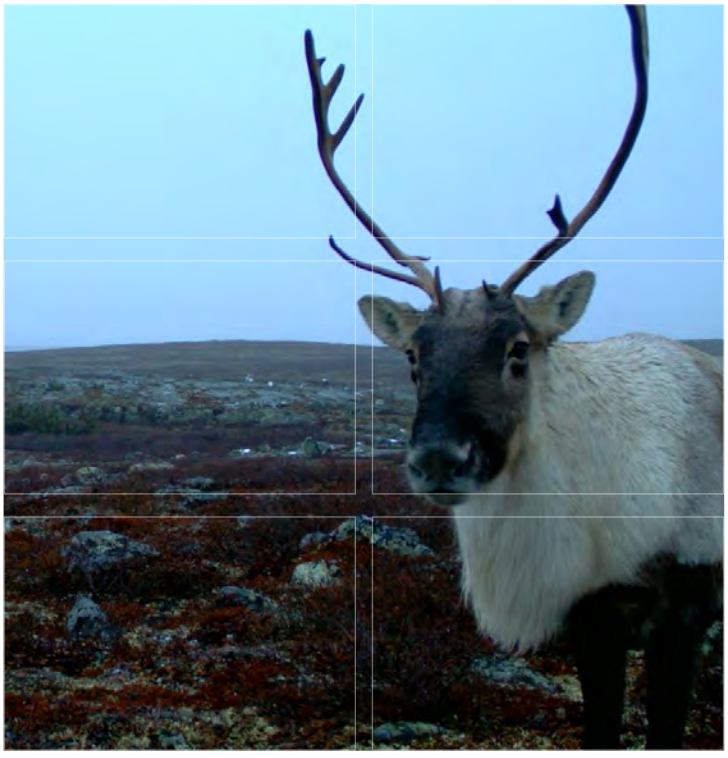
# Appendix V2-3E
Caribou Workshop








*Prepared for:*

TMAC RESOURCES

# PHASE 2 OF THE HOPE BAY PROJECT

## Caribou Workshop

November 2016

*The business of sustainability*

ERM

**TMAC Resources Inc.**

# PHASE 2 OF THE HOPE BAY PROJECT
# Caribou Workshop

**November 2016**

Project #0300783-0401

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# ACKNOWLEDGEMENTS

This report was prepared by Kent Gustavson (ERM) and Mike Setterington (EDI Environmental Dynamics Inc.) on behalf of TMAC Resources Inc. Information presented in this report was provided by Elders and harvesters who participated in a workshop held from September 27 to 29, 2016, in Cambridge Bay, NU. The information is presented in a way that protects the confidentiality of individual participants. We would like to thank the following individuals for their participation and sharing of traditional land use information and knowledge: George Angohiatok; Mary Avalak; David Epilon; George Hakongak; Jimmy Haniliak; Peter Kapolak; Clarence Klengenberg; Randy Klengenberg.

# Caribou Workshop

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# GLOSSARY AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

| | |
|---|---|
| **DEIS** | Draft Environmental Impact Statement |
| **IIBA** | Inuit Impact and Benefit Agreement |
| **IQ** | Inuit Qaujimajatuqangit |
| **KIA** | Kitikmeot Inuit Association |
| **NIRB** | Nunavut Impact Review Board |
| **TIA** | tailings impoundment area |
| **TMAC** | TMAC Resources Inc. |

# 1. INTRODUCTION

## 1.1 BACKGROUND

The Inuit people of the Kitikmeot Region have a longstanding relationship of reciprocity and respect with their region's wildlife and environment as a whole, as is manifested within Inuit Qaujimajatuqangit (IQ). Maintaining the health and the ability of the land to support traditional activities, including hunting, trapping, fishing, and gathering, is essential to the Inuit lifestyle. This includes ensuring the sustainability of wildlife populations in the area. Muskox, caribou, grizzly bear, wolf, and wolverine (among others) are among the species people in the Kitikmeot Region rely upon, with caribou being the most harvested terrestrial mammal. The relationship with caribou is a way of life for the Inuit people.

TMAC is committed to completing a thorough assessment of the potential effects of the proposed mining at Madrid and Boston deposits (Phase 2) of the Hope Bay Project on caribou and other terrestrial wildlife of particular importance to Inuit, and implement protection measures that minimize impacts to caribou and other wildlife in relation to Phase 2 activities. TMAC will involve land users so that their interests and knowledge are reflected in how effects on caribou are avoided or minimized.

A workshop was held with Elders and harvesters to formally begin this dialogue, and support the participation of local knowledge holders in the development of the environmental assessment and design of mitigation and management measures for Phase 2.

## 1.2 WORKSHOP OBJECTIVE

The workshop discussed the potential effects of the Phase 2 Project on wildlife, with a focus on caribou and related traditional land use activities. TMAC shared information on Phase 2 and the environmental assessment that is being undertaken, as well as experience to date on interactions with caribou and proposed ways to mitigate impacts. The workshop heard from Elders and harvesters regarding their knowledge of caribou, experience of managing risks on the land, and a discussion about potential risks of Phase 2 to caribou, and ways in which to manage (i.e., mitigate) those risks.

The overall objective of the workshop was to inform the environmental assessment, gain local knowledge about the Phase 2 Project's potential risks to caribou, and inform the design of measures to protect caribou. This objective was met by: 1) increasing participant understanding of TMAC's current operations at Doris and Phase 2 development; 2) reviewing the environmental assessment process and illustrate how the Nunavut Impact Review Board (NIRB) makes decisions in the face of uncertainty; 3) collectively identifying Phase 2-caribou interactions and differences between the current operation at Doris and the proposed Phase 2 development; 4) learning from and generating an understanding of how Inuit land users perceive and manage risk; and 5) collectively identifying mitigation strategies to reduce potential risks to caribou for Phase 2.

# 2. METHOD

The workshop consisted of two full-day facilitated working sessions. This included:

- Presentations and discussion of background information on the Phase 2 Project description, baseline studies, the environmental assessment process and NIRB's use of the Precautionary Principle, and planned mitigation and monitoring of caribou.
- A focus group discussion, including resource mapping, on Elder and harvester land use activities and knowledge of caribou.
- Brainstorming sessions to develop and group ideas on potential effects on and risks to caribou and mitigation that should be considered to reduce those potential risks.
- Consensus-building exercises to confirm the workshop results and key messages from participants.

The workshop provided an opportunity for the open sharing of information and the development of ideas as a group.

## 2.1 WORKSHOP PARTICIPATION

Workshop participants were selected in consultation with the Kitikmeot Inuit Association (KIA). A number of the participants are also currently members of the Phase 2 Environmental Advisory Committee formed under the Hope Bay Project's Inuit Impact and Benefit Agreement (IIBA). Knowledge holders (Plate 2.1-1) were selected based on having extensive experience in the Phase 2 Project area and being widely recognized within the community as having considerable knowledge of land use and caribou. Participation in the workshop was limited to eight knowledge holders to help ensure that group activities functioned optimally with equitable participation and sharing of information.

Prior to workshop discussions and activities, individuals were asked to consent to participating in the workshop. It was explained that the workshop was to include an open discussion of information shared by all participants. The purpose of the workshop and planned use of the information provided was described. Participants were asked each of the following questions:

- Do you consent to this information being used for the Environmental Impact Statement (EIS) report for the proposed Phase 2 Project?
- Do you consent to your name being used as a reference for this information in our reporting?
- Do you consent to the use of photos from this workshop in our reporting?
- Would you like a written summary of the results of the workshop to be provided for your reference and review?

*Plate 2.1-1. Workshop participants – Elders and harvesters.*

On a Participant Consent Form provided, all participants recorded agreement with each of the above questions. By signature each participant confirmed their understanding of the objectives, consented to participating in the workshop, and acknowledged their understanding of a Statement of Informant Rights provided. A list of workshop participants is provided in Table 2.1-1.

**Table 2.1-1. Workshop Participants**

| | Name | Role |
|---|---|---|
| Elders | George Angohiatok<br>Mary Avalak<br>David Epilon<br>George Hakongak<br>Jimmy Haniliak<br>Peter Kapolak | Knowledge Holder |
| Harvesters | Clarence Klengenberg<br>Randy Klengenberg | Knowledge Holder |
| TMAC | Oliver Curran<br>Alex Buchan<br>Ikey Evalik<br>Nicole Maksagak | Proponent Representative |
| Consultants | Kent Gustavson<br>Mike Setterington<br>Nicole Bishop | Facilitator (ERM)<br>Wildlife Biologist (EDI)<br>Project Manager (ERM) |

## 2.2 WORKSHOP PROCESS AND AGENDA

The workshop was held in TMAC's Cambridge Bay office. ERM was responsible for facilitation and recording of workshop results. Additional technical support was provided by EDI Environmental Dynamics Inc. Professional translation services were provided for the duration of the workshop. Representatives for TMAC attended to provide background information on the Phase 2 Project and to provide clarification or address any questions from participants.

The agenda for the workshop is shown in Table 2.2-1. Presentations by TMAC and EDI provided background information for workshop participants and were provided in four topic areas: 1) Phase 2 overview, 2) caribou studies overview, 3) scoping of Phase 2 Project interactions and potential effects on caribou, and mitigation and monitoring currently identified by TMAC, and 4) management of uncertainty and risk. Each presentation session was followed either by a group work session or a question and answer discussion. Key activities, including the focus group discussion, brainstorming, and consensus building, are described further below. A day-long site visit to the current Doris operations and the proposed Phase 2 Project sites was also planned for the workshop, but was not completed due to poor weather conditions.

**Table 2.2-1. Workshop Agenda**

| Date | Time | Workshop Activity |
|---|---|---|
| Tuesday (September 27, 2016) | 9:00am - 9:15am | Welcome and Review of Agenda |
| | 9:15am - 10:00am | Introductions |
| | 10:00am - 10:30am | The Phase 2 and Caribou Studies (presentation and discussion) |
| | 10:30am - 10:45am | Break |
| | 10:45am - 12:00pm | Group Work – What do we know about Caribou? (focus group discussion and mapping) |
| | 12:00pm - 1:00pm | Lunch |
| | 1:00pm - 2:00pm | Group Work – What do we know about Caribou? (continued focus group discussion and mapping |
| | 2:00pm - 3:00pm | Hope Bay – Project Interactions, Mitigation and Monitoring (presentation and discussion) |
| | 3:00pm - 3:15pm | Break |
| | 3:15pm - 3:45pm | What We Heard (facilitated group consensus) |
| | 3:45pm - 4:00pm | Plan for Site Visit |
| Wednesday (September 28, 2016) | 9:00am - 9:15am | Welcome and Review of Agenda |
| | 9:15am - 10:00am | Uncertainty and Risk (presentation and discussion) |
| | 10:00am - 10:15am | Break |
| | 10:15am – 12:00pm | Group Work – Making Decisions with Uncertainty (facilitated discussion and group work) |
| | 12:00pm - 1:00pm | Lunch |
| | 1:00pm - 2:30pm | Group Work – Managing Risks to Caribou (facilitated discussion and group work) |
| | 2:30pm - 3:15pm | What We Heard (facilitated group consensus) |
| | 3:15pm - 3:30pm | Next Steps |

*Note: Actual time for some activities varied from the planned agenda.*

## 2.3 PRESENTATIONS

The materials presented to the workshop participants are provided in Appendix A. Below is a description of the four main topic areas for the presentations.

### 2.3.1 Project Overview

TMAC provided an overview of the current operation at Doris and an overview of the proposed Phase 2. A high level overview of the environmental assessment process and timelines for the submission of the Draft Environmental Impact Statement (DEIS) to NIRB was also provided. This portion of the presentation was followed by a question and answer period.

### 2.3.2 Caribou Studies Overview

An overview of caribou baseline studies was provided, including a synopsis of the information that has been gathered on caribou in the area since 1996. This includes aerial survey data, ground-based observations and satellite collar information. Figures of the extent of seasonal ranges for the Bathurst caribou herd, collar movement, and a broader overview of the range of Dolphin Union caribou was presented. This presentation was followed by a discussion and group work described below in Section 2.4.

### 2.3.3 Project Interactions, Potential Effects, Mitigation and Monitoring

A list of potential Phase 2 Project effects on caribou was followed by a description of the protection measures that are in place or planned. Adaptive management approaches, and some examples of measures used to mitigate potential effects, such as caribou crossings on some sections of the existing road and monitoring using remote trail cameras, was presented. The presentation also noted that TMAC has access to caribou collar data that will be analyzed annually, or as otherwise necessary, to monitor caribou distribution near Phase 2. Reference was made to other mitigation and monitoring plans that have elements relevant to caribou protection, including the Noise Abatement Plan and Air Quality Management Plan. This portion of the presentation was followed by a discussion.

### 2.3.4 Uncertainty and Risk

The final presentation included a description of the process of developing an environmental assessment, and a high level overview of the environmental review process in Nunavut. This included description of opportunities for public input into the NIRB process, and an example of NIRB decision-making from the decision documents for other proposed Nunavut mining projects, including a summary of NIRB's interpretation of the Precautionary Principle. This portion of the presentation was followed by a group work session discussing how hunters make decisions in the face of uncertainty (described further in Section 2.4).

An example of a risk management matrix, adapted from Fisheries and Oceans Canada[1], was presented along with a discussion of how a risk matrix is constructed and the use of impact, likelihood of occurrence, and risk terminology. The scaling of likelihood of occurrence and severity of effect was described. How protection measures may be used to reduce risk was also discussed. The purpose of presenting the risk matrix to the participants was to show a technical approach to describing risk, and to facilitate the subsequent brainstorming session and grouping of ideas (see Section 2.5).

## 2.4 FOCUS GROUP DISCUSSION

A focus group discussion, with resource mapping (Plate 2.4-1), was conducted with participants to discuss information on land use in the vicinity of the Phase 2 Project and their understanding of caribou and the potential interactions between caribou and Phase 2. A semi-structured interview guide was used to guide the discussion. Discussion topics included: current land use activities (hunting locations, travel, seasonality and changes in hunting activities over time); knowledge of caribou (areas important for caribou, caribou locations and numbers, migrations and movements, caribou behaviour, changes and trends over time); and potential interactions between caribou and Phase 2 (ways caribou may interacts with the Phase 2 Project, issues and concerns, potential ways to avoid or mitigate potential effects, risks that that Phase 2 Project and activities pose to caribou). Written notes were taken of the discussion and important locations marked and described on maps provided.

*Plate 2.4-1. Resource mapping.*

[1] *Practitioners Guide to the Risk Management Framework for DFO Habitat Management Staff, Version 1.0.* See presentation materials provided in Appendix A.

## 2.5 BRAINSTORMING AND GROUPING OF IDEAS

The agenda included brainstorming sessions (Plate 2.5-1) to identify and develop ideas on: 1) the potential effects of the Phase 2 Project on caribou; 2) the risks posed by each potential effect; and 3) protection measures that should be considered to reduce the potential risks. The key focus question posed was "*What can be done to manage risks to caribou?*" For this activity, the following format was followed:

- Participants were first asked to individually brainstorm on potential effects of Phase 2 on caribou, and to write down each idea on a large note card.
- Note cards were collected and each read out to the group. Participants were asked to identify, as a group, if they believed each potential effect to be: 1) unlikely to occur; 2) potentially (maybe) to occur; or 3) expected to occur. Cards were grouped accordingly and displayed on a wall in the workshop venue.
- For each identified potential effect, participants were then asked to identify, as a group, if they believed, should each effect occur, that it would have: 1) a low impact; 2) a moderate (medium) impact; or 3) a high impact.
- For each potential effect, participants were then asked to identify what could be done to protect caribou (i.e., mitigation measures and monitoring).

This activity resulted in the workshop participants developing together a risk matrix of potential effects on caribou of the proposed Phase 2 Project (Table 2.5-1; Plate 2.5-2) and, for each effect, identifying protection measures that should be considered to reduce the potential risks.

Prior to this activity, a separate brainstorming session was conducted using the same exercise format, but asking participants to brainstorm on risk in the context of land use and harvesting. Specifically, participants were asked to identify potential adverse events or impacts that they may face while out on the land while hunting, the risks associated with each of those events, and the measures they employ to avoid or mitigate those risks. This activity was designed to give participants an understanding of the exercise by applying it to a common, familiar experience they all share, prior to running the exercise to address potential effects of Phase 2 on caribou.

**Table 2.5-1. Risk Matrix Template**

| | Likelihood of Occurrence | | |
|---|---|---|---|
| Scale of Impact | Unlikely | Maybe | Expected |
| High | | | |
| Medium | | | |
| Low | | | |

*Plate 2.5-1. Workshop brainstorming.*

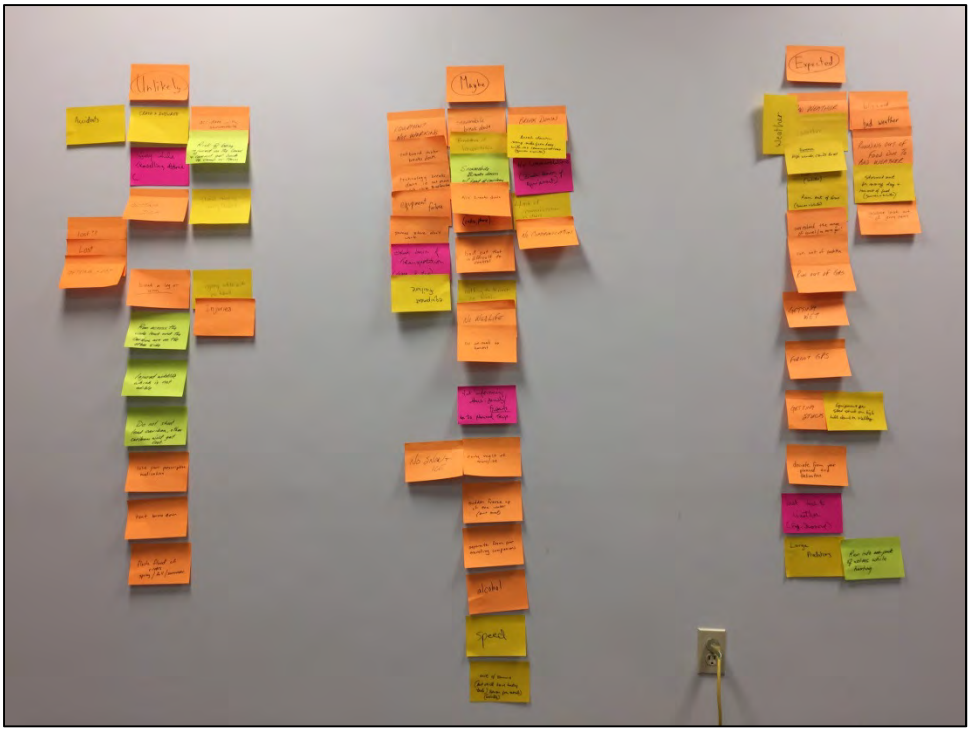


*Plate 2.5-2. Grouping of ideas.*

## 2.6 CONSENSUS BUILDING

At the end of each day, key points of information shared during the working sessions were confirmed with the participants. Group consensus of the key points was developed using a traffic card voting process: 1) a statement was made to the group; 2) individual participants indicated by holding up a coloured card if they agreed with the statement (green card), had some reservations but found the statement acceptable (yellow card), or disagreed with the statement (red card).

After the initial vote on each statement, those participants that indicated reservations or disagreement with the statement were asked to explain their position, and revisions to the statement were then considered by the group. Participants were then asked to vote again. This process was followed for each statement presented to the group. Consensus is reached when there are no "red cards" indicating someone's disagreement. This consensus building process allowed for the development of definitive statements on results.

## 2.7 SUPPORT MATERIALS

To support the informed and meaningful participation of Elders and harvesters in the workshop, the following materials were prepared:

- Meeting agenda.
- Presentations (described in Section 2.3).
- Infographic of key measures implemented to protect caribou.
- Topographical maps showing the location of the Phase 2 Project on the landscape and in reference to communities and key geographical features.

In addition, during the workshop the participants were shown a number of photos from the ongoing camera wildlife monitoring program and video that has been taken of site. The presentation and infographic supplied to the participants in provided in Appendix A.

# 3. RESULTS

## 3.1 LAND USE AND KNOWLEDGE

### 3.1.1 Focus Group and Resource Mapping Discussion Results

Workshop participants described and discussed current land use activities (hunting locations, travel, seasonality and changes in hunting activities over time), knowledge of caribou (areas important for caribou, caribou locations and numbers, migrations and movements, caribou behaviour, changes and trends over time), and potential interactions between caribou and Phase 2 (ways caribou may interact with the Phase 2 Project, issues and concerns, potential ways to avoid or mitigate potential effects). On the maps provided, participants identified important locations and areas, the results of which are shown in Figures 3.1-1 and 3.1-2.

In addition to the information provided on the maps, there were some key comments and observations made about caribou distribution, abundance and behaviour during the mapping exercise (paraphrased from focus group notes):

- Historical trends in abundance and movement were noted, and there was a clear distinction between behaviour of island caribou (a.k.a. Dolphin Union) and mainland caribou.
- Participants spoke of the current downward trend in caribou numbers as an expected event, based on what they had heard about previous cycles from their Elders.
- There was little to no information mapped specifically for the Phase 2 area or the proposed all-weather road development from Madrid to the Boston site.
- Caribou behave differently in spring (less skittish) than they do in fall, which was attributed to caribou being more sensitive to the presence predators in the fall.
- Recurring discussions about the observed increase in numbers of predators (wolves, grizzly bears) and the likely effect of this on declining caribou numbers.

### 3.1.2 Summary of Key Points

The following are the group's consensus statements on caribou baseline information:

- Migration pattern of island caribou have been changing in the last 10 years.
- Caribou numbers have gone up and down since the 1960s as part of a cycle (lows in 1960s and highs in 1980s).
- More wolves in the area have led to a decline in caribou numbers.
- Island caribou migrate mainly north-south and mainland caribou migrate more east-west.
- Change in appearance indicates caribou herds are mixing (specifically, Dolphin Union with Beverly/Ahiak).

The following are the group's consensus statements on considerations for evaluating the potential interactions between the Phase 2 Project and caribou:

- The whole road area is used by caribou.
- Caribou crossing areas are evident in the tundra.
- Sound travels faster and farther in very cold temperatures, which should be considered for mitigation.
- Speed limit does have an effect on dust emissions.
- Metals in tailing water and dust emissions still need to be considered.

## 3.2 RISKS TO CARIBOU

### 3.2.1 Potential Effects

Workshop participants identified a number of potential effects on caribou as a result of the Phase 2 Project. These were first categorized according to the likelihood of occurrence (expected, maybe, or unlikely):

- Expected to occur:
  - Disturbance from aircraft noise (airplanes and helicopters);
  - Disturbance from mine site noise (generators, drilling, etc.);
  - Disturbance from vehicle/ truck traffic noise;
  - Disturbance due to the presence of people;
  - Oil or fuel spills (contamination);
  - Increased predation because predators attracted to the mine site;
  - Vehicle collisions with caribou;
  - Loss of grazing habitat (vegetation) because of mine footprint;
  - Disturbance/ avoidance due to dust;
  - Caribou moving into the vicinity of the mine to avoid predators; and
  - Increased hunting pressure (because workers tell hunters back home in their community the location of caribou if seen near the mine).
- Could occur (maybe):
  - All weather road altering migration (caribou avoiding the road);
  - Mine infrastructure and mining activities altering migration (caribou avoiding the mine area);
  - Caribou drinking contaminated tailings water;
  - Pollution (land or water) affecting caribou;
  - Caribou avoiding areas with exposed drill pipes (if left extending above the surface); and

**Figure 3.1-1**
**Knowledge Shared on Caribou and Land Use – Northern Section**

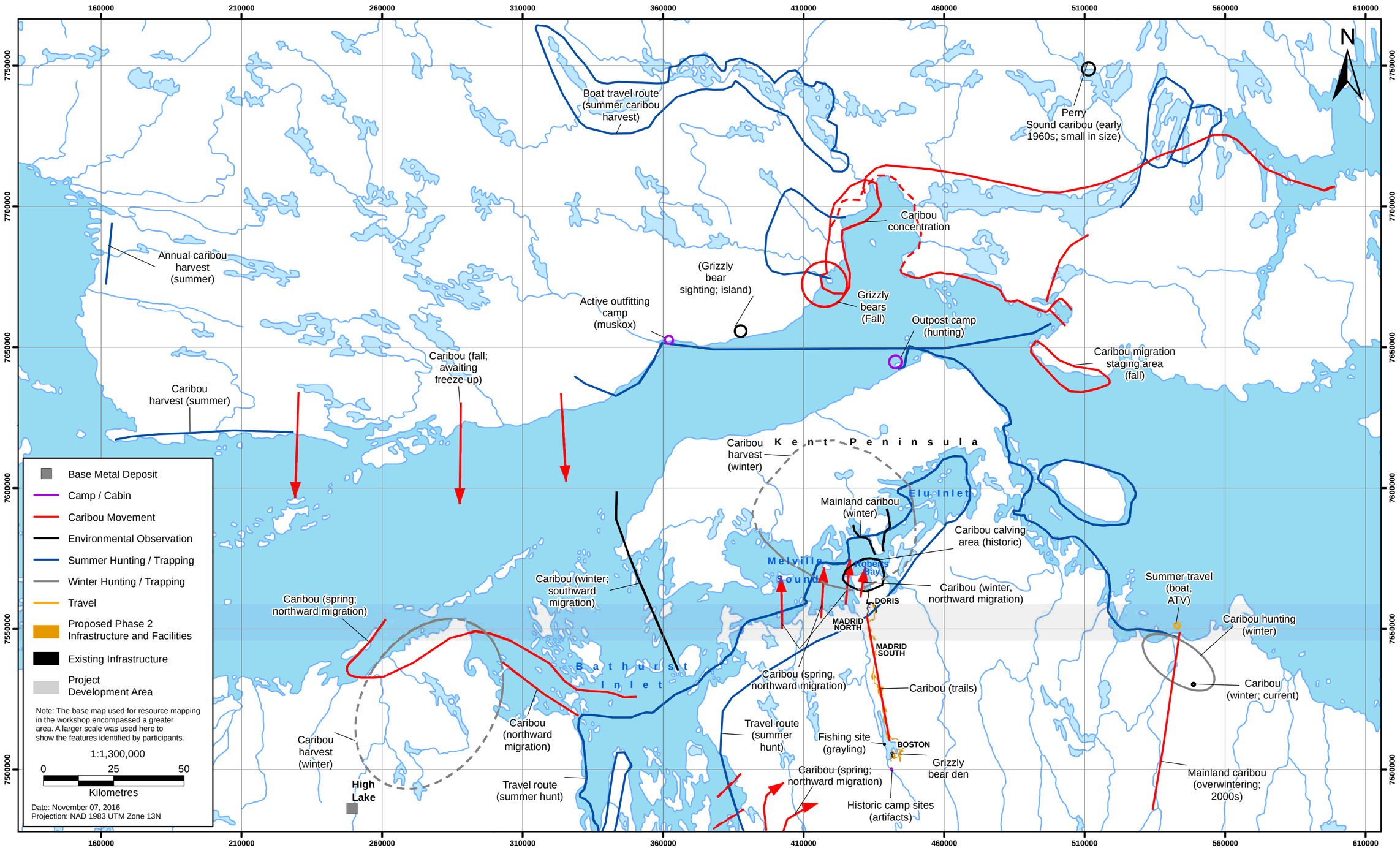
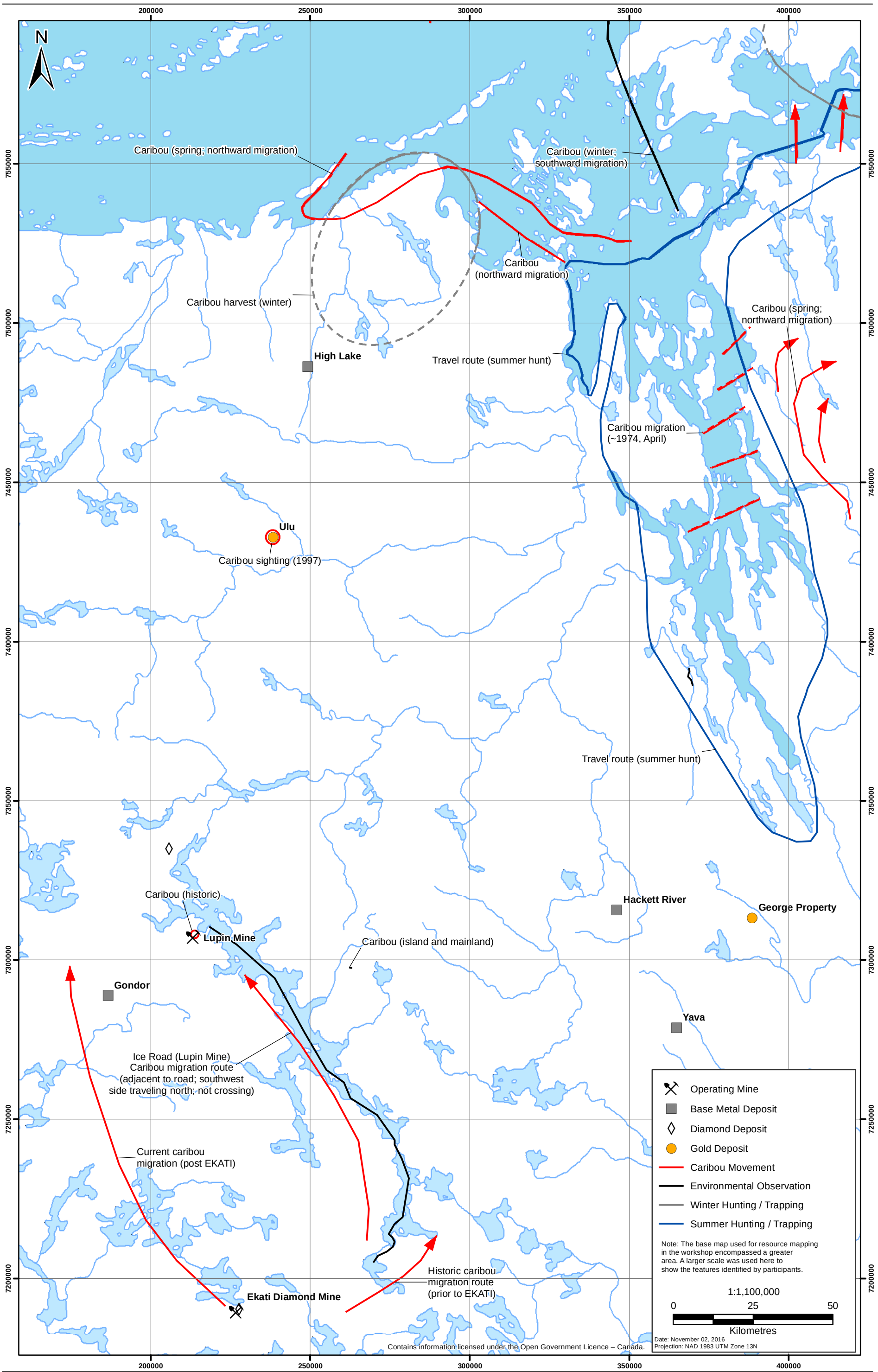


**Figure 3.1-2**
**Knowledge Shared on Caribou and Land Use – Southern Section**



  - Accidents involving caribou (especially when workers are unaware of when caribou are in the area due to poor communications between workers).
- Unlikely to occur:
  - Unexpected mine explosions (accidental);
  - Aircraft accidents; and
  - Tailings dam failure/ breach.
  - Increased hunting pressure if there is winter road access to Cambridge Bay.

Grouping each potential effect according to perceived level of impact (high, medium or low) should the impact occur resulted in the following:

- High impact
  - Disturbance from aircraft noise (airplanes and helicopters);
  - Disturbance from mine site noise (generators, drilling, etc.);
  - Increased hunting pressure (because workers tell hunters back home in their community the location of caribou if seen near the mine);
  - All weather road altering migration (caribou avoiding the road);
  - Mine infrastructure and mining activities altering migration (caribou avoiding the mine area);
  - Pollution (land or water) affecting caribou;
  - Accidents involving caribou (especially when workers are unaware of when caribou are in the area due to poor communications between workers); and
  - Unexpected mine explosions (accidental); and
  - Increased hunting pressure if there is winter road access to Cambridge Bay.
- Medium (moderate) impact
  - Disturbance from vehicle/truck traffic noise;
  - Vehicle collisions with caribou; and
  - Caribou drinking contaminated tailings water.
- Low impact
  - Oil or fuel spills (contamination);
  - Disturbance due to the presence of people;
  - Loss of grazing habitat (vegetation) because of mine footprint;
  - Disturbance/ avoidance due to dust;
  - Caribou moving into the vicinity of the mine to avoid predators;
  - Caribou avoiding areas with exposed drill pipes (if left extending above the surface);
  - Aircraft accidents (impact depends on location relative to location of caribou); and
  - Tailings dam failure/ breach.

Regarding the distinction between a low level of impact versus a higher level of impact, some workshop participants noted that an important determining factor was the number of caribou affected. If an individual caribou is affected, it would be considered a low impact. However, if a large number of caribou are affected, it would be considered a high impact.

Regarding caribou avoiding areas with exposed drill pipes, or the pipes otherwise posing a safety risk to caribou, the workshop participants noted that this was not a concern in the Phase 2 area, but was a concern in exploration areas further south. TMAC clarified that the practice of leaving exposed sections of pipe after exploration drilling is completed was a common practice in the past, but is no longer common practice. Current exploration at Hope Bay cuts off piping at ground level once drilling is completed.

Workshop participants also identified increased hunting pressure as a concern (rated as a high impact, but unlikely to occur) if there is winter road access to Cambridge Bay. However, TMAC clarified that the Phase 2 Project did not include a winter road to Cambridge Bay.

The results of the brainstorming session on the risks to caribou, grouped according to perceived likelihood of occurrence and scale of impact, are shown in Table 3.2-1.

**Table 3.2-1. Risk Matrix of Potential Phase 2 Project Impacts on Caribou**

| | Likelihood of Occurrence | | |
|---|---|---|---|
| **Scale of Impact** | **Unlikely** | **Maybe** | **Expected** |
| High | Unexpected explosion (accident on surface) | All weather road altering migration<br>Mine infrastructure and mining activities altering migration<br>Too much pollution (land and water)<br>Accidents due to miss-communications during operations (involving caribou) | Disturbance from aircraft noise<br>Disturbance from mine site noise<br>Increased hunting pressure |
| Medium | | Caribou drinking tailings water | Disturbance from vehicle/ truck traffic noise<br>Vehicle collisions with caribou |
| Low | Aircraft accidents (depends on location of caribou)<br>Tailings pond dam failure/ breach | | Oil or fuel spills (contamination)<br>Disturbance due to the presence of people<br>Too big a footprint (loss of habitat)<br>Disturbance/ avoidance from dust<br>Caribou running away from predators into the mine site (to avoid predators) |

### 3.2.2 Protection Measures

For each potential effect above (Table 3.2-1), workshop participants identified key caribou protection measures that should be considered by TMAC. These are listed in Table 3.2-2.

With respect to the suggestion to increase the size of the "no hunting" zone around the mine site to mitigate the potential effect of increased hunting pressure on caribou, TMAC noted during the workshop that the current "no hunting" zone is in fact a mandatory safety zone that is legislated and TMAC does not have the authority to increase this zone. Any change in the distances associated with the required safety zone would need to be done by government.

Workshop participants noted that Elders should be involved in the design of two protection measures, in particular: installation of road crossing for caribou, and installation of Inuksuk to direct caribou away from the TIA. Determining the appropriate location of Inuksuk to direct the movement and migration of caribou is specialized knowledge and needs to be done with care.

### 3.2.3 Summary of Key Points

The following are the group's consensus statements on potential effects of the Phase 2 Project:

- Key expected high impact effects are noise (aircraft, site), and hunters in community told where caribou are located (i.e., increased hunting pressure).
- Key expected low impact effects are dust, oil/fuel spill, and loss of vegetation habitat.
- Key possible (maybe) high impact effect is change in migration due to roads and infrastructure.
- Key possible (maybe) medium impact effect is tailings water (caribou drinking tailings water).
- Large predators getting to caribou is a major concern (not related to the mine).
- Caribou behave differently in the spring and fall (more skittish in fall, more worried about predators).

The following are the group's consensus statements on key protection measures:

- Noise. Limit noise, road activity, helicopter use during migration; raise flight altitude when see disturbance of caribou; minimize site activities during migration season.
- Spills. Quick response.
- Dust. Control dust on roads (speed limits, dust control).
- Migration and road impacts. Monitor caribou during migration/ near road/ use of crossings; more road crossing (where caribou cross).
- Tailings water quality. Monitor full-time/ regular sampling; fencing TIA; using Inuksuk to deter caribou from the TIA during migration.

**Table 3.2-2. Risk Matrix of Potential Phase 2 Project Impacts on Caribou and Identified Protection Measures**

| Scale of Impact | Likelihood of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Unlikely | | Maybe | | Expected | |
| | Effect | Protection Measure | Effect | Protection Measure | Effect | Protection Measure |
| High | • Unexpected explosion (accident on surface) | • None suggested | • All weather road altering migration | • Monitoring of roads during migration<br>• Monitoring of caribou movements near roads and use of crossings<br>• Road crossing built for caribou (located where caribou are known to cross) | • Disturbance from aircraft noise | • Use designated flight paths<br>• Raise flight altitude/distance when disturbance of caribou is observed (in addition to minimum distances)<br>• Limit helicopter use during migration<br>• Minimize activity around site during hunting season |
| | | | • Mine infrastructure and mining activities altering migration | • Monitoring of caribou movements | • Disturbance from mine site noise | • Limit noise during migration<br>• Limit road activity during migration<br>• Minimize activity around site during hunting season<br>• Limit road use for operation purposes only (no worker "sight-seeing") |
| | | | • Too much pollution (land and water) | • Pollution management | • Increased hunting pressure | • Increase the size of the "no hunting" zone around the mine site (and communicate to HTOs)<br>• Restrict access to roads by hunters |
| | | | • Accidents due to mis-communications during operations (involving caribou) | • None suggested | | |

*(continued)*

**Table 3.2-2. Risk Matrix of Potential Phase 2 Project Impacts on Caribou and Identified Protection Measures (completed)**

| Scale of Impact | Likelihood of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Unlikely | | Maybe | | Expected | |
| | Effect | Protection Measure | Effect | Protection Measure | Effect | Protection Measure |
| Medium | | | • Caribou drinking contaminated tailings water | • Full-time monitoring of tailings area for caribou during migration<br>• Regular sampling of water quality in tailings area<br>• Fencing of tailings<br>• Installation of Inuksuk to direct caribou away | • Disturbance from vehicle/ truck traffic noise | • Enforce speed limit<br>• Establish minimum distance allowed between vehicles |
| | | | | | • Vehicle collisions with caribou | • Enforce speed limit |
| Low | • Aircraft accidents (depends on location of caribou) | • None suggested | | | • Oil or fuel spills (contamination) | • Quick response to spills |
| | • Tailings pond dam failure/ breach | • None suggested | | | • Disturbance due to the presence of people | • None suggested |
| | | | | | Too big a footprint (loss of habitat) | • None suggested |
| | | | | | Disturbance/ avoidance from dust | • Control dust on roads (speed limits, dust control) |
| | | | | | Caribou running away from predators into the mine site (to avoid predators) | • None suggested |

# 4. SUMMARY

The workshop discussed the potential effects of the Phase 2 Project on wildlife, with a focus on caribou and related traditional land use activities. TMAC shared information on Phase 2 and the environmental assessment that is being undertaken, as well as experience to date on interactions with caribou and proposed ways to mitigate potential effects. The workshop heard from Elders and harvesters regarding their knowledge of caribou, experience of managing risk on the land, and about potential risks of Phase 2 to caribou and ways in which to manage those risks.

Participants shared their knowledge about caribou distribution and abundance on regional-scale and project-scale maps. They noted variability in movements, changes in abundance and trends over time. The current downward trend in caribou numbers is, for the most part, seen as part of a population cycle based on knowledge of past changes. Predation, in particular by wolves, was noted by some workshop participants as an important cause of population decline.

Participants shared their views, through a brainstorming session, on the potential risks of the Phase 2 Project to caribou. There were concerns expressed about noise potentially being of high risk to caribou (depending on the number of animals affected). The potential effects of the all-weather road and mine infrastructure on the migration of caribou, and the potential for caribou to drink tailings water, were also identified as key concerns. Other potential effects of note include: land and water pollution, increased hunting pressure (from Kitikmeot workers telling hunters from the communities when caribou are in the area), and vehicle collisions and other accidents involving caribou.

The workshop participants identified many protection measures to reduce the risk and lower the level of impact. The protection measures discussed included both those that had been identified by and currently in use by TMAC (e.g., water quality monitoring, vehicle speed limits, spill response), as well as some that had yet to be considered (e.g., use of Inuksuk to direct caribou away from the TIA).

The results of the workshop, as reported here, will be considered in the development of the DEIS for Phase 2. It serves as an important source of information for a complete environmental assessment and addresses some uncertainty surrounding the current decline in caribou numbers and how the mining at Madrid and Boston can coexist with caribou and other important wildlife species.

# *Appendix A*

*Support Materials*

The Hope Bay Project

# Caribou Workshop

TMAC Resources
September 2016
Cambridge Bay, NU

The Workshop

## PURPOSE

# The Workshop

**Why are we here?**

- TMAC will complete a thorough assessment of the potential effects of the Hope Bay Project on caribou, and implement protection measures that minimize impacts and keep caribou safe.

- Involving local knowledge holders to collectively understand:
  - What do we currently know about caribou?
  - What changes in caribou have occurred?
  - What are the potential interactions between the Project and caribou?
  - What protection measures are needed for caribou?
  - How do we deal with uncertainty – what we do not understand and where do efforts need to be focused?

3

# The Workshop

**Workshop Objective**

- To understand the interests and knowledge of land users and consider this information in developing ways to avoid or minimize potential effects of the Hope Bay Project on caribou.

**The Commitment**

- TMAC is committed to involving land users so that their interests and knowledge are reflected in how effects on caribou are avoided or minimized. TMAC will provide feedback to participants on how this input influenced Project decisions.

4

# The Workshop

| Tuesday, September 27, 2016 | |
|---|---|
| 9:00am - 9:15am | Welcome and Review of Agenda |
| 9:15am - 10:00am | Introductions |
| 10:00am - 10:30am | The Hope Project and Caribou Studies |
| 10:30am - 10:45am | Break |
| 10:45am - 12:00pm | Group Work – What do we know about Caribou? |
| 12:00pm - 1:00pm | Lunch (provided) |
| 1:00pm - 2:00pm | Group Work – What do we know about Caribou? (continued) |
| 2:00pm - 3:00pm | Hope Bay – Project Interactions, Mitigation and Monitoring |
| 3:00pm - 3:15pm | Break |
| 3:15pm - 3:45pm | What We Heard |
| 3:45pm - 4:00pm | Plan for Site Visit |

5

# The Workshop

| Wednesday, September 28, 2016 | |
|---|---|
| 9:00am - 9:45am | Flight, Cambridge Bay to Doris Site |
| 9:45am - 10:30pm | Site Orientation and Safety |
| 10:30am - 12:00pm | Tour of Doris Site |
| 12:00pm - 1:00pm | Lunch (provided) |
| 1:00pm - 3:00pm | Tour of Madrid Site |
| 3:00pm - 4:00pm | Tour of Boston Site |
| 4:00pm - 5:00pm | Flight, Boston Site to Cambridge Bay |

6

# The Workshop

| Thursday, September 29, 2016 | |
|---|---|
| 9:00am - 9:15am | Welcome and Review of Agenda |
| 9:15am - 9:45am | Group Discussion – Reflections on Site Visit |
| 9:45am - 10:15am | Uncertainty and Risk |
| 10:15am - 10:30am | Break |
| 10:30am – 12:00pm | Group Work – Making Decisions with Uncertainty |
| 12:00pm - 1:00pm | Lunch (provided) |
| 1:00pm - 2:30pm | Group Work – Managing Risks to Caribou? |
| 2:30pm - 3:15pm | What We Heard |
| 3:15pm - 3:30pm | Next Steps |

7


## TMAC Resources

TMAC is a Canadian company with offices in Cambridge Bay, Yellowknife, and Toronto.

- Bought the Hope Bay mineral tenures from Newmont (Hope Bay Mining Company) in 2013
- Currently developing the Doris Project, while undergoing an environmental impact assessment (EIA) with the Nunavut Impact Review Board (NIRB) for the wider development of the Hope Bay Greenstone Belt including Madrid and Boston deposits

TMACs vision is to develop the Hope Bay Project in a responsible and sustainable way for now and years to come.

# The Hope Bay Project: Overview

- New underground gold mines at the Mardrid and Boston deposits
- Use of existing and new processing infrastructure

| Hope Bay Project Highlights | |
|---|---|
| Minerals | • gold |
| Mining Methods | • waste rock will be put back into the underground mines and stored above ground temporarily |
| Production Amounts | • 160,000 ounces of gold per year for about 15 years |
| Processing | • onsite processing at Doris and Boston will produce gold bars |
| Shipping | • summer re-supply of fuel, equipment and supplies by sealift<br>• gold bars flown out to market<br>• all-weather winter roads connecting the mining areas |
| Employment | • up to 440 jobs per year during operations (for approximately 15 years)<br>• fly in-fly out operation from Yellowknife and Kitikmeot |
| Economic Benefit | • approximately $37 million in royalties from the Hope Bay Project (excluding Doris)<br>• mineral taxes approximately $400 million over the life of the Hope Bay Project for federal, territorial and Inuit taxes (excluding Doris) |

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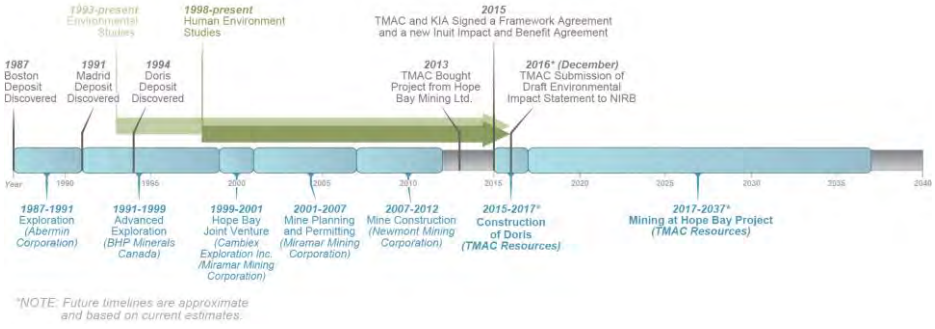
# Timeline and Milestones

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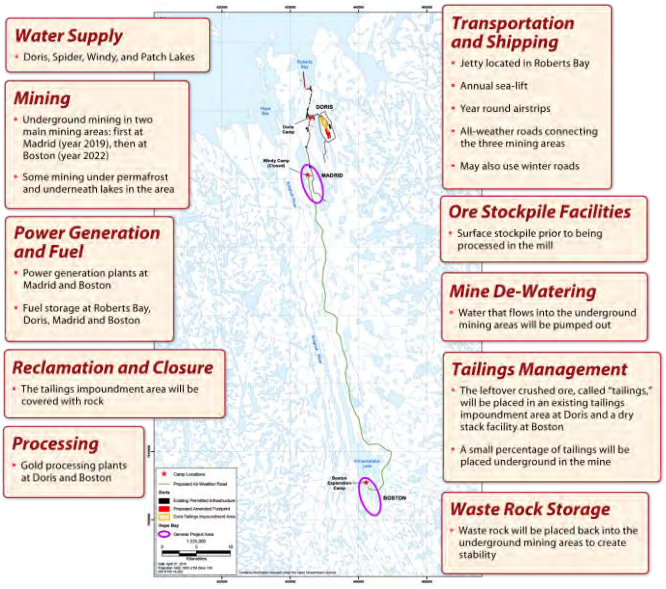
# Site Layout

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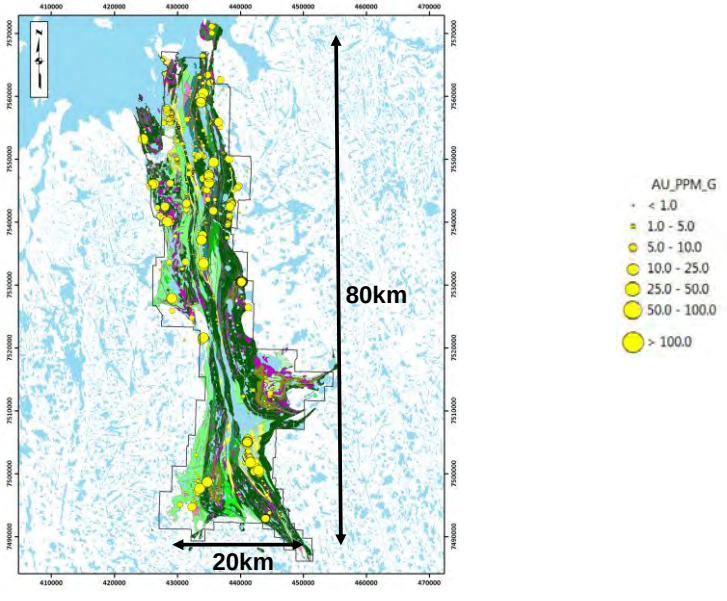
# Hope Bay – Surface Gold Showings



# EIA Components and Timelines

- TMAC is conducting studies of the environment (land, water, air animals, heritage and communities (economic, social, and health).
- TMAC will identify ways to avoid or minimize impacts to the environment and increase benefits to local communities.
- Inuit traditional knowledge (IQ) will be collected and used alongside scientific information in the EA.

| Milestone | Date |
|---|---|
| NIRB publishes the EIS Guidelines (document that states what information TMAC should include in the EIA) | December 2012 |
| TMAC submits a Draft Environmental Impact Statement | Estimated 2016 |
| TMAC submits a Final Environmental Impact Statement | Estimated 2017 |

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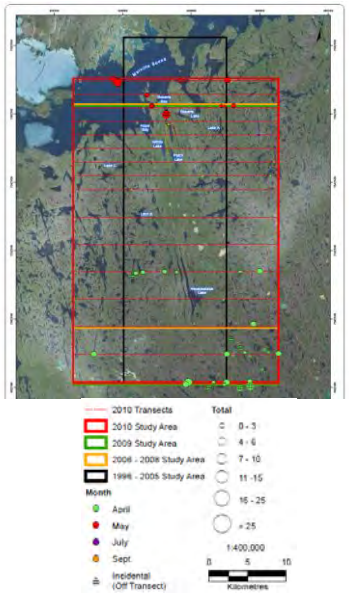
# Caribou Populations

- Dolphin and Union Caribou
  - Listed as "Special Concern"
  - Some spend winter in Project area
  - Government surveys indicate population may be getting smaller
- Beverly/Ahiak Caribou
  - Calving areas to the east of the Project in the Queen Maude Gulf area
  - Caribou migrate to and from calving area south of the Project area



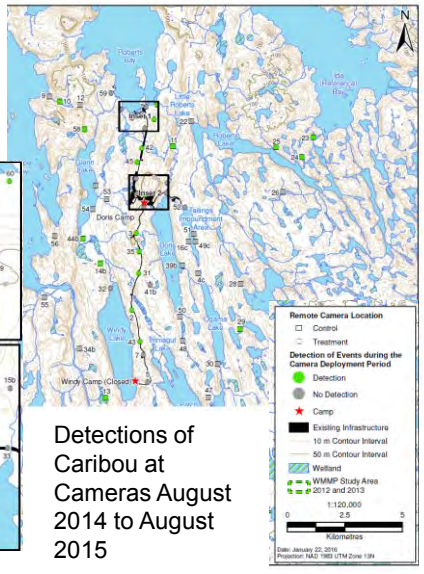
# Methods to Collect Caribou Data

- Aerial surveys (1996 – 2011)



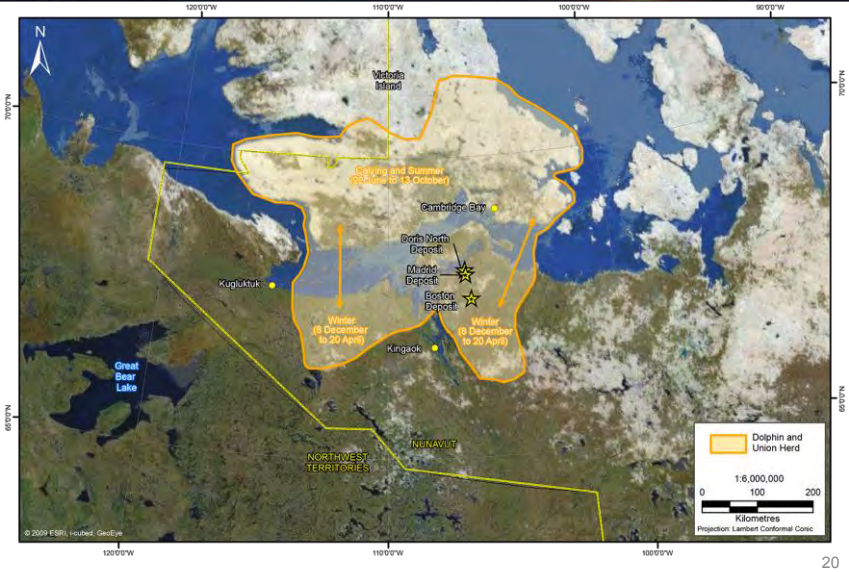
# Methods to Collect Caribou Data

- Camera program (2012 – present)


Detections of Caribou at Cameras August 2014 to August 2015

# Dolphin and Union Satellite Collar Data

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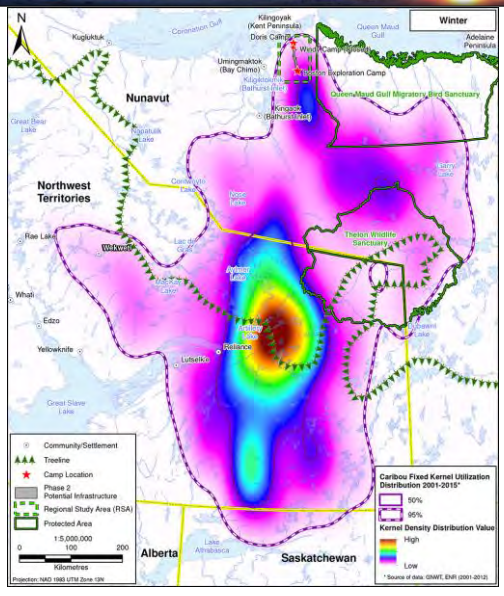
# Beverly/Ahiak Satellite Collar Data - Winter (2001-2015)

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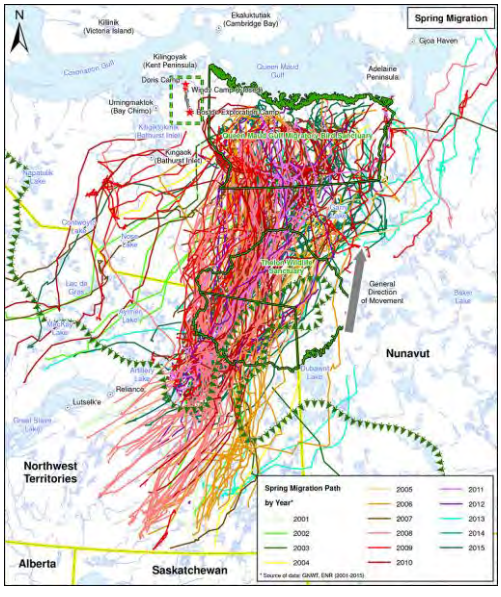
# Beverly/Ahiak Satellite Collar Data – Spring Migration (2001-2015)

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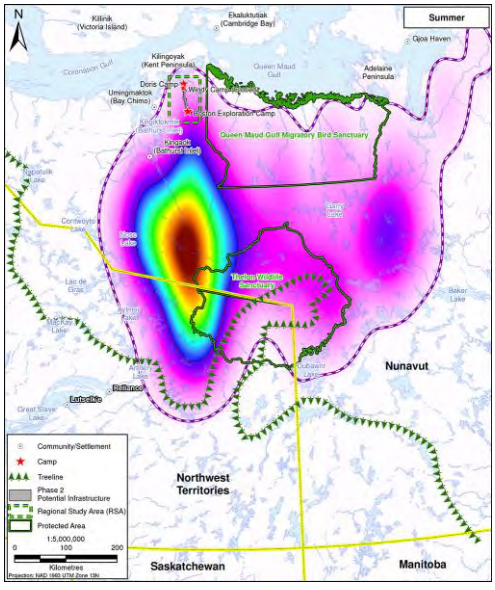
# Beverly/Ahiak Satellite Collar Data - Summer (2001-2014)

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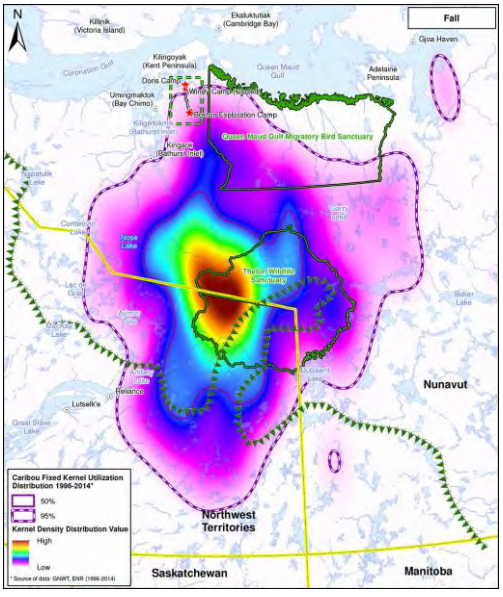
# Beverly/Ahiak Satellite Collar Data - Fall (2001-2014)

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Focus Group Discussion and Mapping

# GROUP WORK – WHAT DO WE KNOW ABOUT CARIBOU?

Caribou

# POTENTIAL INTERACTIONS

# Potential Project Effects

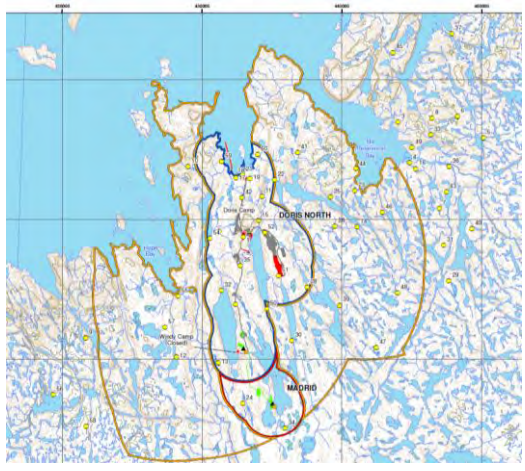
- Habitat loss and alteration
- Disturbance from sounds such as ground traffic, air traffic and blasting
- Changes to water quality
- Dust from road traffic and quarries
- Roads and buildings as an obstacle to caribou movement
- Effects of marine traffic (sealifts)
- Mortality from vehicle collisions
- Wildlife attractants

# Caribou Protection Measures

- Wildlife has right of way on roads
- Speed limits are a maximum of 40 km/hr
- Employees notified if caribou are seen from footprint areas
- No blasting in quarries if caribou are nearby
- Helicopters stay far away from caribou if safe to do so
- Check area before planes leave site
- Monitoring tailing impoundment area for caribou
- The Project does not include ice-breaking for shipping
- Camps are kept clean and all buildings are wildlife proof
- All food waste is incinerated

# Camera Program

- Provides a great deal of information
- Allows a large sampling effort (1/2 million hours/year!)
- Quantitative
- Year-round monitoring
- New design in 2016




# Caribou Crossing

## Annual Satellite Collar Data Analysis

- Satellite collar data will be analyzed every year to track any changes in Beverly/Ahiak calving ground location

## Other Relevant Mitigation and Monitoring Plans

- Noise Abatement Plan
- Air Quality Management Plan
- Spill Contingency Plan
- Non-hazardous Waste Management Plan
- Hazardous Waste Management Plan
- Interim Water Management Plan
- Waste Water Treatment Plan
- Oil Pollution Emergency Plan/Oil Pollution Prevention Plan


## What We Heard

1. Migration pattern of island caribou have been changing in the last 10 years.
2. Caribou numbers have gone up and down since the 1960s as part of a cycle (lows in 1960s and highs in 1980s).
3. More wolves in the area have led to a decline in caribou numbers.
4. Island caribou migrate mainly north-south and mainland caribou migrate more east-west.
5. Change in appearance indicates caribou herds are mixing (specifically, D/U with Beverly/Ahiak).

# What We Heard

1. Whole Phase 2 road area is used by caribou.
2. Caribou crossing areas are evident in the tundra.
3. Sound travels faster and further in very cold temperatures, which should be considered for mitigation.
4. Speed limit does have an effect on dust emissions.
5. Metals in tailing water and dust emissions still need to be considered.

Caribou

# UNCERTAINTY AND RISK

## Present Knowledge

# Defend and Answer Questions





# Nunavut Impact Review Board

"In carrying out its functions, the primary objectives of NIRB shall be at all times to **protect and promote the existing and future well-being of the residents and communities** of the Nunavut Settlement Area, and to **protect the ecosystemic integrity of the Nunavut Settlement Area**. NIRB shall take into account the well-being of residents of Canada outside the Nunavut Settlement Area."

[Article 12, Part 2, Section 12.2.5 of the NLCA]

# Precautionary Approach

*"Where there are threats of serious irreversible damage,* ***lack of full scientific certainty*** *must not be used as a reason for postponing cost-effective measures to prevent environmental degradation."*

Precautionary Principle from 1992 Rio Declaration [NIRB Project Guidelines]

# NIRB Expectations I

In applying a precautionary approach, TMAC must [NIRB Project Guidelines]:

- Demonstrate that the proposed Project is examined in a manner consistent with the precautionary principle in order to ensure that they do not cause serious or irreversible damage to the environment;
- Outline the assumptions made about the effects of the proposed Project and the approaches to minimize these effects, including assumptions that are developed where scientific uncertainty exists;
- Identify any follow-up and monitoring activities planned, particularly in areas where scientific uncertainty exists in the prediction of effects; and
- Present public views on the acceptability of these effects.

It is the Proponent who bears the burden of proof to show that despite uncertainty, the potential for adverse environmental impacts can be mitigated or reversed.

# NIRB Expectations II

"When the Board has concluded that a higher standard of the precautionary principle is called for, the Board requires evidence of positive and preventative actions that will be taken to ensure that where there is potential for a serious risk of environmental degradation, and high levels of uncertainty, the measures proposed to limit or reduce the potential for adverse impacts are highly protective and do not require evidence of impact before they are triggered."

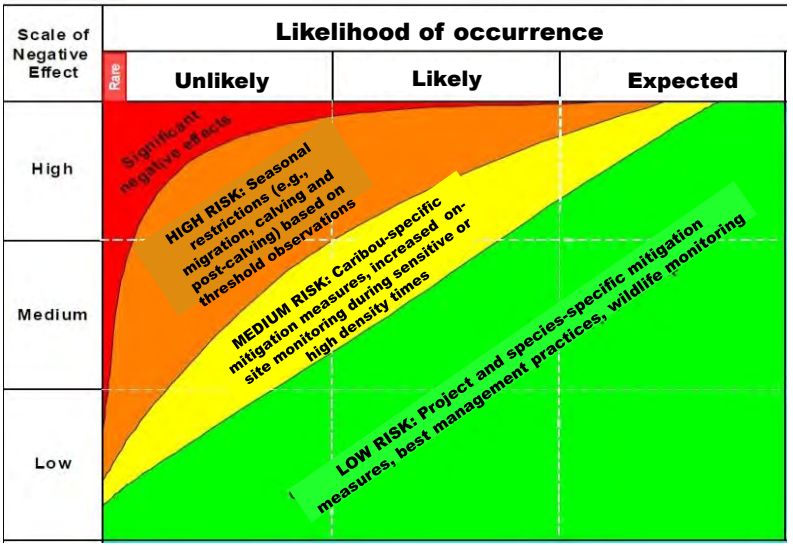
[NIRB Back River Project Decision Document]

# Group Work – Making Decisions with Uncertainty

Focus Question:

- How do you deal with uncertainty and risk in the context of land use, harvesting and understanding of caribou?

# Protection Measures to Reduce Risk




# Group Work – Managing Risks to Caribou

Focus Question:

- What can be done to manage risks to caribou?


## What We Heard – Potential Effects

1. Expected/high impacts = noise (aircraft, site), hunters in community told where caribou are
2. Expected/ low impacts = dust, oil/fuel spill, loss of veg habitat
3. Maybe/high impact = change in migration due to road and infrastructure
4. Maybe/medium impact = tailings water (drinking)

- Large predators getting to caribou a major concern (not related to the mine).
- Caribou behave differently in the spring and fall (more skittish in fall, more worried about predators).

# What We Heard – Protection Measures

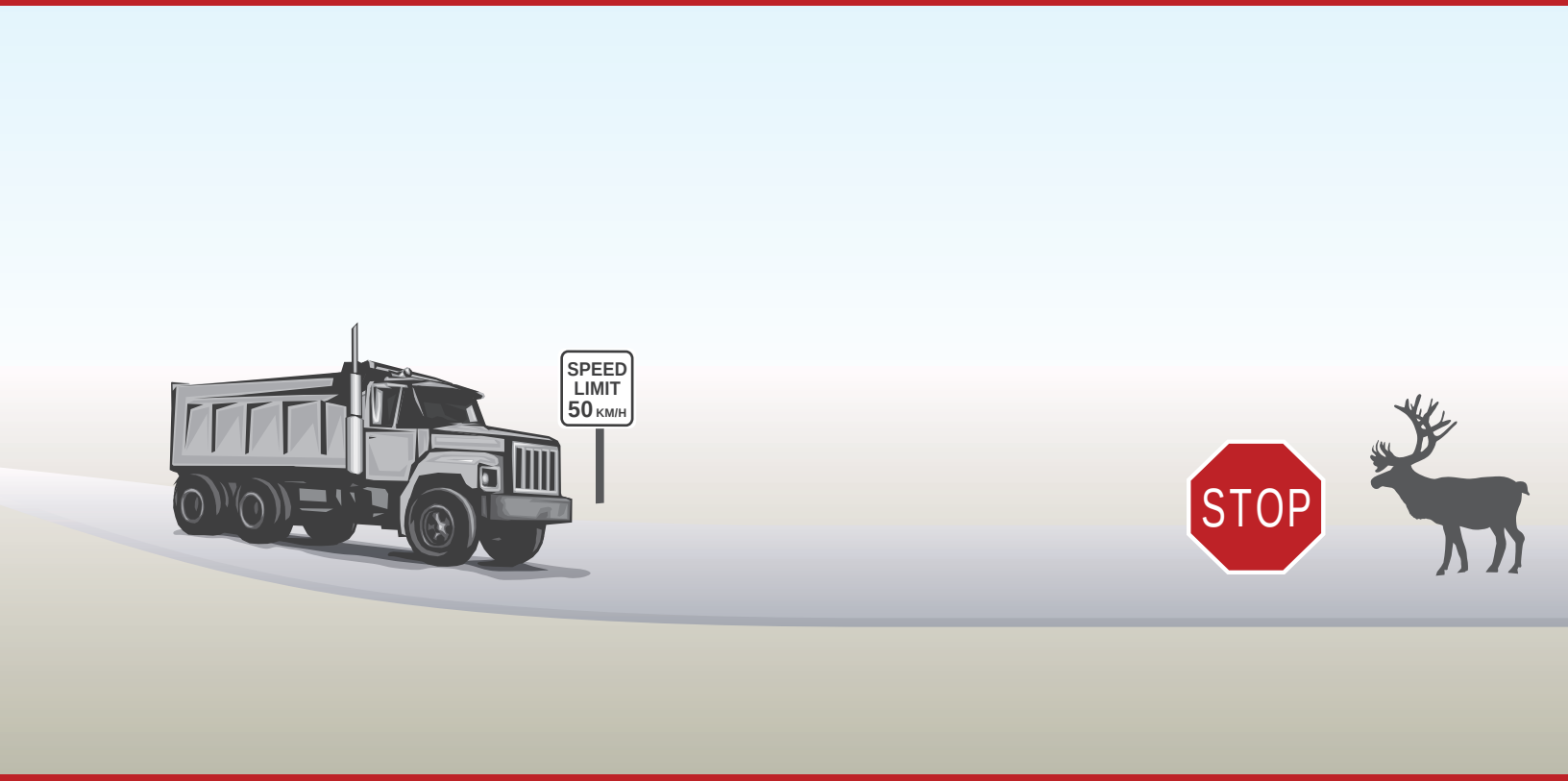
1. Noise = limit noise, road activity, helicopter use during migration; raise flight altitude when see disturbance of caribou; minimize site activities during migration season
2. Spills = quick response
3. Dust = control dust on roads (speed limits, dust control)
4. Migration and road impacts = monitor caribou during migration/ near road/ use of crossings; more road crossing (where caribou cross)
5. Tailings water quality = monitor full-time/ regular sampling; fencing TIA; using Inukshuk to deter caribou from TIA during migration

The Hope Bay Project

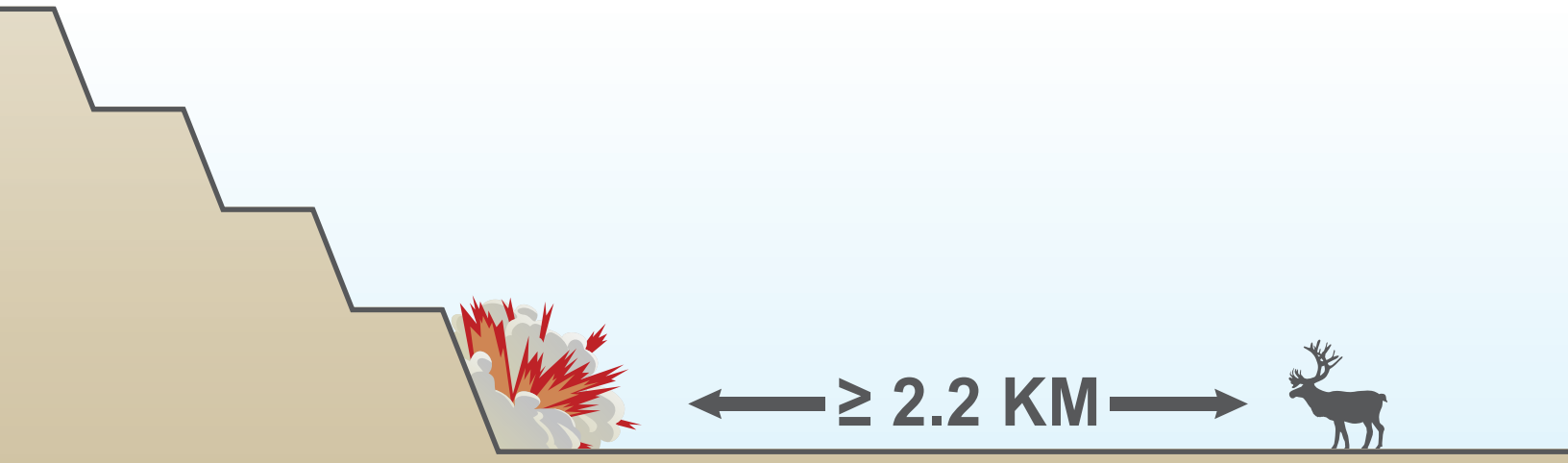
# NEXT STEPS

# Caribou Protection Measures

## 1. Wildlife has Right of Way

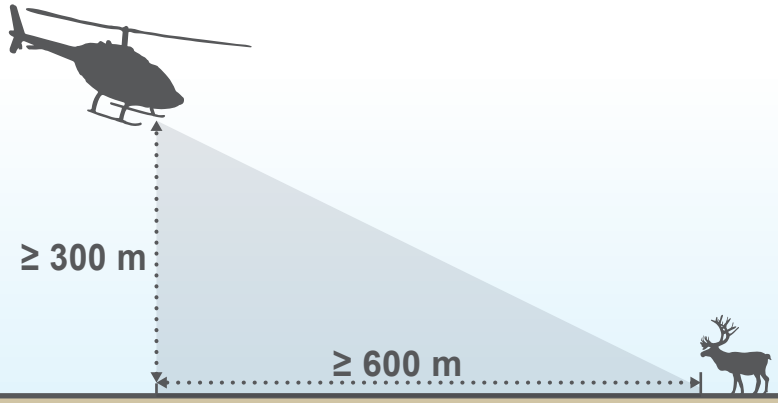



## 2. Quarry Blasting is Controlled



# Caribou Protection Measures

## 3. Helicopters Avoid Caribou




## 4. The Tailings Impoundment Area will be Monitored

By On-site Staff Observations

By Camera Observations

By Dust Fall Monitoring