

## APPENDIX A ENERGY CENTRE MITIGATION AND MONITORING

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## ACRONYMS AND ABBREVIATIONS

CTAG	Caribou Technical Advisory Group
dB	decibel; dBA and dBC are frequency weightings used to measure noise levels.
EC	Energy Centre
FEIS	Final Environmental Impact Statement
GN	Government of Nunavut
GNWT	Government of the Northwest Territories
GPS	Global positioning system
KIA	Kitikmeot Inuit Association
km	Kilometer
LSA	Local Study Area
m	Meter
OMNR	Ontario Ministry of Natural Resources and Forestry
PDA	Project Development Area
PRISM	Program for Regional and International Shorebird Monitoring
RSA	Regional Study Area
TC	Term and Condition
VEC	Valued ecosystem component
WMMP	Wildlife Mitigation and Monitoring Program
WTG	Wind Turbine Generator
ZOI	Zone of influence



# APPENDIX A: ENERGY CENTRE MITIGATION AND MONITORING

## 1. INTRODUCTION

This Energy Centre (EC) Appendix to the WMMP Plan has been developed specifically for the operations phase of the Energy Centre. This Appendix has been created in response to comments, suggestions, and requests from the reviewers of the previous version of the WMMP Plan to summarize caribou and bird mitigation and monitoring related to the Energy Centre in one location (this Appendix).

This EC Appendix primarily describes actions that are intended to manage effects on caribou and birds (migratory birds and raptors) that may be attributed to activities at the Energy Centre, and includes other wildlife valued ecosystem components (VECs) such as grizzly bear, furbearers, and muskox. In addition to the measures provided in the main body of the WMMP Plan, this plan is intended to ensure wildlife habitats and populations are maintained in the area that will be influenced by the operations of the Energy Centre.

The process of mitigating by design and avoidance was conducted during the preparation phase for the Energy Centre Addendum (EC Addendum; Sabina 2023). This included avoidance of key wildlife habitats, as well as placing infrastructure within the existing Goose Project Development Area (PDA) where possible and as close as possible to planned mine infrastructure to minimize the overall Project footprint.

## 2. SCOPE AND OBJECTIVES

The overall objective of this Appendix is to outline management of effects on wildlife due to operation of the Energy Centre. In response to comments from the Caribou Technical Advisory Group (CTAG; particularly the Kitikmeot Inuit Association [KIA]). It targets three valued ecosystem components (VECs) that were identified during review of the EC Addendum as potentially being impacted by the Energy Centre:

- Caribou (primarily the Beverly/Ahiak herd; however mitigation applies to all caribou herds);
- Raptors (e.g., falcons, eagles, hawks, owls, and ravens); and
- Migratory birds (waterbirds and upland birds) and resident birds.

Mitigation and management for other wildlife such as muskox, grizzly bear, and furbearers are also presented in Section 6.

## 3. DESIGN AND CONSTRUCTION MITIGATION FOR CARIBOU AND BIRDS

The Appendix has been designed specifically for the operations phase of the Energy Centre. Management actions that will be implemented during the construction phase of the Energy Centre will be completed in accordance with the measures outlined in the main body of the WMMP Plan, in the sections provided in Table 1.

**TABLE 1 CONSTRUCTION MITIGATION AND MANAGEMENT FOR THE ENERGY CENTRE  
APPLICABLE TO CARIBOU AND BIRDS PRESENTED IN THE WMMP PLAN**

<b>Focal Species Mitigation</b>	<b>WMMP Plan Section</b>
<b>Caribou</b>	Section 7.2
Construction Management	Section 7.2.2.5
Road and Traffic Management	Section 7.2.2.1, 7.2.2.8, 7.2.2.9, 7.2.2.10, 7.2.3, 7.2.4 and 7.2.5
<b>Raptors</b>	Section 10.2
Construction Management and Pre-Clearing Surveys*	Section 10.2.2.2 and 10.3.1.2
Road and Traffic Management	Section 7.2.2.1, 7.2.2.8, 7.2.2.9, 7.2.2.10, 7.2.3, 7.2.4, 7.2.5, 10.2.4, 10.2.5
<b>Migratory Birds</b>	Section 11.2, 12.2, 13.2
Construction Management and Pre-Clearing Surveys*	Section 11.2.2, 11.2.4, 11.3.1.2, 12.3.1.1, 13.3.1.1
Road and Traffic Management	Section 7.2.5, 11.2.5 and 13.2.2

\*Pre-clearing surveys and buffers will follow the species-specific buffers suggested by ECCC in Table 11.2-1 in the main body of the WMMP Plan. If the suggested buffer is inoperable, the Environment Manager will contact ECCC (migratory birds) or GN (raptors) for advice on mitigation activities. Nests will be monitored within buffers for breeding success and will be reported in the annual WMMP Report.

General mitigation and management measures that will be implemented at the Energy Centre during the operation phase include the development of a wildlife education program (including training for all employees), enforcement of wildlife policies, and a noise abatement program.

- Wildlife policies and employee education are described in Section 6.1.1 in the main body of the WMMP Plan and are all applicable to the Energy Centre.
- Noise abatement mitigation measures described in Section 6.1.2 in the main body of the WMMP Plan are also applicable to the Energy Centre. In addition, noise abatement measures specific to the Energy Centre will include the following:
  - The size and design of the Wind Turbine Generators (WTGs) will be selected to reduce potential effects on sight lines, noise and disturbance (the WTG model to be used has not yet been selected as final engineering is ongoing).
  - Energy Centre facilities will be designed to limit the amount of noise that emanates from the site, such as housing static noise sources (e.g., generators) in buildings and using acoustic screening such as walls or berms to muffle noise.
  - Management of noise sources (e.g., staged reduction and temporary shutdown of WTGs when wildlife are present) is discussed in the sections below for each wildlife species (Sections 4 and 5).

## 4. CARIBOU

This section describes mitigation, management, and monitoring activities that are specific to minimizing potential effects of the wind turbines on caribou during operation of the Energy Centre. Traditional Inuit Knowledge and monitoring data indicate that the project is most likely to interact with the Beverly/Ahiak herd; however, as described in the WMMP Plan, mitigation is extended to all caribou regardless of herd.

Mitigation and management actions will be triggered by ongoing monitoring. All mitigation, management, and monitoring for caribou already described in the main body of the WMMP Plan also applies to the Energy Centre.

### 4.1 OVERVIEW OF POTENTIAL EFFECTS TO CARIBOU

Three potential effects were assessed for the EC Addendum, including habitat loss, sensory disturbance, and disruption of movement. The monitoring and mitigation measures outlined for caribou have been developed to address these three potential effects.

These potential effects were identified in the EC Addendum from Inuit Qaujimajatuqangit and scientific data using the planned wind tower design. If the wind tower design is different than what was used in the Addendum, B2Gold Nunavut will update the noise modelling and reanalyze the potential effects on caribou if modelling results are different.

### 4.2 MITIGATION AND MANAGEMENT FOR CARIBOU

This section describes mitigation and management for caribou during operation of the Energy Centre. Mitigation and management actions that are in place and detailed in Section 7.2 of the main body of the WMMP Plan also apply to wind turbines.

#### 4.2.1 MITIGATION AND MANAGEMENT FOR HABITAT LOSS FOR CARIBOU

B2Gold Nunavut has designed the Energy Centre footprint to be as small as possible and to mostly occur within the Goose PDA, which is already evaluated and permitted as lost, to avoid additional habitat alteration. In addition, areas will be reclaimed progressively during operations to minimize the area of disturbance to wildlife as described in the Mine Closure and Reclamation Plan (Volume 10, Chapter 29).

#### 4.2.2 MITIGATION AND MANAGEMENT FOR SENSORY DISTURBANCE AND DISRUPTION OF CARIBOU MOVEMENT

General mitigation strategies to minimize the effects of disturbance and disruption of movement are addressed via design and noise abatement measures outlined in Section 3 of this appendix. In addition, mitigations to minimize the disruption to movement to caribou have been incorporated into the design of the Energy Centre by:

- Selecting WTGs with reduced noise as an objective;
- Maintaining a small array across the landscape (~ 5 km);
- Keeping the number of WTGs low (approximately 13 turbines); and

- Spacing the WTGs in such a way that caribou can still travel around turbines (i.e., spacing ~ 400 m apart).

Noise models produced for the EC Addendum indicate that total noise from the wind-towers will reach 45 dBA at approximately 500 m from the towers, and 40 dBA at approximately 800 m to 1 km (Sabina 2023). B2Gold Nunavut will update the noise modelling if the wind turbines are different than what was presented in the FEIS Addendum.

A noise model was produced (ERM 2024) that separated the total noise into octave bands and compared it to known hearing abilities measured on reindeer (Perra et al 2022). This study reported the hearing abilities of several caribou individuals. When the modeled noise is compared to the hearing abilities of caribou, the least sensitive caribou would be able to hear the WTGs at approximately 500 m and the most sensitive caribou would be able to hear the WTGs at approximately 2 km (ERM 2024).

If groups of 25 or more caribou are observed by wildlife monitors within 2 km of the Energy Centre, then the WTGs will be stopped until caribou move through the area (See Level 4 – Staged Reduction in Energy Centre Activities in Section 4.2.2.1). The 2 km trigger distance was informed by the caribou hearing modeling (ERM 2024), research on caribou distribution in relation to wind farms (Colman et al. 2012; Colman et al. 2013; Strand et al. 2017; Skarin and Alam 2017; Tsegaye et al. 2017; Lee et al 2020), and discussions with the Caribou Technical Advisory Group (CTAG). Caribou will continue to be monitored as described in Section 4.3.2.2 during operational shutdowns of the WTGs to evaluate effectiveness of the mitigation.

Details regarding the various scenarios and levels of mitigation to manage disturbance to caribou are provided in the following sections (4.2.2.1 and 4.2.2.2).

#### 4.2.2.1 LEVELS OF MANAGEMENT FOR CARIBOU DURING NORMAL OPERATIONS

The Energy Centre will be managed through four levels of response to caribou presence, including:

- Level 1 – Normal operations;
- Level 2 – Site notification;
- Level 3 – Site alert; and
- Level 4 – Staged reduction in activities.

This section outlines management actions under each level that are specific to operation of the Energy Centre. The four levels of response are further described in the main body of the WMMP Plan in Section 7.2.2.2.

##### **Level 1 – Normal Operations**

- Normal operations are conducted year-round, with active caribou monitoring conducted during all seasons.
- Normal operations can be adjusted during any season if caribou are observed, trigger levels 2 through 4, below.

## Level 2 – Site Notification

- During spring migration and the sensitive seasons for caribou (calving, post-calving and early summer) from June 5 to July 31, a site notification will be distributed to all personnel by the Environmental Manager via email or radio notices, postings on bulletin boards and entranceways to buildings, and discussing caribou at morning meetings.
- Site notification includes directing Energy Centre personnel to be vigilant for caribou onsite and to remind personnel of their responsibilities to protect caribou.

## Level 3 – Site Alert

- A site alert is triggered at any time of year if groups of caribou are observed near the Energy Centre. Site alerts will be distributed to all personnel via email or radio notices, postings on bulletin boards and entranceways to buildings, and discussing caribou at morning meeting.
- Energy Centre personnel will be alerted that caribou are in the area and reminded of their responsibilities to protect caribou and that staged reductions in activities may occur imminently.
- A site alert will also trigger the mine manager to prepare for a possible staged reduction in activities (Level 4). This will include notifying the managers for the Energy Centre operations of a potential shutdown of turbines.

## Level 4 – Staged Reduction in Energy Centre Activities

- The objective of staged reductions in activities is to limit the amount of noise and/or visual disturbance that emanates from the Energy Centre site. Staged reductions in activities are triggered by active caribou monitoring (Section 7.2.2.1 in the main body of the WMMP Plan) or by incidental observations (Section 7.2.2.1 in the main body of the WMMP Plan) or ordered by the Environmental Manager.
- **Groups of 25 or more caribou within 2 km of the Energy Centre at any time of the year will trigger a cessation of wind turbine operation (Section 4.2.2).** The 2 km trigger distance was informed by caribou hearing modeling (ERM 2024 and Perra et al 2022) and research on caribou distribution in relation to wind farms (Colman et al. 2012; Colman et al. 2013; Strand et al. 2017; Skarin and Alam 2017; Tsegaye et al. 2017; Lee et al 2020). Caribou will continue to be monitored as described in Section 4.3.2.2 during operational shutdowns of the WTGs to evaluate effectiveness of the mitigation.
- **During all seasons, caribou behaviour will be monitored across a spectrum of group sizes and distances from the WTGs (Section 4.3.2.2).** Should the behaviour monitoring program determine that caribou are having negative behavioural responses to activities outside of the current planned trigger distances for mitigation (i.e., 2 km from the Energy Centre), then these mitigation distances will be reviewed and adjusted accordingly (Section 7.3.1 in the main body of the WMMP Plan), and in discussion with the CTAG.
- Activities required to maintain the Energy Centre so that components aren't damaged and for the safety of staff will continue. This includes operation of generators, heating of buildings, etc.

#### 4.2.2.2 MANAGEMENT FOR SHIFTS IN CALVING RANGES

To manage for potential shifts in caribou calving range, two additional levels (Levels 5 - Rapid Operational Shutdown; and 6 - Planned Operational Shutdown) have been developed to ensure the site is prepared to adaptively manage. These include immediate management when a shift in calving range is observed (Level 5 – Rapid Operational Shutdown) and long-term responses to shifts in calving range in following years (Level 6 – Planned Operational Shutdown).

Should pregnant females or family units (one cow and one newborn calf) be identified in close proximity to the Energy Centre during calving or post-calving, B2Gold will immediately engage the KIA and the GN to determine if additional mitigation, other than what is below, is warranted.

This section outlines management actions under each level that are specific to operation of the Energy Centre, with further details provided in the main body of the WMMP Plan in Section 7.2.2.3.

##### **Level 5 – Rapid Operational Shutdown**

A rapid operational shutdown (Level 5) of the mine site and Energy Centre in response to caribou moving their calving or post-calving range to overlap the Energy Centre will follow the guidelines provided in the main body of the WMMP Plan in Section 7.2.2.3. A Level 5 rapid operational shutdown is intended to occur during the same year that a shift in calving or post-calving range is observed.

**Should monitoring detect a density of greater than 2.0 breeding female caribou/km<sup>2</sup> within 4 km of the Energy Centre during calving and post-calving, then B2Gold Nunavut will shut down the WTGs.** A density of 2.0 breeding female caribou/km<sup>2</sup> is half of the density of caribou in the core calving range and is a number agreed by parties at the Back River Final Impact Hearing in 2017.

The rapid operational shutdown will include the following:

- Cessation of wind turbine operation;
- Activities conducted during a rapid operational shutdown will require written authorization from the General Manager, Environmental Manager or the Safety Manager; and
- Onsite activities required to maintain the site, personnel safety and environmental compliance will continue.

##### **Level 6 – Planned Operational Shutdown**

A planned operational shutdown (Level 6) of the mine site and Energy Centre will follow the guidelines provided in the main body of the WMMP Plan in Section 7.2.2.3. A Level 6 management response will occur during the years after collar data indicates that the Bathurst or Beverly/Ahiak caribou have moved their calving or post-calving range over the Energy Centre.

**The mitigation measures for a planned operational shutdown are the same as described above for Level 4 and 5 but are planned prior to June 5 due to a known overlap of the site with the calving range, and do not require a trigger (i.e., observation of a particular density of caribou).**

#### 4.2.2.3 RESUMPTION OF ACTIVITIES

In some cases, individuals or groups of caribou may become habituated to the site. On first observation of groups of caribou, mitigation will be carried out as indicated above.

Resumption of activities is discussed in the main body of the WMMPP in Section 7.2.2.12, and includes:

- Should the wildlife monitors identify an animal or group of animals that are observed onsite for more than one day then mitigation actions will be relaxed for these animals except:
  - During calving and post-calving when a Rapid Operational Shutdown has been triggered by the observation of greater than 250 caribou within 4 km of the mine site, the suspension of activities would continue; and
  - When a group of 25 or more caribou are observed within 4 km of site, then blasting activities will continue to be suspended until the caribou move off.
- The resumption of activities must be approved by the Environmental Manager or designate.
- Note that B2Gold Nunavut has already made a commitment to discuss mitigation with the CTAG in response to KIA-NIRB-06-1 and this commitment will include resumption of activities: "B2Gold Nunavut commits to continuing ongoing mitigation discussions on the wind energy center with the Caribou Technical Advisory Group (CTAG)."

#### 4.2.3 ADAPTIVE MANAGEMENT FOR CARIBOU

Adaptive management is the management approach of plan, do, monitor, and adjust. Current plans for management are listed above. Monitoring for caribou is listed in Section 4.3 and includes behaviour monitoring, collar monitoring, and ground-based monitoring, etc. Based on results of monitoring, adaptive management may adjust triggers and thresholds or management actions. Triggers for adaptive management are described in the monitoring sections below. For example:

- The trigger distance of 2 km to shut down the WTGs will be reviewed if monitoring (behaviour monitoring or regional distribution monitoring) suggests avoidance or a negative behavioural response of caribou outside of this threshold distance (e.g., Section 4.3.2.2, 4.3.2.4, 4.3.2.6).

### 4.3 MONITORING FOR CARIBOU

This section describes monitoring activities to minimize potential effects of the Energy Centre on caribou. This section is divided into two subsections, the first describing the monitoring that will be conducted to trigger mitigation activities designed to minimize impacts to caribou, and the second describing monitoring to evaluate the predicted effects of the Energy Centre on caribou in the EC Addendum.

Monitoring programs will be largely conducted in the Local Study Area (LSA) and Regional Study Area (RSA) for terrestrial wildlife (Figure 6.2-1 in the WMMP Plan). Sections 7.3.1 and 7.3.2 of the main body of the WMMP Plan provide additional details regarding caribou monitoring programs applicable to the Energy Centre.

Note that B2Gold Nunavut has already made a commitment to discuss monitoring with the CTAG in response to KIA-NIRB-06-1 and this commitment will include monitoring programs for caribou:



"B2Gold Nunavut commits to continuing ongoing mitigation discussions on the wind energy center with the Caribou Technical Advisory Group (CTAG)." Prior to construction of the Project, B2Gold Nunavut will update the WMMP Appendix with additional information on the details of the monitoring programs, including:

- Study design: including locations of test and control areas, amount of pre-construction data that will be collected, distances fecal pellets will be collected.
- Methods: including details regarding how scan sampling will take place (where and when), the frequency and length of scanning, definitions for the categories of behaviors that will be measured.

Note that detailed study design and methods may be better suited to a separate detailed workplan.

- Triggers: including definitions of triggers and statistical tests.
- Adaptive Management: including a discussion on additional levers that can be used to mitigate risk to caribou (e.g., altering group size or seasonal adjustment of thresholds).

#### 4.3.1 CARIBOU MONITORING TO TRIGGER MITIGATION

##### 4.3.1.1 MONITORING SEASONAL RANGES OF CARIBOU

Monitoring seasonal ranges of caribou for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 7.3.1.1. This section summarizes key program details specific to the Energy Centre.

### Objective

The objectives of monitoring seasonal ranges of caribou are to:

- Identify if and when caribou may interact with the Energy Centre so that monitoring and mitigation activities can be planned for caribou (e.g., wildlife monitors will be onsite to conduct active caribou monitoring and mitigation).
- Identify if the calving ground of the Bathurst or Beverly/Ahiak caribou herd has moved to overlap with the Energy Centre.

### Triggers for Monitoring

This monitoring program will occur during each year of operation of the Energy Centre.

### Methods

To evaluate when caribou are likely to interact with the Energy Centre, collar data for the Bathurst and Beverly/Ahiak caribou herds (1996 to present) will be used to calculate kernel utilization distributions for each season to monitor their degree of overlap.



## Triggers for Adaptive Management

Should the 50% or 80% core calving or post-calving ranges of the Bathurst or Beverly/Ahiak herds shift to overlap with the Energy Centre, B2Gold Nunavut will liaise with the KIA, Government of Nunavut (GN), and Government of the Northwest Territories (GNWT) to discuss the degree of overlap, the timing of overlap, the details of the proposed planned operational shutdown actions, and the timing of planned operational shutdown for the following year. Following these discussions, B2Gold Nunavut will conduct planned shutdowns in activities for these seasons as described in Section 4.2.2.1.

## Reporting

Results of the collar monitoring program will be reported annually in the WMMP Report.

### 4.3.1.2 NEAR REAL-TIME COLLAR MONITORING

Near real-time collar monitoring for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 7.3.1.2. This section summarizes key program details specific to the Energy Centre.

## Objective

The objective of the near real-time collar monitoring program is to identify if caribou are approaching the Energy Centre, which will be used to trigger a site alert.

## Triggers for Monitoring

The near real-time collar monitoring program will be completed during periods when caribou are most sensitive to disturbance (calving and post-calving) and likely to be in the area surrounding the site (spring migration, summer).

## Methods

Collar data will be acquired from the GNWT and GN for the Bathurst and Beverly/Ahiak herds. Collar locations will be reviewed as they are received from the governments.

The Environmental Manager will monitor collar data from the Bathurst and Beverly/Ahiak caribou herds to determine if groups of caribou are approaching the Back River site.

## Triggers for Adaptive Management

Should collars indicate that caribou are approaching the Energy Centre during calving, post-calving, spring migration, or early summer, the Environmental Manager will trigger a site alert (Level 3 outlined in Section 4.2.2.1) and alert wildlife monitors that caribou are approaching. Adaptive management will follow the levels described in Sections 4.2.2.1 and 4.2.2.2.

B2Gold Nunavut will also conduct regional monitoring of caribou using satellite collars to examine any potential zone of influence (ZOI) for caribou (Section 4.3.2.4) around the Energy Centre. The results of this monitoring plan will be used to update the biologically-based trigger distance as needed.

## Reporting

Results of the near real-time collar monitoring program will be reported in the annual WMMP Report.

### 4.3.1.3 ACTIVE CARIBOU MONITORING BY WILDLIFE MONITORS

Active caribou monitoring by wildlife monitors will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 7.3.1.3. This section summarizes key program details specific to the Energy Centre.

## Objective

The objectives of the active caribou monitoring program is to:

- Reduce any potential disturbance effects on caribou due to Energy Centre activities. This program is designed to identify when caribou are in the vicinity and trigger mitigation if caribou are 1) within the trigger distance, 2) of a sufficient group size, and 3) present during the designated season.
- Survey caribou both within and at greater distances than the proposed trigger distance of 2 km.

## Triggers for Monitoring

Active monitoring will occur during each year of operation of the Energy Centre. Active caribou monitoring will be triggered:

- During the periods of the year when caribou are most sensitive to disturbance (calving and post-calving) and when they are most likely to interact with site (spring migration, summer);
- When caribou are reported within the trigger distance set by the near real-time collar monitoring program; and
- In response to incidental observations of caribou near the Energy Centre.

## Methods

Back River personnel will be trained for the role of wildlife monitor as described in the main body of the WMMP Plan in Section 7.3.1.3.

The proposed monitoring location for the Energy Centre is located on the ridge to the west of the Energy Centre to maximize the view of the tundra. Monitoring will be conducted as described in the main body of the WMMP Plan in Section 7.3.1.3. The preferred method for monitoring is height of land monitoring from a vehicle. This provides a good view of the landscape while keeping the survey crew safe, particularly in cold conditions.

## Triggers for Adaptive Management

If groups of 25 caribou are observed within 2 km of the Energy Centre at any time of the year, a cessation of wind turbine operation will be triggered (see Section 4.2.2). Caribou will continue to be monitored during operational shutdowns of the WTGs to evaluate effectiveness of the mitigation.

## Reporting

Caribou sightings and adaptive management triggered from the active caribou monitoring program will be reported in the annual WMMP report.

### 4.3.1.4 INCIDENTAL OBSERVATIONS

The incidental observations program for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 7.3.1.4. This section summarizes key program details specific to the Energy Centre.

## Objectives

The objectives of the incidental wildlife observation program include:

- Recording general caribou activity at the Energy Centre;
- Identifying unexpected conflicts or potential conflicts posed by existing Energy Centre facilities for caribou;
- Identifying opportunities for adaptive management if a new risk to caribou is identified; and
- Assessing effectiveness of mitigation measures over time.

## Triggers for Monitoring

The incidental observation monitoring program will be in place throughout operations of the Energy Centre.

## Methods

All personnel will be asked to report observations of caribou (and other wildlife species) to the Environment Department as described in the main body of the WMMP Plan in Section 7.3.1.4. Environment staff will routinely be monitoring the area around the Energy Centre facilities for caribou or caribou sign.

## Triggers for Adaptive Management

Observations of caribou near the Energy Centre may trigger the following adaptive mitigation:

- Personnel will alert the Environment Department, which may trigger active monitoring or behaviour monitoring by wildlife monitors.
- Should unexpected observations be made of wildlife in distress (injured, etc.), then the Environment Department and the appropriate regulator will be notified.

## Reporting

Incidental observations and monitoring responses will be reported in the annual WMMP report.

#### 4.3.1.5 ONSITE CAMERA MONITORING

Onsite camera monitoring for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 7.3.1.5. This section summarizes key program details specific to the Energy Centre.

##### **Objectives**

The objective of the onsite camera program is to monitor caribou (and other wildlife VECs) activity around the Back River mine and the Energy Centre, including:

- Locations that are not staffed for long periods of time (including the WTGs); and
- The time of year when caribou use the Energy Centre site.

##### **Triggers for Monitoring**

The onsite camera monitoring program will be in place throughout operations of the Energy Centre.

##### **Methods**

Motion-triggered cameras will be placed in the Energy Centre to assess disruption of movement due to WTGs, and behaviour of caribou near the WTGs. Across years, data analysis will evaluate 1) the timing of caribou presence, 2) activity around the Energy Centre, and 3) behaviour of caribou near WTGs and roads. Changes in activity at these sites may trigger adaptive management.

Monitoring methods are further described in the main body of the WMMP Plan in Section 7.3.1.5.

##### **Triggers for Adaptive Management**

Observations of caribou using the area around the WTGs in a way that may be harmful to caribou will be adaptively managed.

##### **Reporting**

Data and analyses will be reported in the annual WMMP report.

#### 4.3.2 CARIBOU MONITORING TO MEASURE PREDICTED EFFECTS

##### 4.3.2.1 FOOTPRINT MONITORING

Footprint monitoring for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 7.3.2.1. This section summarizes key program details specific to the Energy Centre.

##### **Objectives**

The objective of footprint monitoring program is to quantify habitat losses for caribou due to construction and clearing of areas for the Energy Centre.

## Trigger for Monitoring

This monitoring program will track the as-built size of the Energy Centre (along with the rest of the mine footprint), compared to the size presented in the EC Addendum. Monitoring will occur in each year of operation of the Energy Centre.

## Methods

The as-built footprint will be compared to the previous year's footprints, the planned footprint, and wildlife habitat maps on a yearly basis. A GIS analysis will be conducted to overlay the constructed footprint area with the habitat suitability mapping for caribou (and other wildlife VEC species) conducted during baseline studies. Maps and a table of habitat loss will be produced.

## Triggers for Adaptive Mitigation

If the constructed footprint exceeds the planned PDA areas, then this area will be reported in the WMMP report.

## Reporting

Footprint monitoring will be reported in the annual WMMP report during years that the footprint has increased in size. The report will contain a map of the site footprint and tables summarizing the areas of habitat removed.

### 4.3.2.2 BEHAVIOUR MONITORING PROGRAM

Behaviour monitoring for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 7.3.2.2. This section summarizes key program details specific to the Energy Centre.

## Objective

The objective of the behaviour monitoring program is to test the EC Addendum prediction that caribou may be disturbed by WTGs and other activities at the Energy Centre, principally noise. This program's aim is to determine 1) what behavioural responses caribou display in reaction to potential stressors at the Energy Centre, including wind turbines, and 2) if caribou behaviour suggests they may be attracted to the wind turbines for insect relief.

## Trigger for Monitoring

The behaviour monitoring program will be triggered in each year of operation of the Energy Centre where there are caribou near the site, as well as when caribou are observed, and when an observer can be within 2 km of the caribou to ensure accurate recording of behavioural data. Behaviour monitoring will also be completed prior to construction of the Energy Centre to obtain "before" data, to ensure a Before-After-Control-Impact (BACI) study design is in place.

## Methods

Behaviour monitoring at the Energy Centre will be completed using scan sampling by trained observers using spotting scopes at heights of land to record the behaviour of individual caribou and groups of caribou in the vicinity of the Energy Centre and varying distances from the Energy Centre. Access will be by pickup truck, taking caution not to disturb the caribou by approaching too closely and giving the animals at least 5 minutes acclimate prior to surveys.

During scan sampling on groups up to 25 caribou, all caribou will be included in the scan. For larger groups, a sub-sample of 20 to 25 caribou will be observed. The distance of the caribou to the nearest WTG will also be determined and used to investigate whether the WTGs are acting as a stressor at various distances. Section 7.3.2.2 in the main body of the WMMP Plan provides additional details regarding behaviour monitoring methods.

A power analysis will be conducted to evaluate what behavioural monitoring sample size is required to detect an effect. If the sample size is insufficient to detect effects, B2Gold Nunavut will work with the CTAG to identify ways to increase sample size and carry out additional sampling.

## Triggers for Adaptive Management

Should the behaviour monitoring program determine that caribou are having negative behavioural responses to activities outside of the current planned trigger distances for mitigation (i.e., 2 km from the Energy Centre), then these mitigation distances will be reviewed and adjusted accordingly (Section 7.3.1 in the main body of the WMMP Plan), and in discussion with the CTAG. Should methods in the SOP require adjustment to monitor caribou behaviour at or beyond 2 km, B2Gold Nunavut will discuss the changes with the CTAG. Should behaviour monitoring determine that caribou are attracted to the WTGs for insect relief, caribou will continue to be monitored, results will be presented in the annual WMMP report, and discussed with the CTAG, including the types of statistical analyses used and whether potential adaptive management steps are required.

Examples of adaptive management should an effect (avoidance or attraction) be observed on caribou include: 1) reviewing the mitigation program at site to ensure that mitigation has been conducted properly, 2) reviewing the results of monitoring programs in relation to mitigation measures to determine if there are any altered response to different mitigations that may inform adaptive management and 3) working with the CTAG to determine potential next steps.

## Reporting

The results of the behaviour monitoring program will be reported in the annual WMMP Report.

### 4.3.2.3 STRESS HORMONE STUDY

The stress hormone program for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 7.3.2.3. This section summarizes key program details specific to the Energy Centre.

## Objective

The objective of the stress hormone study is to test the EC Addendum prediction that caribou may be disturbed by the Energy Centre. This program will determine what physiological responses caribou have to the Back River site (including the Energy Centre).

## Trigger for Monitoring

The stress hormone study will occur once during operation of the Back River mine and while the Energy Centre is in operation, when there are caribou on or near the site (including the Energy Centre). If possible, this study will occur in the first two years of operation.

## Methods

This study will examine the level of stress hormones at a variety of distances from the Energy Centre and the mine. Fecal pellets from caribou will be recovered at distances from 500 m to 30 km. Section 7.3.2.3 of the main body of the WMMP Plan provides additional details.

## Triggers for Adaptive Management

Should the stress hormone study determine that caribou are having negative physiological responses to mine site and/or Energy Centre activities, then potential stressors will be adaptively managed (Section 7.3.1 in the main body of the WMMP Plan).

## Reporting

The results of the stress hormone study will be reported in the annual WMMP Report in the year during which the study is conducted.

### 4.3.2.4 REGIONAL COLLAR MONITORING FOR ZONE OF INFLUENCE

The regional collar monitoring program for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 7.3.2.4. This section summarizes key program details specific to the Energy Centre. B2Gold Nunavut will continue to update the analyses specific to detect avoidance of (or attraction to) the wind towers and the design of monitoring programs in consultation with the CTAG and the GNWT prior to implementation.

## Objective

The objective of the regional collar monitoring program is to investigate whether caribou alter their regional distribution following construction and operation of the mine and Energy Centre.

This program will evaluate whether either the Bathurst or the Beverly/Ahiak caribou herds are 1) avoiding the wind towers, 2) not avoiding the wind towers, but moving more quickly through the wind tower area, 3) attracted to the wind towers for insect relief, 4) altering their migration corridors or movement paths due to the Project, or 5) there is no change compared to baseline conditions.

## Trigger for Monitoring

The regional collar monitoring program for zone of influence will be conducted every three years during the operation phase of the mine and Energy Centre.

## Methods

Monitoring for the Energy Centre will be included in the analysis completed for the Goose site as described in the main body of the WMMP Plan in Section 7.3.2.4.

The EC Addendum predicted that caribou may avoid the Energy Centre to some degree and an analysis for ZOI will test for a change in distribution and the magnitude of that change. To test for a ZOI, the density of caribou collar points recorded during the operation of the Energy Centre and the Back River mine will be compared to points recorded before construction at various distances from the site (see Section 7.3.2.4 in the main body of the WMMP Plan for additional details on methods).

A movement rate analysis will be conducted for both the Bathurst and Beverly/Ahiak caribou to measure whether caribou increase their movement near the Energy Centre when it is in operation. Methods for this analysis will follow those for the ZOI analysis, but instead of comparing density of caribou at different distances from the Energy Centre, this analysis will examine step length (the km per day moved) by caribou (see Section 7.3.2.4 in the main body of the WMMP Plan for additional details on methods).

Collar analysis will also evaluate movement paths before and after construction of the Project and wind tower generators. This will include an investigation of variables such as directionality, stop-over, high use area, and step-length.

Note that B2Gold Nunavut has already made a commitment to discuss monitoring with the CTAG in response to KIA-NIRB-06-1 and this commitment will include the collar monitoring programs for caribou: "B2Gold Nunavut commits to continuing ongoing mitigation discussions on the wind energy center with the Caribou Technical Advisory Group (CTAG)."

## Triggers for Adaptive Management

Should the regional collar monitoring program determine that caribou are avoiding (or are attracted to) the Energy Centre more than predicted in the EC Addendum (predicted ZOI of 2 to 4 km), B2Gold Nunavut will investigate possible mechanisms for this avoidance and adaptively manage its activities.

## Reporting

The results of the regional collar monitoring program will be reported in the annual WMMP Report during the years when the analysis is conducted and an overview of results provided to the CTAG in years without detailed analysis.

### 4.3.2.5 NOISE MONITORING

Noise monitoring for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 7.3.2.5. This section summarizes key program details specific to the Energy Centre.

## Objective

The objective of the noise monitoring program is to measure the amount of noise produced by the Energy Centre, specifically the WTGs, at various distances, to meet compliance requirements for personnel health and safety and to test the predictions of the EC Addendum.



## Trigger for Monitoring

The noise monitoring program will be conducted every three years during the operation phase of the Energy Centre starting in the first year of operation and in conjunction with noise monitoring for the Back River mine site.

## Methods

Noise monitoring will be conducted in winter (approximately March) and summer (approximately June) at a total of 10 sites to address potential effects on caribou at varying distances from the mine and wind tower generators.

The exact locations of the sites will be determined based on the final WTG specifications and the predominant wind directions. Sound meters will make noise measurements every minute for 24 consecutive hours at a height of 1.5 m above ground. Noise will be measured in the audible range of caribou. Section 7.3.2.5 in the main body of the WMMP Plan provides additional details on methods for noise monitoring.

## Data Analysis

Analysis will follow those conducted in the noise baseline (Final Environmental Impact Statement [FEIS] Appendix V4-2A).

## Triggers for Adaptive Mitigation

Noise levels exceeding noise-monitoring thresholds for human safety will trigger mitigation that will also act to reduce potential effects on wildlife receptors. Noise measured for caribou may also be used to trigger adaptive management through discussion with the CTAG.

## Reporting

Noise monitoring data will be reported as a stand-alone report and referenced in the annual WMMP report in the years that it is completed.

### 4.3.2.6 REGIONAL CAMERA MONITORING PROGRAM

The regional camera monitoring program for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 7.3.2.8. This section summarizes key program details specific to the Energy Centre.

## Objective

The EC Addendum predicted that caribou may avoid the Energy Centre due to disturbance. The objective of the regional camera monitoring program is to determine if caribou are avoiding the Energy Centre.

## Trigger for Monitoring

The regional monitoring program using cameras will be conducted every three years during the operations phases of the mine and the Energy Centre.

## Methods

The regional camera monitoring program will be designed as a Before-After-Control-Impact study, using the existing camera data from 2012 to 2015 as the before category, along with any additional years of data prior to construction of the Energy Centre. The Regional camera monitoring program for the project has 60 cameras installed in three zones – treatment (0-5 km from site), zone of influence (5-10 km) and control (>10 km). Cameras are placed in the same locations as baseline studies in 2012-2015. Locations were chosen by Inuit personnel as high quality habitat for caribou with site conditions being as similar as possible in heath tundra ecosystem. B2Gold Nunavut will discuss whether there are any changes required to this program to account for windfarm monitoring prior to windfarm construction.

Cameras will be placed in three “zones” during the operations phases of the Energy Centre and the mine to evaluate ZOI-type effects:

- Treatment, with cameras arrayed within 2 km of the Energy Centre;
- Zone of influence (ZOI), with cameras arrayed between 2 and 10 km of the Energy Centre; and
- Control, with cameras arrayed outside of 10 km of the Energy Centre.

Section 8.3.2.2 in the main body of the WMMP Plan provides additional details on methodology and analyses.

Camera data for the Energy Centre will be analyzed in accordance with Section 8.3.2.2 in the main body of the WMMP Plan. Camera data will be analyzed to detect differences between caribou detections at increasing distances from the Energy Centre by fitting a spline, using a dose-response method (Boulanger et al. 2012) or other distance-dependent methods.

## Triggers for Adaptive Management

Should the regional remote camera monitoring program determine that caribou are avoiding the Energy Centre more than predicted in the EC Addendum (predicted ZOI of 2 to 4 km), B2Gold Nunavut will investigate possible mechanisms for this avoidance and adaptively manage its activities.

## Reporting

The results of the regional remote camera monitoring program will be reported in the annual WMMP Report during the years when the analysis is conducted and an overview of results provided to the CTAG in years without detailed analysis.

## 5. BIRDS

This section describes mitigation, management, and monitoring activities that are specific to minimizing potential effects of the wind turbines on birds (raptors, waterbirds, and upland birds) during operation of the Energy Centre. Mitigation and monitoring for birds will follow the guidance provided by Environment Canada (2007a, 2007b).

### 5.1 OVERVIEW OF POTENTIAL EFFECTS TO BIRDS

Four potential effects were evaluated in the EC Addendum, including habitat loss, sensory disturbance, disruption of movement, and direct mortality. The monitoring and mitigation measures outlined for birds have been developed to address these four potential effects.

These potential effects were identified in the EC Addendum from field data on birds and flight elevation and the planned wind tower design. If the wind turbines and blade swing arc is closer to the ground in the final design, B2Gold Nunavut will reanalyze potential effects on birds using the updated design specifications than what was presented in the FEIS Addendum.

### 5.2 MITIGATION AND MANAGEMENT FOR BIRDS

This section describes mitigation and management for birds during operation of the Energy Centre.

#### 5.2.1 MITIGATION AND MANAGEMENT FOR HABITAT LOSS FOR BIRDS

B2Gold Nunavut has designed the Energy Centre footprint to be as small as possible and to mostly occur within the Goose PDA, which is already evaluated and permitted as lost, to avoid additional habitat alteration. Additionally, the footprint was designed to occur outside of sensitive areas for migratory birds (e.g., staging waterbodies). No suitable cliff-nesting habitat for raptors will be lost due to the Energy Centre, and relatively little ground-nesting raptor habitat is predicted to be lost.

#### 5.2.2 MITIGATION AND MANAGEMENT FOR SENSORY DISTURBANCE OF BIRDS

General mitigation strategies to manage the effects of disturbance are addressed via design and noise abatement measures outlined in Section 3.1.2. In addition, a series of mitigation and management strategies specific to birds will be implemented to reduce the potential for disturbance:

- Infrastructure, including proposed WTGs, are situated to avoid raptor nesting territories and cliff habitat. No known raptor nests have been observed within 1.5 km of the proposed turbines;
- WTGs are situated to avoid staging areas for waterbirds, as the nearest waterbody that potentially supports staging waterbirds is approximately 15 km away from the WTGs;
- Ancillary equipment will be chosen to manage the continuous noise produced by equipment such as generators, heavy equipment, and other mobile equipment; and
- If a raptor builds a nest on Energy Centre infrastructure (e.g., on a building then normal operations at that site can continue. In the unlikely event of a raptor nesting on a wind tower generator, B2Gold Nunavut will contact the GN and ECCC for advice. No new activities will be conducted within a minimum buffer of 100 m of the active raptor nest, but existing activities can continue. The nest will be reported to the GN and monitored to determine the nest success.

- Should other birds nest on Energy Centre infrastructure, a species-specific buffer will be set up and the nest monitored for success.

### 5.2.3 MITIGATION AND MANAGEMENT FOR DISRUPTION OF MOVEMENT OF BIRDS

Mitigations for disruption to movement have been incorporated into the design of the Energy Centre by:

- Maintaining a small array across the landscape (~ 5 km);
- Keeping the number of WTGs low (approximately 13 turbines); and
- Spacing the WTGs in such a way that birds can still travel around turbines (i.e., spacing ~ 400 m apart).

### 5.2.4 MITIGATION AND MANAGEMENT FOR DIRECT MORTALITY AND INJURY OF BIRDS

Mitigation and management to prevent direct mortality and injury of birds around the Energy Centre includes the following:

- Any roadkill will be removed from Energy Centre roads, and disposed using approved methods (i.e., incineration or transport away from the Energy Centre) to avoid attracting carrion feeders to the area.
- The proposed WTGs may pose a higher risk of collision to birds during low visibility foggy conditions, which occur infrequently during the fall migration period (late August through September) at the Back River site. Monitoring for foggy conditions (Section 5.3.1.2) will be completed year-round and provided in the annual report.
- **B2Gold Nunavut will temporarily halt operations of the WTGs during periods of dense, low fog during the peak migration season (Section 5.3.1.2).**
- B2Gold Nunavut will preferentially use un-guyed meteorological towers. Should guy wires be used, their use will be minimized to reduce potential collisions and to minimize perching opportunities for birds (Environment Canada 2007a). Markers will be installed on necessary guy wires to increase their visibility and reduce potential for collisions.
- Lighting on turbine towers will be optimized to include shorter duration flashes, longer gaps between flashes, and additional measures included in *Wind Turbines and Birds, Environmental Assessment Guidance Document* (Environment Canada 2007a). Red and white lighting on turbine towers will be avoided except where legally required by Transport Canada. Blue or green light will be preferentially used where possible.
- Should a wildlife incident occur, B2Gold Nunavut will contact ECCC to report the incident using the following contact information:

Environment and Climate Change Canada,  
Manager of Enforcement, Yellowknife,  
867-669-4730

### 5.2.5 ADAPTIVE MANAGEMENT FOR BIRDS

Adaptive management is the management approach of plan, do, monitor, and adjust. Current plans for management are listed above. Monitoring for birds is listed in Section 5.3. Based on results of monitoring, adaptive management may adjust triggers and thresholds or management actions. Triggers for adaptive management are described in the monitoring sections below. For example:

- Carcass monitoring will be completed at the Energy Centre to monitor bird mortality rates (Section 5.3.1.1). If mortality rates exceed thresholds identified in Section 5.3.1.1, B2Gold Nunavut will discuss potential adaptive management measures with the CTAG. Adaptive management actions that may be implemented immediately if mortality rates exceed thresholds include temporary shutdown of WTGs, while long term response may include adaptive management actions such as increasing visibility of blades using paint on one blade. These measures (and other best practices available at the time) will be explored, discussed, and decided upon in concert with the CTAG. In addition, if annual mortality exceeds thresholds identified in Section 5.3.1.1, carcass monitoring may continue more frequently than every three years after the initial five years (Project Certificate 007, TC #53) at the turbines where carcasses have been recorded, and monitoring of the effectiveness of adaptive mitigation (if employed) will occur.

## 5.3 MONITORING FOR BIRDS

This section describes monitoring activities to manage potential effects of the Energy Centre on birds. This section is divided into two subsections, the first describing the monitoring that will be conducted to trigger mitigation activities designed to minimize impacts to birds, and the second describing monitoring to evaluate the predicted effects of the Energy Centre on birds in the EC Addendum.

Monitoring programs will be largely conducted in the LSA and RSA for wildlife (Figure 6.2-1 in the WMMP Plan). The sections of the main body of the WMMP Plan where bird monitoring programs applicable to the Energy Centre are provided in Table 2.

**TABLE 2 SECTIONS OF THE WMMP PLAN OUTLINING BIRD MONITORING**

<b>Focal Species Monitoring</b>	<b>WMMP Plan Section</b>
Raptors	Section 10.3.1 and 10.3.2
Migratory Birds	Section 11.3, 12.3 and 13.3

### 5.3.1 BIRD MONITORING TO TRIGGER MITIGATION

#### 5.3.1.1 MONITORING FOR BIRD CARCASSES

##### **Objectives**

The objective of the carcass monitoring program is to test the EC Addendum prediction that bird mortality may occur due to potential collisions with WTGs, the meteorological tower, or the solar panel at the Energy Centre. This program's aim is to determine what the mortality rate is at the

Energy Centre, particularly due to the wind turbines, and with more frequent monitoring during the first year of operation.

### Trigger for Monitoring

Monitoring of WTGs, meteorological tower, and solar panel array for bird mortality will be conducted for a period of five years of turbine operations during spring and fall migration, followed by every three years thereafter, as per Project Certificate 007, TC #53.

### Methods

During spring migration (over approximately six weeks) and during fall migration (over approximately eight weeks), carcass surveys will be completed twice weekly, as per recommendations by Environment Canada (2007b). For a site with greater than 10 turbines, it is recommended that 30 to 50% of the turbines are surveyed (Environment Canada 2007b). During the first year of operation, B2Gold Nunavut will monitor more frequently and will plan to double these numbers to 100% of turbines and will complete surveys three or four times per week (approximately every other day). Therefore, in the first year of operation of the wind turbines, all 13 turbines, the meteorological tower, and the solar panel array will be searched for carcasses. In subsequent years, a minimum of seven of the 13 turbines (54%), the meteorological tower, and the solar panel array will be searched for carcasses (additional turbines will be searched if timing allows).

Surveyors will search an area of 50-80 m around the structures using transects. If carcasses are observed during surveys, they will be recorded and removed from the area. Detailed survey methods will be provided in a Standard Operating Procedure for environmental staff prior to operation of the Energy Centre, and personnel will be trained on how to complete these surveys including identification of species at risk and recording scavenging. Surveyors will also be trained on species identification (including horned lark, *Eremophila alpestris*) to ensure accurate recording of mortality events.

In addition, remote cameras will be installed at the Energy Centre to identify use of the area by scavengers to help determine if carcasses are being scavenged prior to surveys.

### Triggers for Adaptive Mitigation

Adaptive management will be triggered if the number of bird mortalities due to strikes exceeds the following guidelines:

- More than two raptors per year for all turbines (OMNR 2022);
- More than 14 birds (raptors, waterbirds and/or upland birds) per year at individual turbines, or turbine groups (OMNR 2022); or
- Any one species of conservation concern is recorded (OMNR 2022).

This EC Appendix and the main body of the WMMP Plan will be updated as needed to adjust mortality thresholds, monitoring methods, adaptive management, and mitigation approaches by consensus with the CTAG and ECCC prior to construction.

If adaptive management is deemed necessary due to mortality rates exceeding the above thresholds, B2Gold Nunavut will discuss possible measures with the CTAG (e.g., temporary shutdown, increase visibility of blades using paint on one blade).

## Reporting

The results of carcass monitoring and any corrective action taken will be reported in the annual WMMP report and provided to regional bird research/monitoring programs. Reporting of mortalities due to the windfarm will follow the existing Term and Condition (TC) #46 in B2Gold Nunavut's Back River Project Certificate, and mortalities will be reported to Environment and Climate Change Canada, as per TC #59. In addition, B2Gold Nunavut will acquire any necessary permits to handle dead birds prior to collecting any bird mortalities.

### 5.3.1.2 MONITORING FOG

## Objectives

The objective of the fog monitoring program is to ensure turbines are temporarily shut down during peak migration during foggy conditions to minimize the potential for collisions between birds and the WTGs.

## Trigger for Monitoring

Monitoring fog at the Energy Centre will be conducted year-round.

## Methods

Weather (particularly visibility) at the Energy Centre will be monitored by site personnel responsible for monitoring the weather for aircraft safety. A marker will be placed 300 m from the observer/B2Gold Nunavut personnel to assess visibility conditions once every hour. Low visibility fog will be considered present when visibility falls below 300 m for at least 15 consecutive minutes (Panuccio et al. 2019, Becciu et al. 2021).

## Triggers for Adaptive Mitigation

During spring and fall migration periods, if visibility is less than 300 m for at least 15 consecutive minutes, the WTGs will be temporarily shut down until visibility improves for at least 15 consecutive minutes.

## Reporting

The results of fog monitoring and any corrective action taken will be reported in the annual WMMP report.

### 5.3.1.3 INCIDENTAL OBSERVATIONS

The incidental observations program for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 7.3.1.4, 10.3.1.4, 11.3.1.4, and 12.3.1.3. This section summarizes key program details specific to the Energy Centre.

## Objectives

The objectives of the incidental wildlife observation program include:

- Recording general bird activity at the Energy Centre;
- Identifying unexpected interactions or potential interactions of birds with Energy Centre facilities (e.g., WTGs, meteorological tower, solar array); and
- Identifying opportunities for adaptive management if a new risk to birds is identified.

## Triggers for Monitoring

The incidental observation monitoring program will be in place throughout operations of the Energy Centre.

## Methods

All personnel will be asked to report observations of raptors and notable observations of migratory birds (e.g., nesting, large staging groups) to the Environment Department as described in the main body of the WMMP Plan in Section 7.3.1.4.

## Triggers for Adaptive Management

Observations of nesting birds (migratory birds or raptors), or observations of bird carcasses near the Energy Centre may trigger the following adaptive mitigation:

- Any incidental observations of birds that have chosen to nest onsite infrastructure will be reported to the Environment Department. Onsite environmental monitors will monitor the nest and determine the nest success.
- Any incidental observations of carcasses within 100 m of WTGs, the meteorological tower, or the solar array will be reported to the Environment Department. Environment staff will remove the carcass and record the mortality.

## Reporting

Incidental observations and monitoring responses will be reported in the annual WMMP report.

### 5.3.2 BIRD MONITORING TO MEASURE PREDICTED EFFECTS

#### 5.3.2.1 FOOTPRINT MONITORING

Footprint monitoring for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 7.3.2.1. The objective of footprint monitoring program is to quantify habitat loss for birds due to construction and clearing of areas for the Energy Centre. Methods and triggers for adaptive management are the same as described for caribou (see Section 4.3.2.1).



### 5.3.2.2 REGIONAL SURVEYS FOR RAPTORS

The regional raptor monitoring program for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 10.3.2.2. This section summarizes key program details specific to the Energy Centre.

#### **Objective**

The objective of regional monitoring for raptors is to evaluate if raptors are disturbed by site activities, resulting in lower nesting success.

#### **Trigger for Monitoring**

The raptor monitoring program will occur every three years, beginning during construction and continuing through operations.

#### **Methods**

Raptor nests in the RSA (including the Energy Centre) will be monitored to determine distribution, occupancy, and productivity.

Data analyses will be conducted to determine trends over time in the distribution, occupancy rate, and productivity rate of raptors as well as to determine if a ZOI is detectable at various distances from the Energy Centre and mine site.

#### **Triggers for Adaptive Mitigation**

Results indicating lower breeding success by raptors near the Energy Centre and the mine will trigger a review of site activities to identify if there are adaptive management measures that can reduce any potential disturbance to raptors.

#### **Reporting**

Data and the results of analyses will be reported in the annual WMMP report in the years that surveys are completed.

### 5.3.2.3 REGIONAL MONITORING FOR WATERBIRDS

The regional waterbird monitoring program for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 11.3.2.2. This section summarizes key program details specific to the Energy Centre.

#### **Objective**

The objective of regional monitoring for waterbirds is to determine if waterbirds are disturbed or otherwise affected by the Energy Centre and mine site, resulting in reduced density or breeding success.

## Triggers for Monitoring

Regional monitoring for waterbirds birds is planned for every three years beginning during construction and continuing through operations of the Energy Centre and the mine.

## Methods

Monitoring for the Energy Centre will be included in the analysis completed for the Goose survey block as described in the main body of the WMMP Plan in Section 11.3.2.2. Waterbird monitoring will consist of two types of surveys: 1) surveys to assess site-related changes in the distribution of waterbirds in the RSA during staging periods, and 2) surveys to assess the effect of Back River on resident breeding waterbirds in the RSA. Analyses will be conducted to determine trends over time in the distribution (i.e., a ZOI), and productivity of waterbirds in relation to the Energy Centre and mine infrastructure.

## Triggers for Adaptive Mitigation

Results indicating fewer waterbirds near the Energy Centre and Back River site will trigger a review of site activities to identify if there are adaptive management actions that can reduce any potential disturbance to waterbirds.

## Reporting

Data and the results of analyses will be reported in the annual WMMP report during the years that surveys are completed.

### 5.3.2.4 REGIONAL MONITORING FOR UPLAND BIRDS

The regional upland bird monitoring program for the Energy Centre will be completed in accordance with the program outlined in the main body of the WMMP Plan in Section 12.3.2.2. This section summarizes key program details specific to the Energy Centre.

## Objective

The objective of regional monitoring is to determine if upland birds are avoiding the Energy Centre and the mine site.

## Trigger for Monitoring

Regional monitoring is planned for upland birds every two years beginning during construction of the mine and continuing through operations.

## Methods

A combination of variable radius point-count surveys and Program for Regional and International Shorebird Monitoring (PRISM) plots will be used to monitor potential effects of the Energy Centre on upland birds. Methods will follow those described in Section 12.3.2.2 in the main body of the WMMP Plan, with plots and transects established within and around the Energy Centre.

## Triggers for Adaptive Mitigation

Results indicating fewer upland birds near the mine site and Energy Centre will trigger a review of activities at the site to identify if there are adaptive management measures that can reduce any potential disturbance to upland birds.

## Reporting

Data and the results of analyses will be reported in the annual WMMP report during the years surveys are completed.

## 6. OTHER WILDLIFE

### 6.1 MUSKOX

Two potential effects were assessed for the EC Addendum: habitat loss and sensory disturbance. The monitoring and mitigation measures outlined for muskox in Section 8 of the main body of the WMMP Plan apply to the Energy Centre.

#### 6.1.1 MITIGATION, MANAGEMENT, AND MONITORING FOR HABITAT LOSS

The primary mitigation measure to reduce the amount of habitat loss for muskox was to ensure the infrastructure was located within the existing Goose PDA, where possible. Some turbines were located outside of this area to optimize operation of the turbines.

Mitigation, management, and monitoring measures during the construction, operations, and closure phases of the Energy Centre to reduce the potential for habitat loss for muskox are included in Section 8.2.1 of the main body of the WMMP Plan, and are the same as those being conducted for caribou, described in Section 5.2.1.

#### 6.1.2 MITIGATION, MANAGEMENT, AND MONITORING FOR SENSORY DISTURBANCE

General mitigation strategies to minimize the effects of noise disturbance to muskox are addressed via design and noise abatement measures included in the Noise Abatement Plan, and described in the main body of WMMP Plan.

Monitoring described in Section 8.3.2.3 of the main body of the WMMP Plan will also incorporate the wind turbines. This includes the following monitoring:

The behaviour monitoring program (also described in Section 4.3.2.2) will include muskox. This program will determine what behavioural responses muskox display in reaction to potential stressors at the Mine site, including aircraft, vehicles, blasting, and wind turbines. Groups of 25 muskox or more observed within 1 km of the wind turbines will trigger monitoring muskox behaviour to determine if muskox are disturbed by the turbines within 1 km distance. If muskox appear disturbed or stressed by the operation of the wind turbines, then mitigation will apply (e.g., temporary cessation of wind turbine operation).

## 6.2 GRIZZLY BEAR AND WOLVERINE

Three potential effects were assessed for grizzly bears and wolverine in the EC Addendum: habitat loss, sensory disturbance, and attraction. The monitoring and mitigation measures outlined for grizzly bear and wolverine in Section 9 of the main body of the WMMP Plan apply to the Energy Centre and are summarized below.

### 6.2.1 MITIGATION, MANAGEMENT, AND MONITORING FOR HABITAT LOSS

The primary mitigation measure to reduce the amount of habitat loss for grizzly bear and wolverine was to ensure the infrastructure was located within the existing Goose PDA, where possible. Some turbines were located outside of this area to optimize operation of the turbines.

The following mitigation, management, and monitoring measures will be conducted during the construction, operations, and closure phases of the Energy Centre to reduce the potential for habitat loss for grizzly bears and wolverine and are included in Section 9.2.1 of the current WMMP Plan:

- Dust will be managed and monitored, as described in Section 7.3.2.6, and in the FEIS Air Quality Monitoring and Management Plan (Volume 10, Chapter 17).
- Areas will be reclaimed progressively during operations and at closure to minimize the area of disturbance to wildlife as described in the Mine Closure and Reclamation Plan (Volume 10, Chapter 29; Sabina 2015).
- Footprint monitoring (as described in Section 9.3.2.1) will be completed to track the as-built size of the Energy Centre, compared to the size presented in the EC Addendum. Monitoring will occur in each year of the Mine, including reclamation/closure and as needed in post-closure to track the reclamation of the site.

### 6.2.2 MITIGATION, MANAGEMENT, AND MONITORING FOR SENSORY DISTURBANCE

No residual effect of the Energy Centre on grizzly bears or wolverine is anticipated resulting from disturbance, due to the minimal additional noise resulting from the WTGs, and due to mitigation measures already in place. General mitigation strategies to minimize the effects of noise disturbance to grizzly bear and wolverine are addressed via design and noise abatement measures included in the Noise Abatement Plan, and the WMMP Plan, as well as the following:

- Locations of the Energy Centre infrastructure were designed to avoid grizzly bear and wolverine denning habitat or known grizzly bear or wolverine dens to ensure that works and activities do not disturb grizzly bears during hibernation (Volume 10, Chapter 20);
- Pre-construction ground clearing will be conducted outside of denning periods for grizzly bears and wolverine, where possible, to reduce disturbance (Volume 10, Chapter 20);
- Construct and maintain equipment to minimize the production of noise;
- Monitor and adaptively manage noise; and
- Vehicles restricted to site roads during construction and operations to avoid unnecessary disturbance to grizzly bear or wolverine habitat.

### 6.2.3 MITIGATION, MANAGEMENT, AND MONITORING FOR ATTRACTANTS

Mitigation and management to minimize potential for grizzly bears and wolverine to be attracted to the Energy Centre infrastructure includes continuing to follow all existing waste management protocols outlined in the Landfill and Waste Management Plan, Incineration Management Plan, Fuel Management Plan, Hazardous Materials Management Plan, and Section 9.2.6 of the main body of the WMMP Plan. On site camera monitoring will also include the area around the wind turbines, as described in Section 4.3.2.6.

## 7. REPORTING

Reporting of monitoring results, management triggered, and adaptive management measures will be reported annually for the Energy Centre as part of the annual WMMP Report with results highlighted for the Energy Centre as needed.

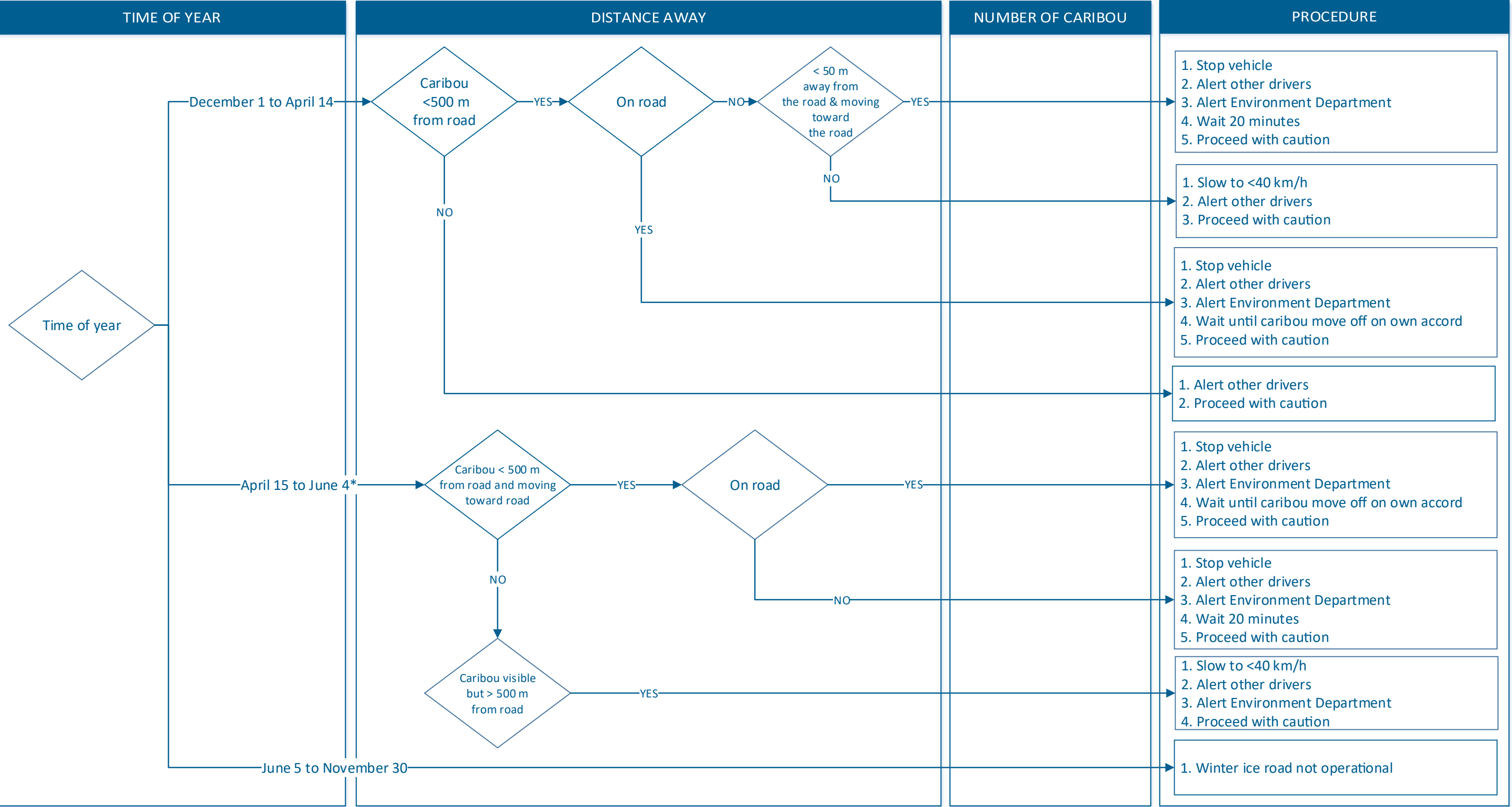
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## APPENDIX B CARIBOU STAGED REDUCTION FLOWCHART

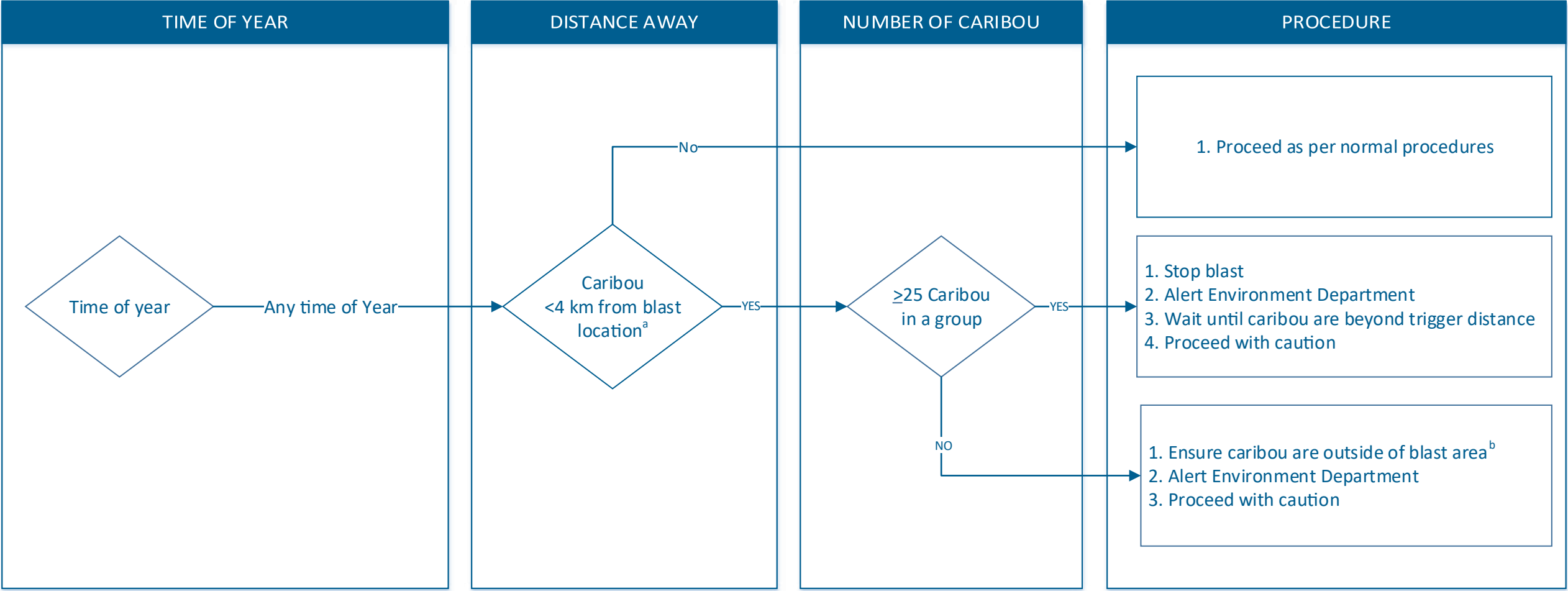
WINTER ICE ROAD OPERATIONS



- Mitigation /Monitoring:
- Traffic managed through central dispatch and trucks grouped into convoys
  - Speed limit of 60km/hr
  - Height and shape of snow banks will be managed to facilitate crossing by caribou
  - Wildlife always have the right of way
  - \*Spring migration: Caribou collars will be monitored and caribou monitors will survey the road for caribou crossing the road.



# OPEN PIT MINE BLASTING OPERATIONS



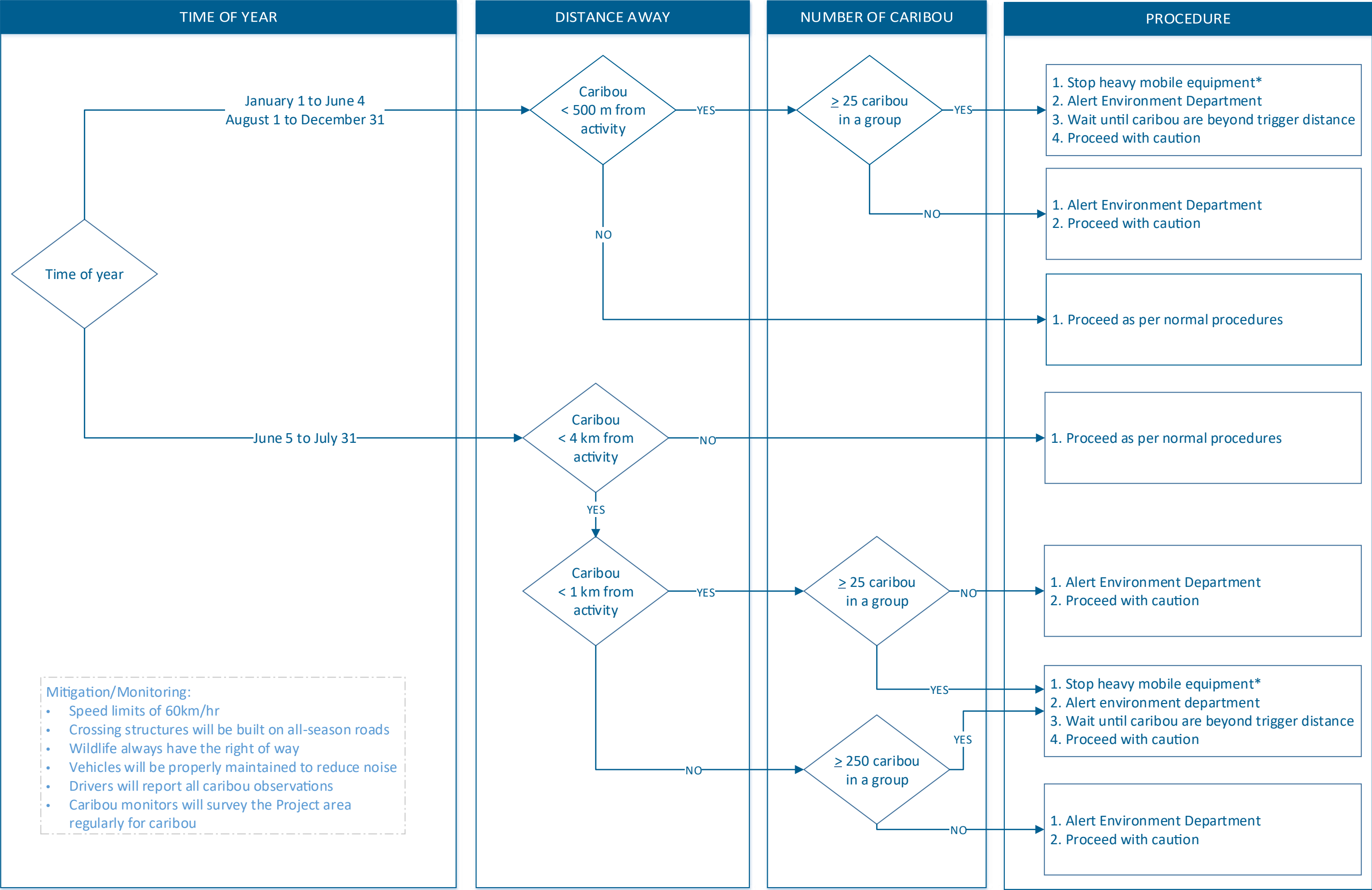
<sup>a</sup>Setback distance may be updated during the life of the Project using the results of herd vulnerability, noise monitoring, behaviour monitoring, zone of influence monitoring, and changes to blast size.

<sup>b</sup>The blast safety area will be determined on a case by case basis considering factors such as, but not limited to: material to be blasted; type and amount of explosive material; blast pattern; and delay systems.

Mitigation/Monitoring:

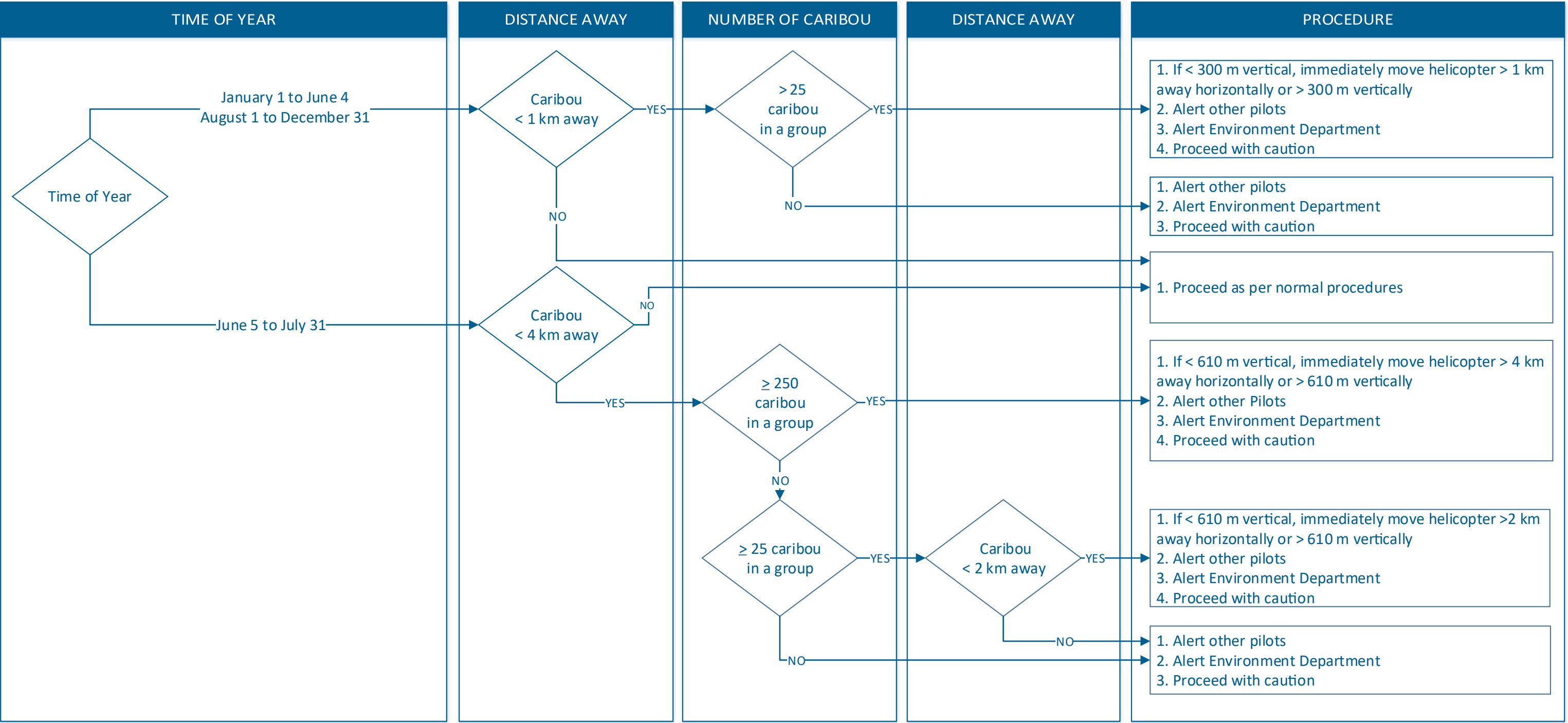
- Prior to blasts, caribou monitors will survey for caribou

HEAVY EQUIPMENT OPERATIONS



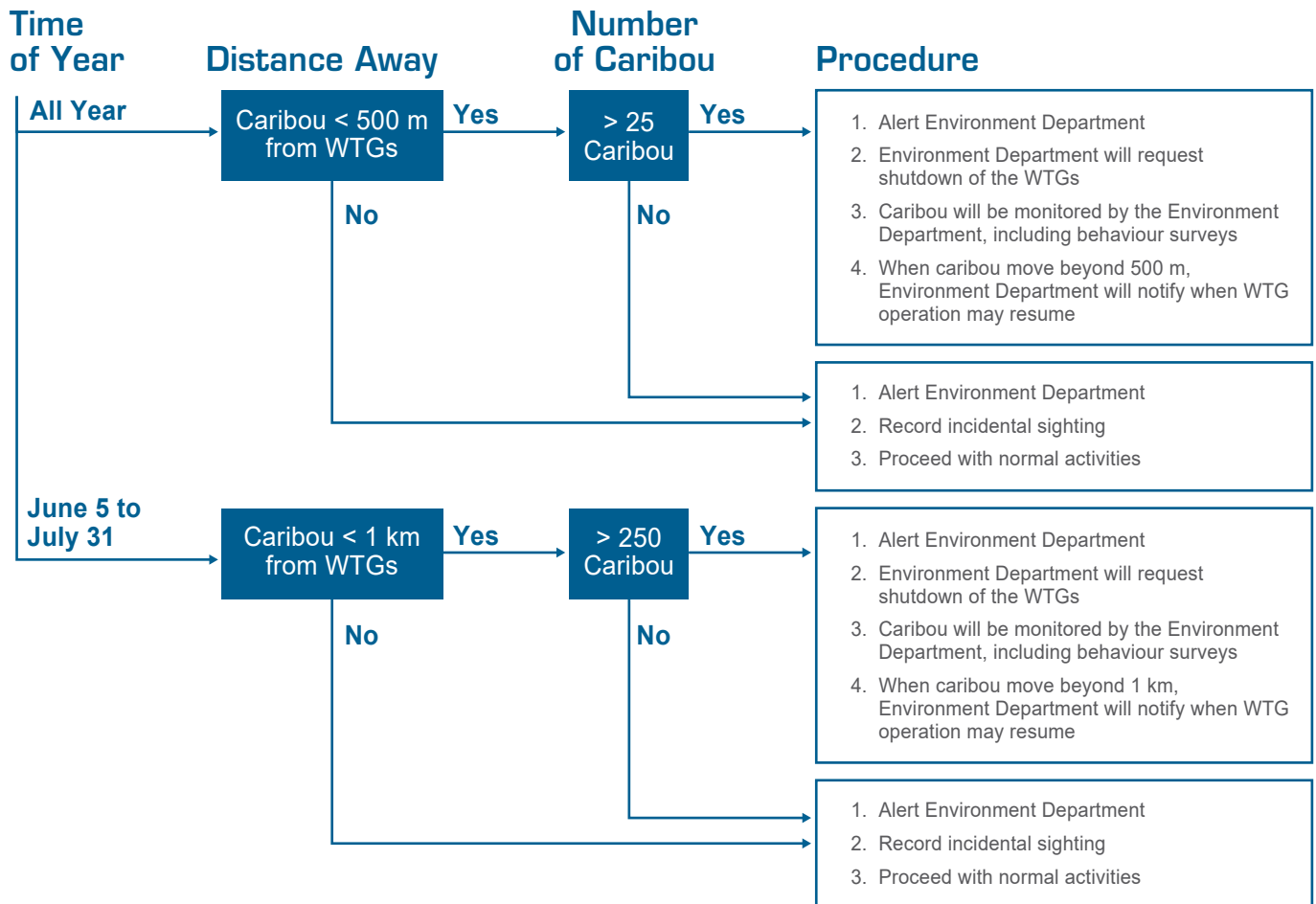
\*Excluding mill site operations and activities required to ensure the safety of staff and the safe operation/maintenance of e quipment.

# HELICOPTER OPERATIONS



- Mitigation/Monitoring:
- Pilot education on sensitive wildlife areas and periods
  - Minimum standard flight height of 610 m between June 5 and July 31 and 300 m between January 1 to June 4 and August 1 to December 31, except where needed
  - Pilots will report all caribou observations

# WIND TURBINE OPERATIONS



## Mitigation/Monitoring:

- Caribou monitors will survey the WTGs regularly for caribou
- Behaviour monitoring if > 25 caribou are observed within 1.4 km of the WTGs
- Year-round, if > 25 caribou are observed within 500 m of the WTGs, they will be shutdown until caribou move away
- During calving/post-calving, if > 250 caribou are observed within 1 km of the WTGs, they will be shutdown until caribou move away
- Remote cameras will be used to monitor caribou presence near WTGs

## APPENDIX C CARIBOU MITIGATION, MONITORING, AND MANAGEMENT INFOGRAPHIC

# **CARIBOU PROTECTION MEASURES**

## **BACK RIVER PROJECT**



**B2GOLD**  
ᐅᐅᐅᐅ NUNAVUT

*September 2024*

## B2GOLD NUNAVUT'S COMMITMENT TO CARIBOU PROTECTION

Caribou are integral to the identity, culture and livelihood of Inuit, First Nations, and Métis in northern Canada. B2Gold Nunavut has worked closely with community representatives, government and regulatory agencies, and other stakeholders to identify how development, climate change, land use, and other changes may affect caribou. B2Gold Nunavut is committed to operating the Back River Project in a way that minimizes any effect on caribou. Through our Wildlife Mitigation and Monitoring Program, we have committed to industry-leading measures to reduce any potential effect on caribou.

## INCORPORATING TRADITIONAL KNOWLEDGE

We recognize that Indigenous peoples hold unique knowledge about caribou and their interconnections with wider ecological, cultural, economic, and spiritual systems. B2Gold Nunavut has worked closely with the Kitikmeot Inuit Association to understand and document Traditional Knowledge of the Project area and the wildlife and people who depend on it. We also reviewed publically available Traditional Knowledge from North West Territories Indigenous groups.

B2Gold Nunavut has incorporated this Traditional Knowledge into all aspects of the Back River Project. We designed the Project to avoid important traditional and current land use sites such as hunting camps, caribou movement corridors, river crossing sites, and ice crossing locations.

Traditional Knowledge was also used to determine potential effects on caribou, including caribou health, disturbance, and important habitat areas. Mitigation measures were similarly based on Traditional Knowledge, e.g., using open water shipping to protect the migration routes of island (Dolphin and Union) caribou, designing roads to not hinder caribou movement and minimizing noise and disturbance from aircraft, helicopters, vehicles, wind turbines, and blasting. Traditional Knowledge also identified that caribou calving ranges can periodically shift to new locations. Calving and Post-calving ranges will be monitored and Project shut downs will occur if these ranges shift to overlap the Project.

## B2GOLD NUNAVUT'S APPROACH

Through extensive consultation, B2Gold Nunavut developed a list of potential effects on caribou, as described in the Final Environmental Impact Statement and Energy Centre Addendum. B2Gold Nunavut will use a system of mitigation, monitoring and management to reduce each potential effect on caribou.

**Mitigation** measures are activities that are ongoing on a constant basis, or are designed into the Project. Project design changes include designing buildings and waste facilities to exclude wildlife, and using open water shipping only. Mitigation will avoid or minimize potential effects on caribou.

**Monitoring** includes regularly scanning the Project area for caribou and will be conducted throughout the life of the Project. Community members and trained specialists will work as caribou monitors.

**Management** actions are triggered by monitoring. Examples include giving wildlife the right of way on Project roads and stopping blasting when caribou are observed near the Project site. B2Gold Nunavut has committed to adaptive management, where management activities are developed in response to monitoring studies, feedback from the Kitikmeot Inuit Association, community members, other stakeholders, and existing best management practices.



## REPORTING

B2Gold Nunavut will report the results of all mitigation, monitoring and management activities in their annual Wildlife Effects Monitoring Program Report. This report will be circulated to the Kitikmeot Inuit Association, government agencies, and all other relevant stakeholders for discussion.

# BATHURST CARIBOU



The seasonal ranges of the Bathurst herd do not overlap the Project site. This herd calves approximately 210 km to the north-west of the Project site. During post-calving, this herd travels south. The closest the herd gets to the Project site at any time is approximately 90 km to the west. During summer, this herd is centered around Contwoyto Lake, 160 km west of the Project site.

When all years of collar data, 1998-2015, are combined, the July range of the Bathurst herd overlaps the route of the winter ice road. However, the winter ice road is only active when the Bathurst caribou are more than 300 km away.

Overall, the Project footprint does not overlap the Bathurst herd range.

### Bathurst Herd

- Calving Core Range
- Post-Calving Core Range
- Herd Total Range

### Beverly/Ahiak Herd

- Herd Total Range



The Bathurst Caribou DO NOT interact with the Project site when it is operating

WINTER			SPRING MIGRATION		CALV	POST-CALVING	SUMMER	FALL MIGRATION		WINTER	
January	February	March	April	May	June	July	August	September	October	November	December
Winter Road											Winter Road

Source data for the Bathurst Herd Total Range is from GNWT, ENT (1998 - 2015). All other source data from the GN DOE collar data from 2003-2014.






# BEVERLY/AHIAK CARIBOU

The Beverly/Ahiak herd is the principal herd that interacts with the Project site. This herd has its calving and post-calving areas approximately 250 km north-east of the Project.


During the summer and fall, the Beverly/Ahiak herd range overlaps the Project site. During winter, the northern end of the Beverly/Ahiak herd range overlaps the Project site. The Project does not overlap the herd calving and post calving areas.

Overall, the Project footprint overlaps 0.002% of the Beverly/Ahiak herd range.

**Beverly/Ahiak Herd**

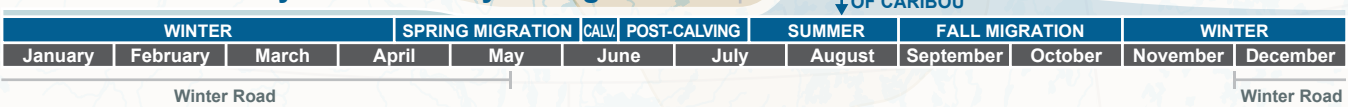
-  Calving Core Range
-  Post-Calving Core Range
-  Herd Total Range

**Bathurst Herd**

-  Herd Total Range



**The Beverly/Ahiak caribou interact with the Project in summer and early fall and rarely during winter**





# THE DOLPHIN AND UNION (ISLAND) CARIBOU

The Dolphin and Union (Island) herd winters on the mainland, crosses the sea ice north to Victoria Island in Spring (April and May), where the herd calves and spends the summer, and returns south across the sea ice in the fall (October and November). The Project does not overlap with the calving, post calving or any portion of the herd range.

Collar data indicate that the Dolphin and Union (Island) herd is north of the Marine Laydown Area. Sightings of caribou using cameras at the Marine Laydown Area in winter have been rare.

Overall, the Project footprint does not overlap with the Dolphin and Union (Island) caribou herd.

## The Dolphin and Union (Island) Herd

-  Calving Core Range
-  Herd Total Range



**The Dolphin and Union herd are generally north of the Project site, even during winter**

WINTER			SPRING MIGRATION		CALV	POST-CALVING	SUMMER	FALL MIGRATION		WINTER	
January	February	March	April	May	June	July	August	September	October	November	December
Winter Road											Winter Road

All other source data from the GN DOE collar data from 1998-2004.

# TRADITIONAL KNOWLEDGE



**B2GOLD**  
NUNAVUT

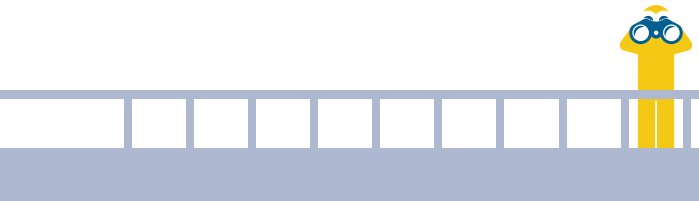
B2Gold Nunavut recognizes the inherent value of Traditional Knowledge and continually considers it on an equal basis with scientific data. B2Gold Nunavut has worked closely with the Kitikmeot Inuit Association and other sources to understand and document the Project area and the wildlife and people who depend on it.

Traditional knowledge reports that the Bathurst caribou herd have historically calved approximately 100 km north of the Goose Property Area, west of Bathurst Inlet, for the period of 1930s to present.



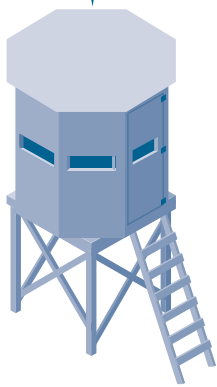


Caribou monitors will be on site at all times.

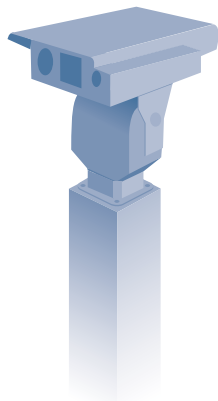


Active Caribou Monitoring by On-site Caribou Monitors Year Round

Observation Blind



Tower Camera

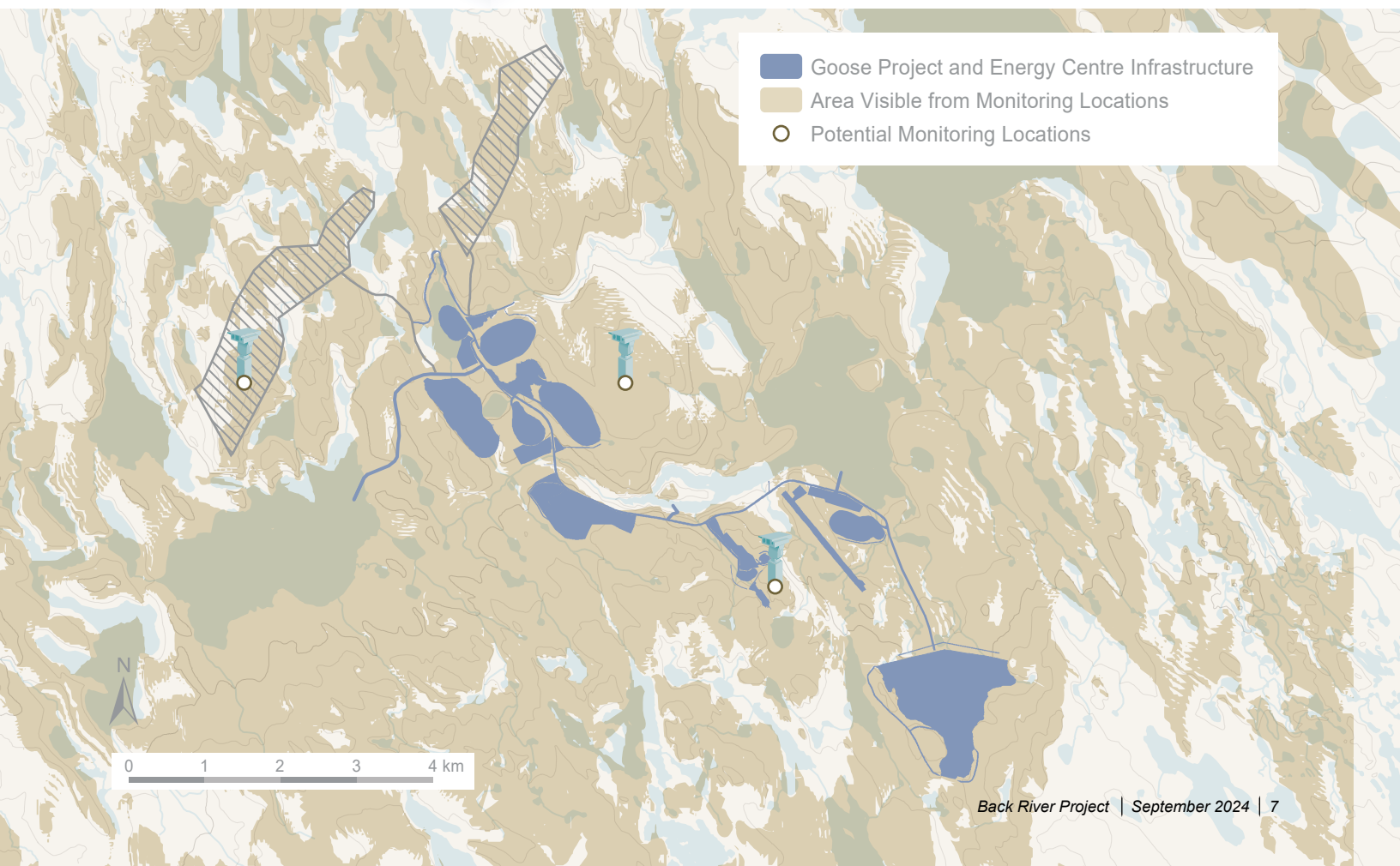


## Observations of caribou can trigger Staged Reduction

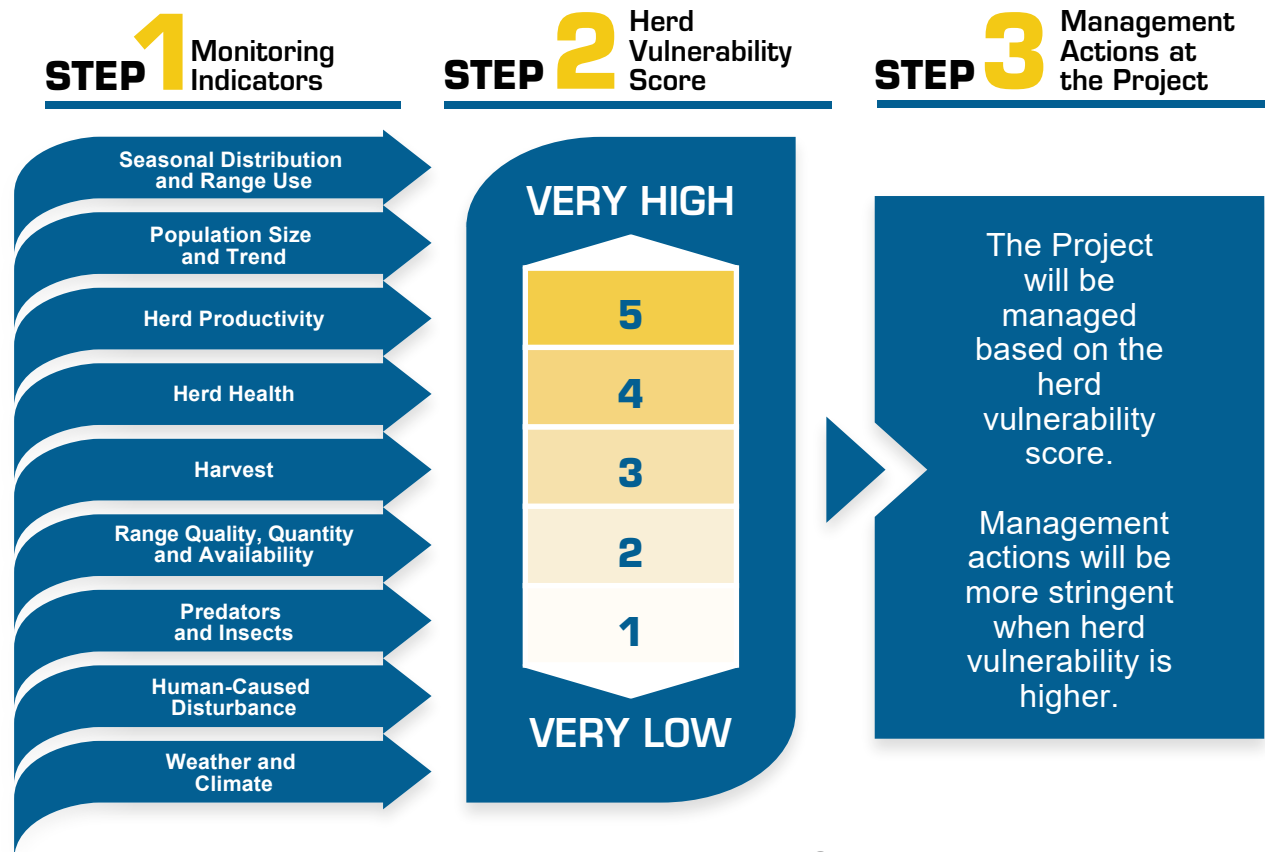
If a group of caribou (25-250 animals) are observed near the Project site, then the Project will manage the site to reduce disturbance by reducing or stopping blasting, heavy mobile equipment, wind turbines, vehicles on roads, helicopters and fixed wing aircraft.

## Rapid Operational Shutdown

If a large group of caribou (density of  $>2.0/\text{km}^2$ ) move their calving or post-calving range over the Project site, then observations of caribou will trigger a 'rapid operational shutdown' to further reduce Project activities.



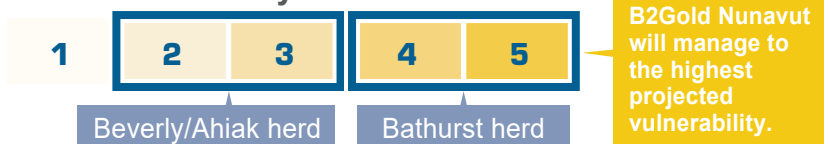
## Herd Vulnerability: B2Gold Nunavut's Management Approach



The Bathurst herd is projected to be ranked a 4-5 herd vulnerability.

The Beverly/Ahiak herd is projected to be ranked a 2-3 herd vulnerability.

### Herd Vulnerability Score



### Herd Vulnerability: Management in Sensitive Seasons

B2Gold Nunavut will have more intensive management during sensitive seasons: calving, post-calving, and early summer.

WINTER			SPRING MIGRATION		CALV	POST-CALVING	SUMMER	FALL MIGRATION		WINTER	
January	February	March	April	May	June	July	August	September	October	November	December

### Herd Vulnerability: Management and Group Size



Large groups (>250) - triggers rapid operational shutdown during calving and post calving



Groups (25 - 250) - triggers staged reductions all year: additional blasting setbacks, wind turbine shutdowns, and stopping heavy equipment



Individuals (<25) - triggers management of vehicles on roads, blasting, and helicopters

# LEVELS OF CARIBOU PROTECTION

B2Gold will have six levels of protection for caribou, based on season and group size. Wildlife monitors survey for caribou every day, year-round. Drivers and pilots survey for caribou while operating their vehicles.

## Level 1 Normal Operations

Mining activities and active monitoring are conducted year-round. Response levels 2 through 4 can be triggered in any season to replace normal operations. Active caribou monitoring is ongoing.

## Level 2 Site Notification

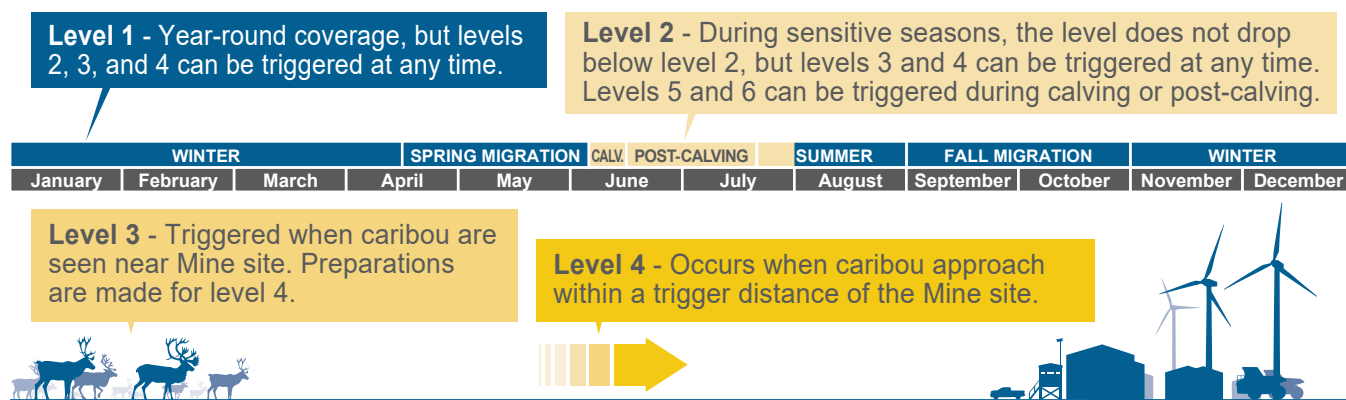
The Environmental Manager triggers a site notification during sensitive seasons for caribou (calving, post-calving and early summer). Site notification includes passing information on to all Mine personnel by radio, bulletin boards and morning meetings. Personnel are reminded of their responsibilities to protect caribou.

## Level 3 Site Alert

The Environmental Manager triggers a site alert if a group of caribou is observed near the Mine site. The site alert prepares personnel for a potential, imminent Level 4 response.

## Level 4 Staged Reduction in Mine Activities

Observations of groups of caribou close to the site will trigger the management or stopping of Mine activities, including blasting, wind turbines, heavy mobile equipment usage, helicopter flights, and vehicles on roads. The objective of staged reductions is to reduce potential noise and visual disturbances to caribou.



## Management for Shifts in Calving Range

### Level 5 Rapid Operational Shutdown

If large groups of caribou are observed on site during calving or post-calving, the Environmental Manager will limit outdoor activity, blasting, wind turbine operation, heavy mobile equipment, helicopter flights and vehicles on roads so the Mine is making less noise than under Level 4 – Staged Reduction.

### Level 6 Planned Operational Shutdown

If satellite collars confirm the calving or post-calving range has changed to overlap the Mine site, B2Gold will conduct a Planned Operational Shutdown during the following year to prevent disturbance to caribou.

# STAGED REDUCTIONS IN MINE ACTIVITIES

**Level 4** of caribou protection is staged reductions in Mine activities.

## 1. Blasting

### MITIGATION

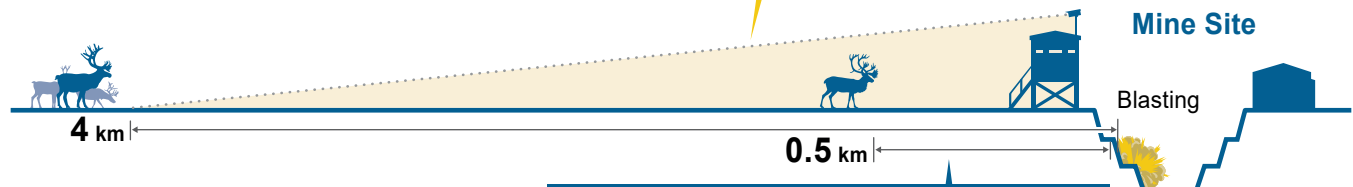
No blasting if caribou are within the safety area.

### MONITORING

Wildlife monitors survey for caribou every day, year-round.

### MANAGEMENT

During all seasons, **suspend blasting** if groups of 25 or greater caribou are within 4 km



## 2. Wind Turbines

### MITIGATION

WTGs are within existing Goose PDA where possible to minimize habitat loss, and size of the WTGs will be selected to reduce potential effects on sight lines, noise and disturbance

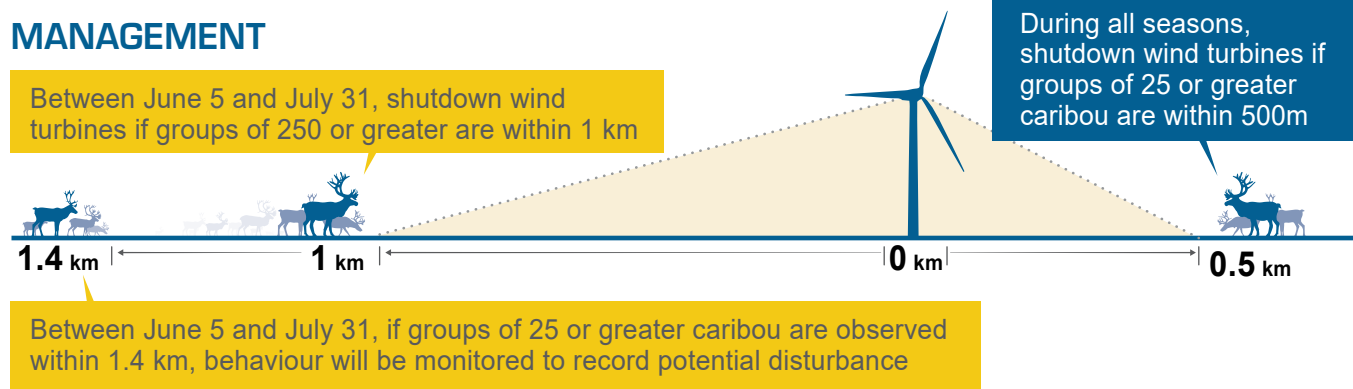
### MONITORING

Wildlife monitors survey for caribou every day, year-round.

### MANAGEMENT

Between June 5 and July 31, shutdown wind turbines if groups of 250 or greater are within 1 km

During all seasons, shutdown wind turbines if groups of 25 or greater caribou are within 500m



## 3. Heavy Mobile Equipment

### MITIGATION

Speed limits will be enforced (60 km/h).

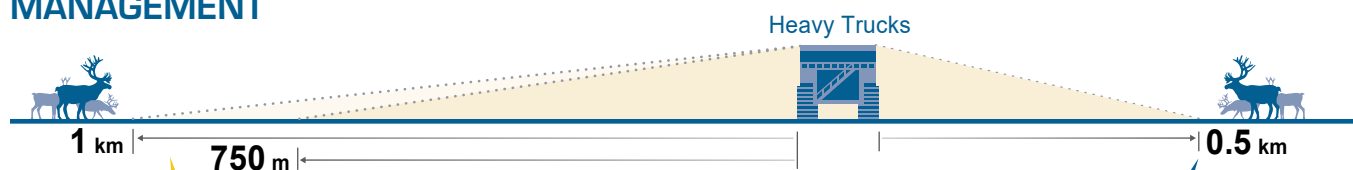
### MONITORING

Wildlife monitors survey for caribou every day, year-round.

### MANAGEMENT

During calving, post-calving and early summer, **suspend heavy mobile equipment** if groups of 25 or greater caribou are within 1 km. During summer, **suspend heavy mobile equipment** if groups of 25 or greater within 750 m.

During the rest of the year, **suspend heavy mobile equipment** if groups of 25 caribou or greater are within 0.5 km



## 4. Helicopters

### MITIGATION

Pilots are trained to identify, report, and avoid caribou groups and high use areas for caribou.

### MANAGEMENT

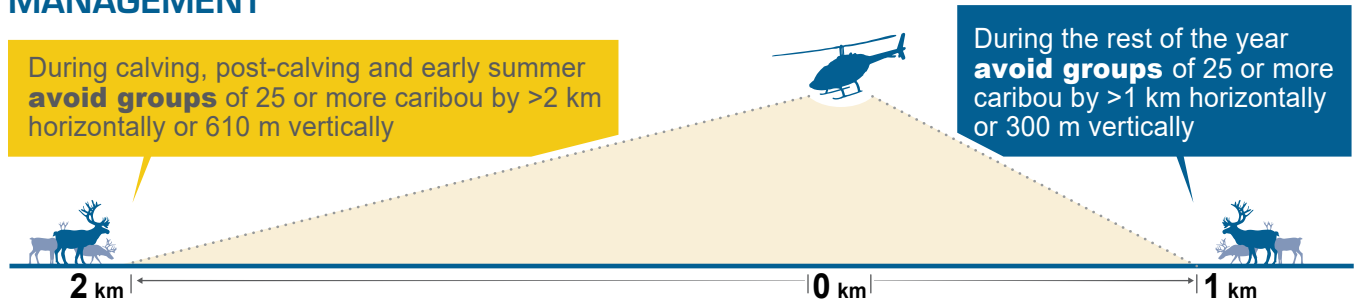
During calving, post-calving and early summer **avoid groups** of 25 or more caribou by >2 km horizontally or 610 m vertically

### MONITORING

Pilots monitor for caribou while flying.

The Environmental Manager informs pilots of known caribou in the area and can ground flights if too many caribou are present near the site.

During the rest of the year **avoid groups** of 25 or more caribou by >1 km horizontally or 300 m vertically



## 5. Roads

### MITIGATION

Speed limits will be enforced (60 km/h) on all roads to reduce potential of interactions with wildlife.

On-site roads will have crossing ramps for caribou at locations chosen by land users and elders.

Snowbanks on the winter-ice road will be maintained to allow caribou to cross easily.

All roads will be closed to the public.



### MONITORING

Drivers will report all caribou and other wildlife observations.

Caribou monitors will monitor the winter ice road in the spring during migration.

### MANAGEMENT

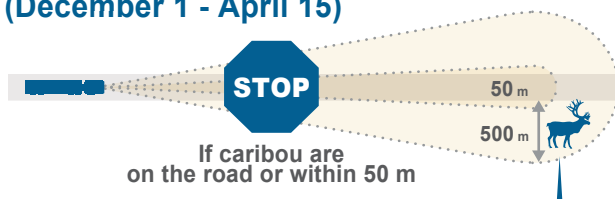
Focus on protecting caribou when they are more sensitive to disturbances, such as calving and post-calving.

If caribou are migrating across the ice road, traffic will be stopped.

Caribou will always be given the right of way on all Mine roads.

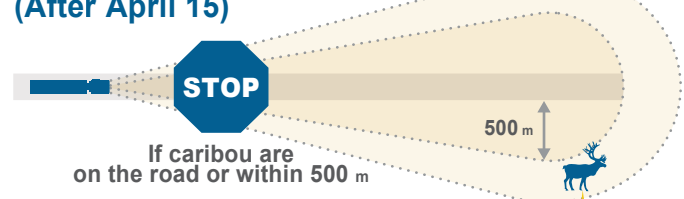
Drivers will slow down or stop if caribou are near the road.

### On-Site Roads (all year) & Winter Ice Road (December 1 - April 15)



< 500 m from road → Slow to 40 km/hr.  
< 50 m from road with intent to cross → Stop for 20 minutes.  
On the road → Stop and wait until animals move off.

### Winter Ice Road (After April 15)



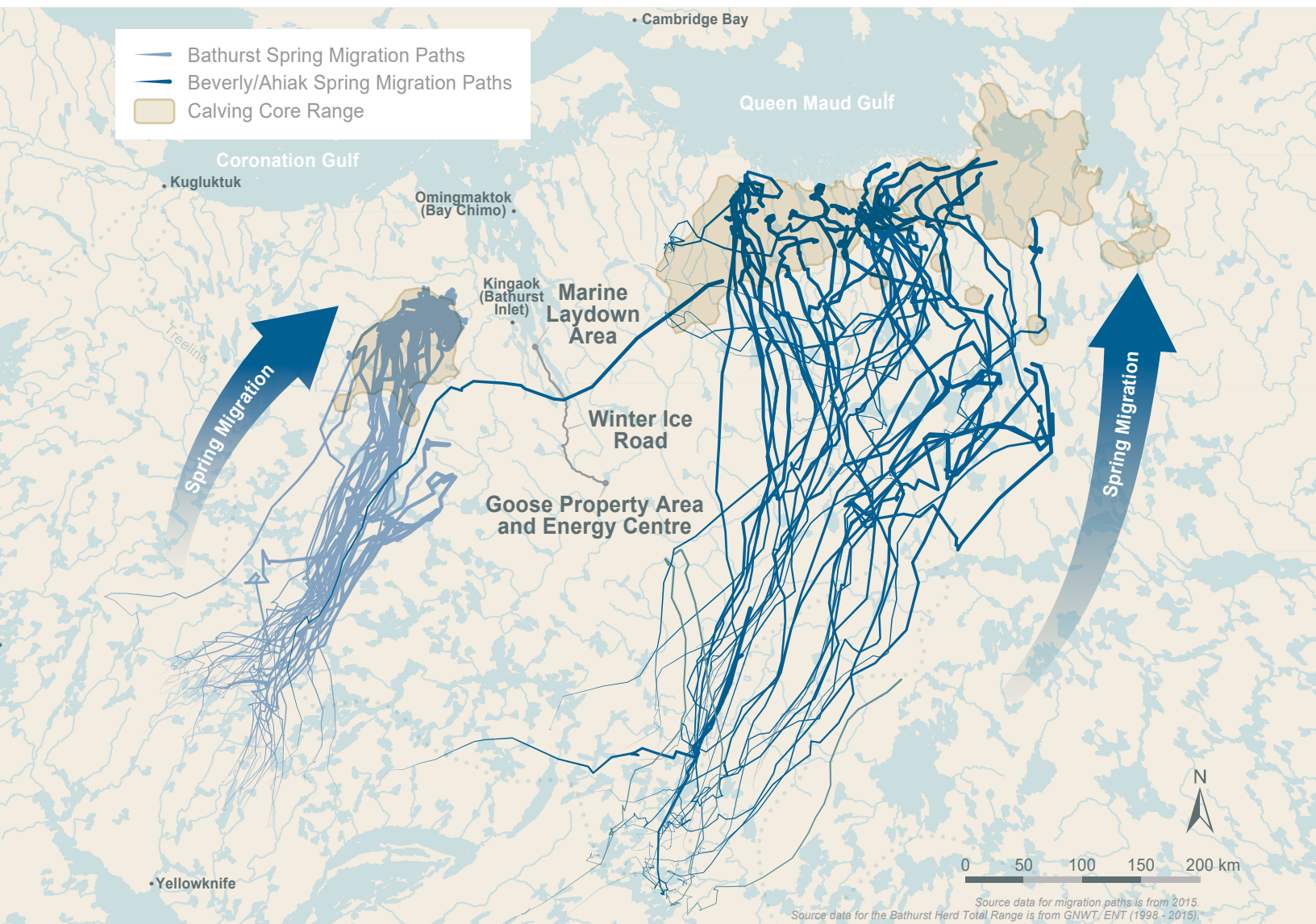
> 500 m from road → Slow to 40 km/hr.  
< 500 m from road with intent to cross → Stop for 20 minutes.  
On the road → Stop and wait until animals move off.



# SATELLITE COLLAR ANALYSIS

## MONITORING

Collar data collected by the government will be used to map the distribution of Bathurst and Beverly/Ahiak caribou each year. Collar data will also be used to determine if caribou are acting differently than previous years.



## MANAGEMENT

During spring, if collars show that Beverly/Ahiak caribou are approaching or crossing the winter ice road, then ground based monitoring will be triggered. The Environmental Manager may also shut down the winter ice road until caribou have left.

During spring migration to the calving ground, if either the Bathurst or Beverly/Ahiak caribou appear to be shifting their calving ground to overlap the Project site, then a site alert will be triggered and the Environmental Manager will discuss triggering a 'Rapid Operational Shutdown' with the KIA, GN and GNWT.

# RESPONDING TO SHIFTS IN CALVING RANGE

## RAPID OPERATIONAL SHUTDOWN

Rapid shifts in calving and post-calving range.

This program describes management responses within the year a shift in range is observed.

### MONITORING

On-site wildlife monitors will monitor for caribou groups every day, year round.

Near real-time monitoring of caribou collars will warn B2Gold Nunavut that caribou are calving or post-calving in a different area than their normal range.

### MANAGEMENT

If large groups (density of  $>2.0 \text{ km}^2$ ) are observed within 4 km during calving or post-calving, then **'Rapid Operational Shutdown'** is triggered which includes:

- Daily communication with regulators.
- Stop open pit blasting and other surface blasting.
- Stop wind turbine operation.
- Stop open pit activities.
- Stop heavy equipment on surface.
- Stop helicopter usage including landings & take-offs.
- Reduction of fixed wing aircraft use.
- Reduction in the number of light vehicles on surface.
- Underground activities not requiring heavy mobile equipment use on surface may continue.

## PLANNED OPERATIONAL SHUTDOWN

Long-term shifts in calving and post-calving range.

This program describes management responses the following year a shift in range is observed.

### MONITORING

Annual analysis of the seasonal ranges of the Bathurst, and Beverly/Ahiak caribou herds will notify B2Gold Nunavut that a long-term shift in the calving or post-calving range has occurred.

This will be verified using the results of on-site wildlife monitoring and discussions with KIA, GN, and GNWT caribou biologists.

### MANAGEMENT

If the core calving or post-calving range overlaps the Project site, then in the following year a **'Planned Operational Shutdown'** will be carried out, including:

- Daily communication with regulators.
- Stop open pit blasting and other surface blasting.
- Stop wind turbine operation.
- Stop open pit activities.
- Stop heavy equipment on surface.
- Stop helicopter usage including landings & take-offs.
- Stop fixed wing aircraft use.
- Restriction to essential light vehicles only.
- Stop underground activities.
- Discussion with all relevant parties 6 months prior to planned operational shutdown.
- A planned reduction in the on-site workforce.
- Reduction in mill operations.



*\* On-site activities required to maintain the site, personnel safety, and environmental compliance will continue.*

# MINIMIZING OUR FOOTPRINT

## MITIGATION

Goose, Energy Centre, and Marine Laydown Area designed with a small footprint. Supply roads are temporary winter ice roads only.

## MONITORING

The Project footprint will be measured annually, compared to the footprint proposed in the Final Environmental Impact Statement, and reported on.



## WILDLIFE-PROOFING BUILDINGS

### MITIGATION

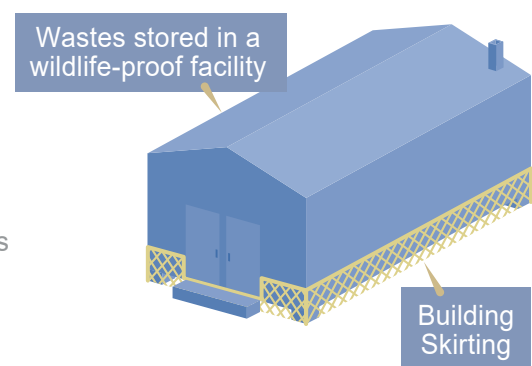
All buildings, camps, and equipment storage will be designed to be wildlife-proof, including doors and windows and building skirting to prevent curious animals from accessing Project materials.

### MONITORING

Skirting and fencing will be monitored.

### MANAGEMENT

Repair skirting and fences as needed.



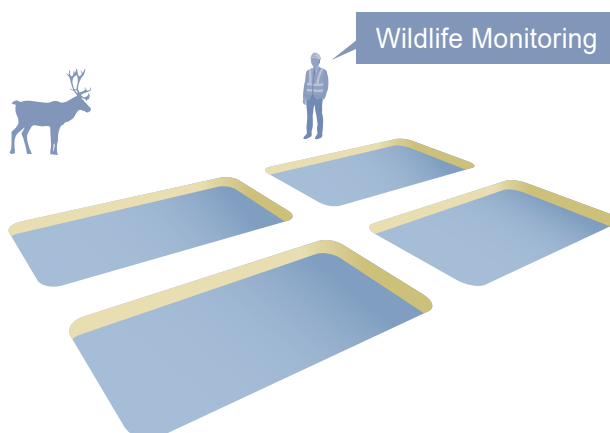
## MINIMIZING ATTRACTANTS

### MITIGATION

Camps will be kept clean.

No-feeding policy for wildlife.

Wastes will be securely stored and incinerated.



### MONITORING

Camps inspected for cleanliness daily.

Waste facilities and Project ponds monitored with cameras to see if wildlife are attracted.

Water quality in Project ponds will be tested to ensure it is safe for caribou and other animals.

### MANAGEMENT

If monitoring indicates there is an attractant problem, the issue will be immediately managed – e.g., cleanups, or additional measures to deter wildlife from waste facilities. Land users and elders will be consulted on how best to deter wildlife.

If caribou are using the tailings management facility and the water is below wildlife standards, then caribou will be kept out.

## MITIGATION

The Project will be designed to limit noise; equipment will be chosen and maintained to limit potential effects on caribou.

## MONITORING

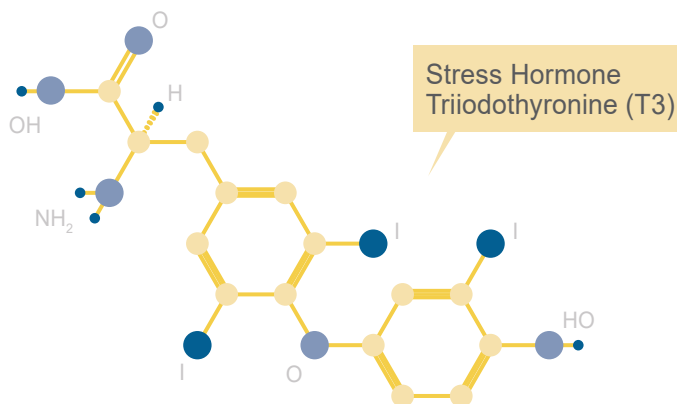
### Noise Monitoring

Noise from the Project will be monitored using sound recording equipment at 1, 3, 5, and 14 km. Additional mitigation will be triggered if noise exceeds predictions in the Final Environmental Impact Statement and Energy Centre Addendum or if caribou are avoiding the Project site because of noise.



### Zone of Influence Monitoring

The Project will use government collar data to determine if caribou are avoiding the Project site because of noise and activity. Collar data collected between 1998-2015 will be compared to collar data during construction and operations to see if fewer caribou are found in the Project area, or if they move through the area faster.



### Behaviour Monitoring

The behaviour of caribou near the Project site will be observed and recorded to determine if they are disturbed by the Project.

### Stress Hormone Monitoring

The Project will monitor the stress levels of caribou near the site by analyzing their droppings.

# MINIMIZING DUST

## MITIGATION

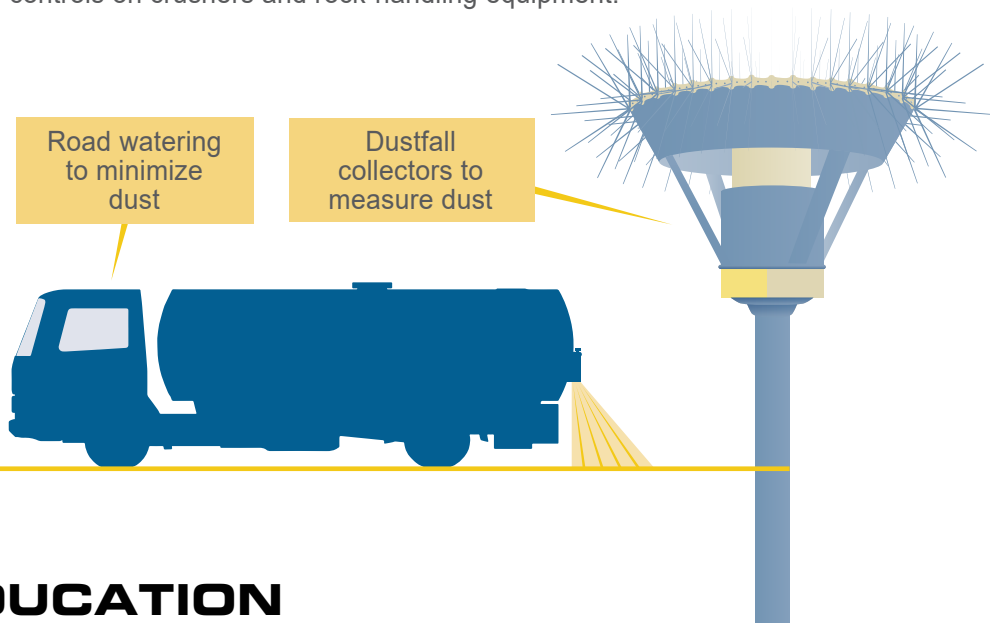
Dust will be controlled on site through watering and use of non-toxic dust suppressants on the road, skirting on conveyors, and controls on crushers and rock-handling equipment.

## MONITORING

Dust will be monitored throughout construction and operations.

## MANAGEMENT

If dust exceeds acceptable limits, then adaptive management will be used to further limit dust deposition.



## EMPLOYEE EDUCATION

All employees will go through a wildlife training program to teach the importance of wildlife protection, and the mitigation and management procedures that every employee must follow.

The Project will have strict wildlife policies to limit effects on wildlife - no feeding wildlife, no littering, no hunting on site.

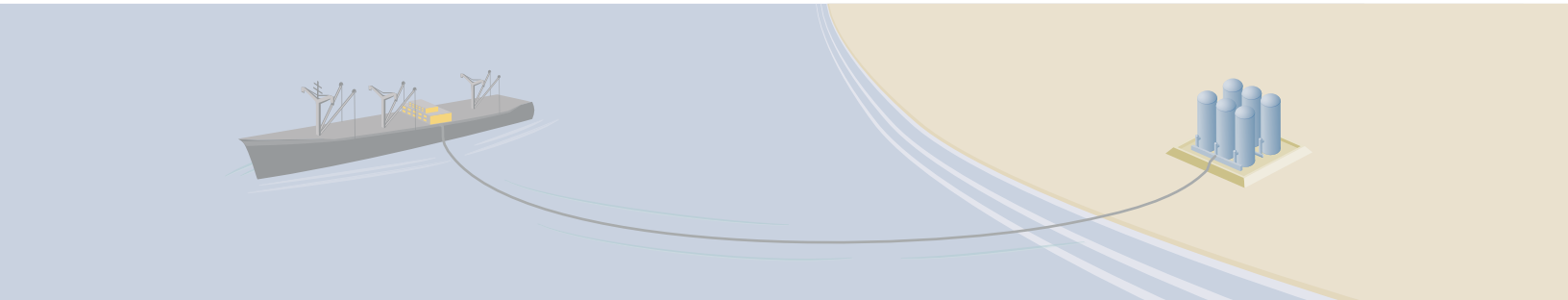


### Training Provided

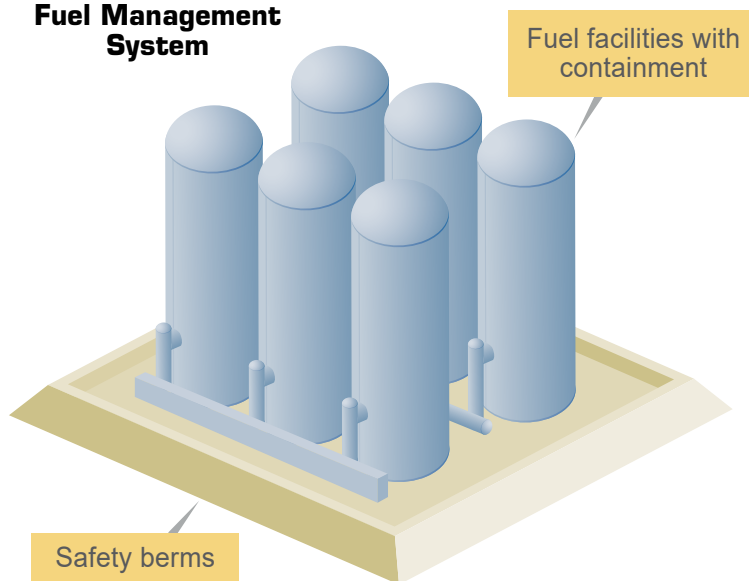
- Wildlife observation reporting
- Awareness of wildlife-sensitive periods and locations
- Local wildlife species
- Managing wildlife attractants
- No feeding of wildlife
- No harassment of wildlife
- No hunting
- Road operating procedures
- Wildlife incident/accident reporting and response procedures
- Bear-aware training for outdoor staff

## MITIGATION

The Project will manage hazardous materials and fuel to ensure worker safety and minimize the potential environmental effects of a spill through management plans.



### Fuel Management System



The Oil Pollution Emergency Plan (OPEP) is a requirement of the *Canada Shipping Act* and describes the responses to oil spill scenarios at the Marine Laydown Area.

The Shipboard Oil Pollution Emergency Plan (SOPEP) is a requirement of the *Canada Shipping Act* for all ships transporting fuel and describes the equipment, training, and procedures the ship must have on board in order to manage and address any fuel spills during shipment.

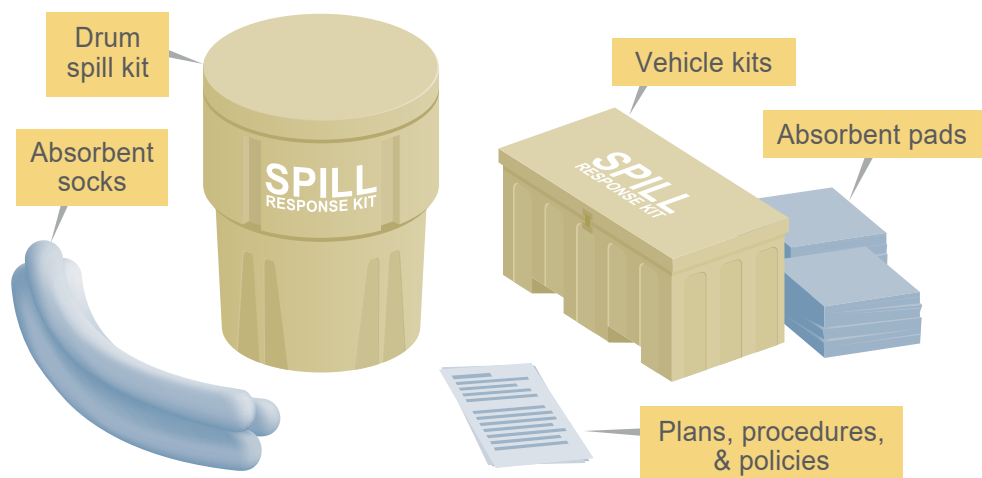
## MONITORING

All personnel will report any spills.

## MANAGEMENT

The Spill Contingency Plan addresses all potential spills of fuel and other hazardous substances at all Project sites.

### Spill Response Kits





# CARIBOU AND SHIPPING



## MITIGATION

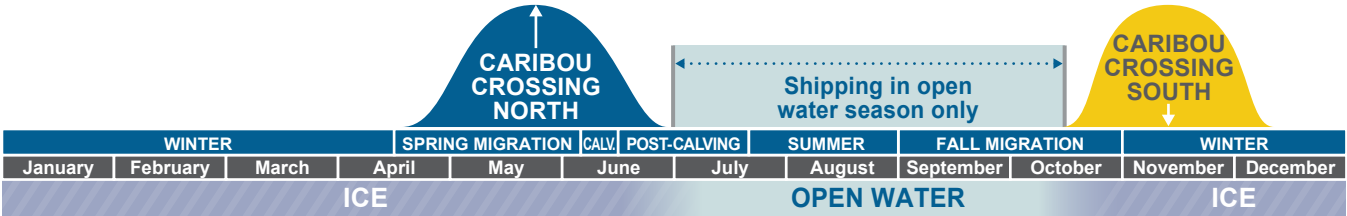
The Dolphin/Union caribou herd cross the sea ice of Coronation Gulf each spring and fall. To avoid affecting this herd during migration, the Project will only ship when there is open water.

## MONITORING

Ship's crew will monitor for spills. Any spills will be reported immediately and cleaned up.

## MANAGEMENT

B2Gold Nunavut has emergency response plans to protect the marine environment and minimize impacts from potential spill events; these include the Ship Oil Pollution Emergency Plan, Oil Pollution Emergency Plan, and Spill Contingency Plan.





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