (www.baffinland.com).

6 REVIEW OF PLAN EFFECTIVENESS

6.1 ANNUAL REVIEW OF COMPLIANCE AND UNANTICIPATED EFFECTS

Baffinland is committed to reviewing the continued suitability, adequacy and effectiveness of the Project environmental management system and associated management plans. This will occur through an annual review process and scheduled updates. Corrective actions will be applied (as appropriate) to address non-compliance, adverse findings and/or unanticipated observations. Follow-up investigations may be required. Corrective actions and follow-up investigations will be documented in the annual report.

During the annual reporting cycle, Baffinland staff will review any unanticipated adverse effects and determine if a review of the effectiveness of monitoring approaches and managements plans. Likewise, should there be a significant unanticipated effect as determined by the Inuit Committee and/or community observations, a review of plan effectiveness will be completed. IQ is incorporated in the annual review cycle through feedback from the Inuit Committee and/or community observations. This process is summarized in Figure 6.1.

6.2 SCHEDULED UPDATES

The TEMMP is intended to be periodically revised as new information becomes available, methods are further developed, refined or replaced, and/or to account for adaptive management measures. Further details will continually be developed following discussions with the Qikiqtani Inuit Association (QIA), community Hunters and Trappers Organizations (HTOs), the TEWG and other involved parties. In addition to the annual review cycle described above, scheduled Plan reviews will occur according to the schedule presented in Table 6.1.

Plan updates will be recorded in the Document Revision Record located at the front of the Plan. Each plan update will be provided to the QIA for review and approval before being finalized for implementation.

TABLE 6.1 PLAN REVIEW SCHEDULE

Review Event	Description
Every 3 years during operation	Mandatory management review

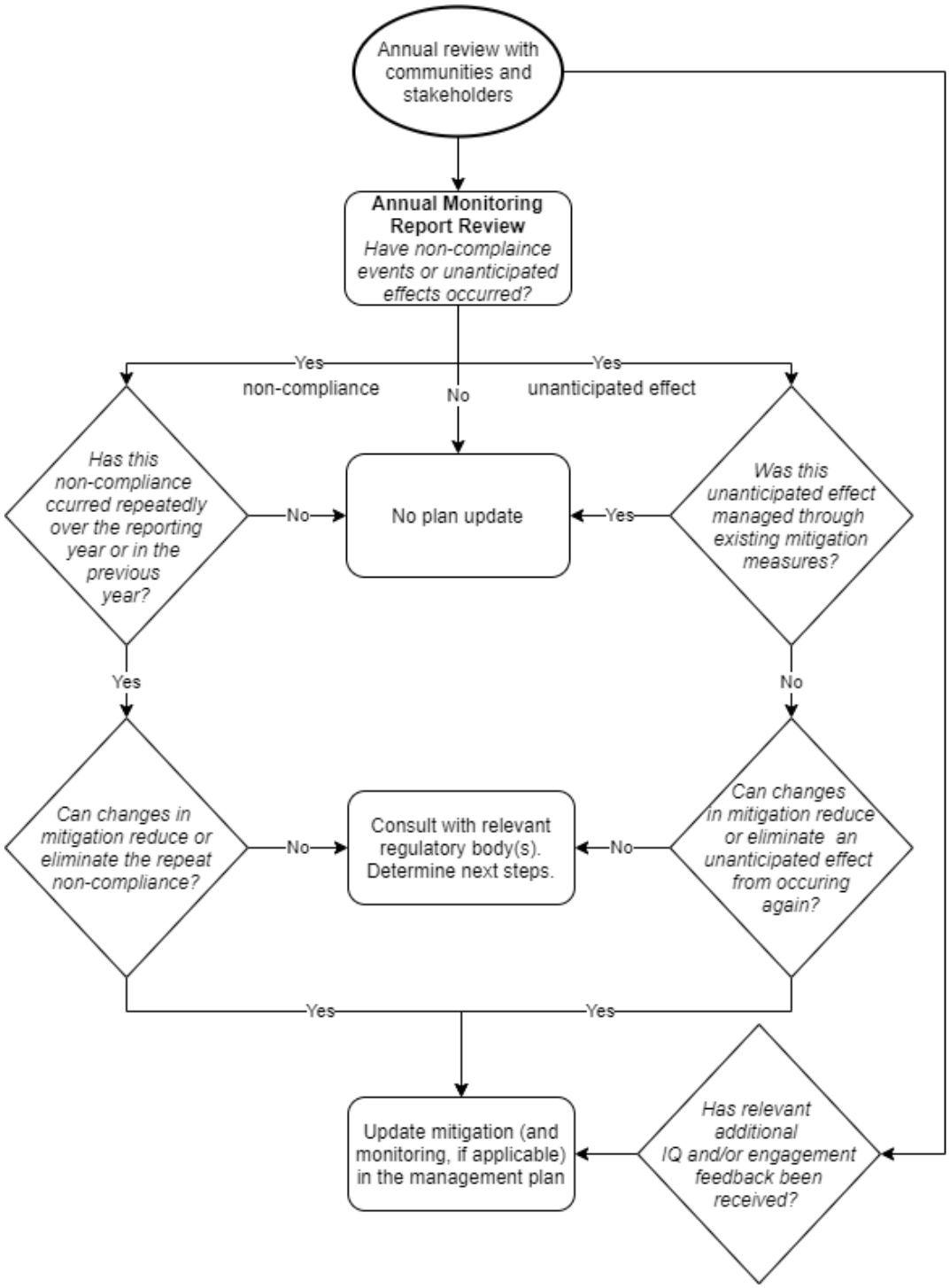


FIGURE 6.1 ANNUAL REVIEW OF PLAN EFFECTIVENESS

7 ROLES AND RESPONSIBILITIES

Baffinland's Environmental Department is responsible for monitoring compliance with applicable regulations and permit requirements. Resourcing is an important element of environmental management. Table 7.1 outlines the roles and responsibilities of Baffinland staff, as well as QIA staff with a role in environmental management.

TABLE 7.1 ROLES AND RESPONSIBILITIES

Position	Responsibilities
Vice-President, Sustainable Development	Provide corporate resources and overall direction to the implementation of the TEMMP. Provide review and approval or revised versions of TEMMP.
Environmental Manager	Provide site-based resources and overall direction to the implementation of the TEMMP.
Health, Safety, Environment and Security Manager	Provide technical guidance and final review and approval of revised versions of EPP. Ensure EPP is properly communicated to departmental Site Managers and ensure adequate training is in place for all site Supervisors.
Environmental Superintendents and Coordinators	Conduct a review and revision of the TEMMP based on the schedule outlined in Section 6.2 to determine if updates are required, or at the request of the Environmental Manager. Review revisions to the TEMMP. Ensure revisions are distributed to managers and supervisors. Perform document controls. Ensure that managers, supervisors and their staff are familiar with the TEMMP. as relevant. Obtain approvals from management for execution of monitoring programs as needed.
Environmental Consultants	Provide training and support as needed to ensure successful implementation of the TEMMP. Conduct implementation of monitoring and provide additional guidance to site-based staff for site-led terrestrial monitoring programs as needed. Initiate changes to improve and update the TEMMP as needed and provide technical support for revisions. Provide technical support to Environmental Protection Plan development and ongoing revisions.
Terrestrial Environment Working Group	The TEWG's primary function is to consult with and provide advice to Baffinland with respect to its monitoring programs and mitigation measures, including its efforts to collect baseline data, monitor effects of the Project, and determine any adaptive management measures that may be required during the construction, operations, closure and reclamation of the Project. In fulfilling its role the TEWG may: Make recommendations and provide advice to Baffinland on any aspects of the TEMMP which require the adoption of additional or revised monitoring programs and mitigation measures in order to comply with applicable regulatory requirements and/or to mitigate adverse Project effects; Collaborate on research programs, activities, or initiatives relating to the terrestrial environment; Review the TEMMP, its implementation, and suggest recommended changes; Review and provide technical advice and directions for improvements relating to the following: • monitoring reports and results provided to the TEWG by Baffinland; • the assessment of potential impacts of the Project on the terrestrial environment and

TABLE 7.1 ROLES AND RESPONSIBILITIES

Position	Responsibilities
	terrestrial wildlife; • the effectiveness of mitigation measures implemented by Baffinland; and • Baffinland's plans for the development and implementation of adaptive management and/or mitigation measures.
QIA Regulatory Manager – Inuit Impact Benefit Agreement (IIBA)	• Directs QIA's onsite environmental resources • Liaise with Baffinland's Permitting and Compliance Managers and/or Environmental Superintendents • Reviews regulatory submissions on behalf of the QIA • Member of the QIA-Baffinland Adaptive Management Working Group
QIA Environmental Monitor (IIBA)	• Monitors implementation of commitments, environmental compliance, and QIA interests • Participate in routine compliance inspections and monitoring alongside Baffinland staff • Participate follow-up corrective action undertaken regarding non-compliance events including spills • Weekly reporting to the QIA Regulatory Manager • Presents annual monitoring data to communities • The core responsibilities of this position are described completely in the IIBA
QIA (Adaptive Management - Position TBD)	• Establish the Adaptive Management Working Group with Baffinland • Provide timely results of relevant monitoring programs carried out under the Inuit Stewardship Plan, to inform the adaptive management system • Engage in additional investigations in circumstances where adverse changes merit adaptive management interventions, for relevant management plans, as required • Identify appropriate interventions for Baffinland to apply in circumstances requiring adaptive management for which there are no pre-defined thresholds and actions • Support the monitoring and reporting of effectiveness of remedial actions, as per the adaptive management feedback loop, through the Inuit Stewardship Plan's mechanisms • Review updates to the Adaptive Management Plan, and adaptive management components including relevant management plans and portions of these plans (i.e., objectives)
BIM-QIA Adaptive Management Working Group	• Evaluate relevant management plans within the Environmental Management System (EMS) system against the Adaptive Management Checklist (Appendix B) • Develop (which will be informed by but may go beyond those required by regulatory approvals) objectives, indicators, thresholds and appropriate response requirements for all relevant management plans within the EMS system • Oversee the implementation of approved Adaptive Management Plans • Review results of Adaptive Management responses completed by Baffinland on an annual and as needed basis

8 REFERENCES

Baffinland Iron Mines Corporation (Baffinland). 2012a. Mary River Project Final Environmental Impact Statement: Volume 10, Appendix 10D-1 — Air Quality and Noise Abatement Management Plan. 64 pp.

Baffinland Iron Mines Corporation. 2012b. Mary River Project Final Environmental Impact Statement: Volume 6 — Terrestrial Environment. 200 pp.

Baffinland Iron Mines Corporation (Baffinland). 2013. Mary River Project - Early Revenue Phase - Addendum to the Final Environmental Impact Statement. June.

Baffinland Iron Mines Corporation (Baffinland). 2018. Mary River Project Phase 2 Proposal - Addendum to the Final Environmental Impact Statement. August.

Baffinland Iron Mines Corporation (Baffinland), 2020. Baffinland Iron Mines Corporation – Adaptive Management Plan (Revised Draft) - Jointly approved draft between Baffinland and the Qikiqtani Inuit Association in relation to the Inuit Certainty Agreement. June 15.

Baffinland Iron Mines Corporation (Baffinland), 2022. Adaptive Management Plan.

2014 Terrestrial Environmental Report

Canadian Endangered Species Conservation Council (CESCC). 2016. Wild Species 2015: The General Status of Species in Canada. National General Status Working Group. 128 pp. (https://species-registry.canada.ca/index-en.html#/documents/3174).

Crown of Indigenous Relations and Northern Affairs Canada (CIRNAC), 2015. Nunavut Planning and Project Assessment Act (NuPPAA) – Before and After Coming Into Force. https://www.rcaanc-cirnac.gc.ca/eng/1436361043458/1547482937046

Crown of Indigenous Relations and Northern Affairs Canada (CIRNAC), 2020. Treaties and Agreements. https://www.rcaanc-cirnac.gc.ca/eng/1100100028574/1529354437231

D. Dylan and S. Thompson, 2020. NIRB's inchoate incorporation of Inuit Qaujimajatuqangit in recommendation-making under Nunavut's impacts assessment regime. The McGill International Journal of Sustainable Development Law and Policy, 15(1), 53–84.

EDI Environmental Dynamics Inc. (EDI), 2018. Mary River Project — Phase 2 Proposal Technical Supporting Document No. 09: Vegetation Baseline and Impact Assessment. Prepared for Baffinland Iron Mines Corporation, Oakville, Ontario. 189 pp.

EDI Environmental Dynamics Inc. (EDI), 2022. Baffinland Iron Mines 2021 Annual Report to the Nunavut Impact Review Board Appendix G.23: Caribou Monitoring Triggers and Recommendations Report. NIRB Registry No. 338492. Prepared for Baffinland Iron Mines Corporation. 28 + app. pp.

Environment and Climate Change Canada (ECCC), 2018. General Nesting Periods of Migratory Birds in Canada. Nesting Calendars in zone N10, technical information for planning purposes covering Arctic Plains and Mountains (BCR3).(https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-

migratory-birds/general-nesting-periods/nesting-periods.html#_zoneN_calendar) Last updated October 30, 2018. Accessed December 11, 2020.

Government of Canada. 1994. Migratory Birds Convention Act. S.C. 1994, c. 22; last amended on Dec 12, 2017. (https://laws-lois.justice.gc.ca/eng/acts/m-7.01/).

Government of Canada. S.C. 2005. 2005, c. 23, s. 3.

Government of Canada. 2018. Species at Risk Act [Last amended on May 30, 2018]. S.C. 2002, c. 29.

Government of Canada and Inuit of the Nunavut Settlement Area. 1993. Nunavut Land Claims Agreement. 282 pp.

Government of Nunavut (GN). 2005. Consolidation of Wildlife Act (Current to: November 6, 2012). S.Nu. 2003,c.26. S.Nu. 2003,c.26.

Government of Nunavut Department of Environment (GNDoE). 2010. Working Together for Caribou: Draft Caribou Strategy Framework, March 2010. 22 pp. https://gov.nu.ca/sites/default/files/Draft%20NU%20Caribou%20Strategy%20Framework%20March%202010.pdf

Nunavut Planning Commission (NPC), 2000. North Baffin Regional Land Use Plan. 124 pp.

Nunavut Tunngavik, 2019. The Nunavut Agreement. Retrieved March 21, 2022, https://nlca.tunngavik.com/

QIA and Baffinland Iron Mines Corporation (Baffinland). 2018. Inuit Impact Benefit Agreement.

Appendix A
CORPORATE POLICIES

Baffinland Iron Mines Corporation

Health, Safety and Environment Policy

BAF-PH1-800-POL-0001

Rev 3

Approved by: Brian Penney

Title: Chief Executive Officer

Date: May 3rd, 2019

Signature: 

DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
05/07/15	0	EM	TP	For Use
03/07/16	1	JS	BP	Minor edits
04/20/18	2	TS	SA/BP	Minor edits
05/03/19	3	TS	BP	Minor edits

This Baffinland Iron Mines Corporation Policy on Health, Safety and Environment is a statement of our commitment to achieving a safe, healthy and environmentally responsible workplace. We will not compromise this policy for the achievement of any other organizational goals.

We implement this Policy through the following commitments:

- Continual improvement of safety, occupational health and environmental performance
- Meeting or exceeding the requirements of regulations and company policies
- Integrating sustainable development principles into our decision-making processes
- Maintaining an effective Health, Safety and Environmental Management System
- Sharing and adopting improved technologies and best practices to prevent injuries, occupational illnesses and environmental impacts
- Engaging stakeholders through open and transparent communication.
- Efficiently using resources, and practicing responsible minimization, reuse, recycling and disposal of waste.
- Reclamation of lands to a condition acceptable to stakeholders.

Our commitment to provide the leadership and action necessary to accomplish this policy is exemplified by the following principles:

- As evidenced by our motto “Safety First, Always” and our actions Health and Safety of personnel and protection of the environment are values not priorities.
- All injuries, occupational illnesses and environmental impacts can be prevented.
- Employee involvement and active contribution through courageous leadership is essential for preventing injuries, occupational illnesses and environmental impacts.
- Working in a manner that is healthy, safe and environmentally sound is a condition of employment.
- All operating exposures can be safeguarded.
- Training employees to work in a manner that is healthy, safe and environmentally sound is essential.
- Prevention of personal injuries, occupational illnesses and environmental impacts is good business.
- Respect for the communities in which we operate is the basis for productive relationships.

We have a responsibility to provide a safe workplace and utilize systems of work to meet this goal. All employees must be clear in understanding the personal responsibilities and accountabilities in relation to the tasks we undertake.

The health and safety of all people working at our operation and responsible management of the environment are core values to Baffinland. In ensuring our overall profitability and business success every Baffinland and business partner employee working at our work sites is required to adhere to this Policy.

Brian Penney
Chief Executive Officer
May 2019

Sustainable Development Policy

At Baffinland Iron Mines Corporation (Baffinland), we are committed to conducting all aspects of our business in accordance with the principles of sustainable development & corporate responsibility and always with the needs of future generations in mind. Baffinland conducts its business in accordance with the Universal Declaration of Human Rights.

Everything we do is underpinned by our responsibility to protect the environment, to operate safely and fiscally responsibly and with utmost respect for the cultural values and legal rights of Inuit. We expect each and every employee, contractor, and visitor to demonstrate courageous leadership in personally committing to this policy through their actions. The four pillars of our corporate responsibility strategy are:

1. Health and Safety
2. Environment
3. Upholding Human Rights of Stakeholders
4. Transparent Governance

Health and Safety

- We strive to achieve the safest workplace for our employees and contractors; free from occupational injury and illness, where everyone goes home safe everyday of their working life. Why? Because our people are our greatest asset. Nothing is as important as their health and safety. Our motto is “Safety First, Always”
- 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, awareness and promoting active courageous leadership. We allow our employees and contractors the right to stop any work if and when they see something that is not safe

Environment

- Baffinland employs a balance of the best scientific and traditional Inuit knowledge to safeguard the environment
- We apply the principles of pollution prevention, waste reduction 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 more sustainable practices. We strive to develop more sustainable practices
- Baffinland ensures that an effective closure strategy is in place at all stages of project development to ensure reclamation objectives are met

Upholding Human Rights of Stakeholders

- We respect human rights, the dignity of others and the diversity in our workforce. Baffinland honours and respects the unique cultural values and traditions of Inuit
- Baffinland does not tolerate discrimination against individuals on the basis of race, colour, gender, religion, political opinion, nationality or social origin, or harassment of individuals freely employed
- Baffinland contributes to the social, cultural and economic development of sustainable communities in the North Baffin Region

Sustainable Development Policy

- 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
- We expect our employees and contractors, as well as community members, to bring human rights concerns to our attention through our external grievance mechanism and internal human resources channels. Baffinland is committed to engaging with our communities of interest on our human rights impacts and to reporting on our performance

Transparent Governance

- Baffinland will take steps to understand, evaluate and manage risks on a continuing basis, including those that may impact the environment, employees, contractors, local communities, customers and shareholders.
- Baffinland endeavours to 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 safety, health, environmental, socio-economic commitments and set annual targets and objectives.
- Baffinland conducts all activities in compliance with the highest applicable legal & regulatory requirements and internal standards.
- We strive to employ our shareholder's capital effectively and efficiently and demonstrate honesty and integrity by applying the highest standards of ethical conduct.

Brian Penney
Chief Executive Officer
March 2016

Appendix B
CONCORDANCE TABLE WITH APPLICABLE PERMITS AND LICENCES

Table B-1 Project Commitments Relevant to the Mary River Project's Terrestrial Environment Mitigation and Monitoring Plan as outlined in Appendix A of the NIRB Final Hearing Report (2012) and additional Project Commitments developed after the NIRB's Final Hearing Report that are relevant to the TEMMP

Commitment No.	Subject	Commitment	Issue raised by (date of commitment)	Project Phase/Timing	Area(s) addressed	
					Mitigation	Monitoring
Vegetation Category						
39	Design (Abandonment and Restoration)	Baffinland is committed to investigating and exploring the potential for native species of flora to be used for re-vegetating areas disturbed within the Project area.	Baffinland/GN (July 26, 2012)	All/Closure	Mine Closure Plan	
60	Air Quality (Fugitive Dust from Railway transport)	Baffinland is committed to monitoring fugitive dust emissions on vegetation along the first few kilometres of the Railway leaving both terminals (Mary River and Steensby Inlet). This monitoring will be extended if it is identified that other areas of the project site are also being impacted by fugitive dust emissions.	EC (July 16, 2012)	All	Section 3.1.4	Section 3.1.3.3
67	Monitoring Plans (Vegetation)	Baffinland is committed to carrying out the monitoring plans for native plant species and vegetative health.	Baffinland (July 19, 2012)	Operations/ Abandonment and Reclamation	Section 3.1.4	Section 3.1.3.2
68	Vegetation (Invasive Species / Re-vegetation Studies)	Baffinland is committed to examining invasive species as well as carry out reclamation experiments on re-vegetation	Baffinland (July 16, 2012; July 23, 2012)	All	Section 3.1.4	Section 3.1.3.1

Commitment No.	Subject	Commitment	Issue raised by (date of commitment)	Project Phase/Timing	Area(s) addressed	
					Mitigation	Monitoring
		options and practices within the Mary River Project area.				
Terrestrial Wildlife and Habitat Category						
15	Design (Railway-Caribou)	Baffinland is committed to creating crossings along the Railway track which facilitate the passage of caribou.	Baffinland (July 23, 2012)	Operations	Section 3.3.4	Section 3.3.3.2
40	Monitoring (Abandonment and Restoration)	Baffinland is committed to undertaking environmental effects monitoring during the mine life as well as after closure.	NIRB (July 23, 2012)	All	N/A	Section 3.1.3
46	Working Group	Baffinland is committed to participating in formal, stakeholder working groups, such as terrestrial environment and marine environment working groups, as established within and/or outside of the scope of the IIBA, to gain input, insight, advice and oversight from stakeholders throughout the life of the project and to ensure that adaptive management principles are applied accordingly.	Baffinland (July 16, 2012)	All	Agency/Partner participation identified monitoring framework tables (Section partnership opportunities discussed in the Terrestrial Environment Working Group	
57	Management Plans	Baffinland is committed to updating its management plans to reflect new information, new practices and changes to operating conditions.	Baffinland (July 17, 2012)	All	The TEMMP is updated on a regular basis (Section 6)	

Commitment No.	Subject	Commitment	Issue raised by (date of commitment)	Project Phase/Timing	Area(s) addressed	
					Mitigation	Monitoring
58	Monitoring	Baffinland is committed to contributing to regional monitoring and information gathering.	NIRB (July 16, 2012)	All	N/A	Affirmed in Section 3
66	Monitoring	Baffinland is committed to the development and implementation of a monitoring program during the construction and other phases of the Mary River Project.	EC (July 23, 2012)	Construction/All	N/A	Affirmed in Section 3
69	Terrestrial (Monitoring)	Baffinland is committed to undertaking the required or relevant monitoring for both terrestrial wildlife and vegetation throughout the life of the Mary River Project to verify predictions made as well as to confirm compliance with applicable regulations. The information would be used to support adaptive management strategies and required mitigation measures.	Baffinland (July 16, 2012)	Operations	Section 3	Section 3
70	Terrestrial (Management Plan)	Baffinland is committed to developing and implementing a Terrestrial Environment Management Plan and track progress of the plan to assist in guiding adaptive management strategies slated for	Baffinland/GN (July 16, 2012)	Operations	N/A	N/A

Commitment No.	Subject	Commitment	Issue raised by (date of commitment)	Project Phase/Timing	Area(s) addressed	
					Mitigation	Monitoring
		implementation at the Mary River Project.				
71	Railway (Caribou Mortality)	Baffinland is committed to investigating any mortality to caribou resulting from project activity, and to investing in a precautionary monitoring and adaptive management program to mitigate caribou responses to development activities.	QIA (July 16, 2012; July 17, 2012)	Operations	Section 3.3.4	Section 3.3.3.6
72	Railway (Caribou Mortality)	Baffinland is committed to implementing appropriate measures to ensure that all caribou carcasses linked to the project activities are discarded in accordance with applicable regulations and guidelines.	Arctic Bay Community Member (July 19, 2012)	All	Section 3.3.4	Section 3.3.3.6
73	Railway (Caribou Mortality)	Baffinland is committed to implementing traffic controls along the Railway if it is determined that the caribou mortality rate is impacted by the Railway.	Baffinland (July 16, 2012)	Operations	Section 3.3.4	Section 3.3.3.2
74	Monitoring (Wolves)	Baffinland is committed to monitoring the effects of the Mary River Project on wolf and wolf denning areas.	Baffinland (July 23, 2012)	All	Section 3.3.4	Section 3.3.3.5

Commitment No.	Subject	Commitment	Issue raised by (date of commitment)	Project Phase/Timing	Area(s) addressed	
					Mitigation	Monitoring
75	Monitoring (Birds)	Baffinland is committed to monitoring relevant sections of the project area for nesting and migration activities, noting both areas and patterns, for Falcons, Eiders, Red Knots, sea birds, song birds and shore birds.	Baffinland (July 19, 2012)	All	Section 3.2.4	Section 3.2.3
76	Monitoring (Birds)	Baffinland is committed to carrying out monitoring over the next few years to look at other types of birds not considered during other research for the Mary River Project.	Hall Beach HTO (July 19, 2012)	All	Section 3.2.4	Section 3.2.3

Table B-2: NIRB Project Certificate #005 (amended November 3rd, 2022 to reflect an extension to the duration of the Production Increase Proposal): Terms or Conditions Relevant to the Mary River Project's Terrestrial Environment Mitigation and Monitoring Plan

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	Monitoring
Vegetation			
31	The Proponent shall ensure that Project activities are planned and conducted in such a way as to minimize the Project footprint.	Section 3 Mitigation Measures	Section 3 Monitoring Plans
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.	Section 3.1.4	Section 3.1.3.1

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	**Monitoring**
33	The Proponent shall include relevant Monitoring and Management Plans within its Environmental Management System, Terrestrial Environment Management and Monitoring Plan.	The TEMMP addresses Project Condition 33	
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.	N/A	Section 3.1.3.2
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.	N/A	Section 3.3.3.4
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	N/A	Section 3.1.3.2
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	Section 3.1.4	Section 3.1.3.1
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 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	

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	Monitoring
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 progressive reclamation and that promote natural revegetation and recovery of disturbed areas compatible with the surrounding natural environment.	Mine Closure Plan	
Terrestrial Wildlife and Habitat			
49	A Terrestrial Environment Working Group (TEWG) shall be established as an advisory oversight body, providing advice, guidance and enforceable recommendations to fulfill the intended objectives. The operation of the TEWG shall not duplicate or impede the exercise of regulatory authority of authorizing agencies or government. The TEWG shall have the following permanent members: The Proponent, the Qikiqtani Inuit Association, the Government of Nunavut, the Government of Canada, the Mittimatalik HTO, and the Hunters and Trappers Organizations of the other Impacted Communities (Arctic Bay, Clyde River, Sanirajak, Igloolik), should they wish to participate. A Terms of Reference shall be established that guides additional participation in the TEWG by observers. The TEWG shall be chaired by an independent third party as chosen by the permanent members. A revised Terms of Reference shall be presented to NIRB no later than December 15th, 2022, or at another date on consent of the Proponent, Canada, and the Qikiqtani Inuit Association.	Appendix D	

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	**Monitoring**
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 Mitigation 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. The Proponent shall give special consideration for supporting regional studies of population health and harvest programs for North Baffin caribou which help address areas of uncertainty for Project impact predictions.	Agency/Partner Participation identified monitoring framework tables partnership opportunities discussed in Terrestrial Ecosystem Working Group (Appendix D)	
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.	N/A	Section 3.3.3.2
53	The Proponent shall demonstrate consideration for the following:	Section 3.3.4	Section 3.3.3.2

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	**Monitoring**
	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. i. Specific measures intended to address the reduced effectiveness of visual protocols for the Milne Inlet Tote Road and access roads/trails during times of darkness and low visibility must be included. 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. The details of these monitoring and mitigation measures shall be developed in conjunction with the Terrestrial Environment Working Group. 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.		
54	The Proponent shall provide an updated Terrestrial Environmental Management and Monitoring Plan which shall include, but not be limited to the following:	d. Appendix C	a. Appendix C b. Section 3.3.3

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	**Monitoring**
	a. Details of the methods and rationale for conducting monitoring prior to the commencement of construction; b. Monitoring for caribou presence and behavior during railway and Tote Road construction. c. 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; d. Details of monitoring and mitigation activities, which should be established in collaboration with the Terrestrial Environment Working Group and are expected to include: 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 and Tote Road. Using the result of this information, an early warning system for caribou on the railway and Tote Road shall be developed for operation. e. Details of monitoring thresholds related to level of mitigation and management; f. 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.		c. Appendix C d. Appendix C e. Monitoring thresholds listed in Monitoring tables in Section 3. f. Appendix C

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	**Monitoring**
55	The Proponent shall develop an adaptive management plan applicable to wolves and wolf habitat in collaboration with the GNDoE to ensure compliance with the Nunavut Wildlife Act. Consideration must be given to the following: a. 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); b. Estimating the available (glacio-fluvial materials) esker habitat within the Regional Study Area/PDA and identifying such habitat as ecologically sensitive c. Developing "wolf indices" for presence/abundance of wolves (by conducting studies) to set a baseline pre-construction baseline; d. Ensuring that wolf monitoring is capable of determining the relative abundance and distribution of wolves in the Project Development Area over time	N/A	a. Section 3.3.3.5 b. Addressed and completed in the FEIS of the ERP c. Addressed and completed in the FEIS of the ERP d. The GN/TEWG suggested that the wolf monitoring program be postponed until wolves are present
56	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.	Section 3.1 Vegetation	See Project Condition 39 and 40 (first sentence). Second sentence of this PC is not actionable.

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	**Monitoring**
57	The Proponent shall report annually regarding its terrestrial environment monitoring efforts, with inclusion of the following information: 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.	N/A	Section 5.4
58	Within its annual report to the NIRB, the Proponent shall incorporate a review section which includes:	N/A	Section 5.4

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	**Monitoring**
	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 behavior and displacements (if any), and caribou responses to and crossing of the railway, the Milne Inlet Tote Road and associated access roads/trails. 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, including the railway, road traffic, air traffic and dust fall 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.		
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	Section 3.3.4.5	N/A

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	**Monitoring**
	horizontal distance from observed concentrations of migratory birds (or as otherwise prescribed by the Terrestrial Environment Working Group) and use flight corridors to avoid areas of significant wildlife importance. The Proponent, in collaboration with the Terrestrial Environment Working Group shall develop a program or specific measures to ensure that employees and subcontractors providing aircraft services to the Project are respectful of wildlife and Inuit harvesting that may occur in and around project areas.		
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 3.3.4.1	N/A
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 3.3.4.3	N/A
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 3.3.4.3	N/A
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	N/A	N/A

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	**Monitoring**
	facilitate these meetings through payment of honoraria and meeting costs.		
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: 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 (odors 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 metre into the ground to prevent animals from digging under the skirting).	Section 3.3.4.7	N/A
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 3.2.4	N/A
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.	Table 3.8	N/A

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	**Monitoring**
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 6	N/A
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 3.2.4	N/A
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 3.2.4	N/A
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 3.2.4.4	N/A
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	Section 3.2.4.3	N/A

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	**Monitoring**
	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.		
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 3.2.4.3	N/A
73	The Proponent shall develop detailed and robust mitigation and monitoring plans for migratory birds, reflecting input from relevant agencies, the local Hunters and Trappers Organizations and communities as part of the Terrestrial Environment Working Group and to the extent applicable the Marine Environment Working Group.	Section 3.2.4	Section 3.2.3
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.	N/A	Section 3.2.3
75	The Proponent's monitoring program shall assess and report, on annual basis, the extent of terrestrial habitat loss due to the Project	N/A	Section 3.3.3.6

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	**Monitoring**
	to verify impact predictions and provide updated estimates of the total project footprint.		
170	The Proponent shall include in an updated Terrestrial Wildlife Management and Monitoring Plan, plans for increased caribou monitoring efforts including weekly winter track surveying and summer and fall surveys undertaken on foot twice per month.	N/A	Section 3.3.3.2
171	The Proponent shall include within its updated Terrestrial Wildlife Management and Monitoring Plan, a commitment to establish deterrents along the railway and Tote Road embankments at any areas where it is determined that caribou are utilizing the embankments or transportation corridors to facilitate movement and where such movement presents a likelihood of caribou mortality to occur.	N/A	Section 3.3.3.2
73	The Proponent shall develop detailed and robust mitigation and monitoring plans for migratory birds, reflecting input from relevant agencies, the local Hunters and Trappers Organizations and communities as part of the Terrestrial Environment Working Group and to the extent applicable the Marine Environment Working Group.	Section 3.2.4	Section 3.2.3
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.	N/A	Section 3.2.3

Term and Condition No.	Term or Condition	Area(s) addressed	
		Mitigation	Monitoring
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.	N/A	Section 3.3.3.6
170	The Proponent shall include in an updated Terrestrial Wildlife Management and Monitoring Plan, plans for increased caribou monitoring efforts including weekly winter track surveying and summer and fall surveys undertaken on foot twice per month.	N/A	Section 3.3.3.2
171	The Proponent shall include within its updated Terrestrial Wildlife Management and Monitoring Plan, a commitment to establish deterrents along the railway and Tote Road embankments at any areas where it is determined that caribou are utilizing the embankments or transportation corridors to facilitate movement and where such movement presents a likelihood of caribou mortality to occur.	N/A	Section 3.3.3.2

Appendix C
MONITORING DETAILS AND METHODS

C-1 VEGETATION MONITORING: VEGETATION ABUNDANCE & COMPOSITION

PROGRAM SUMMARY

Indicator	Vegetation Abundance and Composition
Monitoring Category	Environmental Effects Monitoring
Design Type	Before-After-Control-Impact (BACI)
Measurable Parameter	Changes in vegetation abundance and composition.
Key Project Interactions	Dust, effluent, and air emissions released into the environment have the potential to impact vegetation abundance and composition. Dust and other contaminants may affect the quality and quantity of vegetation (i.e., changes in plant composition and abundance) in proximity to the Project. If contaminants are taken-up by plants and ingested by wildlife or humans, pathway may affect the health of individuals.
Goal	Project will not result in significant changes in vegetation abundance and/or health
Objective	To evaluate vegetation abundance and composition over the life of the Project.
Threshold	Refer to Trigger-Action Response Plan (Section 5.2) Refer to Appendix C-1
Scope of Monitoring Work	Regional monitoring: Monitoring every 3–5 years comparing areas in proximity to Project infrastructure (at varying distance categories) versus reference/control areas within the RSA. Additional investigation may be triggered by the monitoring outcomes. Vegetation abundance and health based on long-term monitoring plots (representing caribou forage).
Status	Active/Ongoing
Agency/Partner Participation	None required

EXPERIMENTAL DESIGN AND METHODS

The vegetation abundance monitoring program examines a total of 15 transects (comprising 66 sites and 151 plots; refer to Map C-1) to evaluate potential changes in vegetation abundance and composition at the Project. Six transects radiate out from the Mine Site, five transects from the Tote Road, and four transects from Milne Port. Six control (reference) sites are established within the RSA, approximately 20 km from the Project footprint. To prevent pseudo-replication, all transects are spaced a minimum of 200 m apart with the majority of transects spaced 500 m apart. Each transect extends perpendicular from the source of disturbance (Mine Site, Tote Road, and Milne Inlet).

Sampling sites are stratified by Northern Land Cover (NLC) LandSat imagery (30 m x 30 m resolution/pixel) to select the Moist to Dry Non-Tussock Graminoid/Dwarf Shrub habitat type. Within this habitat type, transects are randomly situated at the Mine Site, Milne Inlet, and the Tote Road within distance classes (30, 100, 750, and 1,200 m) from the edge of the PDA (Figure C-1). and reference (control) sites are located approximately 20 km from the PDA to the north and south of the RSA and outside the ZOI. These distance classes were chosen based on a review of relevant available literature and dust isopleth modeling.

Each sample site consists of an open plot and associated closed plot. To account for within-site variability in vegetation cover some sites include a second open plot (total of three plots per site). Within a site, plots are spaced 2.5–3 m apart. Each plot is 1 x 1 m; closed plots include an additional cage that measures 2 m x 2 m and encompasses

the 1 m x 1 m sampling area to assess potential grazing effects by caribou and/or small mammals. The cage design consists of half-inch hardware cloth along the sides and one-inch poultry wire on top with rebar as corner posts. Where necessary, the hardware cloth is flanged at the base and piled with rocks to exclude small mammals (lemmings).

Each plot is assessed for plant group composition (i.e., lichen) and percent plant cover. The point quadrat method is used to measure percent plant cover with a total of 200 sampling points per plot. This is equivalent to 100 sampling points for the canopy cover layer and 100 sampling points for the ground cover layer (Figure C-2). Using a 2 mm diameter laser projected onto the vegetation below, percent plant cover measurements are determined by the number of "hits" within the plot. A "hit" is where the laser beam intersects a plant at a sampling point (Figure C-3). This is equivalent to a measurement for percent plant cover (i.e., 1 hit out of 200 possible hits).

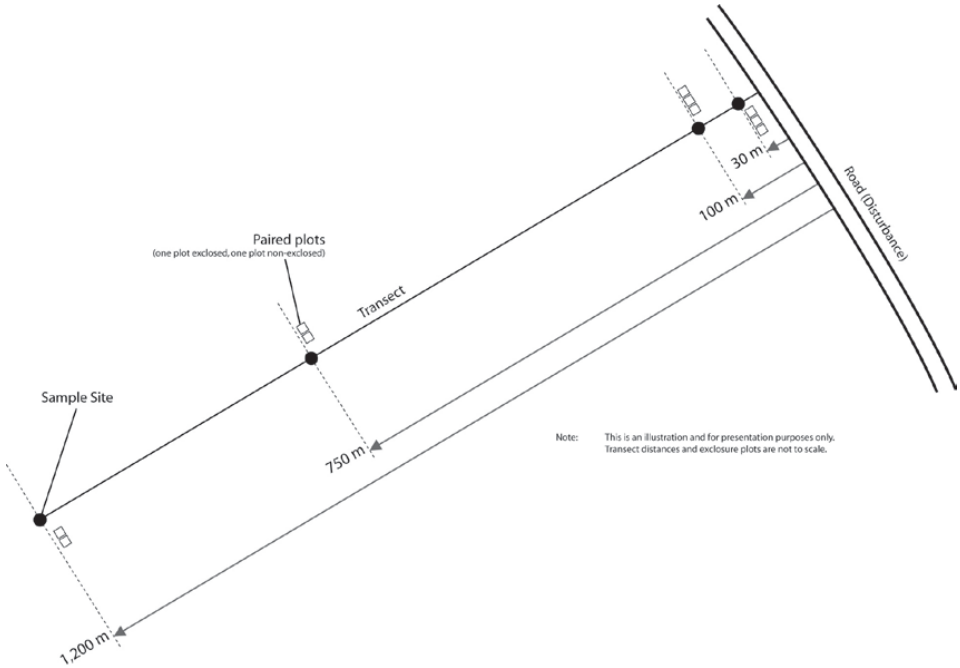


FIGURE C-1: SAMPLE PLOT DISTRIBUTION ALONG VEGETATION TRANSECT

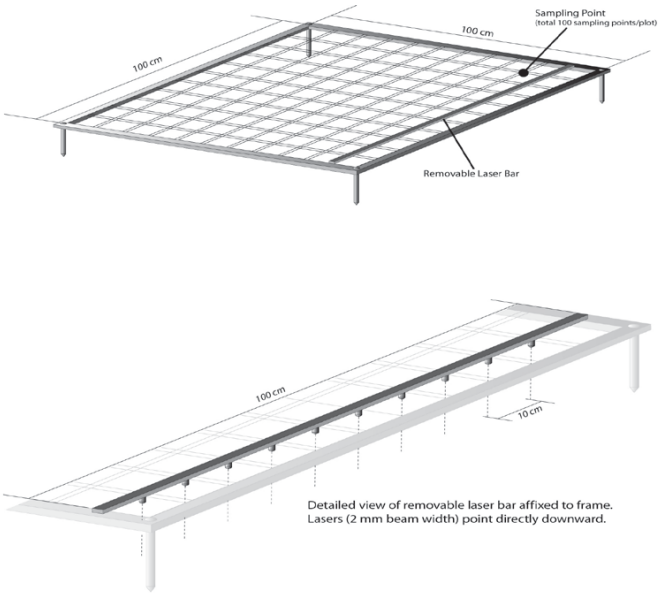


FIGURE C-2: POINT QUADRAT METHOD IS USED TO MEASURE PERCENT PLANT COVER

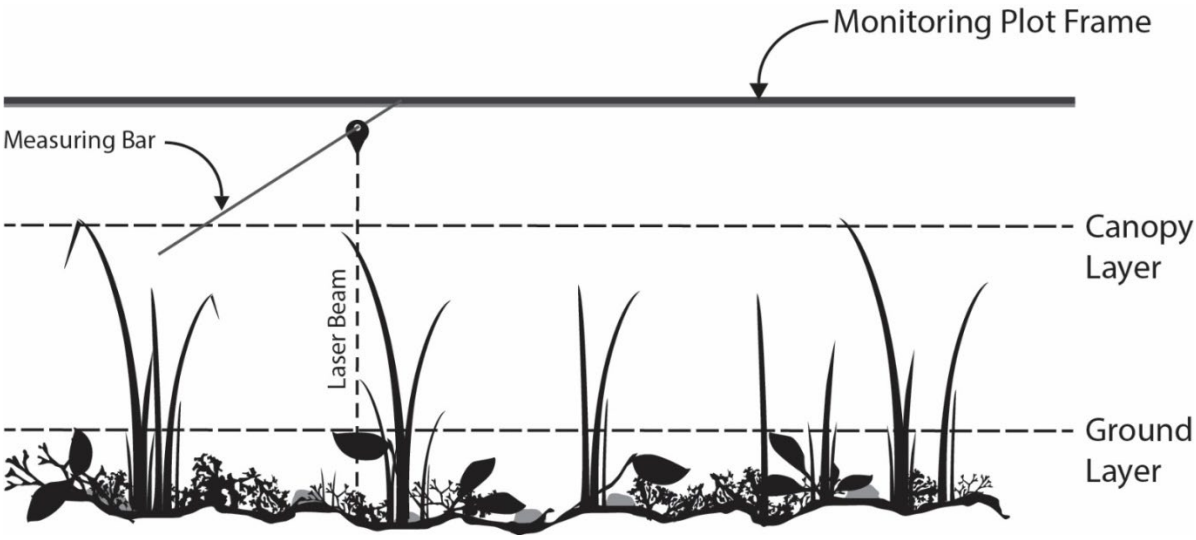


FIGURE C-3: PROFILE OF GROUND COVER AND POINT QUADRAT MEASUREMENT.

DATA ANALYSIS

The vegetation abundance data are analyzed to assess the relationship of percent plant cover and composition with distance from the PDA, while accounting for the potential effect of herbivory (i.e., caribou, small mammals). Differences in caribou forage (e.g., lichen) related to the focal area (Mine Site, Milne Inlet, Tote Road), distance class (30, 100, 750 and 1,200 m) and exclosure treatment (open vs. closed plots) are explored. The data analysis includes:

1. Total percent canopy cover
2. Total percent ground cover
3. Composition by plant group (i.e., deciduous shrubs, evergreen shrubs, forbs, graminoids, moss, and lichen)
4. Inter-annual variation.

THRESHOLDS

There are no known thresholds for the loss of vegetation through decreasing percent plant cover. Thresholds can only be determined based on our ability to detect change using a statistical power analysis and consideration of what is biologically important. Consequently, thresholds were identified using a power analysis tool to assess two scenarios; the first scenario simulated the data to detect a decline in percent plant cover for canopy cover, ground cover, and lichen cover; the second scenario simulated the data to detect an increase in lichen cover. Specifically, the two scenarios include:

1. Declines in overall percent ground cover, canopy cover, and lichen cover for the 30 m distance class. The 30 m distance class was chosen for the power analysis as it is closest to the Project footprint and presumably the most likely to be affected be Project activity.
2. Increase in overall percent cover of lichen for all distance classes more than 30 m from the Project area; the range of values considers the observed baseline value up to 30 %. This assumption is based on the theory that lichen cover within plots is currently low and over time cover will increase at sites further from the Project footprint; however, sites within 30 m of the footprint are likely to be impacted by Project activities which may counter overall growth and abundance, potentially reducing the percent cover of lichen within 30 m distance classes. Additional background to support this prediction is provided in the 2014 Annual Terrestrial Monitoring Report, Section 3.1.2— Composition by Plant Group (EDI, 2015).

The results of the power analysis were used to inform Project specific thresholds and assess the power of the monitoring program to detect changes in percent plant cover. The power analysis identified the following thresholds, which represents the highest level of power able to detect changes in percent plant cover with 15 balanced transects:

Canopy Cover: 25% decline; 90% of the time

Ground Cover: 30% decline; 87% of the time

Lichen Cover: 50% decline; 83% of the time[24]; 75% increase; 78% of the time

FREQUENCY

Monitoring will occur every 3–5 years as determined by vegetation growth rates based on data collected during sampling and consideration of adaptive management required to mitigate effects to vegetation health. If no

[24] The analyses of the ability to detect a decline in lichen abundance near Project facilities was considered following a request from the GN in the fall 2014 TEWG meeting.

biological differences are noted after three or four consecutive sampling intervals, the sampling frequency may be reassessed.

REFERENCES

EDI Environmental Dynamics Inc. 2012. Mary River Project Wildlife Baseline 2006–2011: Appendix 6F, Volume 6 — Terrestrial Environment, Final Environmental Impact Statement. Prepared for Baffinland Iron Mines Corporation, Toronto, Ontario. 103 pp.

EDI Environmental Dynamics Inc. 2015. 2014 Terrestrial Environment Annual Monitoring Report. Prepared for Baffinland Iron Mines Corporation, Toronto, Ontario. 134 pp.

Russell, D. 2014. Energy-protein modeling of North Baffin Island caribou in relation to the Mary River Project: a reassessment from Russell (2012). Prepared for EDI Environmental Dynamics Inc. and Baffinland Iron Mines Corporation, Oakville, ON. 16 pp.

Vegetation Abundance Monitoring Program 2018 — **Point-Quadrat Data** — Baffinland

Page: of

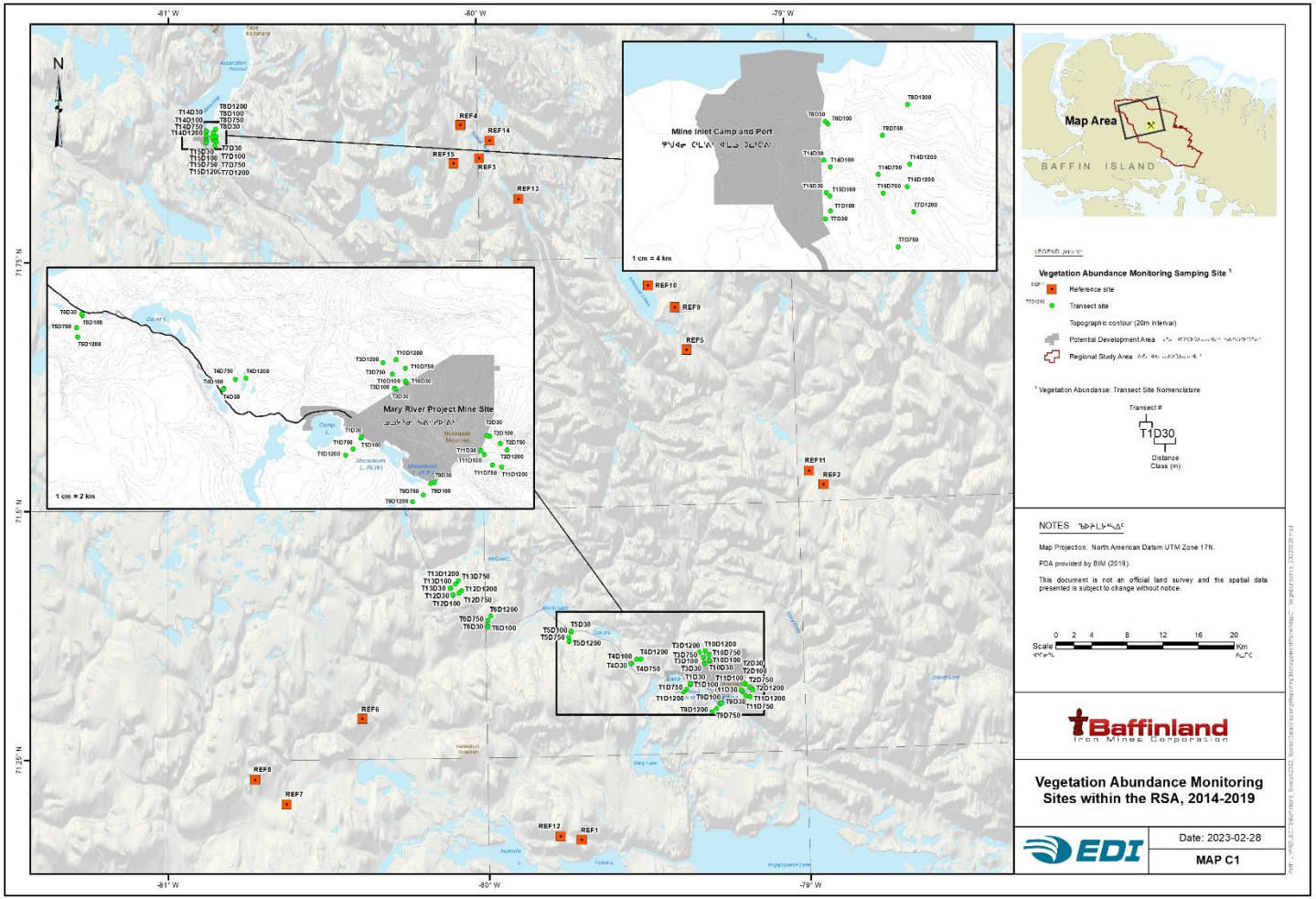
Year:										Frame Ht (cm): start @thick, go counter clockwise	
Site ID:										Thick:	
Treatment:	Exclosure									Temp:	
	Non-Exclosure									Thin:	
Plot:	A	B	X							Temp:	
5 cm CANOPY			**15 cm CANOPY**		**25 cm CANOPY**		**35 cm CANOPY**		**45 cm CANOPY**		**55 cm CANOPY**	
A5:			A15:		A25:		A35:		A45:		A55:	
B5:			B15:		B25:		B35:		B45:		B55:	
C5:			C15:		C25:		C35:		C45:		C55:	
D5:			D15:		D25:		D35:		D45:		D55:	
E5:			E15:		E25:		E35:		E45:		E55:	
F5:			F15:		F25:		F35:		F45:		F55:	
G5:			G15:		G25:		G35:		G45:		G55:	
H5:			H15:		H25:		H35:		H45:		H55:	
I5:			I15:		I25:		I35:		I45:		I55:	
J5:			J15:		J25:		J35:		J45:		J55:	
5 cm GROUND			**15 cm GROUND**		**25 cm GROUND**		**35 cm GROUND**		**45 cm GROUND**		**55 cm GROUND**	
A5:			A15:		A25:		A35:		A45:		A55:	
B5:			B15:		B25:		B35:		B45:		B55:	
C5:			C15:		C25:		C35:		C45:		C55:	
D5:			D15:		D25:		D35:		D45:		D55:	
E5:			E15:		E25:		E35:		E45:		E55:	
F5:			F15:		F25:		F35:		F45:		F55:	
G5:			G15:		G25:		G35:		G45:		G55:	
H5:			H15:		H25:		H35:		H45:		H55:	
I5:			I15:		I25:		I35:		I45:		I55:	
J5:			J15:		J25:		J35:		J45:		J55:	
Notes:												

Vegetation Abundance Monitoring Program 2018 **Point-Quadrat Data**

Page: of

65 cm CANOPY		75 cm CANOPY		85 cm CANOPY		95 cm CANOPY	
A65:		A75:		A85:		A95:	
B65:		B75:		B85:		B95:	
C65:		C75:		C85:		C95:	
D65:		D75:		D85:		D95:	
E65:		E75:		E85:		E95:	
F65:		F75:		F85:		F95:	
G65:		G75:		G85:		G95:	
H65:		H75:		H85:		H95:	
I65:		I75:		I85:		I95:	
J65:		J75:		J85:		J95:	
65 cm GROUND		**75 cm GROUND**		**85 cm GROUND**		**95 cm GROUND**	
A65:		A75:		A85:		A95:	
B65:		B75:		B85:		B95:	
C65:		C75:		C85:		C95:	
D65:		D75:		D85:		D95:	
E65:		E75:		E85:		E95:	
F65:		F75:		F85:		F95:	
G65:		G75:		G85:		G95:	
H65:		H75:		H85:		H95:	
I65:		I75:		I85:		I95:	
J65:		J75:		J85:		J95:	

FIGURE C-4: DATASHEET FOR VEGETATION ABUNDANCE MONITORING.



MAP C-1: VEGETATION ABUNDANCE MONITORING SAMPLING SITES.

C-2 VEGETATION MONITORING: VEGETATION HEALTH (SOIL/LICHEN-METALS)

PROGRAM SUMMARY

Indicator	Vegetation Health
Monitoring Category	Environmental Effects Monitoring
Design Type	Before-After-Control-Impact (BACI)
Measurable Parameter	Changes in COPC concentrations in soil and/or vegetation
Key Project Interactions	Dust, effluent, and air emissions released into the environment have the potential to impact vegetation health. Dust and other contaminants may affect the quality and quantity of vegetation (i.e., changes in plant composition and abundance) in proximity to the Project. If contaminants are taken-up by plants and ingested by wildlife or humans, pathway may affect the health of individuals.
Goal	Project will not result in significant changes in COPC concentrations in soil and/or vegetation
Objective	To evaluate COPCs (metals) in soil and vegetation over the life of the Project.
Threshold	Refer to Trigger-Action Response Plan (Section 5.2) Refer to Appendix C-2
Scope of Monitoring Work	Regional monitoring: Monitoring every 3–5 years comparing areas in proximity to Project infrastructure (at varying distance categories) versus reference/control areas within the RSA. Additional investigation may be triggered by the monitoring outcomes. COPC (metals) in soil and vegetation addressed via long-term collection of soil and vegetation samples for analysis of constituents.
Status	Active/Ongoing
Agency/Partner Participation	None required

EXPERIMENTAL DESIGN AND METHODS

The study design for the improved vegetation and soil base metal monitoring program considers three Project areas (Milne Port, Tote Road, Mine Site) at varying distances from the PDA (0–100 m; 101–1,000 m; > 1,000 m; Map C-2). Control site locations are those that are greater than 1000 m from the PDA. Distance classes were selected based on data from the dustfall monitoring program that indicate differences in dustfall within 100 m from the PDA and between 100–1000 m from the PDA (EDI 2016). Beyond 1,000 m, dustfall levels were generally below laboratory detection limits.

Vegetation and soil base metals sampling typically occurs between late-July and mid-August. As discussed in the 2014 Annual Terrestrial Monitoring Report (EDI 2015) focal vegetation includes available fruticose lichen species (particularly *Cladina* spp., *Cetraria* spp., *Flavocetraria cucullata,* and *Flavocetraria nivalis).* Collections are made using the following procedures:

- A new pair of nitrile gloves are worn for each vegetation and soil sample.
- Stainless steel tablespoons used for soil sampling are cleaned with alcohol wipes before and after each sample.
- A minimum of 10 grams of each vegetation sample was collected at each site.

- A minimum of 100 grams of soil from the top A horizon was collected at each site to a depth of ~10 cm and above permafrost. This reflects the top layer of the rooting zone where the potential for metal uptake in plants is expected to be the greatest.
- Samples are placed in new zip-loc bags, frozen and sent to an accredited laboratory for metals analyses.

Metals are analyzed by an accredited laboratory using inductively coupled plasma mass spectrometry (ICP-MS) to determine metal concentrations relative to background concentrations and the identified CoPC thresholds.

DATA ANALYSIS

Vegetation and soil samples are analyzed for total metal concentrations to assess the relationship of metals in soil and lichen with distance from the PDA, considering Project area, as well as the potential relationship between metals in soil and lichen. Future analysis will focus on determining if base metal concentrations within 100 m of the Mine Site, Tote Road, and Milne Port have increased relative to baseline concentrations, relative to areas further from the PDA, and relative to identified CoPC thresholds (EDI 2017).

THRESHOLDS

Monitoring of metals concentrations in soils and vegetation focusses on CoPCs. These CoPCs were chosen based on the consideration of several factors including baseline metal concentrations in soils and vegetation, metals present in the Mary River ore, and the level of risk associated with each element. Several sources were consulted in the selection of CoPCs including:

- Canadian Environmental Quality Guidelines (provided by the Canadian Council of Ministers of the Environment (CCME) including soil quality guidelines for both agricultural and industrial settings;
- Relevant studies on the presence, effects and other aspects of metals in arctic and northern terrestrial biota (e.g., Canadian Arctic Contaminants Assessment Report 2003, Gamberg 2008); and
- Literature on vegetation and lichen-specific toxicity.

Phosphorus, manganese, and iron are essential elements for vegetation growth and are not considered elements of concern (Baffinland 2012c). In addition, mercury was not identified as a CoPC for the Mary River Project because there is no substantial natural source of mercury in the soil or in lichen, it is not a component in the ore for the Mary River Project, and incremental additions of mercury to soil and lichen from ore deposition are insignificant (Appendix 6G-2, Mary River Project Final Environmental Impact Statement, Baffinland 2012c).

Initially seven CoPCs were selected for monitoring including aluminum, arsenic, cadmium, copper, lead, selenium, and zinc. Based on the results of the 2014 vegetation and soil base metal monitoring program aluminum was removed as a CoPC due to high variability in the data and its' ubiquitous presence (2014 Annual Terrestrial Monitoring Report; EDI 2015), resulting in six CoPCs for follow-up monitoring. For each of the six CoPCs, toxicity thresholds were determined for soils and lichen (Table C-3).

Soils — CCME soil quality guidelines were consulted for agricultural and industrial settings. As defined by CCME, these land use types are most representative of the land use associated with the Project (CCME 2007). Baseline soil samples indicate that all samples have metals concentrations well below CCME agricultural guidelines; therefore, baseline conditions meet the definition of agricultural guidelines and are used as the most appropriate threshold for CoPCs in soil for the Project.

Lichens — Available toxicity thresholds for lichen species in the Canadian Arctic are limited, regardless of the awareness that they are excellent indicators of pollutants and heavy metal contamination. Determination of thresholds is further complicated by the fact that lichens are intimately tied to site conditions and exhibit species-specific tolerance to pollutants (Dillman et al. 2007); therefore, an inherent level of error must be accepted when trying to determine threshold values and values should be considered predictive. The available literature provided thresholds for lichen toxicity for only four of the six CoPCs: cadmium, copper, lead, and zinc. The available thresholds may or may not be specific to species found on Baffin Island. Where species-specific thresholds could not be found, the following was considered: similar genus and known distribution with reference to neighboring Arctic areas (i.e., Greenland and Nunavut). Where multiple thresholds were available for a CoPC, the lowest available threshold, in consideration of baseline concentrations, was chosen as a conservative estimate.

Table C-3. Thresholds Identified for CoPCs in Soils and Lichen — Vegetation and Soil Base Metals Monitoring Program.

CoPC[a]	Soils[b]	Lichens		
	Threshold (mg/kg)	Threshold (mg/kg dw[c])	Lichen species considered	Source
pH	6–8	--		
Arsenic	12	--	--	--
Cadmium	1.4	30	*Cladonia uncialis*	(Nash 1975, Nieboer et al. 1978)
Copper	63	15	*Cladina rangiferina*	(Tomassini et al. 1976, Nieboer et al. 1978, Folkeson and Andersson-Bringmark 1988)
Lead	70	5	*Cladina rangiferina*	(Tomassini et al. 1976, Nieboer et al. 1978)
Selenium	1	--	--	--
Zinc	200	178	*Cladonia uncialis* *Cladina rangiferina*	(Nash 1975, Nieboer et al. 1978, Folkeson and Andersson-Bringmark 1988)

NOTE(S):
a Chemical of potential concern (CoPC)
b Source: CCME Agricultural Soil Quality Guidelines for the Protection of Environmental and Human Health (Canadian Council of Ministers of the Environment, 2007)
c Dry weight (dw)

FREQUENCY

The vegetation and soil base metal monitoring program will continue to adapt as results are determined. Monitoring will occur every 3–5 years as determined by the results and consideration of adaptive management required to mitigate effects to vegetation health. If no biological differences are noted after three or four consecutive sampling intervals, the sampling frequency may be reassessed.

REFERENCES

Baffinland Iron Mines Corporation. 2012c. Mary River Project Final Environmental Impact Statement: Volume 6, Appendix 6G-2 — Evaluation of Exposure Potential from Ore Dusting Addendum 2011 Data. 22 pp.

Canadian Arctic Contaminants Assessment Report. 2003. Canadian arctic contaminants assessment report (CACAR) II, sources, occurrence, trends and pathways in the physical environment. Northern Contaminants Program, Indian Affairs and Northern Development, Ottawa, ON. 332 pp.

Canadian Council of Ministers of the Environment. 2007. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health: Summary Tables. 6 pp.

Dillman, K.L., Geiser, L.H., and Brenner, G. 2007. Air quality bio-monitoring with lichens: the Tongass National Forest. USDA Forest Service. 323 pp. (http://gis.nacse.org/lichenair/?page=reports)

EDI Environmental Dynamics Inc. 2015. 2014 Terrestrial Environment Annual Monitoring Report. Prepared for Baffinland Iron Mines Corporation, Toronto, Ontario. 134 pp.

EDI Environmental Dynamics Inc. 2016. 2015 Terrestrial Environment Annual Monitoring Report. Prepared for Baffinland Iron Mines Corporation, Oakville, Ontario. 79 pp.

EDI Environmental Dynamics Inc. 2017. 2016 Terrestrial Environment Annual Monitoring Report. Prepared for Baffinland Iron Mines Corporation, Oakville, Ontario. 102 pp.

Folkeson, L. and Andersson-Bringmark, E. 1988. Impoverishment of vegetation in a coniferous forest polluted by copper and zinc. Canadian Journal of Botany 66(3):417–428.

Gamberg, M. 2008. Contaminants in Arctic moose and caribou 2006. Technical Report. Gamberg Consulting, Whitehorse, Yukon, Canada. 21 pp.

Nash, T.H. 1975. Influence of effluents from a zinc factory on lichens. Ecological Monographs 45(2):183–198.

Nieboer, E., Richardson, D.H.S., and Tomassini, F.D. 1978. Mineral uptake and release by lichens: an overview. The Bryologist 81(2):226.

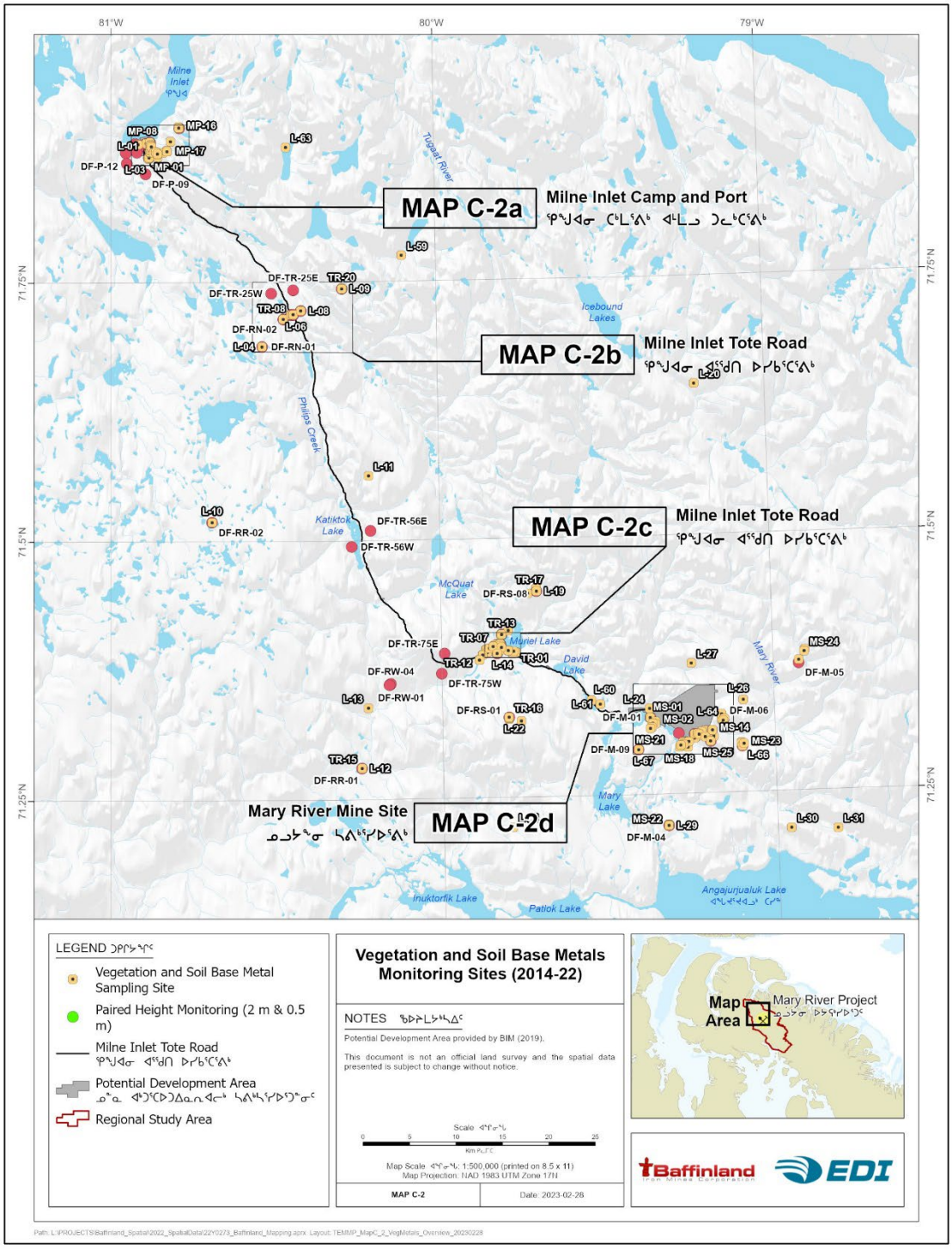
Tomassini, F.D., Puckett, K.J., Nieboer, E., Richardson, D.H.S., and Grace, B. 1976. Determination of copper, iron, nickel, and sulphur by xray fluorescence in lichens from the Mackenzie Valley, Northwest Territories, and the Sudbury District, Ontario. Canadian Journal of Botany 54(14):1591–1603.

Site Data Form **Vegetation and Soil Base Metals Monitoring Program**

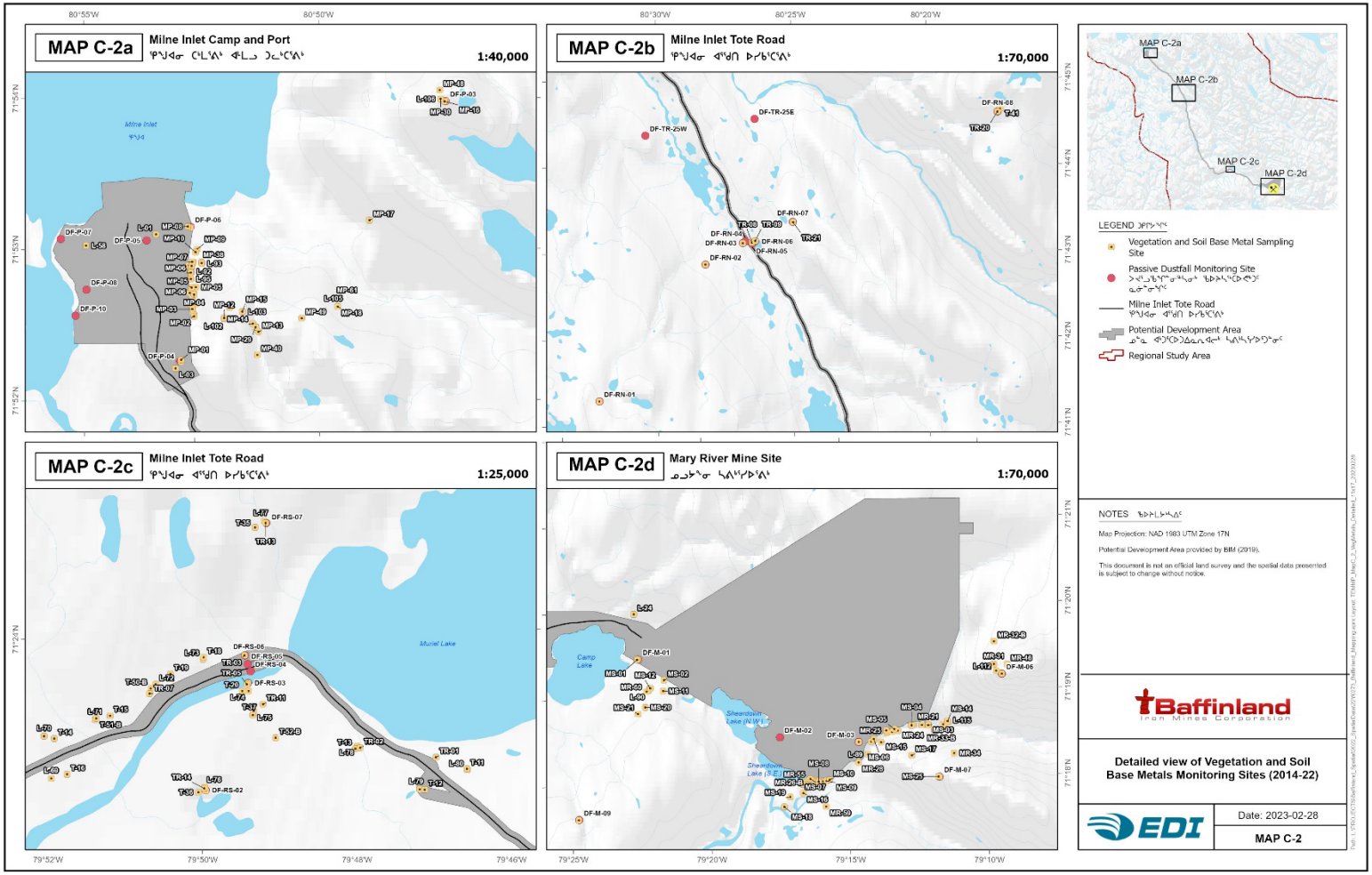
Page: of

Site	Date	GPS WPT	Latitude	Longitude	Area	Distance Category	Soil	Lichen	Photo	Observers	Notes

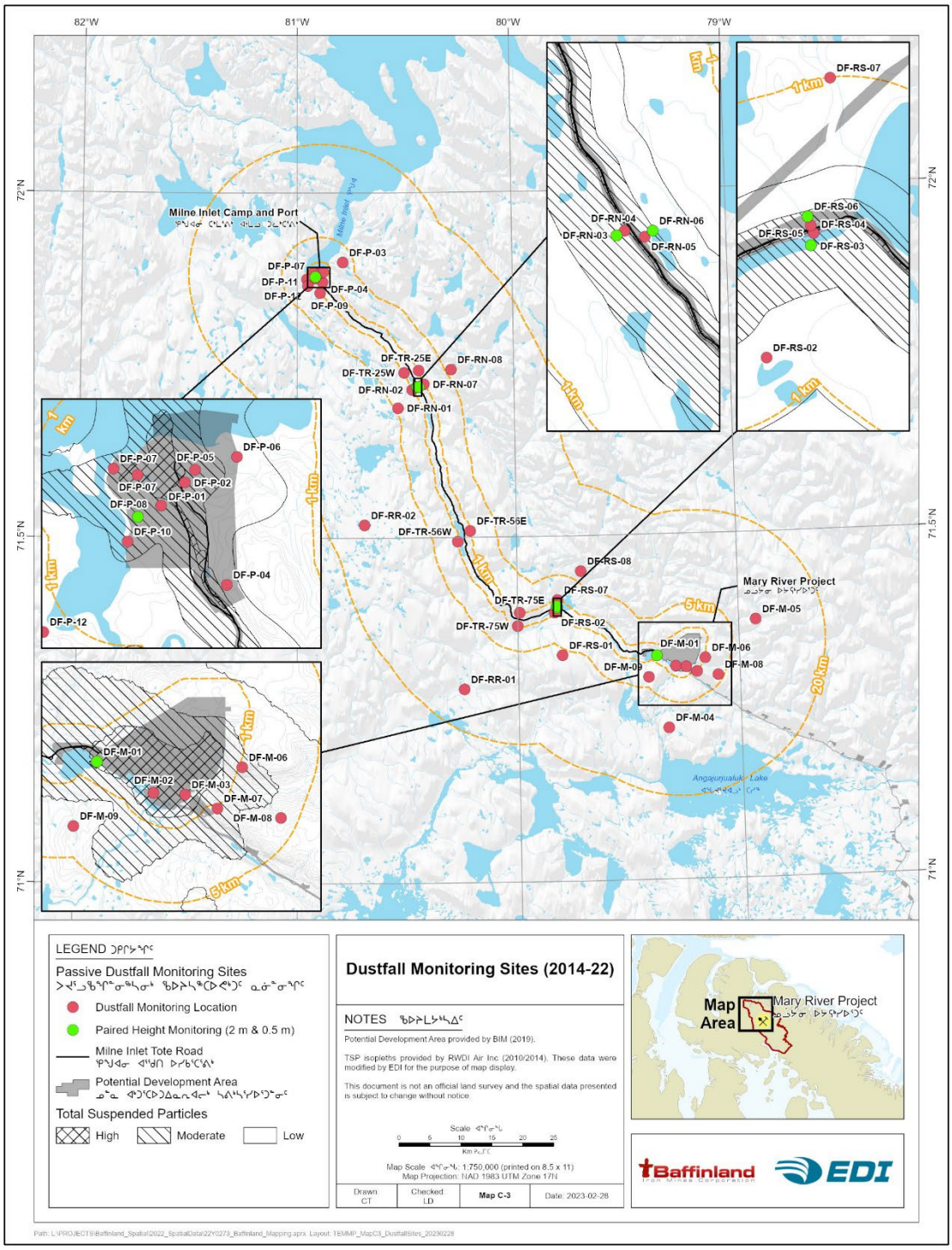
FIGURE C-5: DATASHEET FOR VEGETATION AND SOIL BASE METALS MONITORING



MAP C-2: VEGETATION AND SOIL BASE METALS MONITORING SITES.



MAP C-3: VEGETATION AND SOIL BASE METALS MONITORING SITES (PRECIS).



MAP C-4: DUSTFALL MONITORING SITES.

C-3 VEGETATION MONITORING: EXOTIC INVASIVE VEGETATION AND NATURAL REVEGETATION

PROGRAM SUMMARY

Indicator	Exotic Invasive Plant Species
Monitoring Category	Surveillance
Design Type	Regularly occurring inventory and observation
Measurable Parameter	Presence/occurrence of exotic invasive plant species
Key Project Interactions	Introduction of exotic invasive plant species
Goal	Project will not introduce exotic invasive plant species to the RSA
Objective	To monitor and mitigate introduction potential exotic invasive plant species within and adjacent to the Project footprint To evaluate natural revegetation of disturbed areas of the Project footprint
Threshold	Refer to Trigger-Action Response Plan (Section 5.2) Refer to Appendix C-3
Scope of Monitoring Work	Local monitoring: Monitoring every 3–5 years focusing on disturbed areas within and adjacent to the Project footprint (i.e., prone to colonization by ruderal species). Additional investigation may be triggered by the monitoring outcomes.
Status	Active/Ongoing
Agency/Partner Participation	None required

EXPERIMENTAL DESIGN AND METHODS

Surveys specific to exotic invasive plant species were initiated in 2014. Focal areas for surveying include the Mine Site, Milne Inlet, and the Tote Road (**Error! Reference source not found.**). The survey area will expand as necessary to include disturbed areas (i.e., the railway and Steensby Inlet) as the Project develops. Sample site selection considers potential entry points and locations where there is a high volume of humans, vehicles, and equipment entering or leaving the site (i.e., the batch plant, incinerator, landfill, laydown areas, along the airstrip, Mary River camp, and camps).

Presence/absence sampling methods are used to survey areas where exotic invasive species are most likely to be found, because it is an efficient and targeted method for surveying exotic invasive plants (Oldham 2007, ANPC 2012, Government of Alberta 2014). The method involves extensive surveys targeting disturbed habitats (i.e., along buildings, infrastructure and road ditches). Targeted areas are surveyed on foot with some sections surveyed in a vehicle at slow speeds along the Tote Road.

No exotic invasive plant species were detected during initial surveys in 2014. Monitoring will continue every 3–5 years in conjunction with other monitoring programs or as triggered by observations of exotic invasive plant species. If an exotic invasive plant species is positively identified within the Project footprint, the following steps will be taken to document the species occurrence:

- Identify the species by referring to the Baffinland Field Guide to Exotic Plant Species.
- Collect a sample for verification including the roots, flowers and/or fruits.

- Determine species distribution and density by walking for 100 m in each direction (based on Luttmerding et al. 1990 In British Columbia Ministry of Forests and Range and British Columbia Ministry of Environment 2010).
- Record the location, site information and estimate the area of extent with a GPS. If the species is discontinuous in distribution determine the number of sub-populations and provide the distribution and density for each sub-population (based on Luttmerding et al. 1990 In British Columbia Ministry of Forests and Range and British Columbia Ministry of Environment 2010).
- Photograph and mark the location with a stake.
- Consult a qualified botanist to verify the collected sample.
- Hand-pull individual plants and put in a garbage bag. Dispose of garbage bag in the incinerator or leave the garbage bag in the sun for a week to roast and kill the seeds. Dispose the bag in the landfill once confident that the seeds are dead.
- As per Project Term and Condition No. 37, "Any introductions of non-indigenous plant species must be promptly reported to the Government of Nunavut Department of Environment."

In addition to the exotic invasive plant survey, plant species found revegetating disturbed areas within the Project footprint are recorded to provide information regarding natural revegetation by local species. The survey method is conducted in conjunction with exotic invasive surveys. The survey area includes disturbed habitats (i.e., along buildings, infrastructure, and road ditches). Targeted areas are surveyed on foot with some sections surveyed in a vehicle at slow speeds along the Tote Road. Surveys are conducted every 3–5 years. Following Project construction, select sites will be targeted for revisit and to monitor species composition and abundance as part of revegetation studies.

THRESHOLD

The Project threshold for exotic invasive plant species is zero introductions; any confirmed exotic invasive plants located within or adjacent to the Project footprint will trigger mitigation actions. Exotic invasive plants will be destroyed, and an investigation conducted to determine if the pathway of entry can be determined; if possible, changes will be made to reduce the possibility of further introduction.

FREQUENCY

Monitoring of exotic invasive vegetation will occur every 3–5 years as determined by the results and consideration of adaptive management required to mitigate effects to vegetation health. If no biological differences are noted after three or four consecutive sampling intervals, the sampling frequency may be reassessed.

REFERENCES

Alberta Native Plant Council. 2012. ANPC guidelines for rare plant surveys in Alberta — 2012 update. 22 pp. (http://anpc.ab.ca/wp-content/uploads/2015/01/Guidelines-For-Rare-Plant-Surveys-in-AB-2012-Update.pdf)

British Columbia Ministry of Forests and Range and British Columbia Ministry of Environment. 2010. Field manual for describing terrestrial ecosystems 2nd edition. land management handbook, no. 25. 0229–1622. Crown Publications Inc., Victoria, British Columbia. 266 pp. (https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh25-2.htm)

Curran, O. 2013. Government of Nunavut forwards 2010 list of exotic species in Nunavut. Director, Sustainable Development. Baffinland Iron Mines Corporation. Email from Oliver Curran to Mike Setterington, EDI Environmental Dynamics Inc. July 8, 2013 email.

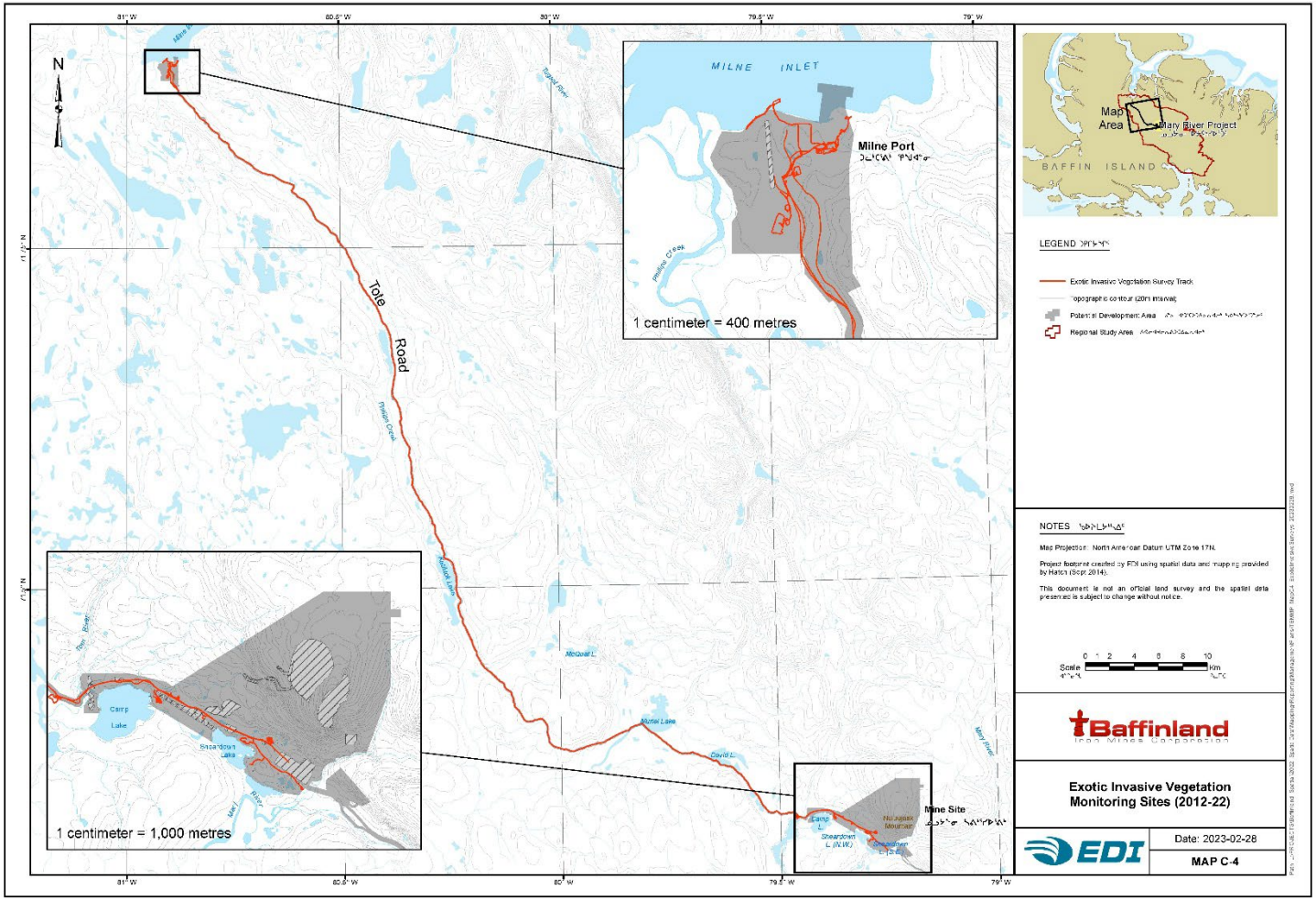
Government of Alberta. 2014. Field scouting. (http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/prm2365). Accessed June 2, 2014.

Government of Canada. 2013. What Are Alien and Invasive Alien Species? (http://www.ec.gc.ca/eee-ias/default.asp?lang=En&n=986EC44D-1.). Accessed January 16, 2014.

Government of Nunavut. 2005. Consolidation of Wildlife Act (Current to: November 6, 2012). S.Nu. 2003,c.26. S.Nu. 2003,c.26.

Oldham, M.J. 2007. 2006 survey of exotic plants along Northwest Territories highways. Presented to the Government of the Northwest Territories. 44 pp. (http://www.enr.gov.nt.ca/sites/enr/files/reports/exotic_plants_survey.pdf)

Yukon Invasive Species Council. 2018. Yukon Invasive Species Council: why are invasive species such a threat? (https://www.yukoninvasives.com/). Accessed April 13, 2018.



MAP C-5: EXOTIC INVASIVE VEGETATION MONITORING SITES.

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

PROGRAM SUMMARY

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	Project will not result in a significant change in 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	Local monitoring: 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).
Status	Complete
Agency/Partner Participation	Local monitoring: Arctic Raptors Inc.

BACKGROUND

Baseline data on cliff-nesting raptors began with exploratory surveys in 2006 and continued through 2008. The data collected in those years was examined to determine the utility for monitoring data. Arctic Raptors Inc. (ARInc.) personnel have conducted raptor monitoring as part of the Baffinland Iron Mine terrestrial baseline surveys and terrestrial effects monitoring efforts from 2011 through 2018. In general, surveys of known nesting sites were conducted by helicopter, boat, and on foot in the Steensby Inlet area, and by truck and helicopter along the Tote Road from the Mine Site to Milne Inlet. Over this period, monitoring objectives have been modified periodically to align with priorities for each phase of the Project (e.g., pre-FEIS, Early Revenue Phase).

The main goal of the 2011 survey was to revisit locations provided by Baffinland to substantiate and undertake quality control of monitoring data that had been collected from 2006–2008 in the Regional Study Area (RSA; extending from Milne Inlet in the north to Steensby Inlet in the south). A second goal was to gauge the potential for establishing a dedicated study area to be based at Steensby Inlet that could serve as a replicate for the long-term monitoring program located near Rankin Inlet, Nunavut. ARInc. initiated a banding program of breeding adults and nestlings, collected blood samples, searched for nesting locations that had not been previously identified, and conducted small mammal trapping following protocols already in place at Rankin Inlet. Surveys were conducted in 2012 of all known nesting sites with the same goals that had been identified in 2011. Surveys conducted in 2013 investigated nesting habitat selection of peregrine falcons (PEFA) and rough-legged hawks (RLHA). Fieldwork in 2014

involved ongoing extensive surveys (occupancy and productivity) of known nesting sites in the RSA and additional coverage of areas not previously surveyed to validate habitat selection models.

Prior to the 2015 breeding season, Arctic Raptors Inc. was tasked with providing a monitoring program to estimate potential effects of the Project. This marked a departure from extensive monitoring of known nesting sites throughout the RSA to monitoring nests within a 10 km radius buffer of the PDA, hereafter referred to as the Raptor Monitoring Area (RMA) (Map C-6). It is assumed that nest sites ≥ 10.0 km from the PDA were not influenced by Project-related disturbance. Prior to the start of the 2015 field season, a total of 131 nesting sites (65 PEFA and 66 RLHA) were known to exist within the RMA. The density of nesting sites was distributed disproportionately with higher densities located within 3 km of anthropogenic disturbance and much lower density beyond 3 km of disturbance. Thus, starting in 2015, survey effort shifted from extensive monitoring of known nesting sites throughout the RSA to monitoring of nesting sites only within the RMA as well as searching for previously unknown nesting sites. In 2015, efforts to locate previously unknown nest sites focused on those areas further from disturbance to address the limitation associated with small sample size further from disturbance. Survey effort in 2016 similarly focused on monitoring of known nesting sites within the RMA, as well as searching for previously unknown nesting sites, but also placed greater effort on multiple visits to address detection error. Fieldwork in 2017 followed the same methodology as 2016 and additional effort was placed on addressing issues raised in previous reports (terminology, and methodology to address the effect of alternative nesting sites on estimates of occupancy and productivity).

Fieldwork in 2018 followed methods used in 2016 and 2017 and included additional work based on recommendations from the 2017 Annual Monitoring Report; specifically, conducting three surveys (rather than two), and adding small mammal monitoring. Ashton Bradley, a graduate student registered in the Department of Biological Science at the University of Alberta, began his thesis research that will focus on investigating the effects of both anthropogenic (distance to disturbance) and natural disturbance regimes (nearest neighbor distance, weather, and prey abundance) on occupancy and reproductive success of peregrine falcons and rough-legged hawks in the RMA.

The landscape in the RMA is generally rugged, and elevation varies ranging from sea-level to 685 metres (m). The area includes a wide valley associated with Philip's Creek surrounded by high plateaus and mountains. The valley extends southward into poorly drained plains and rolling tundra. Vegetation is patchy, and dominated by mountain avens and arctic willow, along with alpine foxtail, wood rush, and saxifrage. Dry or high elevation sites are very sparsely vegetated, whereas wet areas have a continuous cover of sedge, cottongrass, saxifrage, and moss. Peregrine falcon and rough-legged hawk are the most common raptor species. Gyrfalcon, snowy owl and common raven are also encountered. Occupancy of potential nesting sites by gyrfalcon in the RMA have been too low to monitor annual trends for this species.

TERMINOLOGY

The terminology used follows Franke et al. (2017). The following terms are highlighted given their frequent use in the methodology:

Alternative Nesting Site — One of potentially several nests within a nesting territory that is not a used nest in the current year (Millsap et al. 2015).

Minimum Acceptable Age for Assessing Success — A standard nestling age at which a nest can be considered successful. An age when young are well grown but not old enough to fly and after which mortality is minimal until

actual fledging. Typically 80% of the age that young of a species normally leave the nest of their own volition for many species, but lower (65–75%) for species in which age at fledging varies considerably or for species that are more likely to leave the nest prematurely when checked (Steenhoff and Newton 2007).

Nesting Site — The substrate which supports the nest or the specific location of the nest on the landscape (Ritchie and Curatolo 1982, Millsap et al. 2015, Steenhof et al. 2017).

Nesting Territory — An area that contains, or historically contained, one or more nests within the home range of a mated pair: a confined locality where nests are found, usually in successive years, and where no more than one pair is known to have bred at one time (Newton and Marquiss 1984, Steenhoff and Newton 2007). Note that a nesting territory may or may not be defended (Postupalsky 1974), and probably does not include all of a pair's foraging habitat (Newton and Marquiss 1984, Steenhoff and Newton 2007).

Occupancy — The quotient of the count of occupied nesting territories and the count of known nesting territories that were fully surveyed in a given breeding season (Franke et al. 2017).

Productivity — The number of young that reach the minimum acceptable age for assessing success; usually reported as the number of young produced per territorial pair or per occupied territory in a particular year (Steenhoff and Newton 2007, Steenhof et al. 2017).

BREEDING PHENOLOGY

Breeding phenology is an important determinant of the timing of occupancy and productivity surveys. In Nunavut, the earliest documented arrival for peregrine falcons is May 10 at a known breeding site near Rankin Inlet. Although arrival timing varies with spring conditions, most sites are occupied during the third week of May. Median laying date in Rankin Inlet (June 9 ± 4.0 days) was earlier than Igloolik (June 15 ± 3.6 days; $Chi^2 = 31.56$, $p < 0.001$) and north Baffin Island (June 16 ± 3.5 days; $Chi^2 = 35.56$, $p < 0.001$) with no difference observed between Igloolik and Baffin ($Chi^2 = 0.77$, $p = 0.38$) (Jaffré et al. 2015). The incubation period of the fourth laid egg (33 days) is similar to what has been reported elsewhere (Burnham 1983). Rough-legged hawk breeding phenology is very similar to peregrine falcons but is typically advanced by a week to 10 days (Poole and Bromley 1988). Additionally, the presence of breeding pairs in locations where ground squirrels are absent (as is the case on Baffin Island) is typically cyclic in association with lemming abundance. The timing of surveys on Baffin Island was conducted to match the phenology of local breeding birds.

EXPERIMENTAL DESIGN AND METHODS

Raptor surveys from 2011 through 2014 were conducted through the region extending from Milne Inlet to Steensby Inlet. Survey efforts from 2015 to 2018 focused on monitoring of occupancy and reproductive success only within the RMA, and opportunistically documented previously unknown nesting sites.

HELICOPTER SURVEY

The focus of the helicopter surveys was to search known nesting sites for the presence of cliff-nesting birds. In addition to the structured surveys, favourable habitat was searched opportunistically when ferrying between known sites, camps or other mine infrastructure and when raptors or signs of site use (e.g., whitewash, orange-colored lichen, and unused nests) were observed. Sites were considered occupied if one or more adults displayed territorial or reproductive behavior (e.g., vocalization and/or flight behavior associated with defense of breeding territory or

presence of nest building, nest, or eggs). Locations with partially built or unused nests without detection of breeding aged adults were noted as such (i.e., no birds detected).

DISTANCE TO DISTURBANCE

Within the spatial extent of the 2015 study area, ESRI ArcGIS for Desktop v.10.3 (ESRI 2011) was used to calculate the distance from all raptor nest sites to the nearest mapped disturbance features (e.g., Project infrastructure). Shapefiles were derived from CAD drawings provided by HATCH, the onsite procurement and engineering contractors. From the CAD files, the Mine Site, Milne Port and Tote Road footprints were used to represent current and proposed disturbance as of September 2014. The ArcGIS Near Tool was used to calculate the Euclidean distance for each nest site (i.e., point location) to the nearest point of the Project footprint. Sites that were located within the spatial extent of the PDA received a distance value of 0 metres. Distance to disturbance (DD) values for only those sites within the RMA were retained for effects analysis on occupancy and reproductive success.

DISTANCE TO NEAREST NEIGHBOUR

Nearest neighbour distances (NND) were calculated in R (R Development Core Team 2017) using the sp, rgeos, and geosphere packages to transform the geographic coordinates describing nesting site locations into spatial objects, calculate pairwise distances and identify the shortest distance between each point and its nearest neighbouring point. Nearest neighbour distances were then used to assign nesting sites to nesting territories.

ASSIGNING NEST SITES TO NESTING TERRITORIES

In the absence of marked individuals, it can be challenging to definitively identify alternative nesting sites. Failure to account for alternative nesting sites can lead to underestimating demographic parameters such as annual productivity. To address this problem, a rule-based approach was used to estimate the number of alternative nesting sites within the RMA. Mean Nearest Neighbor Distance within the RMA equalled 1.2 km, and this information was used in conjunction with the following rule set to identify clusters of nesting sites that were potential alternative nesting sites:

- If two species-specific nesting sites were separated by a distance of ≤ 1 km they were considered alternative nesting sites in a single nesting territory.
- If two nesting sites within 1 km of each other were occupied by the same species in a given year, they were considered separate territories.
- If multiple species-specific nesting sites were within 1 km of one another, discrete geographic landforms or discontinuities in cliff structure were used to separate or combine sites into territories.

Temporal patterns of multi-species occupancy were used to assess the plausibility of decisions based on the application of the three rules listed above. For example, if two nesting sites were located within 1 km of each other and were occupied by two different species in alternating years, these nesting sites were identified as distinct alternative nesting sites for each species.

Assigning Identification Numbers (ID) to Nesting Territories was conducted according to the following rule set:

- Nesting Territory IDs were assigned within species only (e.g., Nesting Territory IDs for PEFA and RLHA were never shared).
- Nesting Territory IDs were assigned using the Identification Number of one of the Nesting Sites in the cluster according to the following rule set, in order of priority:

- Length of tenure (i.e., nesting sites with the longest tenure)
- First tenure (i.e., nesting sites with the first tenure in the event length of tenure was equal).

OCCUPANCY MODELLING

Although estimation of nesting site occupancy can serve as a metric of population status (MacKenzie et al. 2002, 2003), detection of nesting pairs is invariably imperfect, and estimating the proportion of occupied sites without accounting for detection error can lead to underestimation of true occupancy (Kéry and Schmidt 2008). Hierarchical occupancy modelling can estimate parameters that influence occupancy and simultaneously account for detection probability <1 (Marsh and Trenham 2008).

Occupancy at a nesting sites is limited to one of only two outcomes (occupied or not occupied), and is therefore a Bernoulli trial, and estimates of colonization (i.e., an unoccupied site becomes occupied), extinction (i.e., an occupied site becomes unoccupied), and survival (i.e., an occupied site remains occupied) can be generated for the time series, and covariates can be added to the model to test whether they influence the parameters by linking specific covariates to each of the three parameters using a logit link function.

Mutli-year occupancy was calculated in R (R Development Core Team 2017) using the unmarked package. Where appropriate, data were standardized (e.g., DNN was standardized by subtracting the mean from each distance value and dividing by the standard deviation) and then formatted specifically for unmarked using the unmarkedMultFrame function. Model fitting of candidate models was performed using the colext function. Akaike Information Criterion (AIC) was used for model selection. Fifteen candidate models were selected apriori to address anthropogenic (i.e., distance to disturbance) and ecological factors (i.e., distance to a nearest neighbour), and interactions among factors with the potential to influence model parameters (initial colonization, annual colonization, annual extinction, and detection probabilities). For example, the effect of distance to disturbance may vary with distance to nearest neighbour (i.e., the effect of distance to disturbance may depend on the proximity of neighbouring nesting sites). The aim of this analysis was twofold: 1) to estimate the proportion of occupied nesting sites and identify factors that may influence whether sites are occupied or not, and 2) to estimate the overall trend in occupancy from 2012 – 2018 (2011 was dropped from the analysis as only four nesting sites were fully surveyed in 2011). The trend was estimated using annual occupancy probabilities to calculate the average rate of change at the population level (MacKenzie et al., 2003) where a mean value < 1 indicates population decline and > 1 indicates an increase.

REPRODUCTIVE SUCCESS

The minimally acceptable age (MAA) for peregrine falcons based on recommendations in Steenhof et al. (2017) is 26 days, but 25 days of age is typically used (Anctil et al. 2014, Franke et al. 2016, 2017; Lamarre et al. 2017), to ensure nestlings do not fledge prematurely. Based on an average at 40 days of age (range 31 - 45; Parmelee et al. 1967), the MAA for rough-legged hawks is 32 days.

Given that nestling age during the survey period varied annually among years and sites, measures of annual productivity per se are biased high (i.e., counts of nestlings are often done when nestlings are <MAA), but should still allow for comparison among years within the RMA. Estimates of productivity reported here should not be compared to estimates of productivity in other regions. For this report, any nesting site that was surveyed once in either the pre-laying period or early during the incubation period, and once during the brood rearing period, was considered “fully surveyed”, and estimates of productivity were calculated as:

Productivity = NChicks/NNestingTerritoriesOccupied

where NChicks is equal to the total count of chicks observed in the summer survey and NNestingTerritoriesOccupied is equal to the count of nesting territories occupied (Parmelee et al. 1967). Surveys were conducted in the first week of August when nestlings are expected to range between 15 and 25 days of age and are conspicuous.

Distance to disturbance and distance to nearest neighbour individually, and as an interaction term were used as covariates to model the effect on count of nestlings at fully surveyed peregrine falcon and rough-legged hawk nesting territories from 2012 – 2018 in R (R Development Core Team 2017) the glm command with Poisson link in Package MASS.

SMALL MAMMAL MONITORING

Two small mammal trapping sessions were conducted from July 16-22, 2018 and August 9-15, 2018 following the procedure outlined by Cadieux et al.(2015). Two trapping sites were selected based on habitat thought to be suitable for both brown and collared lemmings (presence of old lemming nests, runways and burrows, seed-bearing plants, wet and dry tundra, and a total area that is equal to or larger than 700 m in length). In addition, we selected areas accessible by a light vehicle along the Tote Road.

Two permanent line transects were staked (GPS-located) at each trapping site. Line transects were 300 m long with 20 stations, 15 m apart. Each station consisted of a flagged stake and three museum special snap traps attached to the stake using string (1 m in length), for a total of 240 traps. Traps were evenly distributed around the stake at a distance no further than 1 m and baited with peanut butter.

All traps were checked once daily for six trap-nights, resulting in 1,440 trap-nights per trapping session. We recorded all captures, misfires, or missing bait from each trap.

REFERENCES

Anctil, A., Franke, A., and Bêty, J. 2014. Heavy Rainfall Increases Nestling Mortality of an Arctic Top Predator: Experimental Evidence and Long-Term Trend in Peregrine Falcons. Oecologia 174(3):1033–1043. DOI: 10.1007/s00442-013-2800-y

Baffinland Iron Mines Corporation. 2012a. Mary River Project Final Environmental Impact Statement: Volume 6 — Terrestrial Environment. 200 pp. (http://ftp.nirb.ca/02-REVIEWS/COMPLETED%20REVIEWS/08MN053-BAFFINLAND%20MARY%20RIVER/2-REVIEW/08-FINAL%20EIS/FEIS/Vol%2006/)

Burnham, W. 1983. Artificial Incubation of Falcon Eggs. Journal of Wildlife Management 47(1):158–168.

Cadieux, M., Fauteux, D., and Gauthier, G. 2015. Technical manual for sampling small mammals in the Arctic. Version 1. Centre d'etudes nordiques, Universite Laval, Laval, Quebec. 55 pp.

ESRI. 2011. ArcGIS desktop. Environmental Systems Research Institute, Redlands, California.

Franke, A., Lammarre, V., and Hedlin, E. 2016. Rapid nestling mortality in Arctic Peregrine Falcons due to biting effects of black flies. Arctic 69(3):281–285.

Franke, A., Steenhoff, K., and McIntyre, C.L. 2017. Terminology. pp. 33–42. In D.I. Anderson, C.M. McClure, A. Franke (eds.) Applied raptor ecology: essentials from Gyrfalcon research. The Peregrine Fund, Boise, ID, USA.

Jaffré, M., Franke, A., Anctil, A., Galipeau, P., Hedlin, E., Lamarre, V., L'Hérault, V., Nikolaiczuk, L., Peck, K., Robinson, B., and Bêty, J. 2015. Écologie de la reproduction du faucon pèlerin au Nunavut. Le Naturaliste Canadien 139(1):54–64. DOI: 10.7202/1027671ar

Kéry, M. and Schmidt, B. 2008. Imperfect detection and its consequences for monitoring for conservation. Community Ecology 9(2):207–216. DOI: 10.1556/ComEc.9.2008.2.10

Lamarre, V., Franke, A., Love, O.P., Legagneux, P., and Bêty, J. 2017. Linking pre-laying energy allocation and timing of breeding in a migratory arctic raptor. Oecologia 183(3):653–666. DOI: 10.1007/s00442-016-3797-9

MacKenzie, D.I., Nichols, J.D., Hines, J.E., Knutson, M.G., and Franklin, A.B. 2003. Estimating site occupancy, colonization, and local extinction when a species is detected imperfectly. Ecology 84(8):2200–2207.

MacKenzie, D.I., Nichols, J.D., Lachman, G.B., Droege, S., Andrew Royle, J., and Langtimm, C.A. 2002. Estimating site occupancy rates when detection probabilities are less than one. Ecology 83(8):2248–2255.

Marsh, D.M. and Trenham, P.C. 2008. Current Trends in Plant and Animal Population Monitoring. Conservation Biology 22(3):647–655. DOI: 10.1111/j.1523-1739.2008.00927.x

Millsap, B.A., Grubb, T.G., Murphy, R.K., Swem, T., and Watson, J.W. 2015. Conservation significance of alternative nests of golden eagles. Global Ecology and Conservation 3(Supplement C):234–241. DOI: 10.1016/j.gecco.2014.11.017

Newton, I. and Marquiss, M. 1984. Seasonal Trend in the Breeding Performance of Sparrowhawks. Journal of Animal Ecology 53(3):809–829. DOI: 10.2307/4661

Nunavut Impact Review Board. 2014. Project Certificate No. 005. Nunavut Impact Review Board. 82 pp.

Parmelee, D.F., Stephens, H.A., and Schmidt, R.H. 1967. The birds of southeastern Victoria Island and adjacent small islands. 222. National Museum of Canada Bulletin No. 222, Ottawa, Ontario. 229 pp.

Poole, K.G. and Bromley, R.G. 1988. Interrelationships within a raptor guild in the central Canadian arctic. Canadian Journal of Zoology 66(10):2275–2282.

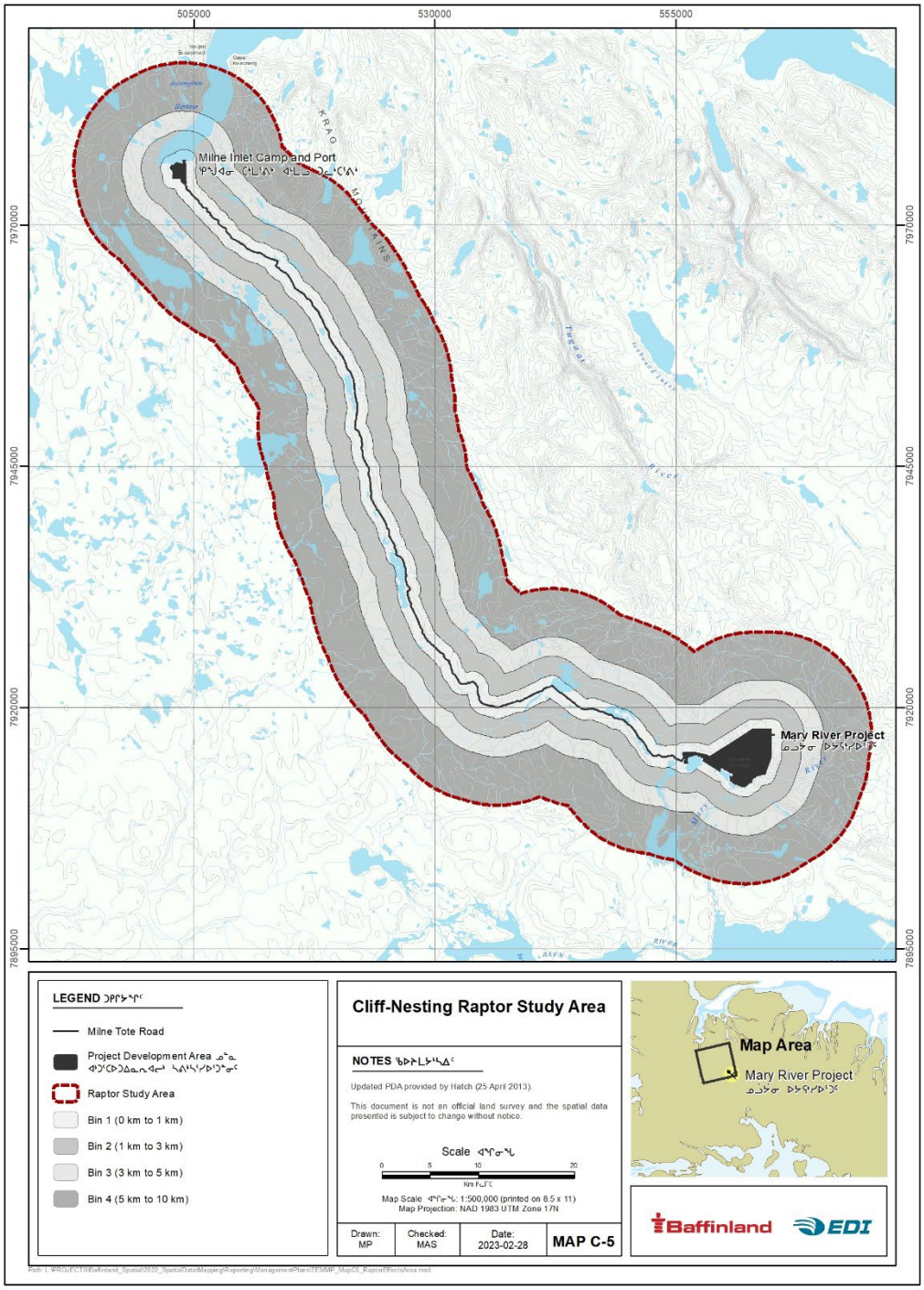
Postupalsky, S. 1974. Raptor reproductive success: some problems with methods, criteria, and terminology. pp. 21–31. In F.N. Hamerstrom Jr., B.E. Harrell, R.R. Olendorff (eds.) Management of Raptors. Raptor Research Report 2. Raptor Research Foundation, Inc., Vermillion, SD.

R Development Core Team. 2017. R: A language and environment for statistical computing. R Foundation for Statistical Programming, Vienna, Austria.

Ritchie, R.J. and Curatolo, J.A. 1982. Notes on golden eagle productivity and nest site characteristics, Porcupine River, Alaska, 1979–1982. Raptor Research 16(4):123–127.

Steenhof, K., Kochert, M.N., McIntyre, C.L., and Brown, J.L. 2017. Coming to Terms about Describing Golden Eagle Reproduction. Journal of Raptor Research 51(3):378–390. DOI: 10.3356/JRR-16-46.1

Steenhoff, K. and Newton, I. 2007. Assessing nesting success and productivity. pp. 181–192. In D.M. Bird, K.L. Bildstein (eds.) Raptor research and management techniques. Hancock House, Blaine, WA.



MAP C-6: CLIFF-NESTING RAPTOR STUDY AREA

C-5 MIGRATORY BIRD MONITORING: SHIPPING ACTIVITY ON SEABIRDS AND SEADUCKS

PROGRAM SUMMARY

Indicator	Common Eider, 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	Project will not result in a significant change in eider and red knot nesting density
Objective	To evaluate number of eider and red knot nests at the port sites
Threshold	<20% decrease (relative to control) in nesting within the Steensby Port ZOI over three consecutive years of monitoring.
Scope of Monitoring Work	Local monitoring Pre- and post-disturbance surveys of eider and red knot nesting densities within and adjacent to the port site and control areas.
Status	Complete
Agency/Partner Participation	ECCC-CWS

RESULTS AND CONCLUSIONS

Baseline surveys on Nesting of Common and King Eider were completed in 2014. Methods and results are summarized in the 2013 and 2014 terrestrial annual monitoring reports.

ECCC-CWS, supported by Baffinland, then conducted research in marine regions of Canada's Arctic looking at the potential risk from increased shipping activity on seabirds and seaducks. Much of this work is ongoing, and research results are being analyzed by graduate students from multiple Canadian universities. Further information regarding these programs is captured in the Marine Environmental Effects Monitoring Plan.

- Thick-Billed Murre Habitat at Digges Island and Cape Graham Moore — The goal of this project is to determine the distribution and abundance patterns of Thick-billed Murres from nesting colonies to identify key marine habitats to fill information gaps related to potential environmental impacts of increased shipping.
- Hudson Strait Common Eider and Polar Bear Surveys — This project is quantifying the distribution and abundance of marine birds and polar bears in the Hudson Strait-Foxe Basin region on an annual basis, as well as the physical and biological factors that determine those patterns. This information will eventually be integrated into computer simulation models to assess and anticipate possible interactions between eider and polar bear populations and proposed project marine shipping.
- Seabird Distribution and Marine Shipping — A review of the at-sea distribution of seabirds in relation to shipping lanes was conducted using historical seabird datasets. Marine areas of high density for seabirds were identified and overlaid with shipping activity data. Interaction of these layers identified regions

important for foraging and migration where high shipping activity would pose the highest risk to seabird species.

- Eider Duck Ecology on East Bay Island — Research on eider duck ecology has been conducted on East Bay Island for the past 20 years in response to concerns regarding overharvesting of northern Common Eiders on their wintering range in west Greenland. This long-term dataset was expanded over the years and has been used as a baseline in response to various other concerns raised by northern communities and environmental assessments, including resource development in the region. This study examines the impacts of weather, harvest, Polar Bear predation, and physiology on eider reproductive decisions in the absence of shipping activity.

C-6 MIGRATORY BIRD MONITORING: SONGBIRDS AND SHOREBIRDS

PROGRAM SUMMARY

Indicator	Songbirds and Shorebirds
Monitoring Category	Baseline Research & Monitoring
Design Type	PRISM Plots
Measurable Parameter	Abundance and density
Key Project Interactions	Habitat loss and sensory disturbance due to Project activities
Goal	Project will not significantly change songbird and shorebird abundance and density within the RSA.
Objective	Baseline documentation of songbird and shorebird distribution and abundance in the Eastern Arctic.
Threshold	Not Applicable
Scope of Monitoring Work	Regional Monitoring: 20 standardized PRISM surveyed during the nesting period and before fledging within the RSA. Monitoring will occur every 5 years
Status	Active/Ongoing
Agency/Partner Participation	ECCC-CWS

RESULTS AND CONCLUSIONS

Baseline surveys are complete. Baffinland is supporting ECCC's PRISM program as suggested in Project commitments and terms and conditions. The Canadian Wildlife Service conducted landbird and shorebird surveys to monitor nesting densities at 14 sites within a 100 km radius of the Project and an additional 24 sites in other areas of North Baffin Island. CWS had previously raised the possibility of the potential for bird species at risk in the Project area and the potential effects on those species. No species at risk (e.g., red knot, red-necked phalarope) were documented during these surveys. Baffinland is supporting further investigation by assisting the CWS in deploying passive sound recording devices to detect the vocalizations of rare birds in suitable habitat in the project area. If species are detected, mitigation will be developed with input from CWS.

C-7 WILDLIFE MONITORING: DIRECT HABITAT LOSS

PROGRAM SUMMARY

Baffinland will quantify the total area disturbed (within approved footprint) and report annually to the NIRB.

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)
Goal	Quantify direct habitat loss in the Project footprint
Objective	Habitat loss limited to the amount identified in the Project description
Threshold	All species
Scope of Monitoring Work	Local monitoring: Measure area of Project disturbance on an annual basis.
Status	Active/Ongoing
Agency/Partner Participation	None required

C-8 WILDLIFE MONITORING: INCIDENTAL OBSERVATIONS AND PROJECT MORTALITY WILDLIFE LOG

PROGRAM SUMMARY

Baffinland will quantify and investigate incidental observations and project-related mortality (should they occur, based on wildlife logs) and report annually to the NIRB.

Indicator	All species
Monitoring Category	Surveillance
Design Type	Not Applicable
Measurable Parameter	Wildlife mortality
Key Project Interactions	Wildlife mortality due to Project activities and indirect habitat loss associated with the Project.
Goal	Track wildlife observations and Project-related mortality within and adjacent to the Project footprint
Objective	Every Project-related mortality of caribou will be reviewed to determine if further action is needed. Other species are dealt with on a species-by-species basis.
Threshold	All species
Scope of Monitoring Work	Local monitoring: Log of wildlife observations within the RSA. Record of collisions and all other observed wildlife mortalities within the RSA.
Status	Active/Ongoing
Agency/Partner Participation	None required

DID YOU SEE ANY WILDLIFE?

LET US KNOW

ᐅᒪᓕᵒᓂᵇ ᑕdᓪᐅᐅᖏᐱᑦ ? ᐊᖏᑎ ᖃᐅᔨᑲᖏᑎᒍᑦ

Wildlife observations by site personnel make very important contributions to environmental baseline studies.
It is important enough that Baffinland asks you to record any observations of wildlife by listing them on this form.
ᐅᒪᓕᵒᓂᵇ ᖃᐅᔨᖏᑲᑦᓂᵒᵇ ᓴᐃᖏᖏᓂᐊᖏᕐᕋᖏᑦ ᓴᓇᓕᵒᓂᑦ ᐊᑐᑎᖏᑎᑲᖏᒪᑦ ᐊᓭᑎᒋᑦᑐᵇ ᖃᐅᔨᖏᑲᓂᒻᑎᑦ.
ᐊᑐᑎᖏᑲᓂᓐᓗ ᐱᔪᑎᓪᓗᒍ ᐸᓭᵒᓪᑯᓂᒃ ᐃᓕᓴᐅᑦ ᐊᐱᓗᐅᑦ ᐅᒪᓕᵒᓂᵇ ᑕdᑐᓴᐃᑦ ᑎᑎᖏᑲᑦᓗᑎᑦ

DATE ᐅᓪᓗᖓ	ANIMAL & HOW MANY? ᐅᒪᓕᵒᓂᵇ ᐱᓯᒪᐅᑦ ᐊᒪᓗ ᖃᐅᐅᓯᒪᐅᑦ ?	WHERE? ᓇᵒᓂ ?	COMMENTS ᐅᵒᖃᐅᓯᑦ

Please leave wildlife alone. Do not feed them and never leave waste behind.
ᐊᖏᑎ ᐅᒪᓕᑦ ᐅᑕᐃᓴᖃᐅᕐᓂᓪᓕᑦ. ᕿᑎᓗ ᐊᕐᓴᓂᓪᓕᑦ ᐊᒪᓗ ᑕᒪᐅᖅᑐᐃᓇᓇᒃ ᐃᑎᑎᖃᑕᕐᓴᓂᓪᓕᑦ

FIGURE C-6: WILDLIFE LOG DATA LOG

C-9 CARIBOU MONITORING: INDIRECT HABITAT LOSS

PROGRAM SUMMARY

Indirect habitat loss will be assessed, likely as a measure of caribou distribution within the north Baffin Island region relative to proximity to the Mary River Project. Distribution and density will be assessed at variable distances from the Project to determine if there is a Project and/or habitat related effect on distribution and density. Methods will be developed later when caribou numbers increase and there is a review of current technology to monitor the potential effect of indirect habitat loss. The data used will include a combination of hunter observations, aerial survey data, and collar data collected in collaboration with the regional studies conducted by the GNDoE. Analysis and reporting will occur as data become available.

Indicator	Caribou
Monitoring Category	Surveillance
Design Type	Observational (aerial surveys, collar data)
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 and evaluate the ZOI as suitable data are made available.
Threshold	The size of the ZOI will be equal to that used in the impact assessment and caribou occurrence within the ZOI equivalent to the prediction made in the Project Impact Assessment.
Status	Pending
Scope of Monitoring Work	Addressing this target requires regional-level surveys. Local monitoring: Continuous log of caribou observations from staff to document occurrence and maintain a record of flight paths and cruising altitudes of aircraft within ZOI. Regional Monitoring: • Baffinland and the GNDoE will develop a MOU related to regional caribou monitoring. 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. • A GN and Baffinland-sponsored caribou satellite collaring program will assist with the determination of long-term caribou distribution patterns.
Agency/Partner Participation	Local monitoring: Baffinland employees, QIA, Pond Inlet, Igloolik, Arctic Bay HTOs Regional monitoring: GNDoE

C-10 CARIBOU MONITORING: HABITAT USE DURING CALVING

PROGRAM SUMMARY

Indicator	Caribou
Monitoring Category	Baseline Research and Surveillance
Design Type	Observational (aerial surveys, height of land surveys, collar data) and opportunistic (behavioural observations)
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
Status	Pending
Scope of Monitoring Work	Local monitoring: 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 the calving season and construction activities. Monitoring during construction and post-construction to document occurrence, particularly in the vicinity of Cockburn Lake. Wildlife monitor will be on site to detect calving activities near the road. If a caribou is found to be calving near Tote Road mitigation measures will be implemented. Regional Monitoring: 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	Local monitoring: Baffinland employees, QIA, Pond Inlet, Igloolik, Arctic Bay HTOs Regional monitoring: GNDoE

HEIGHT OF LAND SURVEY

Height of land (HoL) surveys began in 2013 to study caribou use and their behavioural reactions to human activities near the Project footprint, especially during the calving season. The HOL surveys are intended to examine if/how caribou (especially cows with calves) respond to Project-related activities and infrastructure. When data is available, the HOL surveys can allow for long-term monitoring and observation of caribou behaviour throughout the life of the Project and provide information to verify predicted Project-related effects on caribou movement and habitat use.

EXPERIMENTAL DESIGN AND METHODS

The HOL survey methods were developed in consultation with the TEWG (specifically the Mittimatalik Hunters and Trappers Organization [MHTO]) and incorporated Inuit Qaujimajatuqangit into strategies for detecting caribou (EDI Environmental Dynamics Inc. 2019). The HOL surveys comprise observations from a high point of land (i.e., to increase the observable area) for a prescribed amount of time using binoculars and a spotting scope. The objective is to detect and record caribou and their proximity to Project infrastructure. The 2021 HOL surveys were conducted in early summer (June 6 to 17, 2021) to observe caribou during the calving period; opportunistic late-winter surveys were not conducted in 2021.

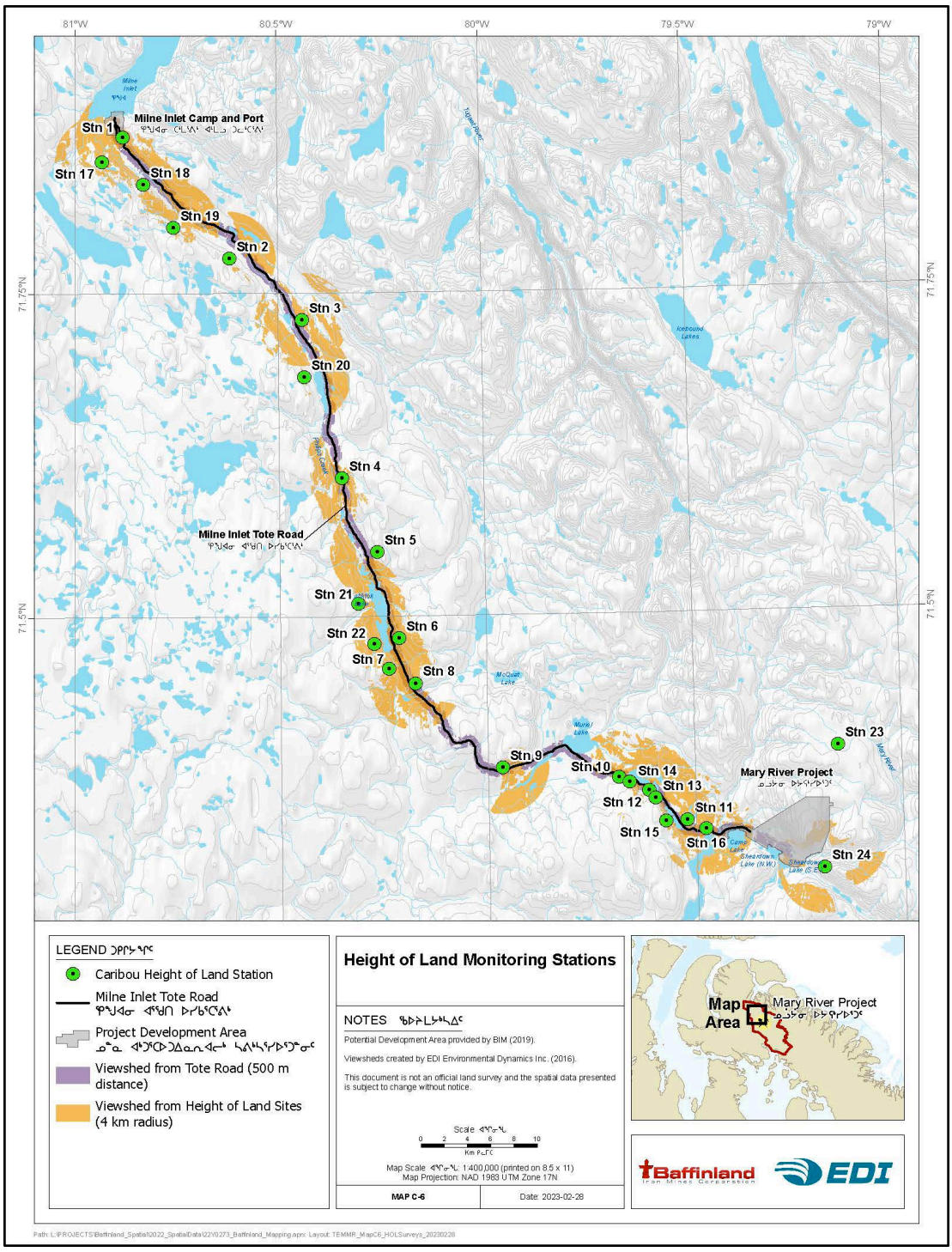
Surveys were conducted at pre-established HOL stations (1 to 24) distributed throughout the Project footprint, typically at the highest points of the landscape, to optimize the viewshed. A 360-degree viewshed was seldom achieved due to obstruction from landscape/terrain. Project components (e.g., the Tote Road, accommodation

complexes, Deposit No. 1) were visible from each station. The locations of the stations were selected based on strategic positioning along the Project footprint, elevation gain (i.e., for improved viewshed), and accessibility during spring conditions. Depending on weather conditions, Stations 1 to 16 were generally accessible on foot, whereas Stations 17 to 24 were primarily accessible via helicopter (e.g., due to waterbodies, terrain and travel distances). Two qualified biologists from EDI Environmental Dynamics Inc. (EDI) conducted the 2021 surveys. Unlike previous surveys, Baffinland personnel and Inuit assistants did not participate in the survey due to COVID-19 restrictions (i.e. minimizing interactions between site personnel).

The survey procedure involved one observer scanning the viewshed with a spotting scope (i.e., focusing on the distant landscape) and one observer scanning the viewshed with binoculars (i.e., focusing on the intermediate and near landscape). EDI conducted a minimum of two surveys at each HOL station for 40 minutes. Using digital, tablet-based forms, the following information standards were recorded:

- station number (with georeferencing),
- location description (direction from road, aspect, terrain, other identifying features);
- general habitat description (vegetation and soil, if/where possible),
- presence of snow cover on landscape;
- photograph numbers (taken from multiple cardinal directions); and,
- survey observation timeframe (start/end times).

If caribou were observed, the survey team would monitor behaviour following established protocols described in the 2013 Annual Monitoring Report (EDI Environmental Dynamics Inc. 2014). Depending on the number of caribou, observations would be made as either a focal or scan sample ((Martin and Bateson 1993). For scan sampling, activity categories (e.g., walking, foraging, running, lying) would be assigned and tallied at two-minute intervals. For the focal sample, activity observations would be recorded at two-minute intervals; Project-related activities or events (e.g., truck travel along the Tote Road) would also be recorded to document any unique responses. Distances and directions of the observed individual or group to and from Project infrastructure were estimated (if/where applicable) and ground-truthed using a GPS.



MAP C-6: HEIGHT OF LAND MONITORING STATIONS.

Table C-1 LOCATION COORDINATES FOR OF HEIGHT OF LAND MONITORING STATIONST

HoL Station	Latitude	Longitude
1	71.871	-80.883
2	71.777	-80.620
3	71.730	-80.442
4	71.607	-80.347
5	71.550	-80.264
6	71.483	-80.213
7	71.460	-80.238
8	71.448	-80.174
9	71.382	-79.967
10	71.373	-79.686
11	71.339	-79.522
12	71.363	-79.614
13	71.357	-79.599
14	71.370	-79.661
15	71.339	-79.573
16	71.332	-79.478
17	71.852	-80.935
18	71.835	-80.831
19	71.801	-80.758
20	71.685	-80.438
21	71.510	-80.311
22	71.479	-80.273
23	71.395	-79.155
24	71.300	-79.195

DATA ANALYSES

HoL observation data are typically summarized as a narrative and in a table summary (e.g.,Table C-3). Behaviour data summaries and analyses will be determined later pending collection of caribou observation data and discussion with the TEWG.

Table C-2 EXAMPLE SUMMARY FOR HEIGHT OF LAND MONITORING OBSERVATIONS

Method of transportation to HoL station	Dates of observation	Number of observers per survey	Survey Effort (hh:mm)
Describe mode of transportation (recognizing that the last resort – helicopter – could influence caribou behaviour	*Insert dates of observations*	*2*	*A full tally of time spent observing the landscape for caribou from the combined height of land surveys*

REMOTE CAMERA WILDLIFE MONITORING

A remote camera monitoring program was initiated in summer 2021. The study involved installing remote cameras paired with HOL stations to supplement HOL surveys and further evaluate caribou movement in response to the Tote Road and proposed rail line. Unlike the HOL surveys, which are limited to 2-3 weeks, the cameras provide a continuous observation alternative spanning a period from late July 2021 to mid October 2021.

EXPERIMENTAL DESIGN AND METHODS

On July 28 and August 6, 2021, EDI and Baffinland personnel deployed 12 Reconyx HP2x HyperFire 2 Professional Cover IR remote cameras (two per site/station) at strategic locations corresponding with HOL survey stations along the Tote Road. Baffinland personnel were responsible for camera care and maintenance (i.e., battery and SD card exchanges).

The remote camera sites were accessed via helicopter, vehicle, or foot. Most cameras were established within 500 m of an access trail or road. Cameras were installed using a rock drill to anchor the units to the ground using a steel/rebar tripod and affixed with steel clamps. Cameras were set approximately chest high and positioned to capture an optimal viewshed. Cameras were programmed before deployment and tested/checked onsite (after installation) to verify proper function and viewshed.

DATA CAPTURE AND CAMERA MAINTENANCE

The cameras are checked and maintained as soon as practicable in early spring and late fall to swap batteries and SD cards and verify realignment. Data files are archived and relayed to a qualified biologist to review the photos and determine wildlife observations focusing on caribou and large carnivores; wildlife activities (even outside the study's focus area) are carefully investigated and documented. The following information was recorded for each wildlife observation: species identity, age and sex (if/where possible), number of individuals, start/end time, and general comments.

REFERENCES

EDI Environmental Dynamics Inc. 2014. 2013 Terrestrial Environment Annual Monitoring Report. Prepared for Baffinland Iron Mines Corporation, Toronto, Ontario. 152 pp.

Martin, P. and Bateson, P. 1993. Measuring behaviour: An introductory guide, 2nd Edition. Cambridge University Press, Great Britain. xvi + 222 pp.

Baffinland

Form C1 – Height-of-Land Survey 2016

Page __ of __

Instructions:

- Set-up spotting scope at station, while the other observer begins scoping with binoculars
- Scan in all directions for 20 minutes, record any wildlife observations below. Take note of any wildlife sign at or on the way to the station.
- If caribou are seen, begin a scan survey using Form C2 – Focal/Scan Survey.

Date_____ Observers_____ Weather_____

Station	Time Start	Time End	Visibility [1]	Species	Number	Observation Type[2]	Distance (m)[3]	Direction[4]	Comments/Form C2 Reference[5]	Snow % Cover

[1] Visibility codes: P = poor, G = good, E= excellent
[2] Observation Type codes: S= sighting, T= track, P= fecal pellet, O= other
[3] Distance from station
[4] Direction from station
[5] If caribou behavioural observations are made, reference the corresponding Form C2 – Focal/Scan Survey 2015.

FIGURE C-7: HEIGHT OF LAND SURVEY FORM (GENERAL).

Baffinland

Form C2 – Focal/Scan Survey 2016
Page __ of __

Instructions:

- Conduct a Focal survey if only a few individuals are observed and you can track the behaviour of each one; Scan survey if multiple individuals are observed and you cannot differentiate, then record a tally of the number individuals displaying each activity type
- Tally the type of activity every two minutes, for at least one hour
- If a stressor event occurs, record the time and type of stressor, the time the stressor is gone, and record all caribou activity immediately following the stressor (i.e., even if the two minute pause is not yet complete)

Date:	Time:	Observer:	Recorder:	
Visibility (P/G/E):	Temperature:	Wind:	Other weather:	
Insect activity:				
Wpt or Station #:	Latitude:	Distance (m) to caribou:	Group size:	
Coordinates must be in decimal degrees (e.g. 64.7778, -130.4456)	Longitude:	Direction to caribou:	Group composition: F___ M___ Y___ C___ U___	
			Females, Males, Yearlings, Calves, Unknown	

Start time:_____ End Time:_____ Total Survey Time:_____

Time	Forage (head down walking)	Run	Trot	Alert (standing or bedded with head up, ears pointed)	Walk	Stand	Lie/Bed	Stressor	Distance to Stressor (m)	Comments
Fill out the top of the sheet while waiting to start scan										

Stressor codes: A= aircraft, LV= light vehicle, HV= heavy vehicle, S= snowmobile, B= blasts, H= human, W= wildlife

FIGURE C-8: HEIGHT OF LAND SURVEY FORM (DETAILED) IF/WHEN CARIBOU ARE OBSERVED

C-11 CARIBOU MONITORING: MOVEMENT

PROGRAM SUMMARY

Caribou movement will be monitored as a direct project interaction through snow tracking, and as a regional-level response through analyses of caribou collar data if 1) the GN has collared caribou in the region and 2) if the data are made available to Baffinland.

Indicator	Caribou
Monitoring Category	Baseline Research and Surveillance
Design Type	Observational
Measurable Parameter	Movement in the ZOI
Key Project Interactions	Road and railway structure and operations may act as a filter or barrier to the 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 Road/Railway and other Project infrastructure
Threshold	Less than 10% deflection of approaches to Railway and infrastructure; Embankments (road or rail) will impose a barrier to fewer than 10% of existing caribou trails.
Status	Pending
Scope of Monitoring Work	Local monitoring: Have an on-site wildlife monitor to implement seasonal caribou track surveys; these can be ground-based (snow machine) to observe movement during early winter and spring seasons. Trail monitoring using remote motion-sensing cameras and documenting fresh tracks at select trails that cross or approach the Road/Railway. Monitor response of caribou to railway bridge and tunnels. In conjunction with snow track surveys, monitor snowbank heights maintained at <1 m; monitor the use of snowbanks by caribou along the Tote Road. Monitor and document effectiveness of the Caribou Decision Tree. Monitor caribou use of water crossings. Regional Monitoring: Long-term movement patterns as identified by a GN and Baffinland-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 GN.
Agency/Partner Participation	Local monitoring: QIA, Pond Inlet, Igloolik, Arctic Bay HTOs, Baffinland employees Regional monitoring: GNDoE

SNOW TRACKING

The purpose of snow tracking surveys is to collect data on caribou response to Project activities based on patterns of movement observed by their tracks.

Snow track surveys are conducted along the Tote Road in late winter (April). Observers travel by truck slowly along the Tote Road looking for wildlife tracks with a focus on caribou tracks. When wildlife tracks are observed, surveyors park the truck and walk to the tracks to confirm species and then follow the tracks towards and away from the road to observe behaviour, habitat use and possible divergence of travel paths. When tracks are near or crossed the Tote Road surveyors would record the following information:

- Latitude and longitude at the point where the tracks crossed the road;

- Species the tracks were from;
- Number of sets of tracks counted (i.e., group size);
- Direction of travel in relation to the road (e.g., deflected, travelled along, or crossing the Tote Road); and
- Height of the snowbank measured at either the crossing point, or likely point of deflection.

Photos and additional relevant information are recorded for each site. Results are provided in annual terrestrial environment monitoring reports, beginning with the 2014 annual terrestrial monitoring report.

Discussion Topics on Methods from TEWG Meetings:

- The elevated position of the observer in the truck allows for clear and unrestricted visibility to at least 300 m horizontal distance from the edge of the road (when conditions are clear). Conducting the survey from the road alone limits observation to near-road. More distant surveys using snow machines with transects parallel to the road (e.g., 1 km) can be considered when caribou are observed using the area in numbers sufficient for robust survey data analysis.
- Surveys will be attempted in “fresh” snow conditions to better estimate current animal use. “Fresh” snow likely means fresh blown snow conditions after weather events have settled.
- The survey will remain at the surveillance level until there is a suitable sample of the response variable (caribou tracks) to allow for robust statistical analyses. When caribou observations increase, Baffinland will consider increasing the frequency of surveys within a season to encompass variability and different snow and operation conditions.

COLLAR DATA

Caribou collar data can be used to assess individual caribou movement patterns and the data can be used in part to see if those patterns are influenced by Project infrastructure and activity. It is unknown what technology will be available for collar data collection and analyses when the GN next collars north Baffin Island caribou. Specific methods are not described further but will be provided as necessary in updates to the TEMMP and as caribou collar studies are initiated and data shared with Baffinland. Baffinland intends to support this regional monitoring program by developing an MOU with the GN should a future study be warranted and proceed. Reporting of movement patterns will be included in annual terrestrial environment monitoring reports when data suitable for analysis become available.

C-12 CARIBOU MONITORING: HARVEST-RELATED MORTALITY

PROGRAM SUMMARY

Baffinland records human use of the project area in the "Hunter and Visitor Log." Log entries include an estimate of the caribou harvested if the individuals are willing to share the information. Summaries of the "Hunter and Visitor Log" are provided in the NIRB annual report.

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	No reduction in the caribou Total Allowable Harvest due to Project-related impacts[25]
Status	Ongoing
Scope of Monitoring Work	Local monitoring: Log of hunters passing through and using the camp. Regional Monitoring: Potential Baffinland-sponsored multi-year hunter harvest study, which includes a summary of annual caribou harvest and, if possible, harvest locations.
Agency/Partner Participation	Local monitoring: QIA, Pond Inlet, Igloolik, Arctic Bay HTOs, Baffinland employees (e.g., train conductor) Regional monitoring: GNDoE, NWMB

[25] QIA suggested wording as per comments on TEMMP in 2021.

C-13 CARIBOU MONITORING: HEALTH, CONTAMINANTS AND BODY CONDITION

PROGRAM SUMMARY

Baffinland will assist with tissue collection, through the GN-led sampling program. Baffinland has offered to the GN the service of providing sampling kits to harvesters passing through the Mary River and Milne Port site.

Indicator	Caribou
Monitoring Category	Surveillance
Design Type	Opportunistic sample collection
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
Status	Ongoing
Scope of Monitoring Work	Regional Monitoring: 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: QIA, Pond Inlet, Igloolik, Arctic Bay HTOs, GNDoE, NWMB

C-14 WOLF MONITORING: DEN SITES

PROGRAM SUMMARY

Methods of wolf den monitoring are described in the 2014 terrestrial environment annual report. The GNDoE suggested that the wolf monitoring program be postponed until wolves are present.

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 activities that create sensory disturbances and/or temporarily reduce the effectiveness (usefulness) of habitats adjacent to the Project footprint potentially resulting avoidance of habitats or disturbance to denning wolves.
Goal	The Project will have a not significant effect on wolf den sites
Objective	Allow wolves to den undisturbed within the ZOI
Threshold	No threshold currently
Status	Pending
Scope of Monitoring Work	Local monitoring: Aerial surveys of known den sites within a 10 km radius of the mine site to document occupancy, opportunistic documentation of other den sites. 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: QIA, Pond Inlet, Igloolik, Arctic Bay HTOs, GNDoE Regional monitoring: GNDoE

Appendix D
TERRESTRIAL ENVIRONMENT WORKING GROUP | TERMS OF REFERENCE

The Terms of Reference (ToR) for the Terrestrial Environment Working Group (TEWG) are currently under revision. The draft ToR were circulated to the Marine Environment Working Group (MEWG) in August of 2022 for review and comment. Baffinland received feedback from all parties as of February 10th, 2023 and is now developing a second draft that incorporates member and observer feedback. This second revised draft of the ToR for the MEWG will serve as the initial revised draft for the TEWG.