

WILDLIFE MITIGATION AND MONITORING PLAN



AGNICO EAGLE
HOPE BAY

**HOPE BAY, NUNAVUT
APRIL 2021**

Wildlife Mitigation and Monitoring Plan

Plain Language Overview:

This Wildlife Mitigation and Monitoring Plan (WMMP; the Plan) describes mitigations that will remove or minimize potential effects to wildlife to ensure there are no significant or irreversible impacts to wildlife populations. This plan also includes the monitoring programs that are designed to validate effects predictions for the Doris, Madrid and Boston Projects.

Location: Hope Bay Project, Nunavut

Publication Date: April 2021

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Revisions

Revision #	Date	Section	Changes Summary	Author
1	2005	Full Document	Update to the 2013	Golder Associates
2	2006	Full Document	Updating the plan to include commitments made during the review of the Doris Project and NIRB conditions.	Golder Associates
3	2011	Full Document	Updating the plan to include updates to methods and in response to intervener comments.	Greg Sharam, ERM
4	2013	Full Document	Updating the plan to include updates to methods and in response to intervener comments.	Greg Sharam, ERM
5	2017	Full Document	Update the Doris compliance plan to include Madrid and Boston (Phase II).	Leslie Bol, ERM
6	2019	Sections 2 and 3.	Updating the plan to include commitments made during the review of the Phase II Project and NIRB conditions.	Leslie Bol, ERM
7	2021	Sections 3.1.10, 3.1.11 and 3.1.12	Updating the monitoring programs for upland breeding birds, waterbirds and raptors.	Greg Sharam, ERM

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Glossary

Term	Definition
Agnico Eagle	Agnico Eagle Mines Limited
Amendment Application	The 2015 and 2018 applications for Amendment No. 1 and No. 2 of Nunavut Impact Review Board Project Certificate No. 003 and Nunavut Water Board Type A Water Licence 2AM-DOH1323.
AWR	All-Weather-Road
CESCC	Canadian Endangered Species Conservation Council
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWS	Canadian Wildlife Service
ELC	Ecosystem Land Classification
ECCC	Environment and Climate Change Canada (formerly Environment Canada [EC])
ERM	ERM Consultants Canada Ltd.
FEIS	Final Environmental Impact Statement
GIS	Geographical Information System
GN	Government of Nunavut
GN DOE	Government of Nunavut Department of Environment
IEAC	Inuit Environment Advisory Group
IQ	Inuit Qauajimajatuqangit
KIA	Kitikmeot Inuit Association
LSA	Local Study Area
MOU	Memorandum of Understanding
Nest Predator	Nest predators include species such as fox, weasels, gulls, jaegers, and common raven
Newmont	Newmont Mining Corporation
NIRB	Nunavut Impact Review Board
PRISM	Program for Regional and International Shorebird Monitoring
the Program	The Wildlife Mitigation and Monitoring Plan Compliance Monitoring Program
the Project	The Hope Bay Project
the Project Certificate	Doris Gold Mine Project Certificate

Term	Definition
the WMMP Report	The annual report generated as a product of execution of the Wildlife Mitigation and Monitoring Plan
RSA	Regional Study Area
RWED	Northwest Territories Department of Resources, Wildlife, and Economic Development
SARA	<i>Species at Risk Act (2002)</i> – a Canadian federal statute which is designed to meet one of Canada’s commitments under the International Convention on Biological Diversity. The goal of the Act is to protect endangered or threatened organisms and their habitats. It also manages species which are not yet threatened, but whose existence or habitat is in jeopardy.
TK	Traditional Knowledge
TIA	Tailings Impoundment Area located near Doris Camp in the Schedule 2-listed Tail Lake
TMAC	TMAC Resources Inc.
TMA	Tailings Management Area permitted for Boston operations
VECs	Valued Ecosystem Components
VRPC	Variable Radius Point Counts
WMMP	Wildlife Mitigation and Monitoring Plan
WRT	Wildlife Response Team
ZOI	Zone of Influence

1. Introduction

This Hope Bay Wildlife Mitigation and Monitoring Plan (WMMP) is intended for use by Agnico Eagle Mines Ltd. (Agnico Eagle) and its contractors. The WMMP is structured to address mitigation and monitoring for wildlife across the Hope Bay property.

Hope Bay is a gold mining and exploration Project located on a property along the south shore of Melville Sound in Nunavut, Canada, operated by TMAC Resources Inc. (TMAC) in 2020. On February 2, 2021, TMAC was purchased by Agnico Eagle Mines Limited (Agnico Eagle) but TMAC continues to exist as a legal entity and is now a wholly owned subsidiary of Agnico. TMAC holds mineral claims, leases and one Inuit Mineral Exploration Agreement that comprise an approximately 20 × 80 km property. These mineral holdings comprise the Project, on which the primary gold deposits Doris, Madrid North, Madrid South and Boston are located.

The WMMP provides a single document to address the mitigation and monitoring requirements of the Hope Bay Project and meets the relevant terms and conditions, and commitments of:

1. NIRB Project Certificates No. 003, Amendment No. 2 (NIRB 2018) and No. 009 (NIRB 2018), and
2. The Framework Agreement (2015) between the Kitikmeot Inuit Association (KIA) and TMAC.

1.1 Objectives

The objective of the WMMP are:

1. describe mitigations that will remove or minimize potential effects to wildlife to ensure there are no significant or irreversible impacts to wildlife populations;
2. identify through monitoring, additional mitigation measures that may become available to remove or minimize potential Project impacts on wildlife;
3. to validate predictions made in the Madrid-Boston Project Final Environmental Impact Statement (FEIS; TMAC Resources 2017) and comply with relevant conditions of Project Certificate 003, Amendment No. 2, Project Certificate No. 009, and the Framework Agreement (2015) between the KIA and TMAC.

Where possible and practical, monitoring programs will aim to collaborate with wildlife studies or monitoring activities conducted in the Project area by other organizations, institutions or government departments to gain cost efficiencies and minimize field work and surveys that may themselves have impacts on wildlife.

1.2 Relevant Legislation and Guidance

There are a number federal and territorial regulations relevant to the WMMP (Table 1.2-1).

Table 1.2-1. Relevant Federal and Territorial Regulations

Regulation	Year	Governing Body	Relevance
<i>Nunavut Wildlife Act</i>	2003	Government of Nunavut	Identifies and defines wildlife management in Nunavut, including legislated responsibilities for the conservation, protection and recovery of species at risk, managing nuisance wildlife, and possession of wildlife.
<i>Nunavut Land Claims Agreement Act</i>	1993	Nunavut Wildlife Management Board	Establishes the Nunavut Wildlife Management Board as the responsible authority for the management of Nunavut wildlife and wildlife habitat in partnership with the government.
<i>Canada Wildlife Act</i>	1994	Environment and Climate Change Canada	Identifies wildlife research and conservation, and allows for the creation, management, and protection of wildlife areas.
<i>Migratory Birds Convention Act</i>	1994	Environment and Climate Change Canada	This Act prohibits the killing of migratory birds or depositing harmful substances in areas frequented by migratory birds, and also protects their eggs and nests.
<i>Canada Species at Risk Act</i>	2002	Environment and Climate Change Canada	Designed to prevent Canadian indigenous species, subspecies, and distinct populations from becoming extirpated or extinct.

1.3 Related Documents

Hope Bay has management plans that outline how various activities are performed on site in consideration of operational needs and regulatory requirements. Numerous mitigation actions associated with these management plans have environmental protection measures that are implemented on site which reduces the overall impact of the Project to wildlife. Some of the plans that are particularly relevant to the protection and mitigation of wildlife are summarized below (Table 1.3-1).

Table 1.3-1. Related Documents

Document Title	Relevance
Air Quality Management Plan (2019)	Outlines the mitigation measures employed specifically to reduce dust and air emissions caused by the Project. These mitigation measures include water or chemical dust suppression. Air quality effects from equipment exhausts and incinerator stack emissions are managed according to prescribed standards. Potential air quality effects on wildlife from both dust and emissions are consequently reduced. Ongoing monitoring is conducted and additional action undertaken as required.
Spill Contingency Plan (2019)	Describes the spill response procedures to ensure timely and appropriate spill cleanup on land, water and ice, as well as identifying equipment available for fuel spills in water and on land. It outlines wildlife spill response procedures and those for migratory birds in alignment with the CWS Birds and Oil – CWS Response Plan Guidance (CWS 2012). There is a requirement that any spills of harmful substances near sensitive wildlife habitat be reported to the responsible authorities.
Non-hazardous Waste Management Plan (2017)	Describes the collection, segregation, handling, treatment, storage, transport, and disposal of non-hazardous waste. In particular, to prevent potential wildlife attractants and access, waste segregation requirements are stipulated that ensure potential attractants are appropriately managed and food waste is safely stored and incinerated. Routine monitoring and inspection of all waste management facilities is undertaken. These actions reduce the attraction of wildlife to the Project.

Document Title	Relevance
Incinerator Management Plan (2019)	Describes the management and disposal of food wastes in a manner that minimizes potential attractants and ensures that food wastes are appropriately stored and incinerated. Routine monitoring and inspection of all waste management facilities is undertaken.
Hazardous Waste Management Plan (2019)	Describes the collection, segregation, handling, treatment, storage, transport and disposal of hazardous waste, with the objective of safe and efficient management that reduces the risk not only to the site workforce but also to wildlife. Since the plan is primarily based on containment of hazardous wastes, achieving the prescribed level of management consequently reduces the possibility of wildlife exposure. On-going record keeping and revision of the plan occurs at regular intervals.
Water Management Plans (2017 and 2019)	Describes the responsible management of water including the collection, management and/or treatment of water for the protection of aquatic resources. Achieving the prescribed level of water management reduces the possibility of effects on wildlife.
Domestic Waste Water Treatment Management Plan (2017)	Describes the treatment system in place, consisting of pre-treatment, biological treatment and effluent separation, treated effluent discharge, and sludge dewatering and disposal. Treatment and discharge is in accordance with the allowances outlined in the Water Licences, and must meet established discharge criteria.
Oil Pollution and Emergency Preparedness Plan	Focused on the shipping, transfer, handling and storage of fuel at the oil handling facility at Roberts Bay as per Transport Canada regulations.
Conceptual Closure and Reclamation Plan (2017)	The objectives of the Closure and Reclamation Plan is to ensure that the site is returned to a stable condition that is compatible with a healthy environment for wildlife and people.

1.4 Plan Management and Implementation

The WMMP is a living document that can evolve over time in response to the results of the Program, changing conditions or development at Hope Bay, updates to scientific methods, and through consultation and discussions with relevant parties. Enhancements can also be made as a result of input from the Inuit Environment Advisory Group (IEAC), Traditional Knowledge, ecological knowledge learned from elders or land users while working in the field or feedback from IEAC workshops.

Personnel responsible for implementing and updating the Plan are identified in Table 1.4-1. It is anticipated that not all monitoring programs will necessarily continue during the entire life of the Project due to sufficient monitoring data and analyses to support impact predications and/or sufficient evidence indicating that detection of effects is statistically unattainable.

Table 1.4-1. Roles and Responsibilities

Role	Responsibility
Site General Manager (GM)	Overall responsibility for, and implementation of, mitigation measures outlined in this management plan. Provide input on practicality of modifications to reduce potential impacts. Support and verify on-site adoption of management practices outlined in the Plan.
Environmental Superintendents/Coordinators / Technicians / Consultants	Ensure this Plan is annually reviewed and updated as needed. Provide necessary resources for the execution of monitoring, mitigation and reporting as outlined in this Plan. Ensure that the monitoring and mitigation outlined in the WMMP is executed at site.

2. Management and Mitigation

Management and mitigation described in this plan are the result of several NIRB approvals and environmental assessment reviews since the early 2000s. It includes the perspectives and guidance from numerous relevant government authorities, the KIA and the IEAC. There exists a robust management and mitigation history and basis in Nunavut and Northwest Territories from which this plan has built upon where relevant. Management and mitigation will continue to evolve over time to ensure programs are meaningful, efficient and serve the objectives of the plan.

2.1 On-Site Personnel Training and Awareness

The following policies and management actions are applicable to all employees and personnel on-site:

1. training for all personnel in their responsibilities to protect wildlife and wildlife habitat (SOP Wildlife Awareness);
2. guidance to staff on how to avoid staff/wildlife interactions;
3. ongoing education related to the dangers of improper food waste disposal and feeding wildlife (SOPs General Site Rules and Wildlife Awareness);
4. bear awareness training and implementation of Bear Notification and Response Procedures (SOP Bear Notification and Responses);
5. a Wildlife Response Team (WRT) trained in bear and predatory wildlife response to minimize the risk to both personnel and wildlife;
6. a no feeding of wildlife policy;
7. a no littering policy;
8. a no hunting policy;
9. all wildlife has the right-of-way on roads and personnel must remain within their vehicle while waiting for animals to pass; and
10. establishment and enforcement of speed limits on roads.

2.2 Caribou and Muskox Management

Currently, the ranges of Island caribou (Dolphin and Union herd) and Mainland caribou (Beverly and Ahiak) herds overlap with the Project area. The Bathurst caribou herd occurs to the west of the Project area (west of the Western River and Bathurst Inlet) and does not interact with the Project. The Island caribou are federally listed as Special Concern on Schedule 1 of SARA (COSEWIC 2004; Government of Canada 2019). Island caribou occur in the Project area during winter and some Island caribou migrate near the Project during spring and fall as they travel between Victoria Island and the mainland. Mainland caribou occur predominantly to the south of the Project area during summer, fall and winter. The Project area does not overlap any caribou calving or post-calving grounds, or any key migratory areas, summer, rutting or winter areas identified by the NPC (2016).

Mitigation relevant to caribou and also relevant to muskox is outlined below, organized by potential effects evaluated for the Project.

2.2.1 Mitigation for Habitat Loss and Alteration

Mitigation and management to reduce the potential effect of habitat loss includes:

- The Project was designed to avoid important habitats for a variety of species, including caribou habitat, raptor nests, carnivore dens, wetlands and special landscape features (eskers) identified from Traditional Knowledge (TK) and scientific surveys.
- Minimize disturbance to tundra.
- Infrastructure will avoid sensitive caribou habitats where possible.
- Minimize the size of the Project footprint.

2.2.2 Mitigation for Disturbance (Noise and Visual)

Wildlife can be disturbed by loud noises or visual cues such as the presence of people. This section describes the mitigation to reduce Project noise sources, manage equipment such as helicopters to avoid animals (and thus reduce startling them with noise) and manage visual disturbances.

Mitigation and operations management to reduce the potential effect of disturbance on caribou includes:

- Construct and maintain equipment to minimize the generation of noise.
- Monitor and adaptively manage noise.
- Pilot education on maintaining minimum flight altitudes and horizontal setback, when safe to do so, wherever wildlife are observed.
- Manage equipment and activities to minimize disturbance to caribou.
- When drivers observe caribou or muskox on the road or within 500 m of the road they will follow the procedures for Driver Mitigation for Caribou and Muskox (Table 2.2-1 and Figure 2.2-1).
- When drivers observe caribou or muskox on the road and stop their vehicles, they will remain in the vehicles.

Additional mitigation that will be implemented for caribou and muskox during all seasons is presented in Table 2.2-1. Additional mitigation specific to the caribou calving period, from June 5 to 20 (Gunn, Fournier, and Nishi 2000), is presented in Table 2.2-2. Implementation of the additional mitigation will be determined based on collaborative evaluation of caribou collar data (Section 3.1.5) and consideration of on-site monitoring results.

The mitigation measures outlined in these tables have undergone multiple iterations of review and discussion with the KIA and GN DoE in 2016 and 2017, and represented the agreed measures deemed appropriate for the Doris Project. These measures will also be adopted for the Madrid-Boston Project due to the similarity of activities and infrastructure proposed. As additional caribou data are collected and analyzed (see Section 3.16), the distances, number of caribou and associated mitigation is anticipated to be revised in collaboration with the GN DoE.

Table 2.2-1. Caribou and Muskox Protection Measures during All Seasons

Activity/ Location	Monitoring Method	Trigger		Mitigation
		# of Animals	Distance	
1. Project Site	All personnel	1+ animals	Visible from footprint areas	<ol style="list-style-type: none"> 1. Environment Department notified 2. Environment Manager informs personnel who need to be aware of caribou and muskox – drivers
2. On-site roads	Drivers	1+ animals	On or within 500 m of the road	<ol style="list-style-type: none"> 1. Ongoing Mitigation: <ul style="list-style-type: none"> • Speed limits of 50 km/hr. or less • Wildlife is given the right of way and drivers stay in vehicles if stopped • Signs posted indicating wildlife has right of way 2. Environment Department notified 3. Environment Manager informs personnel who need to be aware of caribou and muskox – drivers 4. Drivers evaluate distance from the road and caribou or muskox behaviour and react following the Driver Flow Chart (Figure 2.2-1)
3. Quarry Blasting	Pre-blast checks	1+ animals	Line of sight up to 2.8 km	<ol style="list-style-type: none"> 1. Cessation of blasting until animals move > 2.8 km from quarry or the line of sight from the quarry high point, whichever is closer
2. Helicopter	Pilots	1+ animals	300 m	<ol style="list-style-type: none"> 1. Helicopter flights avoid animals by as large a margin as possible, with a minimum of 300 m vertically and 600 m horizontally when safe to do so
3. Airstrip	Air traffic personnel	1+ animals	250 m	<ol style="list-style-type: none"> 1. In the case of caribou or muskox near the airstrip(s), observations are performed. If the risk of interaction with a plane exists, then flights will be held. If caribou or muskox remain in the area, then procedures for moving them off the runway are followed. 2. GN DoE are contacted for guidance when unusual situations arise not covered by established procedures, to ensure an agreed course of action is undertaken incorporating animal welfare as a prime objective.
4. Regional Monitoring	Helicopter pilots and field personnel	Groups of caribou or muskox	15 km	<ol style="list-style-type: none"> 1. Environment Department notified 2. Environment Manager informs personnel who need to be aware of caribou and muskox – drivers and pilots

Table 2.2-2. Additional Caribou-specific Protection Measures during the Calving Period (June 5 to June 20) should the Calving Range Overlap the Project Site

Activity/ Location	Monitoring Method	Trigger		Mitigation
		# of Animals	Distance	
1. Project Site	Site staff (incidental observations)	3-50* ♀ with calves	Visible from footprint areas	1. Environment Department notified 2. Environment Manager informs personnel who need to be aware of caribou – drivers and pilots 3. Stop heavy mobile equipment traffic within 250 m of the observed caribou, except at plant site 4. Traffic to proceed slowly (< 20 km/hr)
		> 50 ♀ with calves	Visible from footprint areas (< 2 km)	1. Actions above, plus 2. Wildlife monitors to conduct periodic site monitoring to evaluate if caribou are still in the area and when activities can resume
2. Quarry blasting	Pre-blast checks	1+ ♀ with calve(s)	Line of sight from quarry up to 4 km	1. Cessation of blasting until animals move > 4 km from quarry or the line of sight from the quarry high point, whichever is closer 2. Monitoring of caribou behaviour in response to quarry blasting if safe to do so
3. Helicopters	Pilots	1+ animals	Calving range	1. Helicopter flights will avoid animals by as large a margin as possible, with a minimum of 610 m vertically and 600 m horizontally when safe to do so
4. Regional monitoring	Helicopter pilots and field personnel	1+ ♀	Calving range	1. Environment Department notified 2. Environment Manager informs personnel who need to be aware of caribou – drivers and pilots 3. Helicopters will avoid caribou to the extent possible, and by a minimum of 610 m vertically and 600 m horizontally when safe to do so
		1+ ♀ with calve(s)	15 km from site	
	Collar reports**	Any	-	1. Environment Department notified
		Any	-	2. Environment Manager informs personnel who need to be aware of caribou – drivers and pilots

*A total of 50 animals observed at once is used as a guide to indicate that an aggregation of caribou have been observed.

**Collar reports will supplement other mitigation responses, if available and provided on a frequent enough basis to be useful for this purpose. Distances for actions related to data from collar reports will depend on frequency of data dissemination to Hope Bay.

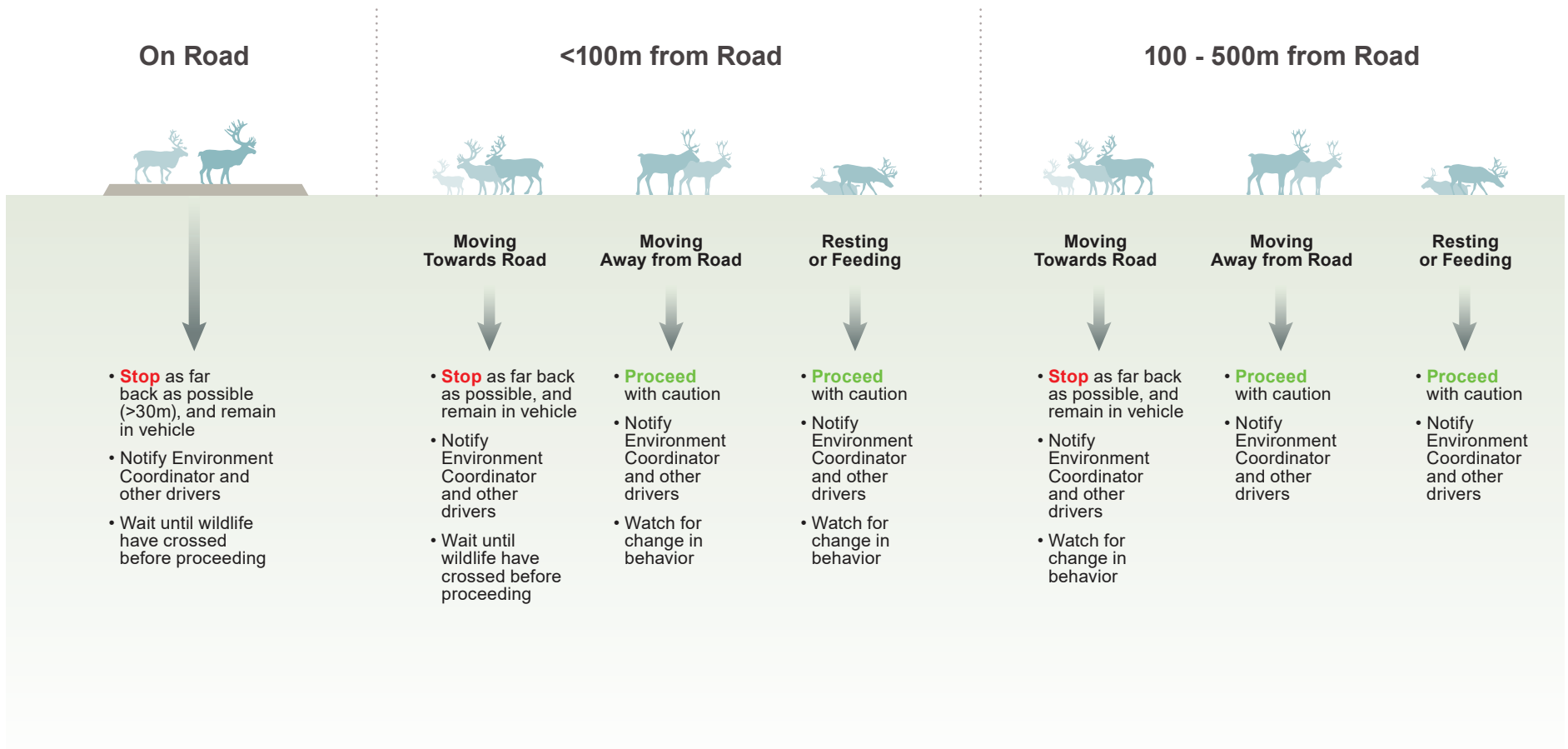


Figure 2.2-1: Driver Mitigation for Caribou and Muskox

2.2.3 Mitigation for Potential Disruption to Movement

Mitigation and management to reduce the potential for disruption of movement to caribou and muskox include:

- Sealift resupply in open water avoids potential interaction with the Island caribou migration between the mainland and Victoria Island and in Melville Sound.
- Roads will be constructed with as low a road height as possible following the road design criteria for the Madrid-Boston all weather road (SRK 2017).
- Grading down snowbank heights to the extent possible is part of road maintenance to minimize snow drifting across the roads. Monitoring at the Ekati Mine suggested that caribou were deflected from crossing the road when the mean snowbank height was 1.6 m, but crossed when the mean snowbank height was 0.5 m (Rescan 2011).
- Caribou and muskox will be given the right of way on all Project roads should they be observed on or near the road.
- As suggested by caribou workshop participants during the second caribou workshop, Elders and land users will advise on the locations where caribou crossing structures will be installed on roads. Caribou crossings will not be constructed where road thickness requires safety berms or barriers along the road edge. The crossing locations will likely consist of 5-10 m wide sections of the roadway where the shoulders are flattened to 5H:1V and topped with surfacing material (Vol 3 Hope Bay FEIS Project Description, Section 3.7.4.2).
- A speed limit of 50 km/hr on roads will reduce noise disturbance and avoidance of the road, and road crossing by caribou and muskox. When caribou or muskox are observed on or near Project roads, drivers will reduce their speed or stop their vehicles as prescribed by the Driver Mitigation for Caribou and Muskox (Table 2.2-1 and Figure 2.2-1).
- Reduced speed when conditions reduce visibility (e.g., blowing snow) such that wildlife on or near the road might be obscured.
- Extra vigilance along the all-weather road during times of migration to ensure that caribou can travel to key seasonal habitats.

2.2.4 Mitigation for Direct Mortality and Injury

Mitigation and management to reduce the potential for direct mortality and injury of caribou include:

- A speed limit of 50 km/hr on all Project roads.
- Caribou and other wildlife will be given the right-of-way on all roads.
- Maintaining clean Project sites where any equipment or materials that could entangle or entrap wildlife are safely stored, including keeping the sea can doors shut at the waste management facility.
- Ensure no caribou are on or near the airstrip prior to aircraft landing or departure.

2.2.5 Mitigation for Increased Access and Harvest

Mitigation and management to reduce the potential for increased access and harvest of caribou include:

- The Hope Bay Project is not connected to any communities by a winter or all weather road.
- Project roads are operated by Hope Bay. Public travel on roads is not permitted for safety reasons.
- Project staff and contractors are prohibited from hunting while on site.
- When caribou are observed on or near the Project site, a representative of the Environment Department will be notified, who will in turn notify employees that need to know (drivers, pilots) but will not broadcast the information to all employees (no “site notification”).
- The *Nunavut Wildlife Act* (2003) prohibits hunting within 1.6 km of Project infrastructure.

2.2.6 Mitigation for Attraction

Mitigation and management to reduce the potential for caribou to be attracted to the Project include:

- Training for personnel on proper handling of food and wastes to limit the attractiveness of the Project to wildlife.
- All buildings will be wildlife-proof.
- A no feeding wildlife policy.
- A waste management plan which includes maintaining the Project site and waste management site in a clean and orderly state, and keeping wildlife out of wastes, including keeping the sea can doors shut at the waste management facility.
- Monitor water quality of reclaim pond at the TIA.
- Consider the use of Inuksuit to deter caribou from the TIA in consultation with the IEAC if caribou are observed drinking the water and the water does not meet applicable wildlife safety guidelines.

2.2.7 Mitigation for Altered Environmental Media Quality

Mitigation and management to reduce the potential for exposure of caribou to altered environmental media include:

- Managing the use of fuels and hazardous chemicals, as described in the Oil Pollution and Emergency Preparedness Plan, Hope Bay Spill Contingency Plan (2019), and Hope Bay Project Hazardous Waste Management Plan (2019).
- Water quality is managed through the Water Management Plan: Water Management Plans, Hope Bay Project (2017 and 2019) and monitored through the Hope Bay Project Phase 2 Aquatic Effects Monitoring Plan (2018).
- Dust and air quality is managed through the Air Quality Management Plan (2019).
- Fuels and chemicals are stored in wildlife-proof buildings.
- Cyanide destruction inside the mill.

- Appropriate measures taken to exclude or deter wildlife from areas where water or waste could pose a risk to wildlife.

Hope Bay will be monitoring dust deposition and water quality during the life of the Project. Dust monitoring will inform whether additional sampling is required including evaluation of metals in soils or plants.

2.3 Species at Risk Management

Species at risk that have been observed during baseline and monitoring surveys at Hope Bay are summarized in Table 2.3-1. Relevant mitigation and monitoring for these species is referenced in Table 2.3-1 below.

Table 2.3-1. Species at Risk Observed at Hope Bay and Relevant Plan Sections

Common Name	Latin Name	Territorial Rank	COSEWIC Status	SARA Schedule 1 Status	Relevant Mitigation	Relevant Monitoring
Dolphin and Union Caribou Herd	<i>Rangifer tarandus</i> (Government of Canada 2019)	-	Endangered (2017)	Special Concern (2011)	Section 2.2	Section 3.1.6
Barren-ground Caribou – Beverly/ Ahik Herd		-	Threatened (2016)	Not Listed		
Grizzly Bear	<i>Ursus arctos</i>	Vulnerable-Apparently Secure	Special Concern (2012)	Special Concern (2018)	Sections 2.4 – 2.9	Section 3.1.7
Wolverine	<i>Gulo gulo</i>	Vulnerable	Special Concern (2014)	Special Concern (2018)	Sections 2.4 – 2.9	Section 3.1.9
Short-eared Owl	<i>Asio flammeus</i>	-	Special Concern (2008)	Special Concern (2012)	Sections 2.5, 2.6, 2.7	Section 3.1.10
Peregrine falcon	<i>Falco peregrinus</i>	-	Not at Risk (2017)	Special Concern (2012)	Sections 2.5, 2.6, 2.7	Section 3.1.12
Red-necked Phalarope	<i>Phalaropus lobatus</i>	Vulnerable	Special Concern (2014)	Special Concern (2019)	Sections 2.5, 2.6, 2.7	Section 3.1.10
Semi-palmated Sandpiper	<i>Calidris pusilla</i>	Vulnerable	Not Listed	Not Listed	Sections 2.5, 2.6, 2.7	Section 3.1.10
American Golden Plover	<i>Pluvialis dominica</i>	Vulnerable	Not Listed	Not Listed	Sections 2.5, 2.6, 2.7	Section 3.1.10
Hoary Redpoll	<i>Acanthis hornemanni</i>	Vulnerable	Not Listed	Not Listed	Sections 2.5, 2.6, 2.7	Section 3.1.10
Least Sandpiper	<i>Calidris minutilla</i>	Vulnerable	Not Listed	Not Listed	Sections 2.5, 2.6, 2.7	Section 3.1.10
Snow Bunting	<i>Plectrophenax nivalis</i>	Vulnerable	Not Listed	Not Listed	Sections 2.5, 2.6, 2.7	Section 3.1.10
Brant Goose	<i>Branta bernicla</i>	Vulnerable	Not Listed	Not Listed	Sections 2.5, 2.6, 2.7, 2.10	Section 3.1.11

Common Name	Latin Name	Territorial Rank	COSEWIC Status	SARA Schedule 1 Status	Relevant Mitigation	Relevant Monitoring
Common Eider	<i>Somateria mollissima</i>	Vulnerable	Not Listed	Not Listed	Sections 2.5, 2.6, 2.7, 2.10	Section 3.1.11
King Eider	<i>Somateria spectabilis</i>	Vulnerable	Not Listed	Not Listed	Sections 2.5, 2.6, 2.7, 2.10	Section 3.1.11
Golden Eagle	<i>Aquila chrysaetos</i>	Vulnerable	Not Listed	Not Listed	Sections 2.5, 2.6, 2.7	Section 3.1.12

2.4 Habitat Loss and Alteration

TMAC has designed the Project to avoid environmentally sensitive sites for wildlife and vegetation. This included important sites identified by TK, freshwater and ice crossings for caribou, eskers used by caribou for movement, upland areas used for caribou insect or heat relief, wolf, wolverine and grizzly bear dens, raptor nests, waterfowl habitat, and sensitive wetlands. Identified environmentally sensitive sites were avoided during the design phase of the Project, as discussed in the FEIS, Project Description. Habitat loss within the Project footprint will be monitored and compared to impact predictions (Section 3.1.1).

Disturbance to the surrounding tundra will be minimized adjacent to the Project footprint through dust control and off road travel by Project personnel is prohibited, except for controlled exploration or environmental monitoring purposes.

2.5 Construction Management

Where feasible, Project vegetation clearing and ground disturbance activities that may disturb wildlife residences (nests and dens) will be avoided during specified periods of the year (Table 2.5-1). If avoidance is not possible, pre-clearing surveys will be conducted to identify features that will be avoided and appropriate buffers will be set up during the Construction phase. If any wildlife residence will be removed (raptor nest or wolf, wolverine or grizzly bear den) or if wildlife deterrence will be conducted to ensure the safety of wildlife, GN DOE will be contacted and an appropriate permit will be acquired.

Table 2.5-1. Specified Wildlife Periods and Associated Mitigation

VC	Specified Period	Season/ Habitat Feature	Summary of Mitigation	Minimum Buffer (m)
Raptors	May 15 to August 15	Nests	Clearing and construction at locations for ground-nesting raptors to occur outside of the specified time period. Nest surveys of cliff-nesting habitat within 2 km of the construction area prior to clearing and construction during specified time period. Establishment of a buffer around active nest sites. If an active nest is within 1 km of planned construction areas, a nest- site protection plan will be developed in consultation with GN DOE.	200

VC	Specified Period	Season/ Habitat Feature	Summary of Mitigation	Minimum Buffer (m)
Upland Birds*	May 15 to August 15	Nests or evidence of nesting territory	<p>Conducting ground clearing outside of specified nesting period for upland birds.</p> <p>For new-footprint construction undertaken during the migratory bird nesting season, pre-construction surveys will be conducted by personnel trained at identifying indicators of bird nesting behaviour from a distance, and appropriate avoidance buffers will be established if needed (Environment and Climate Change Canada 2016a). SOP: Doris North Migratory Bird Pre-clearing Survey (ERM 2016)</p>	30
Grizzly Bear	October 1 to April 30	Dens	<p>Ground clearing in areas likely to support grizzly bear dens conducted outside of denning periods for grizzly bears, where possible.</p> <p>Prior to denning season, conduct survey to locate grizzly bear dens within 1 km of construction areas and as informed by maps of high quality denning habitat.</p> <p>If an active grizzly bear den is located within 1 km of planned construction area, construction activities will be delayed until a den-site protection plan has been developed in consultation with the GN DOE.</p>	1,000

*Also applicable to short-eared owls.

2.6 Road and Traffic Management

The following road and traffic management will minimize potential disturbance and mortality effects to wildlife:

- A speed limit maximum of 50 km/hr is in place on all Project roads to reduce the potential for wildlife-vehicle collisions.
- Wildlife is given the right-of-way on and near all roads at all times (Figure 2.2-1). Drivers will remain in their vehicles if they stop for wildlife on roads.
- All equipment will be properly maintained to manage noise levels.
- Vehicles will be restricted to the Project footprint, site roads, and quarries, except where required for environmental monitoring and exploration activities.
- Dust control will be conducted as needed on runways and all-season roads.
- Air quality will be monitored for dust, PM₁₀ and NO₂ per the Air Quality Management Plan (2019).
- Roads will be constructed with as low a road height as possible following the road design criteria for the Madrid-Boston all weather road (SRK 2017).
- Roads will be constructed with caribou crossing structures where roads cross identified.
- Caribou trails. The crossing locations will likely consist of 5-10 m wide sections of the roadway where the shoulders are flattened to 5H:1V and topped with surfacing material (TMAC Resources 2017).
- Elders and land users will inform the placement of road crossing structures in the field.
- Project roads are operated by Hope Bay. Public travel on Project roads is restricted.

- Snowbanks along Project roads will be managed by pushing and leveling the snow back off the road with the objective of reducing drifting snow across the road and improving operational safety. Snow bank management will have the added benefit of enabling wildlife to more easily cross the road. Snowbank heights will be monitored twice a month during the winter months.

2.7 Aircraft Management

The following aircraft management will minimize potential disturbance and mortality effects to wildlife:

- Pilot education on procedures to protect wildlife from disturbance.
- Fixed-wing aircraft will maintain at least 610 m elevation except for take-offs and landing and at the discretion of the pilot for safety concerns.
- Helicopters will maintain 300 m vertical and 600 m horizontal separation (including starts and takeoffs) from caribou and muskox, where safe to do so.
- Pursuing wildlife by helicopters is not permitted.
- Airstrips will be monitored prior to take-off and landings to ensure large mammals and birds are not present on the landing strip.
- If caribou or muskox approach the airstrip within 250 m, the flight will be delayed or cancelled until the animals move away. If caribou or muskox become habituated to the site, they may be moved away from the site for their safety, as per discussion with a GN DoE Conservation Officer to ensure compliance with the Nunavut Wildlife Act.

2.8 Infrastructure and Waste Management

The possible attraction and potential entrapment of wildlife in mine infrastructure will be managed with the following techniques:

- Berms or other markers will be built at high walls of quarries.
- Waste will be managed to reduce the potential for attracting wildlife (see Section 1.3; Related Documents).
- Carrion will be removed from roads.
- Project sites will be clean and maintained, where any equipment or materials that could entangle or entrap wildlife are safely stored.
- The doors on sea cans will be kept closed at all times to avoid the chance of animals encountering wastes or becoming entrapped.
- Site attractants are reduced through secure storage and incineration of all food wastes.
- Structures are designed to limit the potential for denning of foxes or wolverines within Project facilities and routine audits on-site for denning potential associated with infrastructure.
- Waste management facilities will be constructed to prevent wildlife from entry into storage buildings.
- Buildings are designed and maintained to exclude wildlife including skirting, screens over vents and other protective measures, as needed.

- Protocols for human-wildlife interactions are implemented to protect both Project personnel and wildlife in cases where wildlife may come in contact with personnel.
- Cyanide destruction will occur inside the mill, so there is no risk of exposure.

2.9 Blasting Management

Prior to any blasting, a pre-blasting check includes a check for wildlife with a delay in blasting when caribou or muskox are within sight (Table 2.2-1). Blasting will not occur until wildlife have left the area and it is safe to proceed with blasting. In the unlikely event that animals persist in the area and blasting is required to proceed, the Environmental department will advise on methods for encouraging animals to leave the area.

2.10 Shipping Management

Potential effects to marine mammals and birds related to shipping will be managed according to the following:

- Sea lifts during the open water season avoids interaction with Island caribou migration between the mainland and Victoria Island and through Melville Sound.
- The Spill Contingency Plan (2019) and Oil Pollution and Emergency Preparedness Plan includes information and guidelines relevant to implementation of wildlife response measures and equipment available for response, and aligned with the Birds and Oil – CWS Response Plan Guidance (CWS 2012).
- Information will be provided to vessel operators regarding 500 m marine set-back from identified habitat sites in Bathurst Inlet/Elu Inlet for marine birds where safe to do so. Ships will avoid the marine bird colony on Prince Leopold Island by 25 km, except where the safety of the ship dictates otherwise.
- During dock construction, monitoring will be conducted for noise and marine mammal presence. Monitoring and mitigations outlined in any future Fisheries Authorization from DFO for dock construction will be followed.
- Additional details related to wildlife mitigations that will be provided to vessel operators are provided in the Shipping Management Plan.

2.11 Vegetation Management

2.11.1 Invasive Plants

Hope Bay has designed the Project to minimize footprints on the land and avoid disturbance of vegetation and rare plants. Identified environmentally sensitive sites and plants were avoided to the extent possible during the design phase of the Project. Habitat loss within the Project footprint will be monitored and compared to impact predictions (Section 3.1.1).

Mitigation designed to reduce the chance of introducing invasive plant species introduced through Project activities, includes:

- Preventing the introduction and establishment of invasive plant species by ensuring vehicles brought to site are clean.
- Invasive plant species observed will be reported to the GN DOE.

3. Monitoring and Evaluation

3.1 Monitoring

Hope Bay will conduct wildlife, habitat, air quality, snowbank, and traffic monitoring to evaluate the effectiveness of mitigation and test the predictions of environmental assessments.

3.1.1 Habitat Loss

Direct habitat loss within the footprint of the Doris and Madrid-Boston Projects will be compared to the size of the Project Development Area (PDA) predicted in the FEIS (TMAC Resources 2017). This will be measured as the area of high quality habitat from habitat suitability maps based on terrestrial ecosystem mapping included in the FEIS and as the total area lost. Rare plant habitat loss will also be reported.

Dust levels that may result in habitat alteration are measured as part of Air Quality Management Plan (2019).

3.1.2 Camera Monitoring

Camera monitoring is divided into two programs: 1) Facility/Wildlife Interaction Monitoring and 2) Wildlife Zone of Influence Monitoring. For both of these programs, general monitoring methods described below will apply.

Cameras are programmed to take two types of photos: timed photographs and motion-triggered photographs. During winter, timed photos are taken from 10 am to 5 pm to conserve battery during dark periods. Cameras take motion-triggered photos whenever there is movement in the field of view (~25 to 30 m). Cameras take 10 photos at one second intervals with each motion triggered event. Each image records the photo type (i.e., timed [T] or motion triggered [M]), the camera number, date, time, temperature, and, for motion-triggered photos, the number from the triggered series of photos taken (i.e., 1/10 to 10/10).

Cameras are downloaded and checked twice annually at a minimum and data are analyzed to record the number of observations per camera day for wildlife VECs (caribou, grizzly bears, muskox, wolverines, raptors), and nest predators (Arctic fox and red fox). Corrections are made for survey effort, including camera active periods, camera availability (removing periods when cameras are knocked over) and sightability during the winter (removing periods of snow occlusion).

3.1.2.1 Facilities/Wildlife Interaction Monitoring

The facilities cameras monitor sites which may attract wildlife (waste management areas, landfills, and TIA) or confirm wildlife use of wildlife mitigation structures (e.g., representative wildlife road crossings).

These cameras provide information on the effectiveness of mitigation measures and help in identifying potential concerns. The data are summarized to address the following sub-objectives:

- Monitor the waste facilities for use by bears, wolverines and nest predators;
- Monitor the camps and other structures for use by bears, wolverines and nest predators;

- Monitor the road crossing structures for use by caribou; and
- Record locations where wildlife may interact in an unpredicted way with Project infrastructure.

3.1.2.2 *Wildlife Zone of Influence Monitoring*

The wildlife camera monitoring methods described below are the product of discussions with the KIA and GN related to the redesign of this Doris wildlife camera monitoring program during meetings in February 2016 and November 2017, and are the methods currently employed at Hope Bay. The wildlife camera monitoring will focus on whether there is an effect of the mines on grizzly bears and wolverine, and may also be used to look at caribou densities with distance from infrastructure. To evaluate Zone of Influence (ZOI)-type effects, wildlife cameras are distributed into three “zones”:

1. Treatment, with cameras arrayed within 2 km of infrastructure;
2. Control, with cameras arrayed outside of 10 km of the infrastructure; and
3. Zone of influence (ZOI), with cameras arrayed between 2 and 10 km.

Wildlife cameras are currently deployed in this arrangement surrounding the Doris Project, including the Madrid North and Madrid South sites. This program was expanded to the Boston site in 2018 with the same monitoring design. Additional cameras will be installed on the Boston road to examine caribou use of road crossing structures after that road has been constructed.

3.1.3 **Incident and Mortality Monitoring**

Wildlife interactions, incidents, and mortalities are recorded as part of the Wildlife Sightings/Reporting process and reported to the NIRB annually (Incident Reporting and Incident Learning Process). Wildlife incidents relating to larger fauna are also reported to the KIA and the GN DoE on occurrence, and any wildlife mortalities are reported to the KIA, the GN DoE, and the NIRB. Migratory bird mortalities are reported to Environment and Climate Change Canada, Canada Wildlife Service. Reporting procedures at site occur through notification of the Environment Department and/or Wildlife Response Team (WRT). A Wildlife Notification System is employed which includes non-emergency driver notifications in addition to higher levels of notifications for potentially dangerous wildlife. The site Environment Department keeps a register of potential conflicts with, or deterrence of, animals which require a response from the WRT and this forms the basis of the incident reporting component of the Annual Report. These observations will be used to identify any adaptive management required to feed back into the management actions identified in Section 2.

Additionally, incidental observations of harvesters on the land will be reported to the Environment Superintendent, along with a record of harvesters who have stopped at the camps to visit or for emergencies. This information will be documented in annual reports that are made available to the KIA, GN and the NIRB.

3.1.4 **General Wildlife Observations**

Incidental wildlife observations are collected on an opportunistic basis in three ways:

1. observations from the wildlife sightings log as reported by on-site personnel;
2. incidental observations made by ERM biologists during targeted wildlife surveys; and
3. observations of wildlife species from the wildlife camera program.

Data collected using the three methods differ in nature and are therefore not quantitatively comparable. Moreover, some of the collection methods are inherently biased in terms of sightings frequency. This is particularly the case when examining the observations from the wildlife sightings log as reported by on-site personnel. These data are influenced by factors such as:

- Reporting preference — on-site personnel are more likely to report grizzly bear than sik-siks;
- Reporting frequency — the frequency of reporting tends to be higher when a species first appears on site and tapers off through the summer despite the fact that the species remains present on site during that time;
- Time of year — both the number of personnel working outside (fewer in winter) and the ability to see wildlife (due to limited winter daylight);
- Number of personnel on site;
- Reporting enthusiasm — personnel may vary in how consistently they report wildlife sightings;
- Multiple reporting — wildlife may be reported by more than one individual, this is more likely the case when the wildlife observed are large mammals or when the animal stays in one location.

Thus, incidental wildlife observations provide useful qualitative accounts of species presence on site, but are not assessed in a quantitative manner despite the fact that the number of animals sighted is often reported and the frequency of sightings is available.

Observation data from the three sources are summarized for VEC species (i.e., caribou, grizzly bear, muskox, wolverine, upland breeding birds, raptors, and waterbirds), nest predators, and all other mammalian species. Nest predators include species such as fox species, weasels, gulls, jaegers, and common raven.

3.1.5 Road and Air Traffic Monitoring

3.1.5.1 Road Traffic

Traffic monitoring will track the volume and composition of light-weight vehicles (e.g., pick up trucks) and heavy equipment (e.g., haul trucks and other heavy equipment) on Project roads, summarizing the information seasonally and annually. Vehicle traffic on Project roads will be monitored using cameras and records of haul truck trips from Nuna Logistics. The data will be used to determine monthly traffic volumes throughout the year for the two vehicle classes on each Project road segment.

These traffic data will be compared against FEIS traffic predictions (TMAC 2017). If traffic rates exceed those in the FEIS by 25% in two consecutive monitoring periods, a revised assessment of potential impacts of traffic on wildlife will be conducted.

3.1.5.2 Snowbank Height

The height of snowbanks will be measured on Project roads twice per month. The road will be stratified by length into a) the majority of the road in open tundra area where snowbanks can be pushed back and snowbank height are expected to be small, and b) areas in rock cuts or adjacent to rock outcrops where snow accumulation is known to be greater.

3.1.5.3 *Fixed-Wing Air Traffic*

All fixed-wing aircraft take offs and landings will be logged by Hope Bay logistics.

3.1.5.4 *Helicopter Air Traffic*

Helicopter flight paths will be recorded by on-board Global Positioning System (GPS) devices including date, time, location, and elevation. Results will be summarized in the annual compliance report.

3.1.6 **Caribou Monitoring**

3.1.6.1 *Regional Monitoring*

An MOU between TMAC and the GN was signed in 2015 and expired in 2019. Hope Bay is developing a Memorandum of Understanding (MOU) and Data Sharing Agreement (DSA) with the GN wherein the GN plans and executes a collar monitoring program and passes this data to Hope Bay. The caribou collar data generated under this MOU will be provided to Hope Bay and analyzed to evaluate distribution in relation to the Hope Bay Project.

Available caribou collar data from the Mainland (Beverly and Ahiak herds) generated by the Government of the Northwest Territories is analyzed to track the proximity of calving grounds to the Project infrastructure. Wildlife camera data will be collected as outlined in Section 3.1.2 and will be used to determine caribou densities at varying distances from Project infrastructure. Facilities camera data will be collected as outlined in Section 3.1.2.1 and on-site monitoring conducted as described in Section 3.1.4 will also be used to describe interactions with the Project.

3.1.6.2 *Local Monitoring*

Height of Land and Snow Track Surveys

In addition to the camera monitoring program, Hope Bay will conduct local scale monitoring through height of land and snow track surveys. The design of these programs will be developed in consultation with the IEAC and GN DoE. Caribou behavioural observations will be recorded with particular focus on reaction to infrastructure that may alter caribou movements, such as roads.

Snow track surveys will be conducted along Project roads during winter months in conjunction with snowbank height monitoring (Section 3.1.5.2). Surveys will be conducted twice per month (SOP: Snow Track and Snowbank Height Monitoring).

Height of land surveys will be conducted at a set of monitoring locations to monitor for caribou near the road. Detailed objectives and methods are being developed with the IEAC and field trialed during 2019 prior to inclusion in the WMMP Plan.

Surveys will occur at regular intervals:

1. During spring and fall migration, when data indicate that the majority of road crossing events occur, and
2. When local observations or radio-collar data indicate that caribou are within 10 km of Project roads.

Results from these and the snow track surveys will be combined with collar data and analyzed periodically with the objective of evaluating caribou behaviour in relation to roads and wildlife crossing structures.

Caribou Monitoring in Proximity to Tailings

In response to a request from the KIA, Hope Bay will monitor whether caribou are interacting with the TIA:

- The TIA will be monitored for caribou prior to TIA closure;
- At closure, the TIA will be capped with rock to prevent caribou accessing the tailings; and
- If caribou are found to be interacting with the TIA, and the water quality in the TIA poses a risk to caribou health, then Hope Bay will engage with the IEAC to inform the placement of Inuksuit in the field to direct caribou away from the TIA.

Post-closure monitoring of the TIA and TMA will be outlined in the final Closure Plans associated with those developments. Water quality predictions for the TIA reclaim water pond have indicated that this water will not exceed guidelines for the protection of livestock. As such, impacts on wildlife health are not anticipated by wildlife use of this area. Water quality in the reclaim pond continues to be monitored throughout operations as required in Hope Bay's Water License.

3.1.6.3 Caribou Collar Analyses

Calving Ground Location

The Hope Bay Project does not overlap the calving grounds of any caribou herd, and no overlap has been indicated historically. To monitor the locations of calving grounds, Hope Bay will conduct a caribou collar analysis to determine the calving range for the Mainland (Beverly and Ahiak herds) in each year that data are made available.

Caribou Movement Analyses

Hope Bay will conduct analyses of collar data every three years to determine if caribou could be altering their behaviour and proximity to Project infrastructure (i.e., potential ZOI). These analyses will be conducted following construction of the Madrid-Boston infrastructure and once the operations phase has started, comparing pre-and post-construction movement patterns and use of habitat as related to the proximity to infrastructure. A geospatial model of the final structural attributes of the AWR to Boston will be created and will be one of the data sources for considering potential changes in caribou movement patterns. Other potential factors affecting caribou movement in the region will also be considered.

3.1.7 Grizzly Bear Monitoring

Grizzly bears (*Ursus arctos*) are considered a species of Special Concern by COSEWIC (COSEWIC 2002, 2012). Barren ground grizzly bears are at the most northern and eastern limits of the continental grizzly bear range (McLoughlin and Messier 2001; McLoughlin et al. 2003) and have the largest annual home ranges and the lowest densities of any population studied in North America (McLoughlin et al. 1999). However, Inuit TK indicates that the distribution and abundance of grizzly bears has increased in the region since the 1970s (Banci and Spicker 2016). Inuit TK indicated grizzly bears are associated with major river systems, their associated watersheds, and the coast and were most often seen in the spring and fall, during fish-spawning periods, and following migrating caribou. The increase in grizzly bear abundance has resulted in greater predation of ground squirrels.

Maps of high and moderate quality grizzly bear denning habitat are presented in the FEIS. Should construction occur in the denning period and in high quality denning habitat, den searches will be conducted, and any active dens will be appropriately buffered and monitored.

Grizzly bear distribution relative to the Project footprints will be monitored using wildlife cameras. The methodology for the wildlife camera program is described in Section 3.1.2.2. Data from this program will be analyzed in a spatio-temporal manner to determine if bear presence differs with distance from the Project, and, if so, to quantify the extent of this ZOI. Facilities (Section 3.1.2.1) and on-site (Section 3.1.4) monitoring data will also be examined for direct bear interactions with infrastructure. Results will be compared to predictions in the FEIS.

3.1.8 Muskox Monitoring

Muskox are valued by Inuit as a source of food, hides, horns, and wool, as well as for the commercial sale of meat. Muskox are an important food source for wolves and, to a lesser degree, grizzly bears (Gunn and Miller 1982; Reynolds, Wilson, and Klein 2002; Wiebe et al. 2009; Mech 2010). Inuit TK indicates that muskox are sparsely distributed within the RSA and are distributed across the Kent Peninsula particularly along the coasts and to the west side of Bathurst Inlet (Banci and Spicker 2016). According to TK, muskox have generally increased in the Elu Inlet area since the early 1900s. Muskox were traditionally hunted by the Inuit when caribou and seals were not available.

Muskox distribution relative to the Project footprints will be monitored using wildlife cameras. The methodology for the wildlife camera program is described in Section 3.1.2.2. Data from this program will be analyzed in a spatio-temporal manner to determine if muskox presence differs with distance from the Project, and, if so, to quantify the extent of this ZOI. Facilities (Section 3.1.2.1) and on-site

(Section 3.1.4) monitoring data will also be examined for direct muskox interactions with infrastructure. Results will be compared to predictions in the FEIS.

3.1.9 Wolverine Monitoring

Wolverine (*Gulo gulo*) use large home ranges and populations are generally low density in the central Arctic (Mulders 2000). This species is an important cultural and economic resource for people in Nunavut and the NWT. Traditional knowledge has noted that due to the reliance of wolverine on caribou as their main food source, the distribution and abundance of wolverine is affected by the trends in caribou populations (Banci and Spicker 2016). The Canada population of wolverine, including Nunavut, is considered a species of Special Concern by COSEWIC (2014).

Wolverine distribution relative to the Project footprint will be monitored using wildlife cameras to the extent practical (described in Section 3.1.2.2). Data from this program will be evaluated to determine if wolverine presence differs with distance from the Project, and, if so and if sufficient information to do so, quantify the extent of this ZOI. Facilities (Section 3.1.2.1) and on-site (Section 3.1.4) monitoring data will also be examined for direct wolverine interactions with infrastructure. Results will be compared to predictions made in the FEIS.

3.1.10 Upland Birds

Upland birds include songbirds (passerines, with the exception of common raven, which is included under raptors), shorebirds, and ptarmigan. Six species of upland breeding birds recorded in the Doris study area have a territorial rank (CESCC 2016, 2010) as “Sensitive,” including the American golden plover, hoary redpoll, least sandpiper, red-necked phalarope, semi-palmated sandpiper and snow bunting. The red-necked phalarope is listed as Special Concern on Schedule 1 of the *Species at Risk Act* (Government of Canada 2019). However, species diversity of upland breeding birds in Nunavut is changing with the northward expansion of species ranges (Banci and Spicker 2016).

Should construction occur during the upland bird breeding period, then pre-construction surveys will be conducted and any active nests will be appropriately buffered, monitored, and fate of the nest reported (Section 2.5; SOP: Doris North Migratory Bird Pre-clearing Survey; ERM 2016).

Monitoring was conducted for the Doris Project using point count surveys and PRISM plots. Between 2018 and 2021, discussions were held with the CWS and KIA on the results of the long-term upland bird monitoring studies from the Doris Project. A description of methods used in past years is described below.

Following discussions with CWS in winter 2021, it was decided to discontinue surveys for upland breeding birds at Hope Bay with the specific objective of measuring Project effects. The monitoring conducted between 2006 and 2015 and statistical analysis reported in the 2016 Annual Report and updated in 2019, concluded that effects of the Project could not be detected beyond 100-200 m, which is within the predicted effects of 500-1,000 m from the 2006 FEIS.

Following discussions with CWS, Hope Bay will shift from monitoring to determine Project effects, to monitoring as part of a regional upland bird-monitoring program being conducted by CWS for the Canadian Arctic. Twenty-four PRISM plots will be randomly selected and monitored every 5 years. Where possible, the monitoring of the 24 plots should be split into two consecutive years of monitoring (12 plots one year, and the remaining 12 plots the following year). If for unforeseen reasons, 2 consecutive years cannot be monitored, then the monitoring shall be conducted in the following year. In essence, this program will involve monitoring 24 plots over 2 consecutive years within a 5 year period.

PRISM Plot Surveys

The locations for future PRISM plot surveys will be determined in collaboration with CWS. PRISM plots are 300 m × 400 m in size (12 ha) each and will be randomly selected to the extent possible (considering safety and logistical realities). PRISM plots will occur in areas of similar vegetation communities. PRISM plots will be surveyed by two observers, following protocols developed by the Canadian Wildlife Service (CWS 2017). Data will be delivered to CWS as part of regional monitoring for upland birds in the Canadian Arctic.

3.1.11 Waterbirds

Tundra lakes and wetlands host a relatively high density of migratory waterfowl, including tundra swans, loons, sandhill cranes, geese, and ducks. The breeding distribution of several species including the yellow-billed loon, tundra swan, and greater white-fronted goose is exclusive to the tundra region.

Waterbird species such as geese, eiders, sandhill cranes, and loons and their eggs are an important food source for Inuit (Banci and Spicker 2016). The first species to arrive in the regional area are geese, brant, and swans. Spring hunting typically occurs along the coast and on islands.

For new-footprint construction undertaken during the migratory bird nesting season, pre-construction surveys will be conducted by personnel who can recognize indicators of bird nesting behaviour from a distance, and appropriate avoidance buffers will be established if needed as described in Section 2.5, Construction Management.

Monitoring was conducted for the Doris Project to measure Project effects using aerial surveys 2006-2015. A comprehensive statistical analysis of these data was conducted and discussed in the 2015 annual report. This analysis concluded that Project effects could not be detected in the waterbird community. Following discussions with CWS and KIA in 2015 and 2016, further surveys were paused until an updated survey objective and methods could be agreed upon.

In 2021, following discussions with the CWS, waterbird monitoring was updated to determine potential Project effects using ground-based monitoring of lakes and the TIA.

3.1.11.1 *Waterbirds and Shorebirds Monitoring*

Waterbirds and shorebirds will be monitored at Ponds near Project infrastructure and at control ponds at a further distance from the Project (i.e., greater than 2 km). These control ponds will also function as control ponds for waterbird and shorebird monitoring of the TIA.

Monitoring for waterbirds and shorebirds will be conducted every two years from a height of land on the lakeshore using a spotting scope. Birds will be identified to species and counted. Surveys will be conducted once per year in June for pairs of birds to indicate nesting. Surveys would cover the pond out to a reasonable distance (to be determined in the field) using a time-constrained methodology of 20 minutes per survey. Detailed methods will be determined prior to fieldwork.

3.1.11.2 *Waterbirds and Shorebirds Use of TIA*

Additional baseline studies conducted in 2018 indicated that waterbirds and shorebirds are using the TIA for staging, foraging, nesting and brood rearing. Hope Bay is monitoring water quality in the TIA on a regular basis as per their water license requirements. If there are water quality exceedances of wildlife guidelines then a toxicological risk assessment will be conducted. If the toxicological risk assessment indicates that there is a reasonable risk to birds using the TIA then ongoing monitoring of the TIA for use by waterbirds and shorebirds will occur and potential deterrence method options will be determined through consultation with ECC and IEAC.

Monitoring for waterbirds and shorebirds will be conducted every two years using PRISM plots and from a height of land on the lakeshore using a spotting scope. Birds will be identified to species and counted.

3.1.12 **Raptors**

Raptors nests are protected under the Nunavut *Wildlife Act* (2003). Raptors present in the Project area include peregrine falcon (*Falco peregrinus tundrius*), gyrfalcon (*Falco rusticolus*), rough-legged hawk (*Buteo lagopus*), golden eagle (*Aquila chrysaetos*), short-eared owl (*Asio flammeus*), and snowy owl (*Nyctea scandiaca*). Common ravens (*Corvus corvax*) are included as functional raptors in Nunavut because they compete for the same resources as cliff nesting raptors (White and Cade 1971; Root 1969). The tundra peregrine falcon and short-eared owl are ranked as a species of Special Concern by COSEWIC and listed under Schedule 1 of SARA (Government of Canada 2019), while the golden eagle, rough-legged hawk, gyrfalcon and short-eared owl are listed as sensitive by the Canadian Endangered Species Conservation Council (CESCC 2010).

Any active nest of ground-nesting raptor species encountered and appropriately buffered during construction activities will be monitored weekly and the outcome of the fate of the nest will be reported.

Monitoring of wind turbines for raptor mortality will be conducted for a period of two years of wind turbine operations during spring and fall migration, as per recommendations in Environment Canada (2007). As a cautionary measure, adaptive management to reduce the potential effect will be triggered if the number of bird mortalities due to turbine strikes exceeds available guidelines (i.e., more than two raptors per year) (OMNR 2011) or if any raptor species of conservation concern is recorded as experiencing mortality due to the turbines.

As part of construction management, nest surveys of cliff-nesting habitat within 2 km of the construction area prior to clearing and construction during specified time period. If any raptors are discovered nesting within 2 km of planned construction activities, a nest management plan will be written. Establishment of a buffer around active nest sites will occur as described in Section 2.5, Construction Management.

Monitoring was conducted for the Doris Project using aerial surveys 2006-2016. A comprehensive statistical analysis of these data was conducted and reported in the 2016 annual report. This analysis determined that project effects could not be detected on raptors near the Project site. A further analysis, conducted in 2019 combined data from the 1980s to 2016 and concluded that there is significant variation year to year in raptor nesting, but no detectable Project effect. Following discussions with the CWS, KIA and GN raptor specialist 2018-2020, no further monitoring for Project effects on raptors is planned at Hope Bay.

3.1.13 Marine Mammal Monitoring

Depending on construction methods (subject to detailed design) of the dock in Roberts Bay, construction noise may result in noise disturbance to marine mammals if they are present in the bay during these activities. A fisheries authorization will be required prior to the work being initiated that will include applicable protection measures for fish and marine mammals. Hope Bay will apply for an authorization in advance of dock construction but only after the design and construction methods are determined. The authorization will include an environmental protection plan or equivalent to ensure the protection of fish and wildlife.

3.1.14 Plants

Loss of habitat within Project footprints resulting from construction activities will be tracked and summarized in comparison to impacts predictions (as per Section 3.1.1).

3.2 Documentation and Reporting

Results of the WMMP will be reported annually to the NIRB who will make the reports publically available for review and comment by applicable parties. Any wildlife incidents or mortalities will be reported as outlined in Section 3.1.3, and will be summarized in the annual report.

Should monitoring results indicate effects beyond those predicted, a review of the mitigation measures currently employed will be undertaken to verify they are being implemented appropriately or whether changes or additional mitigation or management action is required. Similarly, if monitoring data and analyses substantiate the predictions of the FEIS and/or sufficient evidence indicates that detection of effects is statistically unattainable then discussions will occur with the NIRB, KIA, ECCC/CWS, and the GN DOE to determine the direction of future monitoring.

4. Contingencies

Internally, wildlife concerns are first brought to the attention of the Environment Department and/or Wildlife Response Team. For any unforeseen situations which require additional and timely external guidance the KIA, GN DOE and/or CWS will be contacted.

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