



MEADOWBANK DIVISION

# **Terrestrial Ecosystem Management Plan**

Prepared by:  
Agnico Eagle Mines Limited – Meadowbank Division

Version 7  
June 2019

## EXECUTIVE SUMMARY

As a requirement of the Whale Tail Pit Project Certificate No.008, Condition 28, and Meadowbank Project Certificate No.004, Condition 54, an updated Terrestrial Ecosystem Management Plan (TEMP) for Agnico Eagle Mines Ltd. (Agnico Eagle) Meadowbank Gold Mine, which includes the All-Weather Access Road (AWAR) from Baker Lake to the Mine, the Vault Pit Haul Road, and the extension of the Meadowbank Mine through the Whale Tail Pit and Haul Road (inclusively 'the Project'), which is this current document. In addition, the TEMP also applies to the proposed Whale Tail Expansion Project that includes a small expansion to the previous Local Study Area (LSA) to accommodate an additional pit (IVR Pit), underground mining and a vertical and minor horizontal expansion of the existing Waste Rock Storage Facility (WRSF). All other infrastructure related to processing (e.g., mill and tailings), camps, and airstrip, among others, remain unchanged. The Project is located approximately 90 to 150 km north of Baker Lake and 300 km inland from the northwest coast of Hudson Bay.

This revised TEMP has been prepared as a requirement of Project Certificate No.004 and No.008 in association with the Meadowbank Terrestrial Ecosystem Impact Assessment and the Whale Tail Pit Final Environmental Impact Statement, which identify potential residual effects of the Project to wildlife and wildlife habitat. For each potential effect, mitigation measures are proposed. To confirm that residual effects (i.e., after mitigation) are acceptable, a comprehensive monitoring plan is presented that evaluates the response of wildlife habitat and wildlife populations to the effects of the Project and Project-related activities, and measures effects against thresholds.

Adaptive management is used to assess the effectiveness of the mitigation. Ongoing review of the TEMP through the Whale Tail Pit regulatory process and annual Wildlife Monitoring Summary Reports by regulatory agencies, technical reviewers, Terrestrial Advisory Group (TAG), and stakeholders will further ensure that local and regional concerns have been adequately addressed.

This revised comprehensive TEMP builds on the successes of the original TEMP (October 2005) and subsequent versions, and incorporates the extension of the Meadowbank Mine through the Whale Tail Pit operations. To date, the TEMP has been effective in identifying, monitoring, and managing residual effects of the Project on wildlife and wildlife habitat. This revised TEMP incorporates detailed decision trees outlining monitoring and adaptive management for varying scenarios of wildlife occurrence, and should enhance the ability of operations managers to respond to changes in wildlife distribution, abundance, and movement. This method provides transparency based on agreed upon approaches, thereby minimizing and mitigating potential Project/wildlife interactions.

## **IMPLEMENTATION SCHEDULE**

This Plan will be implemented immediately subject to any modifications proposed by the Nunavut Water Board and Nunavut Impact Review Board as a result of the review and approval process.

## **DISTRIBUTION LIST**

Agnico Eagle – General Manager

Agnico Eagle – Engineering Superintendent

Agnico Eagle – Geotechnical Engineer

Agnico Eagle – Environment Superintendent

Agnico Eagle – Environment General Supervisor

Agnico Eagle – Environmental Coordinator

Agnico Eagle – Environmental Technician

## DOCUMENT CONTROL

Version	Date (YMD)	Section	Revision
1	October 2005		Comprehensive plan for Meadowbank Project
2	May 2016	All	Update to include Whale Tail Pit and Haul Road
3	February 2017	All	Update in response to Whale Tail environmental assessment information requests
3.1	May 2017	All	Further revisions following meetings with GN, KivIA, HTO in Ottawa, February 22 and 23, 2017
3.2	June 2017	2.2, 3.4 and 4.0	Following EIS Technical Session and Community Roundtable in Baker Lake, April 28 – May 2, 2017
4	July 2017	All	Further revisions following meetings with GN, KivIA, HTO in Winnipeg, June 20 and 21, 2017
5	June 2018	All	Final revisions following final hearings, receipt of NIRB Project Certificate No.008 and comments from the June 2018 pre-TAG technical meeting.
6	December 2018	All	Revisions following receipt of NIRB Project Certificate No.008, pre-TAG technical meeting and for review of the proposed Whale Tail Expansion Project.
7	February 2019	All	Revisions per comments from January 2019 TAG meeting (issued as draft)
	June 2019	All	Revision per additional comments from TAG members, and Whale Tail Expansion Project environmental assessment information requests, technical comments, and technical meetings.

Prepared By: Golder Associates Ltd., and Meadowbank Environment Department

Approved by:

Meadowbank Environment Department

\_\_\_\_\_  
Name:

\_\_\_\_\_  
Title:

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- Appendix I:** Predatory Mammal Den Management and Protection Plan

## 1. INTRODUCTION AND APPROACH

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### 1.1 BACKGROUND

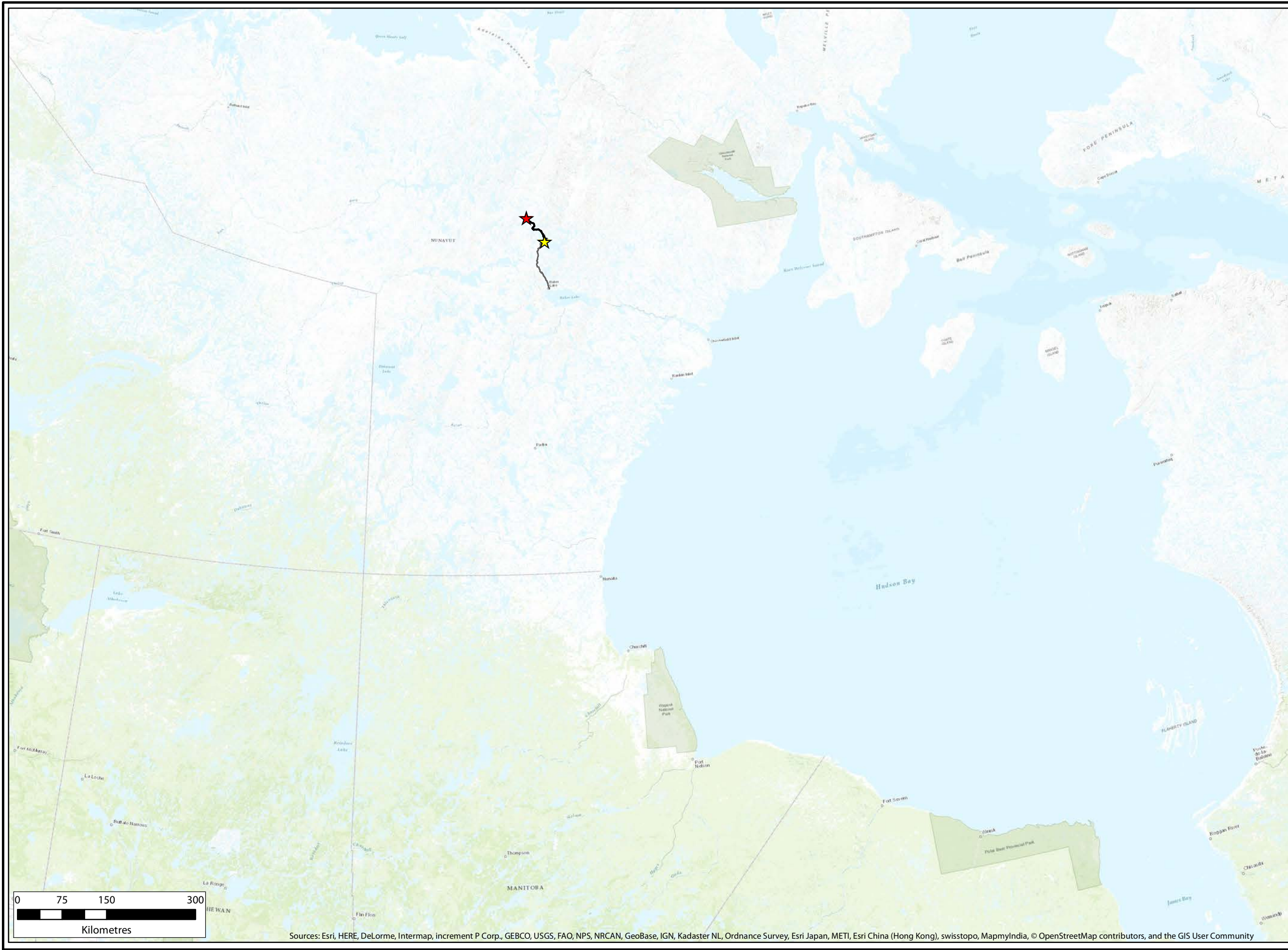
This report provides the Terrestrial Ecosystem Management Plan (TEMP) for Agnico Eagle Mines Ltd. (Agnico Eagle) Meadowbank Gold Mine, which includes the All-Weather Access Road (AWAR) from Baker Lake to the Mine, the Vault Pit Haul Road, and the Whale Tail Pit and Haul Road (inclusively the Project; see **Figures 1** and **2**). In addition, the TEMP also applies to the proposed Whale Tail Expansion Project that includes a small expansion to the previous Local Study Area (LSA) to accommodate an additional pit (IVR Pit), underground mining and a vertical and minor horizontal expansion of the existing Waste Rock Storage Facility (WRSF). All other infrastructure related to processing (e.g., mill and tailings), haul road, camps, and airstrip, among others, remain unchanged. The Project is located approximately 90 to 150 km north of Baker Lake and 300 km inland from the northwest coast of Hudson Bay. The Project area is above the tree line near the Arctic Circle. The local physiography is characterized by numerous lakes and low, rolling hills covered mainly by lichen/rock complexes, and heath tundra.

This TEMP has been written to ensure consistency in association with the Meadowbank Terrestrial Ecosystem Impact Assessment (EIA; Cumberland 2005a), the Whale Tail Pit Final Environmental Impact Statement Addendum (FEIS; Golder 2016) and proposed Whale Tail Expansion activities (FEIS Addendum, Agnico Eagle 2018), which identify potential residual effects of the Project to vegetation and wildlife. The EIAs are based on an analysis of Project components and their effects on terrestrial Valued Ecosystem Components (VECs). In addition to being a revision of the original TEMP (Cumberland 2005a) and building on the monitoring experience at Meadowbank, this TEMP has also benefitted from collaborative input from the Government of Nunavut Department of Environment (GN), the Kivalliq Inuit Association (KivIA), Environment and Climate Change Canada (ECCC), and the Hunters and Trappers Organization (HTO) of Baker Lake through annual report reviews, technical reviews, workshops, and discussions through the Terrestrial Advisory Group (TAG).

A summary of environmental effects and a description of mitigation measures that have already been implemented during the design, construction, and operations phases of the Project, and those that will be implemented, are provided in this document. A detailed description of potential environmental effects is provided in the Project's EIA documents.

For each potential effect (described in detail in the EIAs), mitigation measures are proposed. To measure residual effects (i.e., after mitigation), a monitoring plan is presented that evaluates the response of vegetation communities and wildlife to the effects of the Project and Project-related activities, and measures effects against thresholds (see **Figure 3**).





**Legend**

- ★ Whale Tail Project Location
- ★ Meadowbank Mine Site
- Haul Road (AEM, Nov. 2015)
- All Weather Access Road (AWAR)

**Project Location Map - Nunavut Overview**

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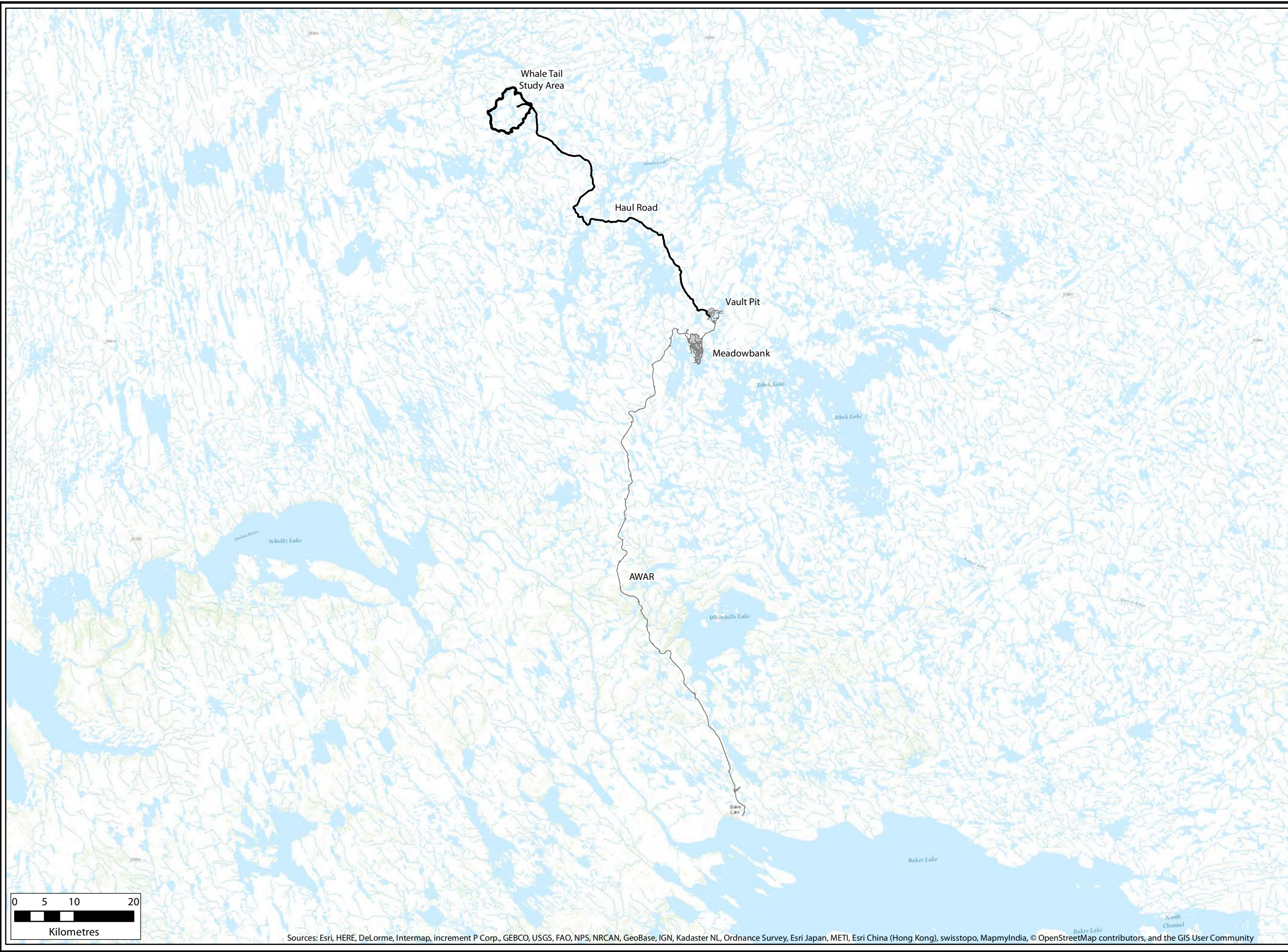
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
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Figure: 1


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- Legend**
-  Whale Tail Study Area
  -  Haul Road (AEM, Nov. 2015)
  -  Meadowbank Mine Site
  -  All Weather Access Road (AWAR)

**Project Location Map - Meadowbank & Whale Tail**



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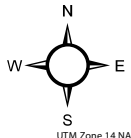
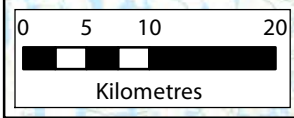
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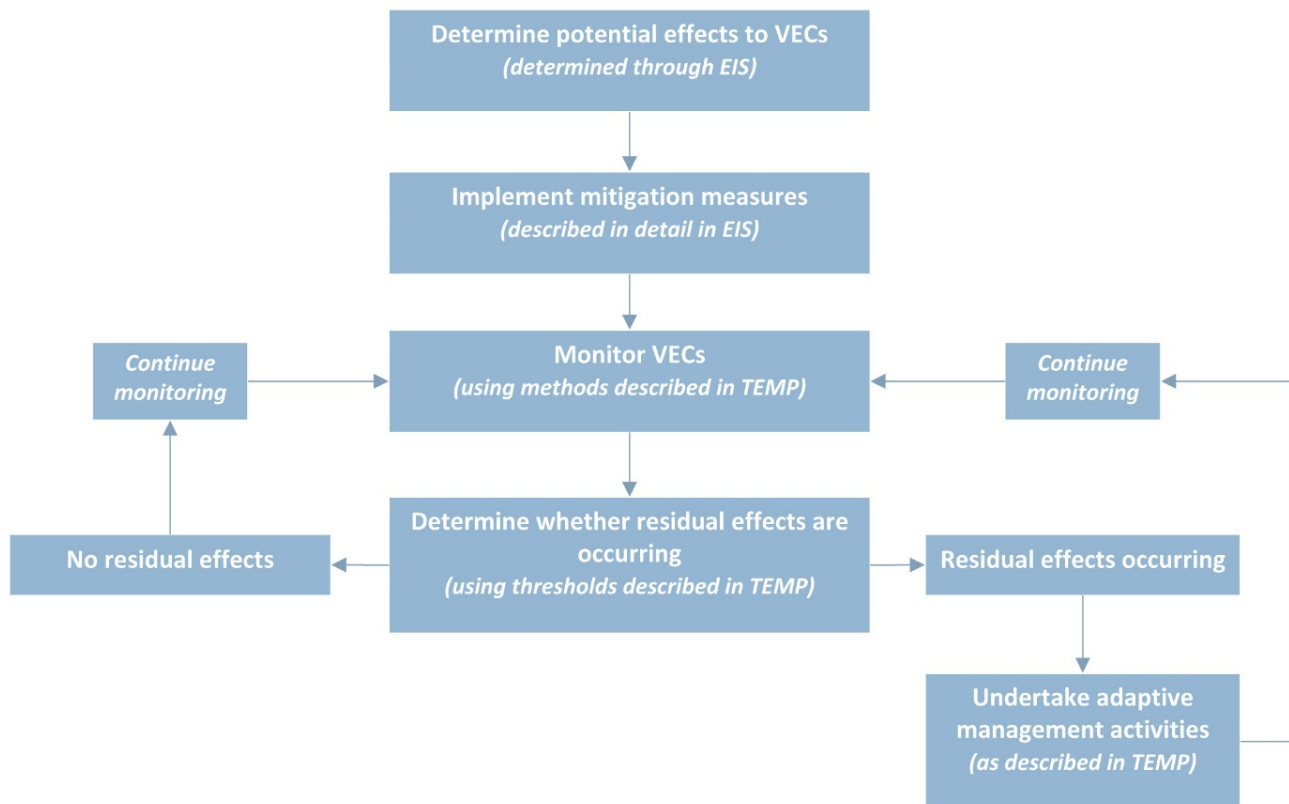
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**Figure 3:** Relationship between Effects, Mitigation, and Monitoring



Where monitoring determines that unacceptable residual effects exist, an adaptive management approach will be taken to assess the monitoring and mitigation. Additional mitigation will be the most likely means by which this will be accomplished. Adaptive management is an ongoing process that evolves throughout the life of the Project as better and more effective ideas are introduced in a process that is designed to be continually improving. Ongoing review of the TEMP and annual Wildlife Monitoring Summary Reports (which provide results of TEMP monitoring programs) by regulatory agencies, technical reviewers, and stakeholders will further ensure that local and regional concerns have been adequately addressed. All of these approaches or plans have been previously reviewed by the Nunavut Impact Review Board (NIRB). For example, due to concerns raised by local stakeholders, Agnico Eagle has updated the Air Quality and Dustfall Monitoring Plan (Agnico Eagle 2018) to continue to measure dustfall along the Baker Lake to Meadowbank AWAR and Whale Tail Haul Road, and a Screening Level Risk Assessment Plan (**Appendix A**). In addition, response procedures have been developed for when Ungulates, Predatory Mammal dens, and Raptor nests are in close proximity to Project facilities.

The mitigation and monitoring procedures identified in this TEMP will be integrated into all stages of the Project to ensure that mine operation and future mine development can proceed as scheduled while accommodating wildlife management needs. The TEMP also outlines strategies for identifying how natural changes in the environment can be distinguished from Project-related

effects. Reporting of natural versus Project-related effects will be in the annual Wildlife Monitoring Summary Report.

This TEMP builds on the success of the original TEMP (October 2005) and subsequent meetings and feedback from the Kivalliq Inuit Association (KivIA), the Baker Lake Hunter and Trapper Organization (HTO), Environment and Climate Change Canada (ECCC), the Kivalliq Wildlife Board (KWB), and the Government of Nunavut (GN). The revised TEMP includes monitoring of the extension of the Meadowbank Mine through the operation of Whale Tail Pit and proposed Whale Tail Expansion, and additions (e.g., decision trees for wildlife monitoring and management) will increase the transparency of the monitoring and mitigation, and enhance the ability of operation managers to protect wildlife occurring in the area.

## **1.2 PURPOSE AND OBJECTIVES**

While specific monitoring objectives for each VEC are provided in later sections, the TEMP should meet the following global objectives:

- Provide information to test the predicted wildlife-related effects of the Project
- Estimate the effectiveness of environmental design and mitigation efforts
- Incorporate local and traditional ecological knowledge (Inuit Qaujimajatuqangit)
- Monitor for action levels or thresholds that could be used to initiate additional mitigation or studies
- Reduce uncertainties and provide information that increases confidence in environmental assessment predictions of future developments
- Consider regional and collaborative environmental monitoring programs, and contributions to regional or national monitoring initiatives
- Reduce Project related effects to wildlife

## **1.3 RELEVANT ENVIRONMENTAL MANAGEMENT PLANS**

This document includes overlap with other environmental management plans for the Meadowbank Mine, Whale Tail Project, and proposed Whale Tail Expansion. Other management plans developed for the Project contain elements of mitigation and monitoring that are relevant to the terrestrial environment, particularly the following:

- Air Quality and Dustfall Monitoring Plan
- Hazardous Materials Management Plan
- Landfarm Design and Management Plan
- Landfill and Waste Management Plan
- Noise Monitoring and Abatement Plan

- Spill Contingency Plan
- Transportation Management Plan All-weather Private Access Road
- Whale Tail Pit Haul Road Management Plan
- Traffic Management Program (Section 3.10 of TEMP)
- Wildlife Protection and Response Plan (Appendix C of TEMP)
- Migratory Birds Protection Plan (Appendix F of TEMP)
- Predatory Mammal Den Management and Protection Plan (Appendix I of TEMP)

#### 1.4 VALUED ECOSYSTEM COMPONENTS SELECTION

Valued Ecosystem Components were selected through consultation with regulatory and governmental authorities and members of the local community (e.g., Hamlet of Baker Lake, Baker Lake HTO), and a review of VECs identified in other northern mines. Selection of VECs was further refined through the consideration of one or more of the following criteria: conservation status, relative abundance within the Project study area, importance in subsistence lifestyle and economy, importance in predator-prey systems, habitat requirement size and sensitivity, and contribution to local area concerns.

Based on this selection process, the key terrestrial VECs were determined to be: Wildlife Habitat, Ungulates, Predatory Mammals, Raptors, Waterbirds, and Upland Breeding Birds. Key species associated with these VECs are shown in **Table 1**.

**Table 1:** Valued Ecosystem Components in the Meadowbank and Whale Tail Study Areas

VEC	Common Name	Scientific Name
Vegetation	N/A	N/A
Ungulates	barren-ground caribou muskox	<i>Rangifer tarandus</i> ssp. <i>groenlandicus</i> <i>Ovibos moschatus</i>
Predatory Mammals	grizzly bear wolverine gray (Arctic) wolf Arctic fox	<i>Ursus arctos</i> <i>Gulo gulo</i> <i>Canis lupus</i> <i>Vulpes lagopus</i>
Raptors	peregrine falcon gyrfalcon rough-legged hawk snowy owl	<i>Falco peregrinus</i> ssp. <i>tundrius</i> <i>Falco rusticolus</i> <i>Buteo lagopus</i> <i>Nyctea scandiaca</i>
Waterbirds	Canada goose long-tailed duck loons sandhill crane	<i>Branta canadensis</i> <i>Clangula hyemalis</i> <i>Gavia</i> spp. <i>Grus canadensis</i>
Upland Breeding Birds	rock ptarmigan lapland longspur horned lark semipalmated sandpiper	<i>Lagopus mutus</i> <i>Calcarius lapponicus</i> <i>Eremophila alpestris</i> <i>Calidris pusilla</i>

## 1.5 SPECIES OF CONCERN

Species of concern include those species identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as being at risk, and may be impacted by the Project, along with their status under the *Species at Risk Act* (SARA, 2002). Species of concern for the Project are listed in **Table 2**.

**Table 2:** Species of Concern Meadowbank and Whale Tail Study Areas

Species	COSEWIC Status	SARA Status	Effects Pathways
Barren-ground caribou	Threatened	No schedule	<ul style="list-style-type: none"> <li>mortality due to vehicle collisions</li> <li>habitat loss</li> <li>change in harvest due to improved access</li> <li>barriers to movement and changes in behaviour</li> </ul>
Grizzly bear	Special Concern	Schedule 1 (as of May 2018)	<ul style="list-style-type: none"> <li>habitat loss</li> <li>mortality due to attraction or vehicle collisions</li> </ul>
Polar Bear	Special Concern	Schedule 1	<ul style="list-style-type: none"> <li>None anticipated</li> </ul>
Wolverine	Special Concern	No schedule	<ul style="list-style-type: none"> <li>habitat loss</li> <li>mortality due to attraction or vehicle collisions</li> </ul>
Short-eared Owl	Special Concern	Schedule 1	<ul style="list-style-type: none"> <li>habitat loss</li> <li>potential loss of nest/eggs from clearing or flooding during the breeding season and due to vehicle collisions</li> </ul>
Peregrine Falcon	Not at Risk (as of November 2017)	No schedule	<ul style="list-style-type: none"> <li>physical hazards to nests on mine infrastructure or in quarries</li> </ul>
Red-Necked Phalarope	Special Concern	Schedule 1 (as of May 2019)	<ul style="list-style-type: none"> <li>habitat loss</li> <li>mortality due to potential loss of nest/eggs from clearing or flooding during breeding season</li> </ul>
Transverse Lady Beetle	Special Concern (as of November 2016)	No schedule	<ul style="list-style-type: none"> <li>habitat loss</li> </ul>

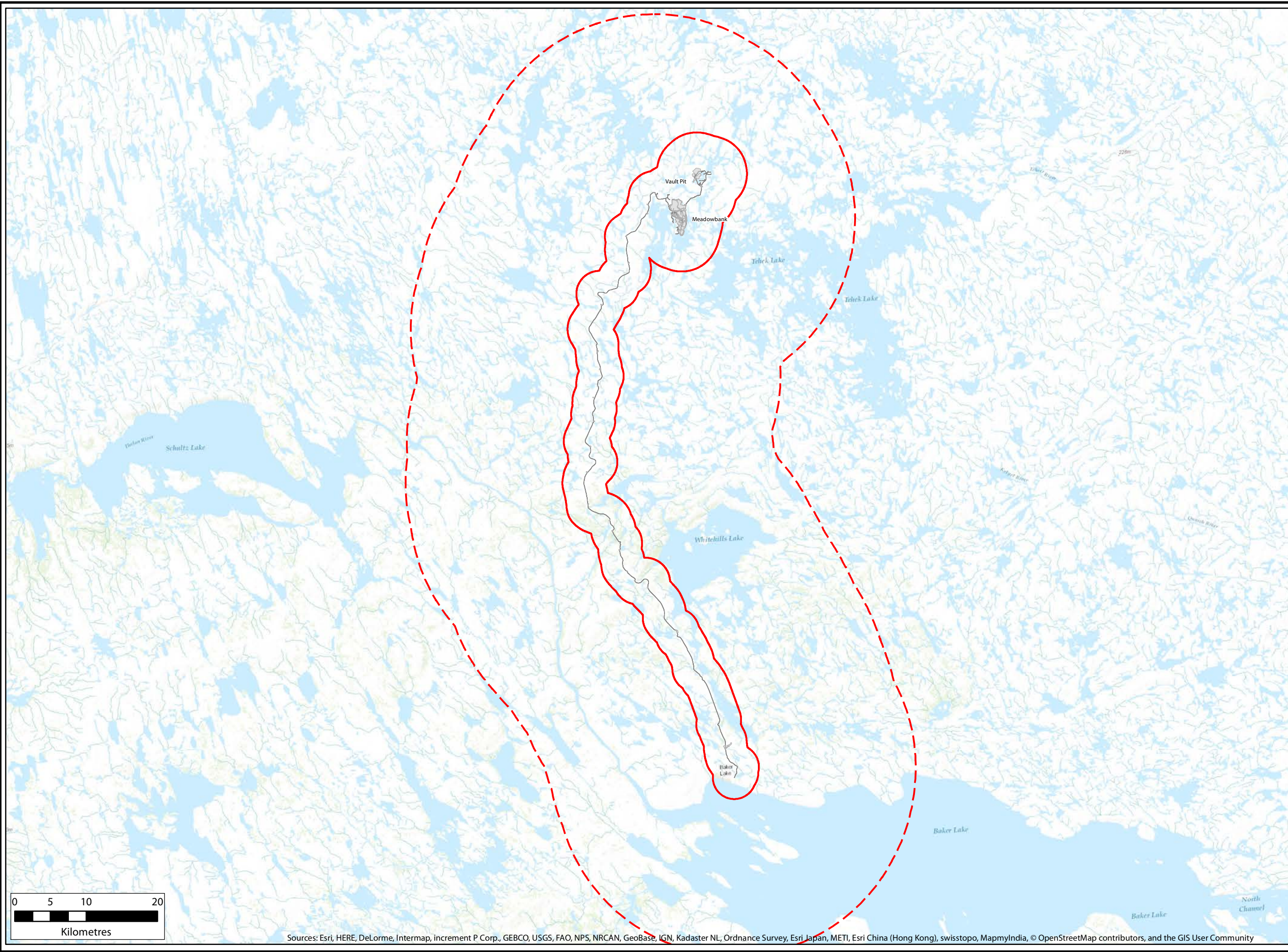
Notes: species listed as identified through the Meadowbank Terrestrial Ecosystem Impact Assessment (EIA; Cumberland 2005a), the Whale Tail Pit Final Environmental Impact Statement Addendum (FEIS; Golder 2016) and proposed Whale Tail Expansion activities (FEIS Addendum, Agnico Eagle 2018). Status updates under SARA since 2015-2016 are to be considered.





As per Project Certificate No.008, Condition 35, Agnico Eagle will ensure that the mitigation and monitoring strategies developed for Species at Risk (SARA) are updated as necessary to maintain consistency with any applicable status reports, recovery strategies, action plans, and management plans that may become available through the duration of the Project. Updates to the SARA will be considered during annual review and with each new revision of the TEMP. **Appendix B** highlights the Project Certificate No.008 Terms or Conditions related to the TEMP.

## 1.6 SPATIAL BOUNDARIES


The Meadowbank Mine LSA includes a 5 km radius area centred on the Mine site and a 5 km radius around the Vault Site creating an elliptical shape with a total area of 154 km<sup>2</sup>. The AWAR LSA consists of a 3 km wide corridor centred on the AWAR between Baker Lake and the Meadowbank Mine (**Figure 4**). The regional study area (RSA) encompasses an area that includes a 25 km radius area around the Main and Vault sites and a 50 km wide corridor along the AWAR for a total area of 5,077 km<sup>2</sup> (**Figure 4**).

The Whale Tail LSA is a 3 km corridor centered on the Whale Tail Haul Road and borrow site access roads (i.e., 1.5 km on either side of the road and 1.5 km around borrow areas) and includes an approximate 1.5 km buffer around development areas at the Whale Tail Pit area, for a total area of 282 km<sup>2</sup>. The Whale Tail RSA is a 50 km corridor centred on the Haul Road alignment (i.e., 25 km on either side of the Haul Road and borrow site access roads, and 25 km around borrow areas), with a total area of 5,017 km<sup>2</sup> (**Figure 5**).



- Legend**
-  Meadowbank (5 km) & AWAR (3 km) LSA Boundary
  -  AWAR RSA Boundary (25 km)
  -  Meadowbank Mine Site
  -  All Weather Access Road (AWAR)

**Meadowbank RSA & LSA Boundaries for Monitoring Studies**



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PROJECT: Terrestrial Ecosystem Management Plan  
 CLIENT: Agnico Eagle Mines Limited

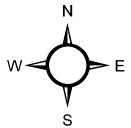
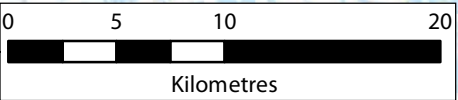
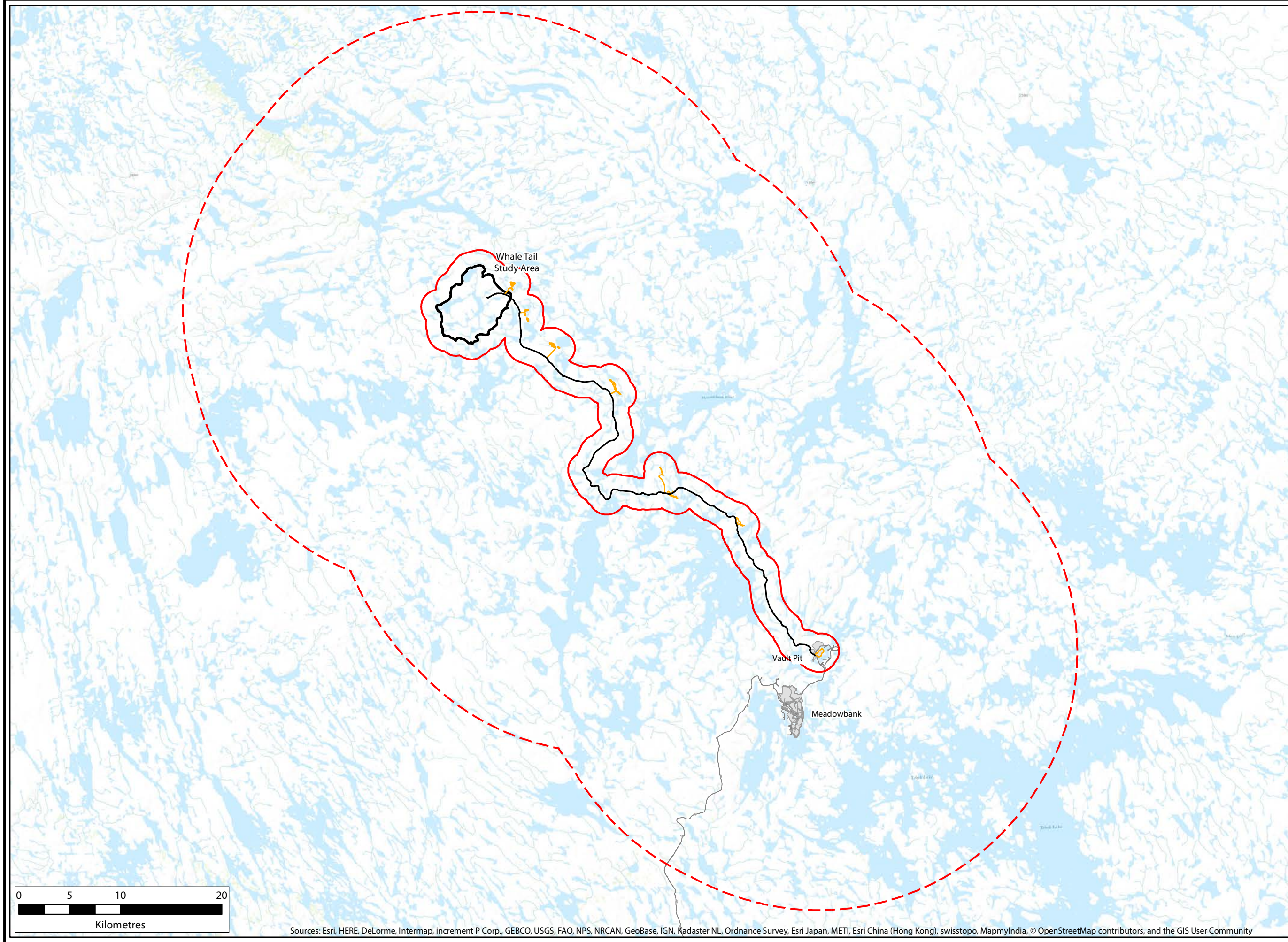
 UTM Zone 14 NAD83	DATE: FEBRUARY 2016
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	CHECKED BY: MAY

Figure: **4**

The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should not be relied on as being a precise indicator of locations, features, or roads, nor as a guide to navigation. MNR data provided by Queen's Printer of Ontario. Use of the data in any derivative product does not constitute an endorsement by the MNR or the Ontario Government of such products.





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- Legend**
- Whale Tail Study Area
  - Haul Road (AEM, Nov. 2015)
  - Esker Access Road
  - Meadowbank Mine Site
  - All Weather Access Road (AWAR)
  - LSA Boundary (1.5 km)
  - RSA Boundary (25 km)

**Whale Tail RSA & LSA  
Boundaries for Monitoring Studies**

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PROJECT: Terrestrial Ecosystem Management Plan

CLIENT: Agnico Eagle Mines Limited

 <small>UTM Zone 14 NAD83</small>	DATE: FEBRUARY 2016
	SCALE: 1:350,000
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Figure: **5**

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## 1.7 RESIDUAL EFFECTS

Residual effects are Project effects that remain after implementation of all mitigation. A comprehensive assessment of the expected residual effects on vegetation and wildlife has been provided in the Meadowbank Terrestrial Ecosystem Impact Assessment (Cumberland 2005a), the Whale Tail Pit FEIS (Golder 2016) and the proposed Whale Tail Pit Expansion Addendum (Agnico Eagle 2018). The effectiveness of mitigation (described in **Section 2.0**) and magnitude of residual effects will be determined via monitoring programs outlined in this document, and compared against thresholds described in **Section 3.0**. Where monitoring determines that residual effects are outside established thresholds of acceptability, adaptive management will lead to more intensive monitoring or additional mitigation.

## 2. MITIGATION

### 2.1 GENERAL MITIGATION

General mitigation applicable to most wildlife are provided in **Table 3** below, while **Section 2.2** summarizes the anticipated environmental effects and mitigation specific to each VEC.

**Table 3:** General Mitigation for the Meadowbank Mine, and Whale Tail Pit and Haul Road

Environmental Education
Employees will participate in a wildlife awareness program during their induction, including bear safety procedures, instructions on wildlife rights-of-way, and other wildlife protection measures (see Wildlife Response and Protection Plan in <b>Appendix C</b> ).
Feeding of wildlife is prohibited.
Wildlife on Site
A wildlife reporting system (e.g., wildlife log) will be maintained by environmental staff. Where human safety or wildlife well-being is an issue, employees will be notified regarding procedures (up to an including stopping work in the affected area). The Wildlife Protection and Response plan includes a staff organizational chart indicating who has responsibility for predatory mammal-human interactions, and procedures to be followed (see <b>Appendix C</b> ).
Road Access and Restrictions
Public use of the AWAR is monitored by the Safety Department. For mine safety reasons, Baker Lake residents will be prohibited from travelling beyond the 85 km mark of the AWAR (see <b>Figure 2</b> ). Because the Vault and Whale Tail Haul Roads begin within existing mine facilities and are beyond km 85, public access to these roads will be limited (see <b>Figure 2</b> ). Voluntary hunting use data will be collected by Agnico Eagle at the gatehouse, and further action regarding acquiring this information is being considered to evaluate the presence of ATVs and hunting (i.e., shooting) as a mechanism affecting caribou interactions with the AWAR and as a component of the Hunter Harvest Survey (HHS).
The <i>Wildlife Act</i> prohibits discharging firearms along or across roads or within 1 km of dwellings (see <b>Figure 2</b> for no shooting zone). Upon notification by Agnico Eagle or this public, this is to be enforced by the Government of Nunavut (GN). Marker posts will be placed periodically to delineate the 1 km buffer along the road.
To avoid unnecessary degradation of wildlife habitats, Project vehicles will be restricted to existing roads.
Wildlife have the right-of-way on roads.
Maximum speed limits of 50 km/hr will be enforced, including periods of reduced speed limits when caribou, and/or other wildlife, are on or adjacent to the road.
All road-killed wildlife will be reported immediately to Meadowbank Mine environmental staff and removed to avoid attracting scavengers. If necessary, animals will be examined by the Environment Department to determine cause of death; ungulate and predatory mammal mortalities will be reported to the GN wildlife conservation officer. If approved by the GN officer, disposal of ungulates and predatory mammals will be through incineration at the mine or as directed by the GN. In the case of an ungulate and predatory mammal collision, drivers must fill out a vehicle/animal collision report to document the conditions and circumstances surrounding the incident. All such incidents will be reported using the Incident Report Form ( <b>Appendix D</b> ).

<b>Hunting</b>
Hunting and harassment of any wildlife species by mine employees while on shift will be prohibited.
Access by way of All Terrain Vehicle (ATV) from Baker Lake to km 85 on the AWAR for hunting, is permissible according to NIRB Project Certificate No.004, Condition 32. See <b>Figure 2</b>
Agnico Eagle will enforce the policy of a “no-hunting zone” from km 85 to Whale Tail Pit, to reduce road-related effects on wildlife and to protect employee safety. A 1 km marker at the gatehouse will be used to ensure all hunters are aware of these restrictions. Periodic markers will be used along the AWAR to delineate the 1 km no-hunting zone between the Baker Lake gatehouse and km 85. See <b>Figure 2</b> .
Except for designated persons (e.g., wildlife monitors, environmental technicians), employees will not be permitted to carry firearms.
<b>Spills and Contamination</b>
All spills will be immediately cleaned up or isolated to minimize the potential for exposure to wildlife or degradation of the surrounding environment (see the Spill Contingency Plan).
Water that has the potential to come into contact with the mining activities will be intercepted, contained, and will meet license limits prior to discharge.

## 2.2 CARIBOU PROTECTION MEASURES

Caribou Protection measures employed by the Project will be evaluated, in collaboration with, and through data sharing among TAG members, including the components outlined in **Table 4**.

**Table 4:** Caribou Protection Measure Components to be Evaluated

<b>Caribou Protection Measure Components</b>
Tests of monitoring methods that are used to detect caribou near the Project in order to quantify: (i) the probability of detecting groups; (ii) the effective range of detection; and (iii) the spatial extent of detection capacity relative to the mitigation distance buffers.
Collection of additional collar and observation data on caribou group sizes to confirm the relevance of group size thresholds used in mitigation.
Collection and analyses of collar data to quantify the Zone-of-Influence (ZOI) associated with the Whale Tail Project, its haul road and the existing Meadowbank mine (and all-weather-access-road [AWAR]).
Collection and analyses of collar and observation data to quantify the effects of the Whale Tail Project, its haul road and the existing Meadowbank mine (and AWAR) on the movements of caribou, in particular during migratory periods.
Collection of accurate records documenting the detection of caribou and the subsequent implementation of mitigation measures.
Analyses of collar data from the GN – analysis to be completed within 5 years of Project commencement. Evaluate phase/timing data comparing the movements of individuals, per collar data, that were and were not subject to the implementation of mitigation measures. If active mining life span extended, the evaluation should be updated every 5 years (NIRB Final Hearing Decision for the Whale Tail Pit Project NIRB File No. 16MN056, Page B-2).
<b>Evaluation of Caribou Protection Measure Components - Scope</b>
A study area or areas that encompass the Whale Tail mine site, haul road, Meadowbank mine and all-weather-access-road (including all activities utilizing this infrastructure including on-going exploration), all of which are integral components of the Project.
The use of accepted scientific methods and experimental designs to provide quantitative information.
The engagement of recognized subject matter experts in each area of the evaluation.
Collection of data with sufficient statistical power to detect potential impacts.

Guidance on study designs, analyses and interpretation from the Project's TAG.
The collection of data during both the construction and active mining phases of the Project.
Completion of the evaluation within 5 years of Project commencement (beginning with construction) to ensure that any adverse effects or deficiencies in caribou protection measures are revealed prior to potential extensions in the use of Project infrastructure.
A technical report on the collar data analysis completed within 5 years of Project commencement, as noted above, is to be submitted to NIRB; and if the Project's active mining life span is extended beyond that currently proposed (i.e., 2022), including extended use of the haul road to support other projects, the evaluation should be updated every 5 years.

## 2.3 VEC-SPECIFIC MITIGATION

### 2.3.1 Wildlife Habitat

#### 2.3.1.1 *Summary of Potential Environmental Effects*

Permanent habitat loss will occur due to the construction footprint of mine facilities, including mine buildings, haul roads, and access roads to quarry and borrow sites. Dewatering of Whale Tail Lake at the end of the construction phase, will result in the flooding of a number of tributary lakes upstream of the Whale Tail Dike to the Mammoth Lake Watershed, thereby altering flows to Mammoth Lake and downstream lakes. This change in water regime can strongly influence plant species composition, community structure, and biological diversity (Vale et al. 2015). These temporary changes in water levels will affect soil moisture, and may result in localized effects to vegetation quality through decreased species abundance and flooding. All terrestrial habitats provide some value to wildlife VECs. Consequently, loss or degradation of any of these habitats may result in localized negative effects on wildlife.

Another potential effect on Wildlife Habitat is degradation from dust and exhaust. Bryophytes and lichens may experience the largest effects close to roads where the greatest amount of deposition frequently occurs. Consistent with current dustfall monitoring and terrestrial monitoring along the AWAR, the EIA and EIS predicted that the primary effects of dust are generally confined to the immediate area next to roadways (Cumberland 2005a; Golder 2016; Everett 1980; Walker and Everett 1987). A recent study found that dust on plant leaves from diamond mine haul roads was significantly higher in a zone of up to 1000 m from the road (Chen et al. 2017).

#### 2.3.1.2 *Mitigation for Wildlife Habitat*

Proposed mitigation for Wildlife Habitat are summarized in **Table 5**.

**Table 5: Mitigation to Minimize Effects to Wildlife Habitat at the Meadowbank Mine, and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion**

Mitigation	Design	Construction	Operations	Closure/ Post-Closure
<b>Minimizing Wildlife Habitat Loss</b>				
Avoid high value habitats (e.g., eskers, wet graminoid/sedge meadows), where practical	X	X		
Cluster facilities and minimize footprints	X			
Minimize haul and access road width and length	X	X		
Minimize borrow area size	X	X	X	
Construct boardwalks and helicopter pads		X	X	X
Stay on roads		X	X	X
Clearly mark road edges		X	X	X
Restore and revegetate disturbed habitats			X	X
Scarify roads, remove facilities, restore drainage patterns, and stabilize slopes			X	X
<b>Minimizing Wildlife Habitat Degradation</b>				
Minimize vehicle traffic and speeds to reduce dust		X	X	X
Contain (berms) fuel storage areas	X	X	X	X
Follow hazmat and spill contingency guidelines	X	X	X	X
Implement dust control measures (including dust suppressants) on mine roads and airstrip		X	X	X
Use landfill area to dispose of inorganic waste (e.g., concrete, plastic). All other materials shipped and disposed off-site		X	X	X
Maintain natural drainage patterns	X	X	X	X
During water diversion, pump discharge using natural drainage patterns when possible		X	X	X
Remove and dispose of contaminated soil (see 'Environmental Guidelines for Site Remediation', GN-DOE 2009)		X	X	X

## 2.3.2 Ungulates

### 2.3.2.1 Summary of Potential Environmental Effects

Caribou and muskox are susceptible to habitat loss and sensory disturbance associated with Project facilities and activities. The potential for direct effects such as vehicle-animal collisions and increased hunting pressure are concerns, as are indirect effects related to contaminated water and vegetation. Although caribou may be present during any season, movements of collared caribou through the Meadowbank RSA are most common during the spring and fall migratory periods, (Agnico Eagle 2016; Golder 2016 Appendix 5-D).

Per previous information requests for the Project and in reference to GN Commitment No. 2 (see Appendix B), caribou observation data are presented based on Project-specific seasons, which are largely based on caribou migratory movements and historical caribou numbers (i.e., when

they have been at their peak) from monitoring data. Project-specific seasons are defined as follows:

- Spring migration: April 1 – May 25 (sensitive season)
- Summer: May 26 – September 21
- Fall migration: September 22 – December 15 (sensitive season)
- Winter: December 16 – March 31

Start and end dates are approximate and may vary from year to year, pending caribou movement observations over time. The time frames aim to capture a wide enough window where caribou movements have been recorded to date, based on GN collar data and particularly for the migration periods, during which applicable monitoring and mitigations measures are to be employed. Caribou movements and behaviour may be altered by different factors, including the severity of the seasons (i.e., colder or hotter temperatures, variable precipitation, etc.), insect prevalence (more or less insects may emerge between seasons), and other factors. These considerations, guided by caribou movement observations, will be taken into account for the implementation of adaptive management measures, as appropriate.

Likewise, while there are areas of the AWAR with more frequent observations of caribou, caribou may be observed along the entire length of the AWAR (Agnico Eagle 2016). Roadside observations of caribou from 2007 to 2018 show that caribou within and adjacent to the Meadowbank RSA are most common during the winter (44% of caribou observed), and fall migration (34% of caribou observed) and spring (19% of caribou observed) (see **Table 6**). Data from collared caribou also closely follow the seasonal pattern of caribou observations observed from the AWAR and the Meadowbank Mine.

**Table 6:** Summary of AWAR Caribou Observations from 2007 to 2018 by Season and Collar Data from the Ahiak/Beverly, Lorillard, and Wager Bay Herds (2000 to 2016)

Season	Total Number of Caribou Observed from AWAR (% of Total)	Range of AWAR Count Observations (min-max)	Collar Days in Whale Tail RSA (% of Total in RSA)**
Spring* (April 1 to May 25)	21,024 (19%)	1 to 300	224.01 (23%)
Summer (May 26 – September 21):	8,218 (18%)	1 to 250	161.07 (16%)
Fall* (September 22 to December 16)	37,350 (34%)	1 to 2,000	155.15 (16%)
Winter (December 16 to March 31)	44,736 (40%)	1 to 900	438.22 (44%)
<b>Total</b>	<b>111,328</b>	<b>1 to 2,000</b>	<b>978.45</b>

\* sensitive season

\*\* currently being updated to include 2019 collar data, which has not yet been received as of June 2019

Monitoring at other mines suggests that caribou herds change their distribution around diamond mine developments, where probability of occurrence increases with distance from the mine (Boulanger et al. 2012; Johnson et al. 2005; Rescan 2007; Golder 2011a). This area is termed the zone of influence (ZOI), and likely results from sensory disturbance that may be related to

smell, noise, taste and sight. A study using aerial survey and satellite-collar data collected around the Diavik, Ekati, and Snap Lake mines estimated that caribou relative abundance was reduced near the mine, and reached expected levels at up to 14 km (Boulanger et al. 2012).

Golder (2011a) detected ZOI ranging from 12 to 40 km around the Diavik mine and Lac de Gras, although the estimates may be confounded by the presence of Lac de Gras, which affects caribou distribution. Ground-based monitoring at Ekati suggested that caribou groups with calves spend less time feeding within 5 km of the footprint (BHPB 2004). At the smaller Snap Lake Mine, a ZOI of 6.5 to 28 km was detected (Golder 2008; Boulanger et al. 2009), which increased with the level of mining activity (Golder 2008). Adding to the uncertainty, interviews with hunters in Kulguktuk familiar with mining reported that caribou are often observed at active mines; appearing undisturbed and staying for days at a time. Caribou are even attracted to mine infrastructure for mosquito relief (Golder 2011b). To date, although ZOI have been demonstrated to varying degrees around mine sites, they are poorly understood in terms of their mechanism, their extent, and the effects to individual caribou and populations.

Agnico Eagle completed a preliminary ZOI study for the Lorillard and Wager Bay herds and found no ZOI effect with the exception of a weak effect during the winter months at a distance of 35 km. As part of the ZOI study, the Ahiak/Beverly herds were considered; however, there were too few collar locations within the RSA to include these data in the analysis. Through further discussions with the TAG and potentially additional workshops, additional studies are being considered in collaboration with the GN and other interested and qualified parties to better understand the presence of a ZOI, and potential barrier effects from mine infrastructure and the AWAR.

Road-related mortality may be a source of residual effects if not carefully managed. Although muskox are not considered a species at risk, their low reproductive rate, sedentary nature, and tendency to stand their ground when threatened make them vulnerable to disturbance and over-hunting.

A minor concern is the potential for caribou or muskox to drink potentially contaminated water from the tailings impoundments or possibly runoff from the waste rock piles; however this has not been documented. Approved deterrent methods have been implemented at Meadowbank Mine when necessary to remove caribou from areas of risk. On-site environmental staff will monitor the tailings facilities daily.

### **2.3.2.2 Mitigation for Ungulates**

Proposed mitigation for Ungulates are summarized in **Table 7**. See also General Mitigation in **Table 3** and the Wildlife Protection and Response Plan.



**Table 7:** Mitigation to Minimize Effects to Ungulates at the Meadowbank Mine and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion

Mitigation	Design	Construction	Operations	Closure/ Post-Closure
<b>Minimizing Wildlife Habitat Loss (see Table 5 for Wildlife Habitat)</b>				
<b>Minimizing Wildlife Habitat Degradation (see Table 5 for Wildlife Habitat)</b>				
<b>Reducing Sensory Disturbance (see also General Measures, Table 3)</b>				
Site-wide notifications of caribou presence (see <b>Figure 6</b> and <b>Figure 7</b> )		X	X	
Caribou on or crossing the road are given right-of-way		X	X	X
Construct the Whale Tail Haul Road during the winter to avoid effects to caribou during potentially sensitive periods (e.g., spring and fall migration)	X	X		
Minimize engine noises, as per the Noise Abatement and Monitoring Plan		X	X	X
Limit (regular season) or postpone (sensitive season) blasting when caribou are near (i.e., within 4 km outside of the calving period, or within 5 km during the calving period, see <b>Figure 9</b> ) and muskox are near (i.e., within 1 km)		X	X	
Enforce speed limits on the AWAR and haul roads		X	X	X
Aircraft pilots are instructed to avoid caribou muskox and other wildlife, and will receive site-wide notifications of caribou movements. Mandatory minimum distance is 300 m altitude and 1 km horizontal (provided Transport Canada requirements and flight safety considerations are accounted for), including landings and take-offs.		X	X	X
Report Ungulates in the vicinity of the road to environmental staff and road dispatcher		X	X	X
Reduce speed to 30 km/h when caribou are observed from the haul road and Level 3 caribou mitigation is triggered ( <b>Figure 7</b> )		X	X	
Other mitigative action as determined by the Environmental Supervisor, possibly including: grouping haul trucks into convoys (e.g., 2X2 or groups of 4 or more vehicles), imposing additional speed limits, using pilot vehicles, stopping traffic near caribou attempting to cross haul roads, complete closure of haul roads, and suspending blasting, in accordance with <b>Figures 6 through 9</b>		X	X	X
<b>Reducing Ungulate Project-related Mortality (see also General Measures, Section 2.2)</b>				
Along pits, graduate slope angles to diminish likelihood of slippage	X	X	X	
Herd ungulates off airstrip only prior to arrivals and departures if air traffic could not be delayed		X	X	X

**Table 7:** Mitigation to Minimize Effects to Ungulates at the Meadowbank Mine and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion

Mitigation	Design	Construction	Operations	Closure/ Post-Closure
<b>Avoiding Exposure to Potentially Contaminated Water and Wildlife Habitat</b>				
Deter ungulates attracted to potentially contaminated water in tailings ponds or runoff, documented using the Incident Report Form ( <b>Appendix D</b> )		X	X	X
<b>Avoiding Disruption of Movement or Migration Patterns</b>				
Where caribou intersect with the Haul Road, road shoulders will be designed with either a low profile or smaller-grained materials to accommodate caribou passage. Roads will be top dressed with esker-sourced materials, where available. The Whale Tail Haul Road is not perceived to be a physical barrier to caribou movement where caribou predominately interact with the Haul Road.	X	X	X	
Implement special measures if Ungulates are in close proximity to Project facilities and roads (see <b>Section 3.5</b> )		X	X	
Contour snow banks to avoid creating barriers		X	X	X
Post updated maps of known migration corridors and report to GN, KivIA, and HTO personnel		X	X	
During road decommissioning, flatten and scarify road edges			X	X

### 2.3.3 Predatory Mammals

#### 2.3.3.1 Summary of Potential Environmental Effects

Predatory Mammals are susceptible to animal/vehicle collisions, loss of denning habitat, and sensory disturbance associated with Project construction and operation. Grizzly bears and wolverines may be particularly vulnerable to road development. Due to their wide-ranging and scavenging natures, they are drawn to road edges where road kills may be readily available. Once they have been attracted, habituated or food-conditioned to a site, they may be difficult to avert and may eventually become a human safety concern. One wolverine and three wolves have been killed along the Meadowbank AWAR between 2007 and 2015 (Gebauer et al. 2016).

The potential for direct loss of denning habitat for some predatory mammals, especially wolves, is also a concern during road construction and borrow pit development. Wolves use unconsolidated materials (e.g., eskers), to excavate den sites, and the same den sites may be used from year to year (Cluff et al. 2002). Occasionally, adults with pups have been sighted along the AWAR area in summer denning months, and most recently, an active den and nursery site was identified within the borrow area at Esker #3 in the Whale Tail Haul Road study area (Dougan & Associates and Nunavut Environmental 2015). Wolf denning occurs between early May and late September (May et al. 2012).

Grizzly Bears are also known to use habitats such as eskers for denning (Mueller 1995), wolverines have been linked to areas of persistent snow cover and boulders because of their reliance on cached food as they litter during late winter (Inman et al. 2012). Sensory disturbance from road construction and operation could result in an indirect loss of nearby functional denning habitat (May et al. 2012).

Other potential effects to Predatory Mammals, such as changes in prey abundance, distribution, or health, are of lesser concern. Mitigation to ensure that the viability and integrity of prey populations are maintained (e.g., Ungulates) will also mitigate the potential effects to Predatory Mammals.

### 2.3.3.2 Mitigation for Predatory Mammals

Proposed mitigation for Predatory Mammals are summarized in **Table 8**. See also General Measures in **Table 3** and the Wildlife Protection and Response Plan.

**Table 8:** Mitigation to Minimize Effects to Predatory Mammals at the Meadowbank Mine and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion

Mitigation	Design	Construction	Operations	Closure/ Post-Closure
<b>Reducing Project-related Mortality (see also General Measures, Table 3)</b>				
Apply response plan (see <b>Appendix C</b> ) when individuals are near		X	X	X
Manage mine food wastes and odors ( <b>Appendix C</b> )		X	X	X
Instruct mine workers to keep lunches inside vehicle cabs or buildings		X	X	X
Remove or incinerate all wildlife carcasses to avoid attracting predators to facilities		X	X	X
Continue to improve waste segregation techniques and procedures	X	X	X	X
Incinerate all kitchen waste, wood/paper products daily		X	X	X
Seal and store all aromatic products (e.g., paint) in bear-proof containers		X	X	X
Construct skirts or sheathing along all facilities with potential to attract Predatory Mammals	X	X	X	
Use deterrents if necessary for human and wildlife safety ( <b>Appendix C</b> )		X	X	X
<b>Avoiding Disturbance of Den Sites</b>				
Initiate a den-specific response plan when a wolverine, grizzly bear or wolf den site is detected within 1 km of activities (see <b>Section 3.6</b> )		X	X	X
Restrict human and vehicle activity in the vicinity of den sites		X	X	X

## 2.3.4 Raptors

### 2.3.4.1 Summary of Potential Environmental Effects

Available survey data indicate that few Raptors nest in the vicinity of the Project area, and possibly also in old quarries and open pits. However, direct effects to breeding Raptors are expected to be very low (Cumberland 2005b; Dougan & Associates and Nunavut Environmental 2015). Ongoing monitoring (see **Section 3.7**) will document active nests if they are near mine facilities, or along the AWAR, Whale Tail Haul Road, and access roads to quarry/borrow sites.

Other potential effects to Raptors may result from changes in abundance, distribution, and health of prey populations due to road activities. Mitigation to minimize Wildlife Habitat removal (see **Section 2.3.1**) will reduce effects to prey populations.

### 2.3.4.2 Mitigation for Raptors

Proposed mitigation for Raptors are summarized in **Table 9**. See also General Measures in **Table 3**.

**Table 9:** Mitigation to Minimize Effects to Raptors at the Meadowbank Mine and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion

Mitigation	Design	Construction	Operations	Closure/ Post-Closure
<b>Minimizing Wildlife Habitat Loss (see Table 5 for Wildlife Habitat)</b>				
<b>Minimizing Wildlife Habitat Degradation (see Table 5 for Wildlife Habitat)</b>				
<b>Avoiding Disturbance to Nesting Raptors</b>				
Develop a nest-specific response plan for identified raptor nests within areas of concern to ensure that nesting success is not affected by development activities (see <b>Section 3.7</b> )		X	X	X
Follow GN-DoE guidelines (GN-DOE 2005) for avoiding disturbance to raptor nests		X	X	X
Consult with GN (with respect to obligations under the <i>Wildlife Act</i> , SNU 2003, c.26) as per Project Certificate No.008, Condition 36. If deemed appropriate, discourage raptors from establishing nests on artificial structures, pit walls, or other facilities (see <b>Appendix E</b> )			X	
Limit ferrying flight altitudes to a minimum height of 300 m above ground level (provided Transport Canada requirements and flight safety considerations are accounted for)		X	X	X

## 2.3.5 Waterbird

### 2.3.5.1 Summary of Potential Environmental Effects

During baseline data collection and operational monitoring, only a small number of nesting Waterbirds were documented within the Meadowbank Mine and along the AWAR (see annual Wildlife Monitoring Summary Reports). Given these low densities of nests identified within the Project area since 2005 (i.e., too low to determine whether changes in nest abundance or success

have occurred), and the absence of data suggesting that road-related effects were occurring, the Waterfowl nest survey program at Meadowbank was discontinued in 2012 (Gebauer et al. 2013). Initial waterfowl surveys for the Whale Tail study area have also documented low numbers of nesting waterfowl (Dougan & Associates and Nunavut Environmental 2015).

Waterbirds that use flooded portions of the tailings impoundment areas for resting or roosting purposes during the summer and migratory periods may be exposed to contaminants; however, residence times are not expected to be long due to the lack of wetland vegetation, and the absence of fish or invertebrates in the tailings impoundment and water management areas in addition to deterrent measures as outlined in **Appendix F**.

There is a possibility that Waterbirds (e.g., geese) may forage on potentially contaminated graminoid vegetation (e.g., vegetation that may have been contaminated by fugitive dust fall from vehicles); however, results of recent risk assessments for the Meadowbank Mine have indicated no excess risk to Waterbirds as a result of Project activities (Agnico Eagle 2014).

The proposed expansion at Whale Tail will require a fish-out, which may lead to mortality of diving birds that can get caught in nets. Further, possible flooding during the nesting season may lead to loss of nests.

#### 2.3.5.2 Mitigation for Waterbirds

Proposed mitigation for Waterbirds are summarized in **Table 10**. See also General Measures in **Table 3**.

**Table 10:** Mitigation to Minimize Effects to Waterbirds at the Meadowbank Mine and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion

Mitigation	Design	Construction	Operations	Closure/ Post-Closure
<b>Minimizing Wildlife Habitat Loss (see Table 5 for Wildlife Habitat)</b>				
Stay 30 m away from shoreline areas during design except where necessary for constructing road crossings and pit development	X	X	X	
Provide foraging opportunities for Waterbirds, particularly geese, over the long term in revegetated areas and flooded mine pits			X	X
<b>Minimizing Wildlife Habitat Degradation (see Table 5 for Wildlife Habitat)</b>				
Where high levels of contaminants have been identified in water or vegetation, undertake reclamation activities to manage risks to Waterbirds		X	X	X
<b>Avoiding Disturbance to Nesting Waterbird</b>				
Clear land outside the breeding season (mid-May to mid-August) unless a nest survey by a qualified wildlife biologist has determined that no Waterbird nests are present		X	X	X
Helicopter ferrying flight altitudes will be above 1,000 m when birds are congregated and during sensitive seasons (e.g., breeding, moulting),		X	X	X

**Table 10:** Mitigation to Minimize Effects to Waterbirds at the Meadowbank Mine and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion

Mitigation	Design	Construction	Operations	Closure/ Post-Closure
provided Transport Canada requirements and flight safety considerations are accounted for)				
Where important bird areas (e.g., moulting areas, goose breeding colonies etc.) are identified, observe a 1,000 m vertical and 1,500 m horizontal distance whenever possible (Hines and Wiebe 1997). Make all pilots aware of these flight restrictions		X	X	X
<b>Reducing Waterbird Project-related Mortality (see also General Measures, Table 3)</b>				
Monitor tailings, reclaim ponds, and storm water retention ponds daily to ensure that Waterbird have not landed on these waterbodies. Where Waterbird have landed on ponds, use aversive tactics to scare them away		X	X	X
Implement mitigation for nests in flooding zones at the Whale Tail Project ( <b>Appendix F</b> )		X		
Implement mitigation for diving bird mortality during fish-out activities (see the Fishout Diving Waterbird Protection Plan, Appendix F)		X		

## 2.3.6 Upland Breeding Birds

### 2.3.6.1 Summary of Potential Environmental Effects

The greatest effect to Upland Breeding Birds (e.g., songbirds, shorebirds) is the removal, flooding, or degradation of nesting habitat. Virtually all terrestrial habitat within the study area provides foraging or nesting habitats for one or more species. Some species prefer shrubby terrain (e.g., Savannah Sparrow), others are found primarily in open tundra (e.g., lapland longspur), whereas some are restricted to wet meadows (e.g., semipalmated sandpiper).

Another potential environmental effect is the reduced habitat effectiveness due to human activity, although passerines appear to readily habituate to these activities compared to larger species such as Raptors and Waterbird. Studies have documented avoidance effects and reduced bird densities within 1 km of human infrastructure (Reijnen et al. 1997; Benitez-Lopez et al. 2010). Conversely, a study of lapland longspurs by Male and Nol (2005) showed no difference in nest success between sites with high and low levels of human noise at the Ekati Diamond Mine, though this is not a particularly sensitive bird species. In addition, the results of recent studies show that no decrease in upland bird species richness or abundance from mine activity has been observed at the Meadowbank Mine (Gebauer et al. 2012, 2013), or at the Ekati Diamond Mine (Smith et al. 2005; Rescan 2010).

Buildings, pits, and other facilities will provide new perching opportunities and possibly nesting opportunities for Raptors. The potentially higher densities of Raptors in the area, and potentially increased depredation rates on passerines, are possible negative effects of the Project on songbirds.

**2.3.6.2 Mitigation for Upland Breeding Birds**

Proposed mitigation for Upland Breeding Birds are summarized in **Table 11**. See also General Measures in **Table 3**.

**Table 11:** Mitigation to Minimize Effects to Upland Breeding Birds at the Meadowbank Mine and Whale Tail Pit and Haul Road and Proposed Whale Tail Expansion

Mitigation	Design	Construction	Operations	Closure/ Post-Closure
<b>Minimizing Wildlife Habitat Loss (see Table 5 for Wildlife Habitat)</b>				
<b>Minimizing Wildlife Habitat Degradation (see Table 5 for Wildlife Habitat)</b>				
Where high levels of contaminants have been identified in water or vegetation, undertake reclamation activities to manage risks to Upland Breeding Birds		X	X	X
<b>Avoiding Disturbance to Nesting Upland Breeding Birds</b>				
Clear land outside the breeding season (mid-May to mid-August) unless a nest survey by a qualified wildlife biologist or technician has determined that no Upland Breeding Bird nests are present		X	X	X
If nest found within Project facilities, set up buffer zone if possible		X	X	X
Avoid human activity around nest sites to avoid attracting predators to site		X	X	X
<b>Reducing Upland Breeding Bird Project-related Mortality (see also General Measures, Table 3)</b>				
Monitor tailings, reclaimed ponds, and storm water retention ponds daily (concurrent with Waterbird monitoring) to ensure that Shorebirds have not landed at these waterbodies. Where Shorebirds have landed at ponds, use aversive tactics to scare them away		X	X	X
Deter Raptors from nesting or roosting on mine facilities (see <b>Appendix E</b> ). Locally breeding Raptors will increase predation rates on songbirds		X	X	X
Deter Upland Breeding Birds from nesting or roosting on equipment and facilities prior to arrival (see <b>Appendix F</b> )		X	X	X
Implement mitigation for nests in flooding zones at the Whale Tail Project ( <b>Appendix F</b> )		X		

### 3. MONITORING OVERVIEW

A comprehensive suite of monitoring activities are being undertaken for the Project facilities, haul roads and AWAR. **Table 12** summarizes all of the monitoring activities, their frequency, and the VEC each activity targets.

**Table 12:** Monitoring Activities Being Undertaken for the Project Facilities, Haul Roads, and All-Weather Access Road

Monitoring Activity	Frequency	VECs					
		Wildlife Habitat	Ungulates	Predatory Mammals	Raptors	Waterbirds	Upland Breeding Birds
Traffic Monitoring for AWAR and Haul Roads	Currently completed and will be provided in the annual summary report		X	X	X	X	X
Public Use of Roads	Tracked at security gate and incidental observations, and will be provided in the annual summary report		X	X	X	X	X
Habitat monitoring	Every three years post-construction, or if greater than 25% of the overall mine footprint changes	X					
Dustfall monitoring	Monthly around Meadowbank Mine and Whale Tail Pit; detailed study conducted annually along the AWAR and the Whale Tail Haul Road	X					
Habitat reclamation monitoring	At Year 2 post-closure and every 3 years until Year 12 post-closure	X					
Caribou satellite-collaring program	Data provided to Agnico Eagle from GN at least 1x/week		X				
Zone of Influence or other Mechanistic Investigation Studies	As necessary and identified through the TAG		X				
Haul Roads, Pits and mine site ground surveys	At least 1x/week, includes inspections of waste streams for scavenger attractants		X	X	X	X	
Road surveys (AWAR and Haul Roads)	At least 1x/week		X	X	X	X	X
Height-of-Land surveys	At least 1x/week		X	X			
Vehicle encounter reports	Ongoing		X	X	X	X	X
Incident reports	Ongoing (when incidents with wildlife occur)						
Hunter Harvest Survey	Will be redeveloped and implemented in collaboration with the GN, KivIA and HTO (see <b>Section 3.5.2.8</b> )		X	X			
Active den site surveys	Initiated by the detection of an active den (grizzly bear, wolf or wolverine) within the active footprint or vicinity of Project facilities (see <b>Figure 12</b> )			X			



**Table 12:** Monitoring Activities Being Undertaken for the Project Facilities, Haul Roads, and All-Weather Access Road

Monitoring Activity	Frequency	VECs					
		Wildlife Habitat	Ungulates	Predatory Mammals	Raptors	Waterbirds	Upland Breeding Birds
Active Raptor nest monitoring	During nesting season (May 1 to Sept 15) if active nest is within the active footprint and vicinity of Project facilities: within area of concern – 1x/day; not within area of concern – 1x/week (see <b>Figure 13</b> )				X		
Migratory bird (UBB and waterbirds) nest surveys	Active nests identified within 100 m of Project facilities and all roads monitored, if deemed necessary Additional monitoring may be required during fish-out or flooding					X	X
PRISM plot surveys	Once every three years in collaboration with ECCC					X	X
North American Breeding Bird Survey (BBS)	Once every three years during closure and post closure complete a North American Breeding Bird Survey (NABBS) route and contribute to the NABBS						X

### 3.1 GENERAL MONITORING

#### 3.1.1 Road Surveys

##### ***Meadowbank AWAR and Vault/Whale Tail Haul Road***

*Methods:* Systematic ground surveys will be conducted along the AWAR and Whale Tail Haul Road by two observers (one can be the driver) in a vehicle. Survey vehicles will travel no more than 30 km/h to maximize observations of all wildlife along the route. All wildlife observations recorded incidentally as part of regular traffic along the haul roads and AWAR will be known at the start of ground surveys so that observers are aware of the location of wildlife observations and can focus attention in these areas. For each sighting, a UTM coordinate will be taken along the route along with distance of the animal from the haul road or AWAR, nearest road marker, and a variety of other information (see field data form in **Appendix D**). Behavior of Ungulates will also be recorded for each encounter and comments on disturbance related to a particular behavior (e.g., running) will be made (see field form in **Appendix D**). Raw data (i.e., field forms) will be included in the annual Wildlife Monitoring Summary Report.

Further information on these surveys as they relate to caribou interaction are described below in Section 3.5.2.3. Timed observation scans (i.e., roadside observation locations) are also currently being considered, in addition to driving scans, where locations offer a unique vantage point for far-field detection of caribou and other wildlife (e.g., muskox); vantage points will be determined along the AWAR and Haul Road. During the summer of 2019, additional roadside observation points will be determined along the Haul Road as they likely may be as effective as Height-of-Land (HOL) surveys and more efficient to complete. The locations and viewshed of these locations will be provided at the next TAG meeting, planned for October 2019.

### ***Height of Land Surveys***

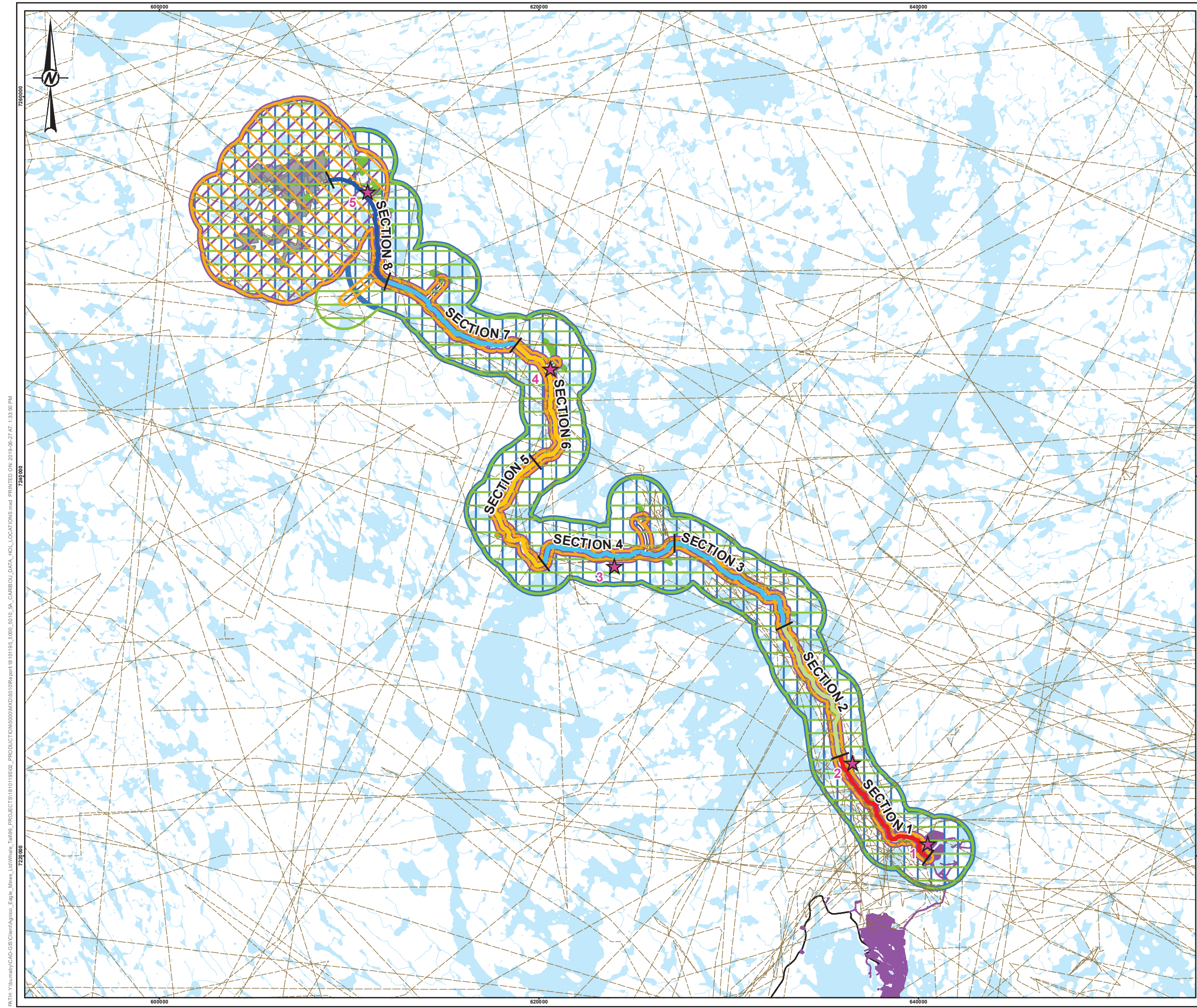
*Methods:* While conducting the ground surveys, two observers (one can be the driver) will stop at the HOL survey locations (see **Appendix G**) for 20 minutes to survey the area, focusing on far-field areas (i.e., likely up to 4 to 5 km). Raw data (i.e., field forms) will be included in the annual Wildlife Monitoring Summary Report. Further information on these surveys as they relate to caribou are described below in Section 3.5.2.3.

*Frequency (haul roads and AWAR):* mid-December to late March and late May to mid-September, once per week; April to late May and late September to mid-December, frequency will increase when caribou are present, see **Figure 6, Figure 7, and Figure 9; Table 12**). Caribou collar data from 1999-2008 in the Project area and proximity to HOL survey locations are presented in **Figure 5A**.

### **3.1.2 Pits and Mine Site Ground Surveys**

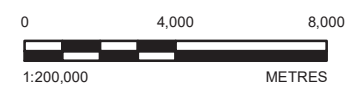
*Methods:* Within the Meadowbank Mine and Vault sites (e.g., tailings pond, haul road to Vault Site) and the Whale Tail Pit site, systematic ground observations of Ungulates will be conducted by on-site environmental technicians/monitors who record details on species, numbers, sex, habitat type, and location. Behavior of Ungulates will also be recorded for each encounter and comments on disturbance related to a particular behavior (e.g., running) will be made (see field form in **Appendix D**).

*Frequency:* Once per week (frequency will increase if caribou are present, **Figure 6, Figure 7, and Figure 9; Table 12**).



**LEGEND**

- ★ HEIGHT OF LAND SURVEY LOCATION
- CARIBOU CROSSINGS**
- 6
- 7 - 8
- 9 - 10
- 11 - 14
- 15 - 20
- CARIBOU PATH
- TERRAIN/SOIL LOCAL STUDY AREA (EXPANDED)
- TERRAIN/SOIL LOCAL STUDY AREA (APPROVED)
- TERRESTRIAL/VEGETATION/WILDLIFE LOCAL STUDY AREA (EXPANDED)
- TERRESTRIAL/VEGETATION/WILDLIFE LOCAL STUDY AREA (APPROVED)
- WHALE TAIL**
- ESKER/QUARRY (APPROVED)
- ESKER/QUARRY (EXPANSION)
- ESKER/QUARRY (NEW)
- INFRASTRUCTURE
- HAUL ROAD
- MEADOWBANK OPERATION AND INFRASTRUCTURE
- WATERCOURSE
- WATERBODY



**REFERENCE(S)**

1. INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED, DRAWING AMQ 2025Q4V5.DWG.
2. HEIGHT OF LAND SURVEY POINTS OBTAINED FROM DOUGAN & ASSOCIATES, JULY 2016.
3. CARIBOU DATA OBTAINED FROM CASLVS.
4. WATERCOURSE AND WATERBODY DATA OBTAINED FROM NATURAL RESOURCES CANADA. DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14

CLIENT **AGNICO EAGLE MINES LIMITED:  
MEADOWBANK DIVISION**

PROJECT **MEADOWBANK AND WHALE TAIL - TEMP**

TITLE **CARIBOU COLLAR DATA (1999 - 2018) AND HEIGHT OF LAND MONITORING LOCATIONS ALONG THE WHALE TAIL HAUL ROAD**

CONSULTANT	YYYY-MM-DD	2019-06-27
DESIGNED		CS
PREPARED		CDB/CN
REVIEWED		
APPROVED		

PROJECT NO. 18101195 CONTROL 5000/5010 REV. A FIGURE 5A

PATH: Y:\urimby\CAD-GIS\client\Agnes\_Eagle\_Mines\_Lu\Whale\_Tail\09\_PROJECTS\1810119502\_PRODUCT\CON\5000\5010\09\5010\_50\_CARRIBOU\_DATA\_HQ\_LOCATIONS.mxd PRINTED ON: 2019-06-27 AT: 1:33:50 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

### 3.2 WILDLIFE HABITAT

#### 3.2.1 Objectives

The objectives of monitoring Wildlife Habitat will be to ensure that measures to minimize the amount (or area) of Wildlife Habitat lost to Project construction and operation are effective, and that concentrations of contaminants in vegetation, water, and sediment do not exceed acceptable levels for wildlife health. Residual effects will be assessed, and opportunities for reclamation or habitat creation will be identified (e.g., recontouring, stabilization, and restoration of drainage patterns). Monitoring will also ensure that potentially contaminated vegetation is removed (or isolated from wildlife), and that the site is restored to its natural state. **Table 13** describes the framework that has been established for monitoring effects to Wildlife Habitat.

**Table 13:** Monitoring Approach for Wildlife Habitat for the Meadowbank, Whale Tail Project and proposed Whale Tail Expansion

Potential Effect	Impact Prediction	Quantitative Monitoring Variable	Thresholds	Monitoring Activity	Frequency
Habitat Loss <b>Meadowbank Mine and Vault Pit and Haul Road (Mine Site)</b>	Loss <EIA prediction and subsequent approvals (see Gebauer et al., 2015)	Area of altered habitat	5% above predicted EIA values of 867 ha for the Mine site	Habitat monitoring	Every three years post-construction, or if greater than 25% of the overall mine footprint changes.
Habitat Loss <b>Meadowbank AWAR</b>	Loss <EIA prediction and subsequent approvals (see Gebauer et al., 2015)	Area altered habitat	5% above predicted EIA values 281 ha for AWAR	Habitat monitoring	Every three years post-construction, or if greater than 25% of the overall mine footprint changes.
Habitat Loss <b>Whale Tail Pit and Haul Road</b>	Loss < EIS prediction (see Golder 2016)	Area of altered habitat	5% above predicted EIs values of 820 ha for the Pit and Haul Road	Habitat monitoring	Every three years post-construction, or if greater than 25% of the overall mine footprint changes.
Habitat Degradation by Contamination <b>Meadowbank Mine site and Haul Roads</b>	Dust and emissions will not result in unacceptable levels of contaminants in vegetation, water or sediment	Concentrations of contaminants	See Wildlife Screening Level Risk Assessment Plan ( <b>Appendix A</b> ), and Air Quality and Dustfall Monitoring Plan (Agnico Eagle 2018)	Screening Level Risk Assessment Dust fall monitoring	WSLRA: Every three years Dust fall monitoring : annually
Habitat Reclamation following Project Closure	Vegetation will be naturally established on reclaimed sites	Proportion of disturbed areas revegetated	Up to 80% of the reclamation will be completed by year 12. Refer to the reclamation and closure plan for more details	Habitat reclamation monitoring	At Year 2 post-closure and every 3 years until Year 12 post-closure

### 3.2.2 Monitoring Approach

As per Project Certificate No.008, Condition 33, Agnico Eagle will continue to document and map sensitive wildlife features such as denning sites, caribou crossing sites, raptor nests and other nesting sites (representative figures are provided in **Appendix H**; from Dougan & Associates 2017).

Initial documentation and mapping has been completed for the Whale Tail Pit and Haul Road (Dougan & Associates 2017) and information related to other development areas will be compiled into a single spatial dataset to guide monitoring activities. There are no caribou calving areas within the regional study area.

Monitoring activities for Wildlife Habitat will be carried out post-construction and post-closure. The following are the methods and frequency for the monitoring efforts for each measurable parameter.

#### 3.2.2.1 *Habitat Loss*

*Methods:* Total area of habitat disturbance will be determined following Project construction using a combination of ground and aerial surveys, photography, ground-truthing (with the aid of GPS), as-built reports, and possibly satellite imagery. Monitoring of habitat loss will occur at three primary locations: Meadowbank Mine (includes Vault Pit and Haul Road), AWAR (including quarry sites), and Whale Tail Pit and Haul Road (includes borrow sites and access roads). Reporting will describe the overall area of different ELC units lost due to Project development.

For the Meadowbank Mine and AWAR locations, thresholds are disturbance of 5% above predicted EIA values of 867 and 281 ha (includes approved changes), respectively. For the Whale Tail and Haul Road location, the threshold is disturbance of 5% above a predicted EIS value of 820 ha.

*Frequency:* Every three years post-construction or if changes are greater than 25% of the overall mine site footprint from the previous year ELC was evaluated. This frequency may be reduced during the operation phase if the amount of new disturbance and reclamation areas is relatively unchanged.

#### 3.2.2.2 *Habitat Degradation by Contamination*

*Methods:* A comprehensive environmental health monitoring program has been initiated that compares contaminant levels in soil and vegetation (i.e., lichen, berries, and sedges) before and after Project activities. Samples taken from the Project area are also compared to reference sites that are not influenced by Project activities. This Screening Level Risk Assessment program is described in **Appendix A** of this document. Additional information is provided through dustfall monitoring along the AWAR and Whale Tail Haul Road, as described in Air Quality and Dust Monitoring Plan (Agnico Eagle 2018).

#### 3.2.2.3 *Habitat Reclamation Post-Closure*

*Methods:* Reclamation efforts will focus on providing conditions conducive to natural re-colonization of the site by surrounding native vegetation. There is a lack of available soils in the

Project area that, in conjunction with the harsh climatic conditions (short cold and dry growing season), makes it difficult to establish vegetation over large areas. Reclamation activities and natural re-vegetation of disturbed areas during the closure and post-closure phases will reduce overall residual effects within the LSA.

*Frequency:* Vegetation plots and mapping will be conducted during the second growing season following closure and every three years thereafter for 4 iterations (considered to be a reasonable period of time within which to expect revegetation of most disturbed areas) to ensure effort is made to re-vegetate and that re-vegetation of previously disturbed areas is progressing.

### **3.2.3 Thresholds**

Should the thresholds outlined in **Table 13** be exceeded, the following actions will be undertaken.

#### **3.2.3.1 Habitat Loss**

Where mapping indicates a loss of habitat area beyond that predicted, discussions will be held with construction contractors and Project personnel to resolve the concern. Additional mitigation may include clearer delineation of work space, road areas, and designated no-disturbance areas. Where unauthorized off-road vehicle activity is noted, more stringent off-road access control measures will be implemented. Habitat reclamation and restoration of natural drainage patterns and contours may be ordered depending on the scale of the disturbance.

#### **3.2.3.2 Habitat Degradation by Contamination**

See **Appendix A** - Screening Level Risk Assessment Program

#### **3.2.3.3 Habitat Reclamation Post-Closure**

If progress of revegetation is not occurring, further reclamation activity will be undertaken and may involve reseeding (e.g., native-grass cultivars and forbs such as nitrogen-fixing legumes).

## **3.3 INVASIVE PLANT MONITORING**

The invasive plant monitoring component outlines the means by which Agnico Eagle plans to reduce Project-related effects to plant populations and communities, primarily through the mitigation and management of invasive species, and includes both environmental and follow-up monitoring (Project Certificate No.008, Condition 25). Proactive measures and monitoring programs are used to track conditions and implement further mitigation as required, while follow-up monitoring is used to verify the accuracy of impact predictions and adaptively manage and implement further mitigation as required.

### **3.3.1 Objectives and Thresholds**

The objectives of the vegetation monitoring and management component are as follows:

- measure distribution and abundance of non-native invasive plant species

- using industry standards and best practices, equipment and bulk supplies must arrive to Project site free of soil or plant debris to minimize the risk of invasive plant introduction

Specific thresholds for invasive plant monitoring include the following:

- no non-native invasive species will occur as a result of mining operations (i.e., new equipment or materials arrival).

### **3.3.2 Monitoring Approach**

Monitoring programs for non-native invasive plant species will be completed during the construction and operations phase of the Project. Surveys for non-native invasive plant species will be undertaken in disturbed areas (e.g., active mine site, borrow pits) to identify and document the extent of any non-native invasive plant species that may occur during construction and operations. Additionally, invasive plant inspection surveys will be completed on cargo in Becancour, prior to being loaded onto shipping vessel(s).

The early detection of non-native invasive plant species is important, as preventing these species from becoming established is the most effective mitigation that can be employed. If non-native invasive plant species are identified in the Project area, they will be reported to Government of Nunavut Department of Environment (GN DoE), as per DoE guidelines. As part of the reporting process, the following information will be collected and sent to DoE:

- location of the species (i.e., GPS coordinates);
- species identification and population extent;
- photographs of the species in question to confirm identification; and
- species-specific management and eradication recommendations.

### **3.3.3 Mitigation**

#### **Terrestrial Pathways**

- All Equipment and supplies brought to the project sites are clean and free of soils that could contain plant seeds or organic matter not naturally occurring in the area
- Vehicle tires and treads are inspected prior to initial use in project areas

#### **Specific Cleaning Measures**

- Equipment and bulk supplies will be cleaned using brooms, brushes, shovels, water, or compressed air. Areas of particular concern include tires, tracks, skids, buckets, scoops, and packing materials.

- Accumulated soil, plant material or crop debris from openings, tracks, skids, wheels, buckets, scoops, and packing materials using a hand scraper, shovel, broom, or other methods.
- Additional focus should be made to areas where soil or plant debris can accumulate (i.e., tires or undercarriage).

### **3.4 UNGULATES**

As previously mentioned, decision charts (**Figures 6 through 10**) outlining monitoring and mitigation (adaptive management) measures for ungulates have been developed for each phase as follows:

- Figure 6 – caribou and mining operations;
- Figure 7 – caribou and haul roads;
- Figure 8 – caribou and the All Weather Access Road (AWAR);
- Figure 9 – caribou and blasting; and
- Figure 10 – muskox and operations.

These figures are periodically updated per ongoing discussions with the TAG and monitoring results to reflect appropriate protection measures.

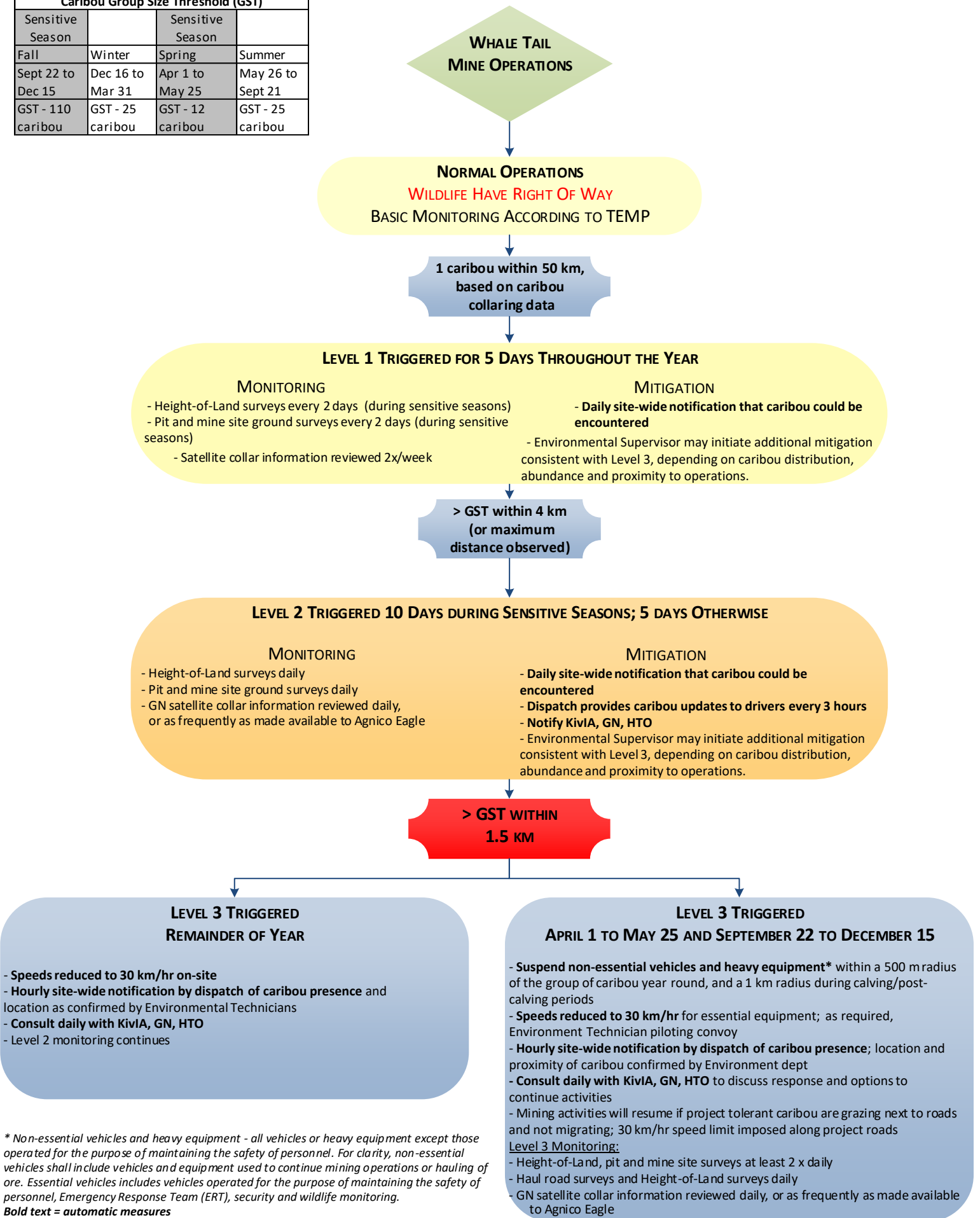
#### **3.4.1 Objectives**

The monitoring objectives are to detect if effect thresholds have been exceeded, to test the efficacy of mitigation, and understand Project-related effects to Ungulates. For Ungulates, it is also an objective to manage sensory disturbance to caribou approaching the Project, leading to monitoring to detect caribou approaching the project and mitigation to reduce sources of sensory disturbance. Due to the collar data sharing agreement, extensive range, large numbers of caribou and muskox, and history of analysis, this evaluation is done in collaboration with the GN.



**Figure 6: Thresholds for Monitoring and Mitigation of Caribou in Proximity to Mine Operations**

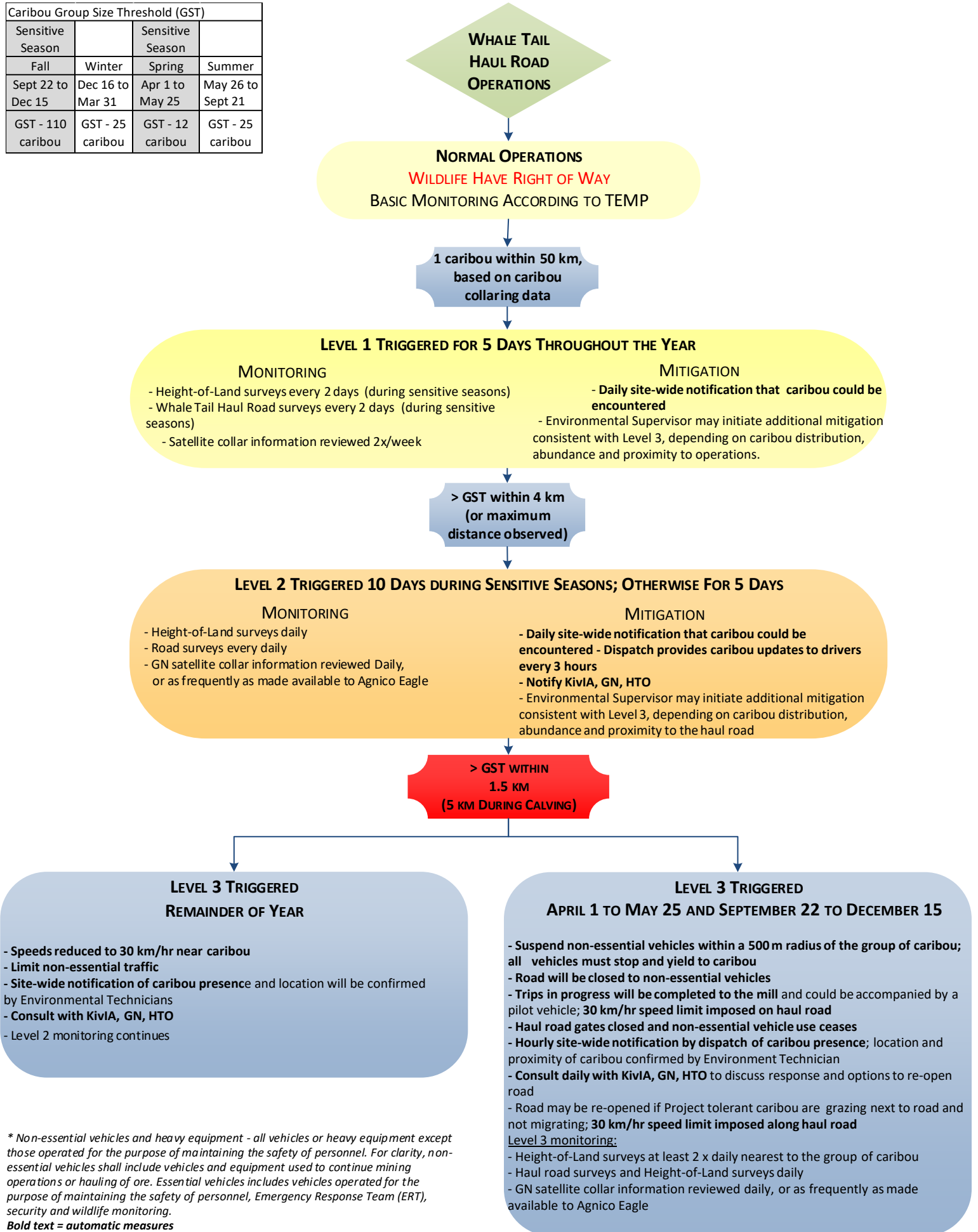
Caribou Group Size Threshold (GST)			
Sensitive Season		Sensitive Season	
Fall	Winter	Spring	Summer
Sept 22 to Dec 15	Dec 16 to Mar 31	Apr 1 to May 25	May 26 to Sept 21
GST - 110 caribou	GST - 25 caribou	GST - 12 caribou	GST - 25 caribou



\* Non-essential vehicles and heavy equipment - all vehicles or heavy equipment except those operated for the purpose of maintaining the safety of personnel. For clarity, non-essential vehicles shall include vehicles and equipment used to continue mining operations or hauling of ore. Essential vehicles includes vehicles operated for the purpose of maintaining the safety of personnel, Emergency Response Team (ERT), security and wildlife monitoring.  
**Bold text = automatic measures**

**Figure 7: Thresholds for Monitoring and Mitigation of Caribou in Proximity to the Whale Tail Haul Road**

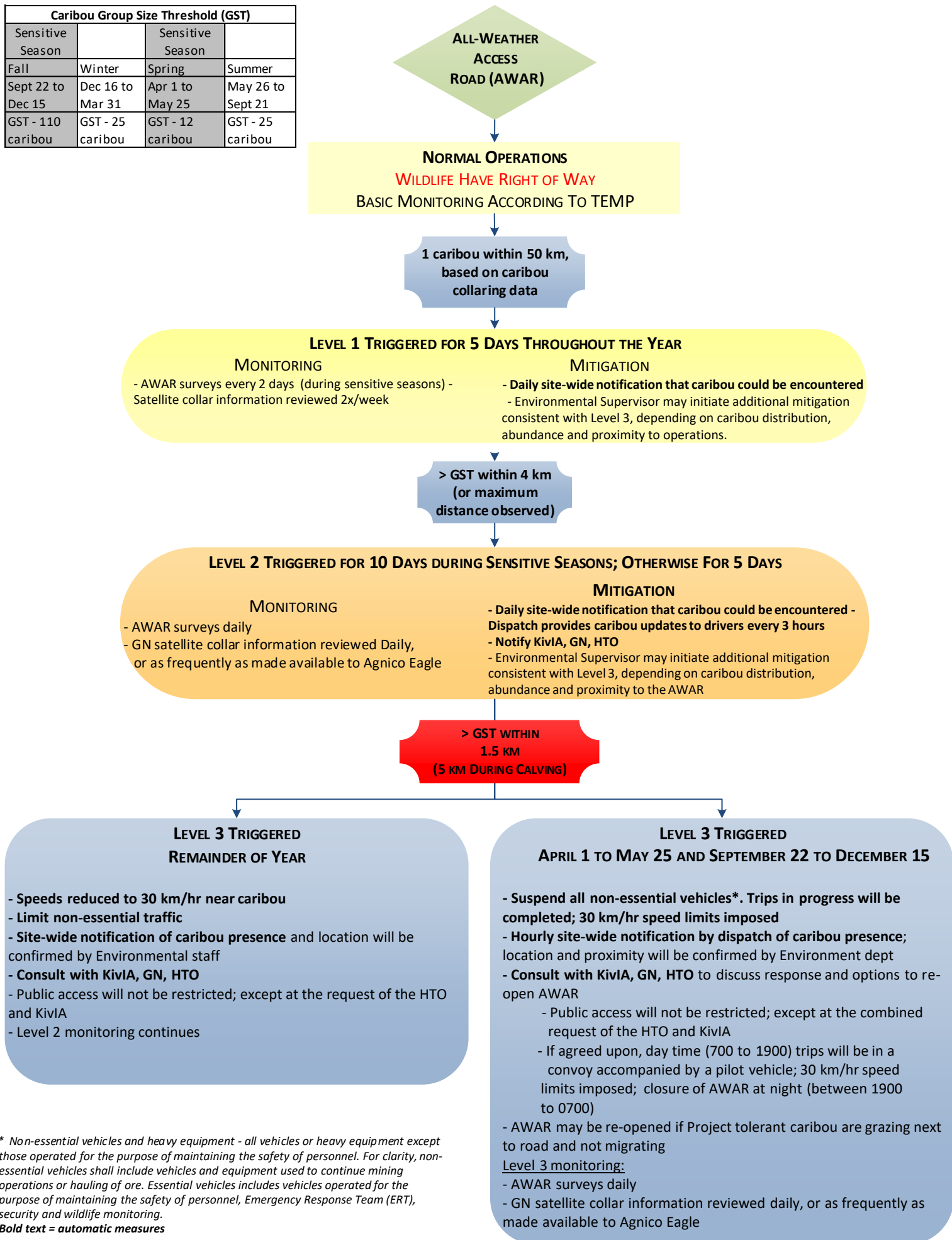
Caribou Group Size Threshold (GST)			
Sensitive Season		Sensitive Season	
Fall	Winter	Spring	Summer
Sept 22 to Dec 15	Dec 16 to Mar 31	Apr 1 to May 25	May 26 to Sept 21
GST - 110 caribou	GST - 25 caribou	GST - 12 caribou	GST - 25 caribou



\* Non-essential vehicles and heavy equipment - all vehicles or heavy equipment except those operated for the purpose of maintaining the safety of personnel. For clarity, non-essential vehicles shall include vehicles and equipment used to continue mining operations or hauling of ore. Essential vehicles includes vehicles operated for the purpose of maintaining the safety of personnel, Emergency Response Team (ERT), security and wildlife monitoring.  
**Bold text = automatic measures**

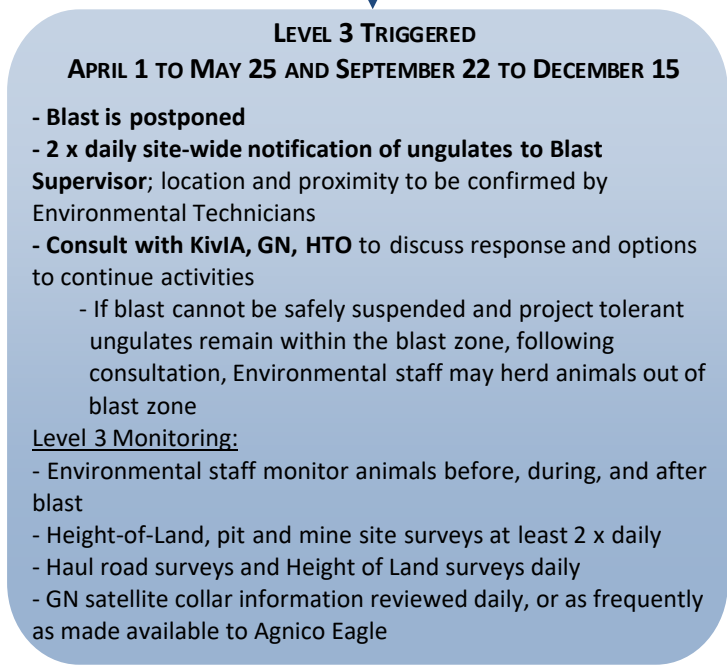
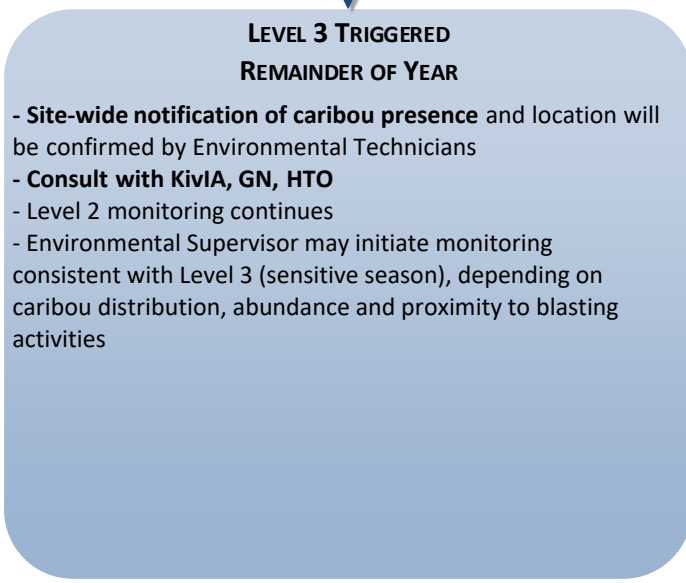
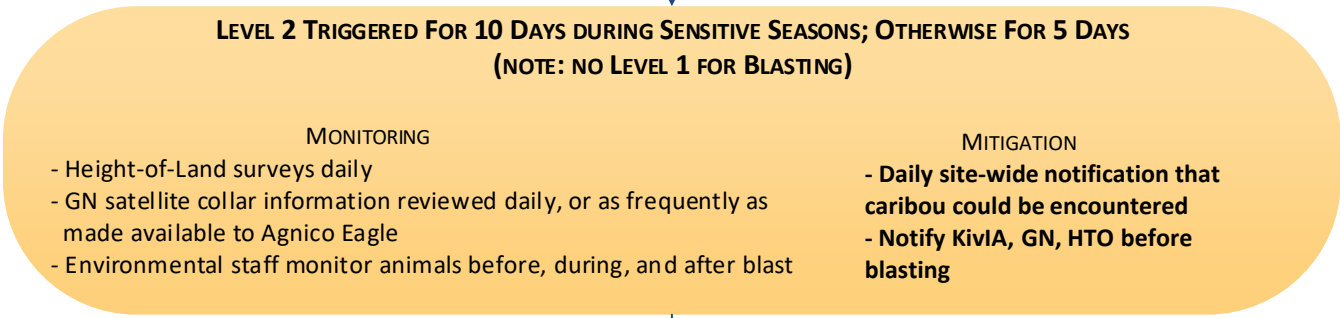
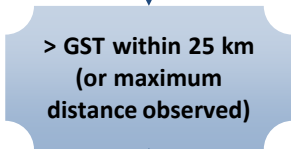
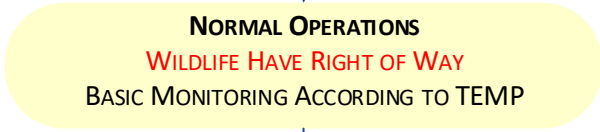
**Figure 08:** Thresholds for Monitoring and Mitigation of Caribou in Proximity to the All Weather Access Road (AWAR)

Caribou Group Size Threshold (GST)			
Sensitive Season		Sensitive Season	
Fall	Winter	Spring	Summer
Sept 22 to Dec 15	Dec 16 to Mar 31	Apr 1 to May 25	May 26 to Sept 21
GST - 110 caribou	GST - 25 caribou	GST - 12 caribou	GST - 25 caribou



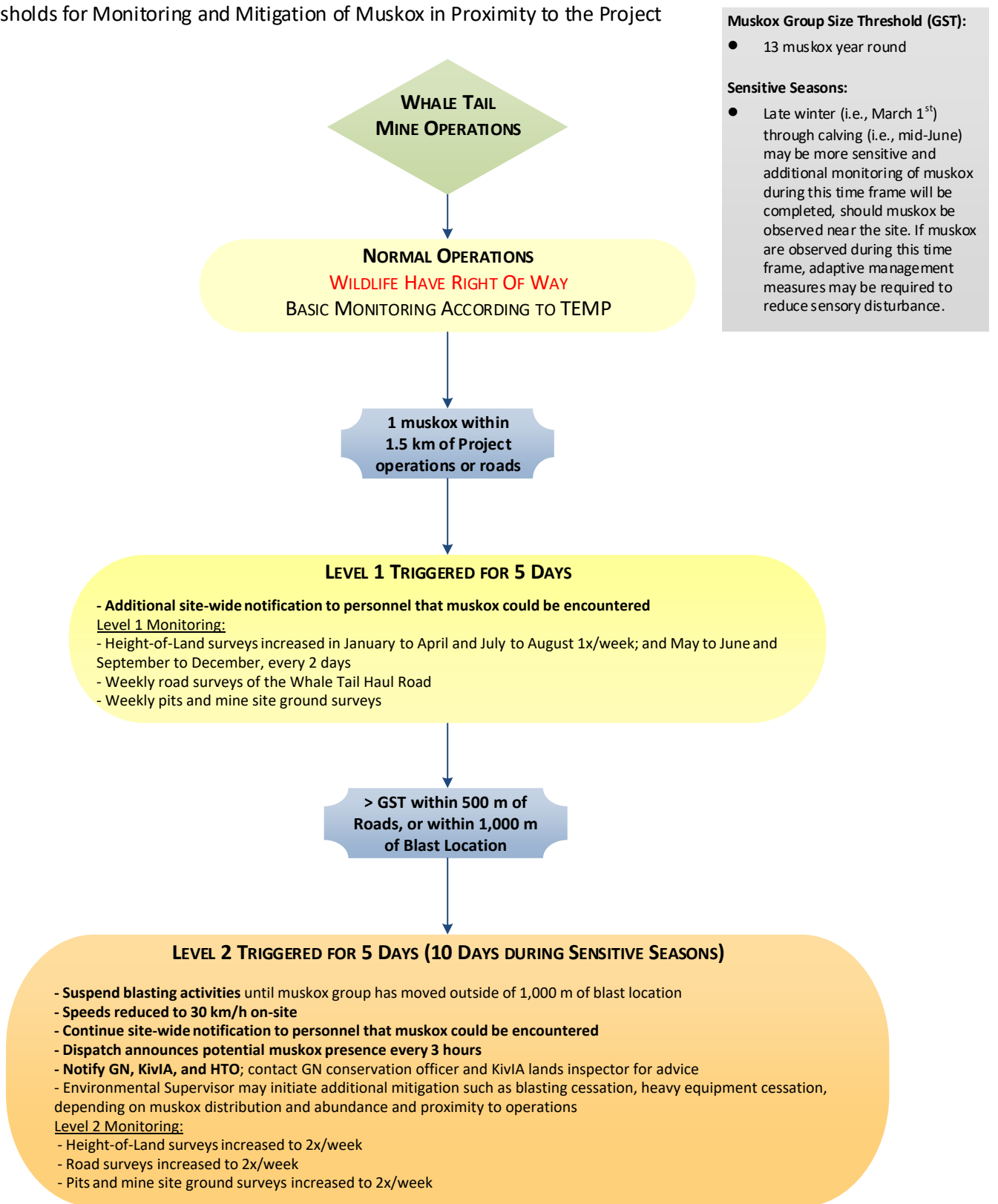
**Figure 09:** Thresholds for Monitoring and Mitigation of Ungulates in Proximity to Blasting Activities

Caribou Group Size Threshold (GST)			
Sensitive Season		Sensitive Season	
Fall	Winter	Spring	Summer
Sept 22 to Dec 15	Dec 16 to Mar 31	Apr 1 to May 25	May 26 to Sept 21
GST - 110 caribou	GST - 25 caribou	GST - 12 caribou	GST - 25 caribou



*Bold text = automatic measures*

**Figure 10:** Thresholds for Monitoring and Mitigation of Muskox in Proximity to the Project



**Muskox Group Size Threshold (GST):**

- 13 muskox year round

**Sensitive Seasons:**

- Late winter (i.e., March 1<sup>st</sup>) through calving (i.e., mid-June) may be more sensitive and additional monitoring of muskox during this time frame will be completed, should muskox be observed near the site. If muskox are observed during this time frame, adaptive management measures may be required to reduce sensory disturbance.

**Bold text = automatic measures**

### 3.4.2 Monitoring Approach

Monitoring activities for Ungulates will be carried out prior to, during, and following construction. Following are the methods and frequency for the monitoring efforts for each measurable parameter.

**Table 14** describes the framework which has been established for monitoring effects to Ungulates. As described above, an objective is to reduce sensory disturbance to caribou approaching the Project. This objective is not linked to an impact prediction, as the monitoring is to trigger mitigation rather than to test a threshold. **Figure 6** through **Figure 10** describe monitoring and mitigation for caribou/muskox approaching the Project site for all aspects of the operations. Documents reviewed to develop monitoring and mitigation strategies included:

- Caribou Road Mitigation Plan for the Jay Project (Golder 2017)
- Wildlife Mitigation and Monitoring Program Plan for the Back River Project (ERM 2017)
- Management of Caribou Post-Calving Areas in the Kivalliq Region, Nunavut (Poole and Gunn 2016)

Distance thresholds for caribou monitoring have the ultimate objective of detecting caribou group size triggers up to a distance of 4 km (or maximum distance observed); however, not all caribou will be able to be observed at this distance in all circumstances and areas associated with the Project. During the spring and fall migration period, alongside HTO and KivIA representatives, additional personnel will be on-site to determine the best and most logistically feasible methods of recording data to document caribou detection thresholds from roads (e.g., AWAR and Haul Road) and for HOL survey locations. On-site environmental supervisors may use discretionary mitigation measures at level 2 or 3 for caribou per the decision trees in Figure 6 to 9, and initiate adaptive management in collaboration with KivIA and HTO. This could include the addition of specific automatic measures intended to prepare for an operational shutdown if caribou move closer to mine operations or roads (e.g., increase survey frequency, reduce traffic speeds, suspending non-essential vehicles and heavy equipment where possible or at night, suspending haul trucks, and temporary road closure). Automatic measures would be implemented when caribou approach the mine site or roads in large numbers (i.e., greater than GST) and are widespread (i.e., along length of roads and not clustered in one or only a couple of locations along the roads), such that site-specific monitoring and mitigation measures are no longer effective. In addition, a retrospective analysis using presence/absence data and wildlife features to determine “hot spots” near infrastructure to focus monitoring and mitigation. Data during field surveys and through strategically placed motion sensing cameras, will provide an understanding of caribou behaviour when approaching infrastructure (e.g., within 500 m of AWAR) and when interacting with infrastructure (e.g., caribou on road with no traffic vs caribou on road with traffic vs. caribou near road with ATV and hunters). These data will be analyzed, discussed with the TAG and reported annually or on a relevant frequency commensurate with data volume.

Although the monitoring and mitigation is focused on caribou, muskox are also observed along the AWAR, with approximately 2,500 animals from 299 observation records, of which nearly 2/3 of observations consist of 5 animals or less. A specific monitoring and mitigation decision chart for muskox has also been developed (**Figure 10**). A group size threshold (GST) of 13 was developed for muskox based on observation data collected to 2018 for all seasons and desired protection level of 70% of all muskox observations (i.e., group sizes of 13 and larger account for 1,804 observations of muskox).

To provide additional clarity and support to the decision trees, the following definitions are provided:

*'Project tolerant' as: an animal or group of animals (i) observed within a mitigation distance buffer for greater than 72 hours during the winter or 48 hours during other seasons; and (ii) not visibly disturbed by the Project.*

*'Non-Essential Vehicles': include vehicles and equipment used to continue mining operations or hauling of ore.*

*'Essential Vehicles': include vehicles operated for the purpose of maintaining the safety of personnel, road maintenance when necessary (e.g., snow removal), Emergency Response Team (ERT), security and wildlife monitoring.*

**Table 14: Monitoring Approach for Ungulates for the Project**

Potential Effect	Impact Prediction	Quantitative Monitoring Variable	Thresholds	Monitoring Activity	Frequency
Habitat Loss <b>Meadowbank Mine, and Vault Pit and Haul Road</b>	Loss <EIA prediction and subsequent approvals (see Gebauer et al., 2015)	Area of altered habitat	10% above total loss of high suitability habitat (for Ungulates) predicted in EIA <b>Meadowbank Mine and Vault Site</b> - 240 and 191 ha for the growing and winter seasons, respectively	Habitat monitoring	Every three years post-construction or based on TAG meeting outcomes
Habitat Loss <b>Meadowbank AWAR</b>	Loss <EIA prediction and subsequent approvals (see Gebauer et al., 2015)	Area of altered habitat	10% above total loss of high suitability habitat (for Ungulates) predicted in EIA <b>Meadowbank AWAR</b> - 63 and 188 ha for the growing and winter seasons, respectively	Habitat monitoring	Every three years post-construction or based on TAG meeting outcomes
Habitat Loss <b>Whale Tail Pit and Haul Road</b>	Loss <EIS prediction (see Golder 2016)	Area of altered habitat	10% above total loss of high suitability habitat (for Caribou) <sup>(a)</sup> predicted in EIA <b>Whale Tail Site</b> – 30 and 342 ha for the growing and winter seasons, respectively	Habitat monitoring	Every three years post-construction or based on TAG meeting outcomes
Sensory Disturbance to Caribou	N/A	Caribou presence	Monitoring is continuous, but with increasing intensity as caribou approach the Project (see <b>Figures 6 through 9</b> )	Pits and mine site ground surveys	Weekly increased up to every two days as per triggers (see <b>Figure 6</b> )
				Whale Tail Haul Road surveys	Weekly increased up to every two days as per triggers (see <b>Figure 7</b> )
				Caribou satellite-monitoring program	Data provided to Agnico Eagle from GN weekly, requested daily as per triggers(see <b>Figure 6 through Figure 9</b> )
				ZOI and Mechanistic Studies	Through discussions/workshops with TAG members, determine new analysis requirements to better understand the indirect effects of mining on caribou as new data is acquired (Project Certificate No.008, Condition 29)
				Incident reports	As occurring
				Height-of-land surveys	Weekly increased up to every two days as per triggers (see <b>Figure 6 through Figure 9</b> )



**Table 14:** Monitoring Approach for Ungulates for the Project

Potential Effect	Impact Prediction	Quantitative Monitoring Variable	Thresholds	Monitoring Activity	Frequency
Sensory Disturbance to Caribou from Blasting	N/A	Intensity of blast	NPC-119 criteria Monitoring is continuous, but with increasing intensity as caribou approach the blasting site (see <b>Figure 9</b> )	Monitoring of blast frequency, noise, and vibration	Blast is postponed. 2 x daily site-wide notification of ungulates to Blast supervisor; location and proximity to be confirmed by Environmental Technicians (see <b>Figure 9</b> )
Sensory Disturbance to Muskox	N/A	Muskox presence	Monitoring is continuous, but with increasing intensity as muskox approach the Project (see <b>Figure 10</b> )	Pits and mine site ground surveys	Weekly increased up to 2x/week as per triggers (see <b>Figure 10</b> )
				Whale Tail Haul Road and All Weather Access Road surveys	Weekly increased up to 2x/week as per triggers (see <b>Figure 10</b> )
				Incident reports	As occurring
				Height-of-land surveys	Weekly increased up to 2x/week as per triggers (see <b>Figure 10</b> )
Vehicle Collisions	Ungulates will not be killed by vehicles	Numbers of Ungulates killed by vehicles	2 individuals	Pits and mine site ground surveys	See above
				Whale Tail Haul Road and All Weather Access Road surveys	See above
				Incident reports	As occurring

**Table 14: Monitoring Approach for Ungulates for the Project**

Potential Effect	Impact Prediction	Quantitative Monitoring Variable	Thresholds	Monitoring Activity	Frequency
Hunting by Baker Lake Residents	Harvest intensity in the Meadowbank RSA will increase <20%	Correlation between spatial distribution of Ungulate harvest and road development Monitor trend in harvest from Hunter Harvest Study	>20% adjustment in harvest distribution Meadowbank AWAR use. This metric will further be refined as part of the revised HHS design and implementation	Baker Lake Hunter Harvest Study	Initiated in 2007 and active until 2015. Re-initiated in September 2017 with quarterly data collection; Yearly reporting
	No increase in harvest from Whale Tail Haul Road RSA	Monitor trend in harvest distribution or total harvest from Hunter Harvest Study	No change in harvest	Baker Lake Hunter Harvest Study  Satellite-collaring program	Initiated in 2007 and active until 2015. Re-initiated in September 2017 with quarterly data collection; Yearly reporting  Data provided to Agnico Eagle from GN weekly, requested up to 2x/week as per triggers (see <b>Figure 6</b> through <b>Figure 9</b> )

Note: Frequency for some activities may change, see **Figure 6** through **Figure 9**

(a) For Whale Tail extension, effects on muskox were screened out during the EA process; therefore, they are not included in habitat loss calculations for the Whale Tail Site

### 3.4.2.1 Caribou Group Size

The environment department representative or observer (i.e., biologist, technician, and local hunter conducting caribou surveys) responsible for determining exceedance of triggers will monitor and document a “group of caribou” defined as:

An aggregation of caribou that are sufficiently close together that they can see and react to another animal’s behaviour, and have the potential of responding should one or more animal in the aggregation become startled.

At the discretion of the observer, if an aggregate of caribou are separated by approximately 500 m, this may be considered 2 groups of caribou depending on level of interaction and behaviour of groups. Agnico Eagle observers will work with GN, KivIA, and HTO representatives to ensure consistency in the application of this definition. Survey type will be recorded when documenting group sizes to determine any bias in determining group sizes as a function of survey type (i.e., HOL, roadside surveys, drive-by scans).

### 3.4.2.2 Group Size Thresholds

Group size numbers of caribou collected from observation monitoring along the AWAR are shown in **Table 15**. A group size of 50, which has been used to trigger adaptive management for caribou to date at the Meadowbank Mine, has been shown to encompass almost 2/3 (i.e., 64%) of all caribou observed from roadside surveys from 2007 to 2018 (**Table 15**). In addition, the majority of caribou groups greater than or equal to 50 are observed in fall and winter seasons (i.e., 73%).

**Table 15:** Summary of Caribou Numbers by Group Size Thresholds along the All-Weather Access Road (AWAR) from 2007 to 2018

Group Size	Total Number of Observations	Total Number of Caribou Represented in Group Size	% Total Caribou Observed
≥500	33	26,054	23.4%
≥100	263	58,563	52.6%
≥50	470	70,991	63.8%
≥40	645	75,013	67.4%
≥30	678	80,517	72.3%
<b>Total<sup>(a)</sup></b>	<b>4,417</b>	<b>111,328</b>	

(a) Represents the total number of caribou observed from AWAR surveys between 2007 and 2018, consequently it will not be the sum of the Total Number of Caribou.

Through discussions with the GN and the KivIA, a desired minimum protection level of 75% of all caribou observed will be used as the foundation for group size thresholds (GST). Consequently, GSTs have been developed for the three main periods when caribou are observed on-site: early and late winter, fall rut and migration, and spring migration (**Table 16**). To be further conservative of caribou protection, the lower Confidence Interval value was used for the GST to trigger adaptive management (**Table 16**).

**Table 16:** Seasonal Caribou Group Size Thresholds Representing the Protection of 75% of All Caribou Observed, with 95% Confidence Intervals

Season		Group Size Threshold	Average Group Size	Upper/Lower 95% Confidence Intervals (CI)
Spring Migration	Apr.1 – May.25	12	16.8	18.1/15.4
Summer	May 26 – Sep 21	25	9.6	10.9/8.4
Fall Rut/Fall Migration	Sep.22 – Dec.15	110	68.2	79.4/56.9
Winter	Dec.16 – Mar.31	25	36.2	36.9/35.4

Agnico Eagle reviewed GSTs to protect 75% of the caribou interacting with the Project. Agnico Eagle is committed to caribou conservation through the implementation of adaptive management based on group size and distance thresholds, but these measures have to be done in a manner that balances mining operations, and at this point it is uncertain how operations will be affected using a GST of 75%. Although Agnico Eagle suggests using the 75% GST and revisiting this number during subsequent TAG meetings provided that this percentage balances operations and caribou conservation, as per Project Certificate No.008, Condition 30, Agnico Eagle will continue to collect additional data on caribou group sizes in proximity to the project and will work with the TAG to refine appropriate caribou GSTs. The frequency of GST updates should be discussed at the next TAG meeting so that all TAG members understand the potential variability from year to year, and the implications to operations. As mentioned earlier, the indirect effects of sensory disturbance on wildlife populations is poorly understood in terms of affecting the distribution and abundance of wildlife in relation to a mining development, even less is known of how these effects can translate to population level effects. Resource management objectives are typically devised around direct effects to wildlife populations such as hunting and habitat conservation, among others. Nevertheless, as per Project Certificate No.008, Condition 30, Agnico Eagle will initially adopt GSTs presented in **Table 17**.

**Table 17:** Initial Seasonal Caribou Group Size's as per Project Certificate No.008, Condition 30

Sensitive Season	Regular (Non-sensitive) Season	Sensitive Season	Regular (Non-sensitive) Season
Fall	Winter	Spring	Summer
Sep.22 to Dec.15	Dec.16 to Mar.31	Apr.1 to May.25	May.26 to Sep.21
GST - 110 Caribou	GST - 25 Caribou	GST - 12 Caribou	GST - 25 Caribou

Based on the seasonal group size that will be used in the field, to implement heightened mitigation measures, more emphasis will be placed on understanding group size and the variation of group sizes within each biological season. In addition, whenever possible, the presence of collars will also be noted so that a linkage between collar presence and overall herd numbers can begin to be developed for each season<sup>1</sup>. Information from traditional knowledge and Inuit Qaujimagatuqangit on observed group sizes will also be incorporated, as appropriate. As GSTs are the main trigger for mitigation and management, it is critical to understand the efficacy of these GSTs for overall herd protection. However, discussions within the TAG and from the HTO have

<sup>1</sup> Collars can be challenging to see and observed at distances <300 m; all effort will be made to locate collars.

also suggested the identification of the lead caribou and allowance for undisturbed passage of the lead caribou as an effective means of mitigation. Further discussions within the TAG are required on how to implement the identification of the lead caribou and associated herds. The Whale Tail haul road is primarily frequented by two different herds, which increases the complexity of identifying if incoming caribou is a lead caribou or followers of a herd that previously crossed the area. Collaring data currently provided to Agnico Eagle by the GN does not include this type of information. However, Agnico Eagle would like to explore, through discussions within the TAG, a more proactive approach of monitoring and mitigation implementation to allow for the identification of the 'lead caribou' and facilitate unimpeded passage across mine site.

#### **3.4.2.3 Range Level Monitoring, Site Level Monitoring and Evaluating Mitigation and Protection Measures**

As per Project Certificate No.008, Condition 29, Agnico Eagle will work in collaboration with the GN and other relevantly interested parties, to collect additional caribou data and conduct analysis of this data to address questions about the direct and indirect effects of mining on caribou distribution and abundance. This is also directly related to GN Commitment No.1 (Appendix B), specifically around the collection of data, and data analysis to evaluate caribou protection measures (refer to Section 2.2, Table 4 for additional details).

#### ***Range Level Monitoring***

Caribou range level monitoring is primarily achieved through the use of GPS collars deployed on caribou. The GN currently manages and directs the caribou collaring programs in Nunavut.

An initial meeting between Agnico Eagle and the GN is anticipated to happen in Q3/Q4 2019 to discuss the caribou collaring program in Nunavut and how that data can be used to investigate and better understand the direct and indirect effects of the Meadowbank and Whale Tail projects, in combination with the Hamlet of Baker Lake, on caribou movements and distribution. Agnico Eagle has been a consistent monetary, and in-kind, contributor to the caribou collaring program in Nunavut for over a decade. To date, Agnico Eagle completed a preliminary zone of influence (ZOI) study using collar data collected through the spring of 2017. Whereas, the GN completed a preliminary study on the effects of the AWAR on caribou movements. Both of these studies can be linked and integrated through greater, and regular, collaboration between Agnico Eagle and the GN. Agnico Eagle will continue to collaborate with the GN so that additional caribou data relevant to Agnico Eagle's operations can be collected to further explore a ZOI and/or other effects on caribou. For example, as discussed at the TAG meeting in January 2019, it was determined that another ZOI analysis, and potentially also a road analysis, should be completed for caribou collar data up to the end of Q1 or beginning of Q2 once hauling commences to understand the significance of change that may be due to operations (i.e., construction to operations). The objectives of a caribou collaring program and subsequent data analysis are still being determined between the GN and Agnico Eagle and a proposed workplan is being developed by the GN for delivery to Agnico Eagle near the end of Q2 2019 for a collaborative research program.

Ultimately, understanding range level parameters related to caribou populations, movements and timing, and distribution and abundance should be clearly communicated by the GN as they are responsible for caribou monitoring and management. Subsequently, site-level monitoring data by Agnico Eagle can be analysed to feed into range level objectives and help to understand observed patterns and trends at the range level (e.g., seasonal movement timing, arrival dates to calving grounds, individual tortuosity). The integration of site-specific and range-level data and associated analytical methods will be discussed and reviewed by the TAG.

### ***Site Level Monitoring***

As described above, ground-based monitoring is the major source of data collection on the mine site for day-to-day operations and management. Caribou monitoring along the AWAR is primarily collected through roadside scans and through dispatch reporting of caribou observations, both of these methods have been ongoing since operations began at Meadowbank.

With the operational expansion of the Whale Tail Pit and Haul Road, caribou monitoring has expanded to include the Haul Road through the use of HOL surveys, road side time-limited scan surveys, road side driving scans and observations recorded by drivers through dispatch. In addition, a remote camera program has been initiated along the Whale Tail Haul Road (Section 3.5.2.6) to examine the interactions of caribou with the road. The data from these monitoring programs will specifically look at collecting, or improving on, the following information:

- Surveys provide information on caribou distribution and relative abundance, and the AWAR datasheet has been the means for collecting information using the following parameters: date, time, species, number (group size), behavior, habitat, location coordinates, direction from road, distance from road, and general comments about the observation.
- Suggested changes to the objectives, methods, and data collection parameters are as follows and will be implemented in 2018:
  - Agnico Eagle developed GSTs to guide mitigation/management; these GSTs are seasonal and based on a protection measure of 75% of the herd (i.e., 75% of the total caribou numbers are represented by group sizes of the seasonal threshold or higher);
  - When caribou are near the Roads, monitoring intensity goes up through a phased approach to daily monitoring;
  - To improve data collection, Agnico Eagle is suggesting to better understand detection distance thresholds from the roads (AWAR/Haul Road) and we can do this by testing detection and measuring using range finders, people on the landscape, and installing visual markers at 1 km perpendicular distances from the road;
  - Observers will also record the maximum observable distance even when caribou observations are 0 and can retrospectively use collar data to try and determine detectability;

- Agnico Eagle is now employing a consistent definition of groups but it is likely still important to note the distance of one group from another and record that behavior on the data sheet (i.e., are they separate groups?) to determine if they are interacting (exchanging individuals or responding to one another). The alternative approach is to only record data for group you know is unique (i.e., if they are close spatially assume it's the same group<sup>2</sup>);
- Haul Road surveys are drive and scan, with un-controlled stops to confirm caribou numbers or to let caribou pass. However, Agnico Eagle is going to implement some trials of time-limited scans in certain locations along the Haul Road (i.e., where there's trails, elevation advantages, etc.) to help with detectability. Depending on how many surveys are completed in each season and based on caribou numbers, there may be enough data to generate an occupancy map of the Haul Road by breaking it into segments with presence-absence data (observed or not). The result would be a heat map of the Haul Road, which could then be used to focus mitigation and monitoring. We would also consider other co-variables such as elevation (i.e., a DEM), caribou trail presence, or survey-specific covariates (e.g., distance to observation, weather).

These minor modifications are intended to better facilitate the determination of detection distance thresholds (i.e., how far out can we detect caribou from these areas when we know the caribou are coming based on collar data), caribou distribution, how many caribou, group size, and ideally even caribou behaviour at various distances from the road and qualified based on road activity level.

However, it is recognized that this type of survey data is limited to the sightability and detection of caribou from the survey locations. Consequently, the determination of sightability and detection functions will be attempted for the various monitoring methods (AWAR/Haul Road scan surveys, Roadside surveys and HOL surveys). Determining sightability and detection will be based on various methods but initially will be based on those outlined by Walsh et al. 2010 and Griffin et al. 2013, as an example, but primarily follow the use of double observers. In addition, attempts to validate observer counts through the use of drones or other unmanned aerial vehicles (UAV) should be given a high priority for consideration. The methods used to determine sightability and detection will be determined in collaboration with the TAG. Group size thresholds trigger enhanced protection, and as such the accuracy of group size determination is of critical importance. Group size determination may be biased towards survey type, consequently, survey type will be recorded and used as a variable to examine group sizes for any patterns or biases.

TAG meetings specific to caribou analysis to understand the direct and indirect effects of mining on caribou distribution and abundance will be established. Agnico Eagle wishes to work collaboratively with the GN, the KivIA, and other interested relevant and qualified parties to help understand the key effects and the optimal mitigation and management. Studies and reports will

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<sup>2</sup> Based on field observations, animals can be considered a single group if they are 500 to 1,000 m apart.

be completed on an as-needed basis throughout the operations of the mine as determined through the TAG and as additional data is acquired.

### ***Evaluating Mitigation and Protection Measures***

The ability to link the collar data patterns (e.g., movement animations) when caribou interact with the mine site and associated infrastructure in combination with site-level monitoring and mitigation implementation is an important, but qualitative, means of determining mitigation outcomes based on caribou behaviour.

For each date occurrence of enhanced caribou protection mitigation, a decision based process could be documented as follows: Date → Caribou Group Size (e.g., >GST) → Distance Observed → Mitigation Action → Outcome of caribou movement/behaviour.

The probability of this series of events happening to a caribou group with a collared individual is very low, however, on-site observations of the caribou response to the implementation of mitigation will be completed to determine the outcome of the mitigation action. In addition, a retrospective qualitative analysis can be completed by examining collar animation data and retroactively going back through data records to understand what was being observed on site, what the mitigation actions were and what the collared caribou response was. This type of qualitative analysis can be highly useful to establish a pattern of mitigation timing and implementation to encourage a positive outcome for caribou (i.e., unimpeded movement through the mine site). However, it should also be noted that there are several other confounding variables that may contribute to caribou behavior than simply the operations of the mine (e.g., ATV traffic, hunting).

The request of GN Commitment No. 1 (Appendix B) is for a robust study design and analysis with statistical power to detect effects. While this is ultimately the goal, the complexity and variability of the environment, caribou movements and behaviour, and confounding variables and not under the control of the mine operations present analytical challenges. Ongoing collaboration and dialogue with the TAG will help to provide continuous improvements toward this goal.

#### **3.4.2.4 *Blasting Thresholds***

Nunavut does not have any regulations or guidelines related to potential environmental noise and vibration effects from blasting and the NIRB does not endorse or recommend any specific regulation or guideline as being appropriate for assessing potential environmental effects from blasting. As such, the approach used here is that safety procedures for the protection of caribou due to blasting should follow the standards and procedures for humans.



The Ontario Ministry of Environment Noise Pollution Control (NPC) Publication 119 (OMOE 1978) represents best practices with respect to the assessment of potential noise and vibration effects from blasting. As such, NPC-119 assessment methods and criteria were used in the Project Noise Impact Assessment. The EIS estimates that blasting noise during haul road construction will reach the NCP-119 limit of 120 dBZ at 300 m from the blast, and at 1,000 m for Whale Tail Pit operations. Noise is also reduced when receptors are not within the line-of-sight of the blast (such as when the blast is in a deep open pit or when receptors are behind a hill). For vibration, the EIS estimates that blasting vibration from haul road construction will reach the NCP-119 limit of 10 mm/s at 165 m from the blast, and at 1,150 m for Whale Tail Pit operations. Blasting vibrations from the Whale Tail Pit operations decay quickly from the source and are 504 mm/s at 100 m from the source, 38 mm/s at 500 m from the source, and down to 4 mm/s 2 km from the source.

### ***Caribou Response to Noise and Vibration***

Research into the range of caribou frequency sensitivity has found that caribou are less sensitive to low frequency noise than humans (Flydal et al. 2001). For example, the caribou hearing threshold at 63 Hz is approximately 30 decibels (dB) higher than the human hearing threshold at 63 Hz. Put another way, a human could be expected to detect a low frequency noise approximately 30 dB quieter than could be detected by a caribou.

Because human hearing is more sensitive to low frequencies than caribou hearing, using human-centric thresholds for effects to caribou can be considered conservative – i.e., tending to overestimate the magnitude of the effect.

Blasting noise and vibration are measured by two parameters:

- Peak Particle Velocity (PPV) expressed in millimetres per second (mm/s)
- Peak Pressure Level (PPL) expressed in unweighted or linear decibels (dBZ)

Caribou hearing is less sensitive at low frequencies than human hearing (Flydal et al. 2001); therefore, it is likely that humans will be able to detect airborne PPL associated with blasting at larger distances than will caribou. In contrast, Inuit Qaujimagatuqangit (IQ) indicates that caribou feet are sensitive; therefore, it is likely that caribou will be able to detect ground-borne PPV associated with blasting at larger distances than humans. In the absence of research identifying specific vibration detection thresholds for caribou feet, it is not possible to estimate specific distances over which caribou will be able to detect ground vibration from Project blasting, although Reimers and Coleman (2001) noted that aerial bombing in military exercises did not typically elicit a visible behavioural response from reindeer at distances between 1.8 and 3.0 km. The EIS indicates that PPV from blasting at the Whale Tail Pit is predicted to drop to effectively 0 mm/s for distances of 4.0 km from the blasting site. As such, it seems reasonable to conclude that PPV associated with blasting would not be detectable by even the most sensitive caribou feet at distances beyond 4.0 km from the blasting site. Conversely, PPV is predicted to be at 13 mm/s at 1,000 m from the source and 7 mm/s at 1.5 km from the site.

Agnico Eagle will implement a field-based study to understand and document the visual and physical parameters of the blast and quantify the response of caribou to the blast.

The Study design will be implemented during the 2019/2020 summer period and followed up again during winter conditions. The objective of the proposed program is to first characterize blasting and vibration levels on the landscape as a result of operational blasting activities. The measurement data will be used to characterize the relationship between noise/vibration levels and blasting parameters (e.g., charge mass, burden depth), and the relationship between noise/vibration levels and propagation conditions (e.g., air temperature, wind speed/direction).

The study will achieve the following:

- The measurement program will consist of long-term blast monitoring over two different time windows. The first time window will cover nominal summertime conditions (i.e., unfrozen ground, temperatures above 0°C). The second time window will cover nominal wintertime conditions (i.e., frozen ground, temperatures below 0°C).
- The monitoring program will characterize ground vibration from blasting using the Peak Particle Velocity (PPV) parameter. The monitoring program will characterize noise from blasting (also known as airblast overpressure) using the Peak Pressure Level (PPL) parameter.
- Based on blasting schedule and knowledge of caribou distribution and group sizes, opportunistically capture caribou behavioural response to blasting.
- Existing blast monitoring program is in place to measure noise and vibration, will use this data to extrapolate vibration measurements across the landscape.
- Characterize each blast in the field based on sound (develop a relative scale similar to the Beaufort scale for wind), visibility of dust plume (Y/N), if so describe it (i.e., height, width, visual longevity, etc.).
- Characterize caribou response to blast – basic behavioural parameters including the initial startle or not. Group and focal behaviour scans will help to quantify the behavioural response and to understand how many individuals respond versus how long. In addition, behavioural monitoring has been scrutinized and requires several hours of effort to determine meaningful results. Consequently, observations from Inuit hunters will be made and incorporated and video of caribou responses will also be used to gather a weight of evidence approach to answering the question.
- The logistical challenge will be to get an accurate distance of caribou groups from the blast, right now Agnico Eagle is considering 250 to 500 m increments. Agnico Eagle is also considering the use of laser range finders that can measure the distance from observer to caribou and distance from observer to blast and the angle to triangulate.
- The objective is to demonstrate the response of caribou to blasting at varying distances.

The approach outlined in **Figure 9**, will be followed. In addition, following threshold to delay a blast will be used for caribou and other wildlife such as muskox:

- If caribou or other wildlife are observed within the danger zone for humans surrounding the blast, where there may potentially be fly rock or debris, as determined by the Blast Supervisor – typically 600 m radius from blast centre
- If the caribou Level 3 mitigation is triggered, when the caribou seasonal GST are observed within 4 km of the Project facilities (**Figure 9**)
- If muskox at the seasonal GST (per Figure 10) are observed within 1 km of blasting activities, blasting will be suspended until the animals have moved away.

#### **3.4.2.5 Habitat Loss & Degradation**

*Methods:* Habitat loss and degradation will be monitored and assessed through habitat monitoring (see **Section 3.3.2** for details). An analysis of the loss of High suitability habitats will be conducted and compared to thresholds (see **Table 13**).

*Frequency:* See **Section 3.3.2**.

#### **3.4.2.6 Sensory Disturbance and Disruption of Movements**

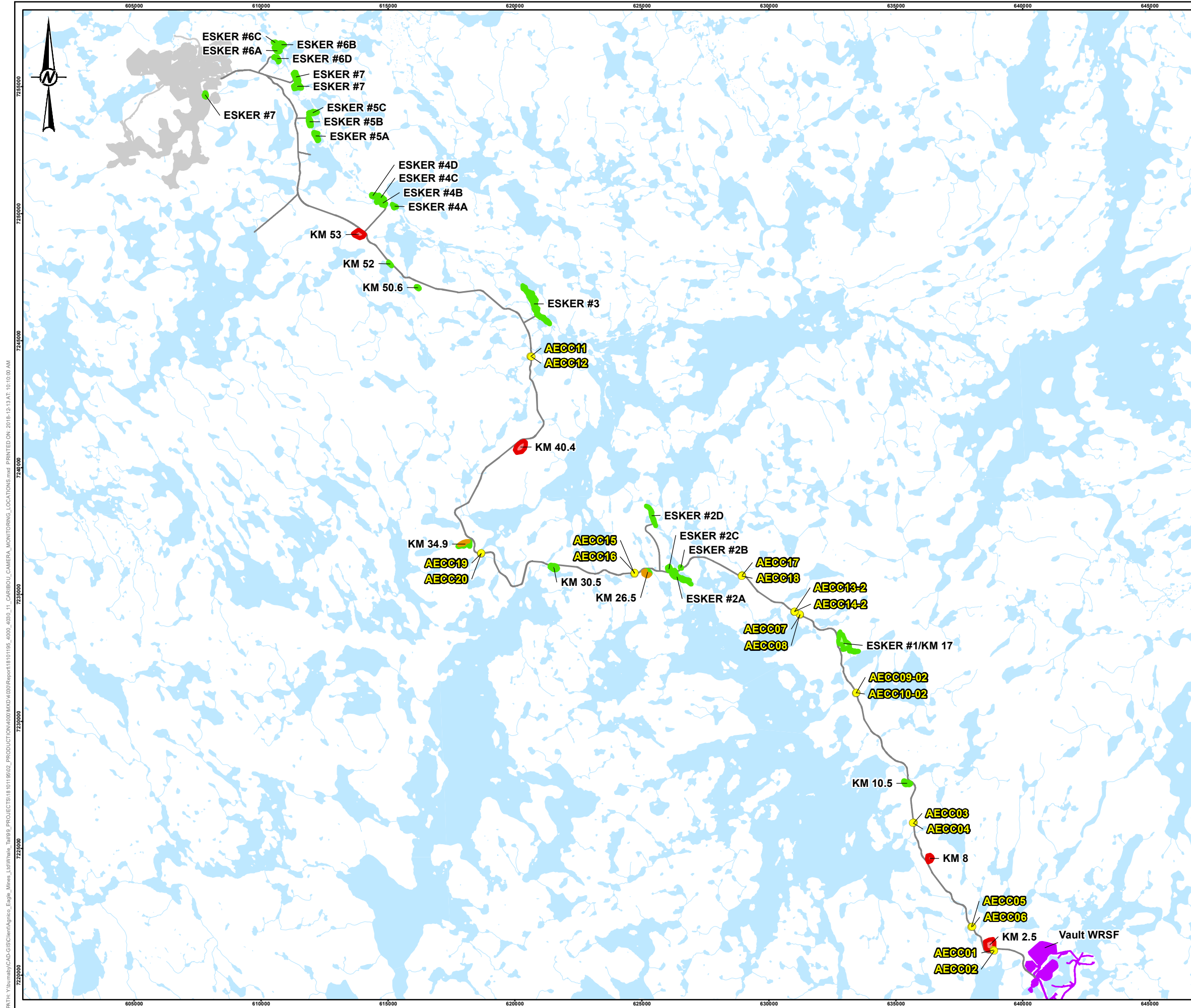
The primary goal of monitoring for sensory disturbance and disruption of movements of Ungulates is to provide an early detection of animals approaching a project (Poole and Gunn 2015). Once animals are detected, operational activities will be adjusted, as described in **Figure 6** through **Figure 10**, to reduce sensory disturbance. For example, when the caribou seasonal GST are observed within 1.5 km of the Whale Tail Haul Road during the regular season, additional mitigation will be implemented of reducing speeds to 30 km/h and limit non-essential traffic. Any caribou crossing any mine associated roads, including the Whale Tail Haul Road and the AWAR, will always be given the right-of-way (see Section 3.10). The following monitoring will be used to detect caribou.

- Caribou Satellite-Collaring Program
- Height-of-Land Surveys (see **Section 3.2.1**)
- Road Surveys (see **Section 3.2.1**)
- Pit and Mine Ground Surveys (see **Section 3.2.2**)

Monitoring and mitigation triggers for caribou include one collared caribou within 50 km of the Project (i.e., Level 1), which initiates more intensive monitoring and heightened awareness for Project staff that caribou are in the area. For day-to-day monitoring and management, maps depicting the movement of collared caribou provided by the GN are reviewed regularly and as provided to identify caribou approaching the mine site, haul road or AWAR. Reviewing frequency of these maps increases when caribou numbers at or greater than GSTs are detected within distance thresholds, and around the sensitive season periods when caribou are detected within 50 km of the mine or associated infrastructure. This is done to prepare for increased monitoring/mitigation measures, or possible road shut-downs, especially during the sensitive

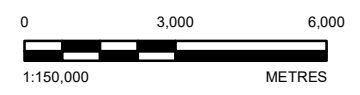
seasons. Map reviewing frequency is identified in **Figures 6 to 9**. See **Table 17** for seasonal specific GSTs.

During the June, 2018 TAG meeting, several topics were evaluated regarding sensory effects to caribou related to general monitoring to examine group size, distribution, seasonality and implement mitigation, blasting (see Section 3.4.2.4 for a study to be immediately implemented) and road interactions, particularly along the haul road in relation to traffic. To gather additional information on caribou interactions with the Whale Tail Haul Road, 20 remote cameras were placed along the haul road (**Figure 11**). This initial monitoring is to determine any trends related to distribution of caribou road crossing, effects of traffic/activity to caribou road monitoring, which can then guide more fine-scale mitigation of traffic, road activity and potentially roadside marker design.



**LEGEND**

- CARIBOU CAMERA MONITORING LOCATION
- WHALE TAIL**
- ESKER/QUARRY (APPROVED)
- ESKER/QUARRY (EXPANSION)
- ESKER/QUARRY (NEW)
- INFRASTRUCTURE
- HAUL ROAD
- MEADOWBANK OPERATION AND INFRASTRUCTURE
- WATERCOURSE
- WATERBODY



**REFERENCE(S)**

1. INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED, DRAWING AMQ 202504V5.DWG.
2. WATERCOURSE AND WATERBODY DATA OBTAINED FROM NATURAL RESOURCES CANADA. DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14

**CLIENT**

**AGNICO EAGLE**  
MEADOWBANK DIVISION

**PROJECT**

MEADOWBANK AND WHALE TAIL - TEMP

**TITLE**

**CARIBOU CAMERA MONITORING LOCATIONS**

CONSULTANT	DATE	REVISION
	YYYY-MM-DD	2018-12-13
	DESIGNED	CS
	PREPARED	CDB
	REVIEWED	CD
	APPROVED	CD

PROJECT NO. 18101195      CONTROL 4000/4030      REV. 0      FIGURE 11

PATH: Y:\msh\CAD-GIS\client\Agnico\_Eagle\_Mines\_Ltd\WHALE\_TAIL\09\_PROJECTS\18101195\_4000\_4030\_11\_CARIBOU\_CAMERA\_MONITORING\_LOCATIONS.mxd PRINTED ON: 2018-12-13 AT: 10:10:00 AM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

### **Caribou Satellite-Collaring Program**

*Methods:* As part of its ongoing monitoring program for the Project, Agnico Eagle is collaborating with the GN in a caribou satellite-collaring program in the Meadowbank RSA. The joint satellite-collaring program will provide seasonal and regional information on caribou distribution within the Meadowbank and Whale Tail RSAs, and data collected during spring and fall migration periods will inform mitigation and management activities. In collaboration with the GN, data are formally analyzed for caribou migration trends and analyzed annually.

Results of the analysis will be included in the annual Wildlife Monitoring Summary Report, as appropriate. In addition, Agnico Eagle has initiated an initial analysis to explore the extent of a potential ZOI from the Project and will provide this information as it is available. Collaring data provided to Agnico Eagle from GN supports monitoring and analyses (see **Figure 6** through **Figure 9**).

### **Height-of-Land Surveys**

*Methods:* Five, easily accessible, HOL survey locations are established along the Whale Tail Haul Road, one of which is near the Whale Tail Pit and another near the Vault Pit. Additional locations are being considered along the road itself, now that Haul Road construction has been completed and it appears there may be several vantage points along the Haul Road for caribou observations, which may ultimately replace and/or supplement the existing HOL survey locations. HOL and road side survey points will be adjusted based on an initial review of all known caribou observation data that intersects with the Haul Road. The locations are within 500 m of the Whale Tail Pit Haul Road, and provide an unobstructed view (up to 360<sup>0</sup>) of the surrounding terrain. **Appendix G** shows a viewshed analysis showing the amount of land available within a 4 km viewshed from each HOL survey location and a 1.5 km viewshed from the AWAR and Whale Tail Haul Road and includes available collar data. The HOL locations also show where caribou observations, signs, and trails were observed, which were used to guide these survey locations. The HOL surveys provide an 'early warning' system of the presence of caribou in proximity to the Whale Tail Pit and Haul Road after the collar data has shown that caribou may be moving towards the Project area and/or collars are within 50 km of the Project area. The surveys can be easily accessed from the Haul Road and will be conducted by environmental technicians or trained wildlife monitors. A minimum of 20 minutes will be spent surveying at each of the locations using a combination of naked eye, binoculars, and scopes. The surveyors will independently view the landscape for caribou starting at opposite cardinal directions and will scan 180° for 5 minutes at a time, but move 90° every 5 minutes. Results will then be compared to determine if GST is triggered, but consensus on numbers is not necessary as each survey will generate a separate result for each observer so that variability can be incorporated into detection rates. Further, where possible, this will also be tested with collar data. If feasible, a representative photo of the herd will be taken if GSTs (refer to decision trees) are exceeded; the environmental supervisor will be contacted immediately.

Information collected will be similar to that collected during systematic pits and mine site ground surveys (see **Table 13**, field data form in **Appendix D**, and **Appendix G**). Behavior of Ungulates

will also be recorded for each encounter and comments on disturbance related to a particular behavior (e.g., running) will be made (see field form in **Appendix D**).

A summary of field confirmation details regarding the viewscape analysis at HOL locations includes the following (M. Young, Dougan Associates, 2017, pers. comm.):

HOL Survey Point	Average Maximum Observable Distance	Comments
1	9.2 km	This site was slightly relocated to improve the visibility of the road. Small blind spots (50 to 100 m wide) facing S and NW
2	7.2 km	Small blind spots facing S, SW, and W
3	9.1 km	Small blind spots facing S, SE, NW, and E
4	8.9 km	Lars Qaqqaq identified this location as a movement corridor for Barren Ground Caribou Small blind spots facing SE, W
5	5.5 km	Road at this section is not currently built. Small blind spots facing SW, NW, NE. SW, and NE blinds spots to be opened up when eskers removed for road construction.

The viewshed analysis is an important component of the overall monitoring program as it provides direction for monitoring locations that best capture caribou movements through the Project area during the spring and fall migration periods. Consequently, the survey locations chosen based on the results of the viewshed analysis will be continually reviewed and updated with the TAG. Additional tasks remaining related to the viewshed and survey locations still need to be completed prior to construction of the Whale Tail Pit and Haul Road, which include the following:

- Additional HOL survey location is to be added on the west side of the Whale Tail Pit to capture areas not currently covered by survey locations as revealed in the viewshed analysis. Suitable locations will be determined in 2019 field season and tested.
- Selected points along the Haul Road may fill in monitoring gaps in the viewshed, these sites have not yet been selected but an initial set of locations will be determined in 2019, given that construction of the Haul Road has now been completed.
- Determine the amount of the landscape covered by HOL survey locations and roadside surveys within an area that buffers the HOL locations by 4 km and the road by 1.5 km to determine if there is sufficient monitoring coverage from the existing surveys.

*Frequency:* Surveys will be conducted weekly from December 16 to late March, twice per week from April to late May and mid-September to mid-December. Increased up to every two days as per triggars (see **Figures 6, 7, 9, and 10**).

#### **3.4.2.7 Project-Related Mortality – Vehicle Collisions**

*Methods:* Monitoring will be conducted during ground surveys at pits and the mine site, and along roads. Incident report (**Appendix D**) to be submitted following every vehicle collision with an Ungulate. The thresholds level of mortality beyond which further mitigation will be required is two mortalities per year (see **Table 14**).

*Frequency:* Incident reports (**Appendix D**) submitted when road-related mortalities occur. Ungulate mortality will be reviewed on an annual basis.

#### **3.4.2.8 Project-Related Mortality – Hunting by Baker Lake Residents**

*Methods:* As stated in the original TEMP (Cumberland 2006), the Hunter Harvest Study (HHS) was established to monitor the spatial distribution, seasonal patterns, and harvest rates prior to and following construction of the AWAR. A survey of hunter harvests was conducted among Baker Lake residents from 2007 through 2015; however, declining participant rates has led to reevaluation of the HHS approach.

Agnico Eagle has discussed and met with stakeholders (GN, KivIA, and HTO in November 2016 [Winnipeg], January and June 2017 [Ottawa]) and January 2019 to broaden the scope of the HHS and facilitate greater involvement of the local community in future years of the study.

The primary objectives of the HHS are to monitor potential Project related effects on harvesting of wildlife by residents of Baker Lake. This objective is achieved by estimating the following key metrics:

1. The distribution of caribou, muskox, and wolverine harvest by residents of Baker Lake; and
2. The total level (or an index of) caribou, muskox, and wolverine harvest by residents of Baker Lake.

Other objectives of the HHS may be established in consultation with TAG or other participants and may include:

1. Supporting creel surveys by gathering information on Arctic Char (*Salvelinus alpinus*), Lake Trout (*Salvelinus namaycush*), Lake Whitefish (*Coregonus clupeaformis*), and Arctic Grayling (*Thymallus arcticus*) catch rates and Inuit-use patterns in the Baker Lake area;
2. Understanding regional distribution of hunting and fishing activity;
3. Investigating seasonal timing of hunting and fishing activity; and
4. Determining whether increased harvest and catch rates are associated with the AWAR.

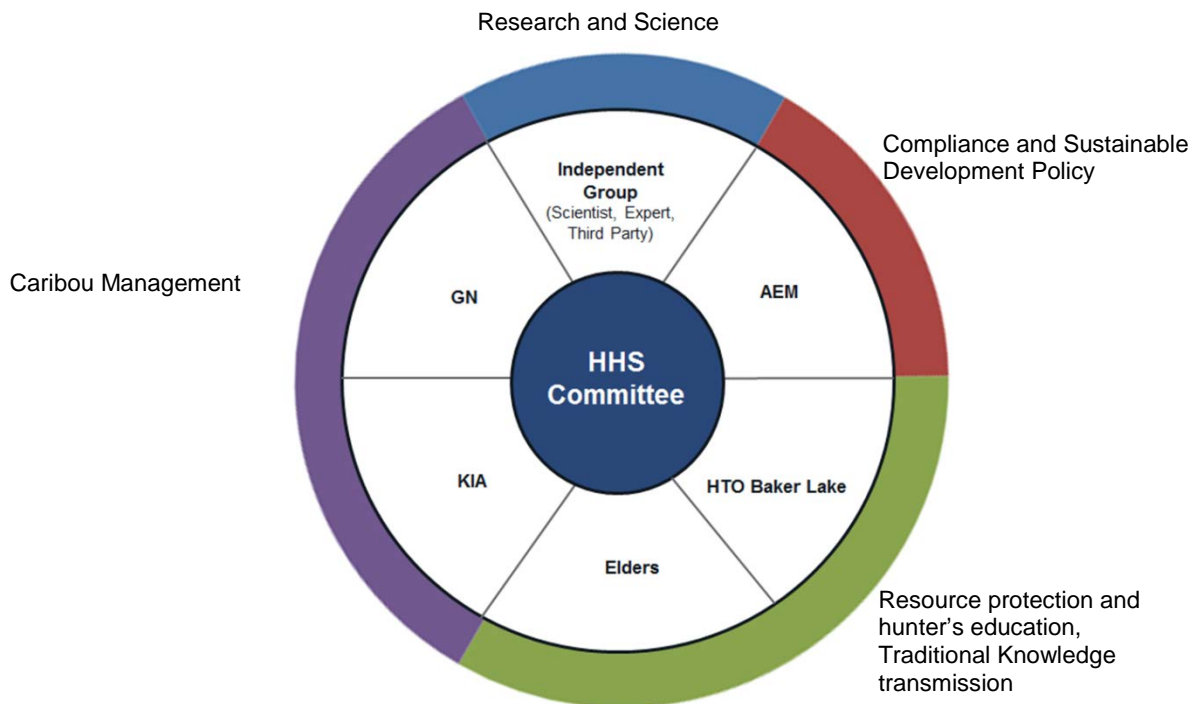


As discussed during consultation with stakeholders, HHS will further seek to:

- increase and maintain the hunter participant rate in the future of the program;
- improve resource protection,
- improve hunter awareness and education;
- increase the integration of Inuit Qaujimagatuqangit and Traditional Knowledge; and
- increase availability of data collected for a collective approach to understanding wildlife harvest, assist Agnico Eagle in mitigative actions and the GN in management decisions.

The HHS will promote involvement/partnership of the local stakeholders; including the HTO, Elders, GN officer, and KivIA in a collaborative format conceptually illustrated in **Figure 12**. Detailed survey methods, survey timing, and promotional strategies will tentatively include HHS Committee members visit hunter harvest study participants on a regular basis to document harvests and discuss general hunting trends and observations. The members will also conduct communication actions and post promotional material around the Hamlet of Baker Lake. The use of social media will also be assessed and potentially used to increase awareness within the community and especially towards a younger generation of hunters.

**Figure 12:** Conceptual Hunter Harvest Study Partnership, Participants, and Relevant Objectives



The HHS was reinstated prior to the 2019 spring caribou migration to facilitate the collection of hunter harvest data and greater inclusion of younger hunters. A summary of 2019 HHS activities will be provided at the fall 2019 TAG meeting.

*Frequency:* Data will continue to be collected at least quarterly and analyzed at the end of each calendar year and provided within the annual Wildlife Monitoring Summary Report.

### **3.4.3 Thresholds**

Should the thresholds outlined in **Table 14** exceeded, the following actions will be undertaken.

#### **3.4.3.1 Habitat Loss & Degradation**

See **Section 3.3.3**.

#### **3.4.3.2 Sensory Disturbance and Disruption of Movements**

Agnico Eagle has developed a tiered caribou monitoring procedure to increase levels of monitoring and mitigation if caribou are found to be in the vicinity of the site. **Figure 6** through **Figure 9** describes the tiers and triggers of this procedure and the appropriate actions to be undertaken.

#### **3.4.3.3 Project-Related Mortality – Vehicle Collisions**

If an Ungulate mortality occurs (i.e., threshold of two mortalities exceeded), an investigation into the circumstances and factors leading up to the incident will be conducted by the on-site Environmental Supervisor (see also the Incident Report Form, **Appendix D**). Where an incident has resulted from operator negligence, disciplinary action may be considered.

#### **3.4.3.4 Project-Related Mortality – Hunting by Baker Lake Residents**

If harvest rates are determined to be increasing significantly (as determined by the GN) as a result of Project infrastructure, Agnico Eagle, will request the Baker Lake HTO and GN investigate additional access control measures.

## **3.5 Predatory Mammals**

### **3.5.1 Objectives**

The primary objective of the Predatory Mammal monitoring program in the Project area will be to evaluate the success of preventative programs designed to proactively avoid the occurrence of problem animals and detect thresholds, as opposed to reactively trying to manage them by relocation or destruction.

### **3.5.2 Monitoring Approach**

**Table 18** describes the framework that has been established for monitoring effects to Predatory Mammals.

**Table 18:** Monitoring Approach for Predatory Mammals at the Meadowbank, Whale Tail Project and proposed Whale Tail Expansion

Potential Effect	Impact Prediction	Quantitative Monitoring Variable	Thresholds	Monitoring Activity	Frequency
Project-related mortality	Predatory Mammals will not be killed as a result of Project activities	Number of grizzly bears, wolves and wolverines killed	Two individuals of the same species in a year	Pits and mine site ground surveys	Weekly, at least. Includes inspections of waste streams to ensure no attractants for Predatory Mammals
				Road surveys	Weekly, at least
				Incident and vehicle encounter reports	Ongoing (when incidents with wildlife occur)
				Baker Lake Hunter Harvest Study (for wolverines)	Initiated in 2007, stopped in 2015 and scheduled for re-implementation in 2017 Quarterly data collection; Yearly reporting
Disturbance of Den Sites	Active Predatory Mammal dens will not be destroyed or disturbed to the point of den abandonment	Number of active grizzly bear, wolf or wolverine dens destroyed or abandoned due to sensory disturbances	One active den	Den-specific management plan, active den site surveys	Initiated by the detection of an active Predatory Mammal den (grizzly bear, wolf or wolverine) within the active footprint or vicinity of Project facilities. See <b>Figure 12</b> . Frequency of den monitoring will be determined by season, species and location. See <b>Appendix I</b>

### 3.5.2.1 Project-Related Mortality

*Methods:* Methods are the same as those described for Ungulates (**Section 3.5.2**). The threshold level of mortality beyond which further mitigation will be required is two individuals per year (see **Table 14**). The pits and mine site ground surveys will include inspections of waste streams to ensure no attractants for Predatory Mammals. In addition, the hunter harvest study (see **Section 3.3.2**) will investigate potential increases in wolverine mortality related to the road.

*Frequency:* The number of grizzly bear, wolf, and wolverine mortalities will be analyzed on an annual basis with findings presented in the annual Wildlife Monitoring Summary Report (see **Table 18**).

### 3.5.2.2 Disturbance of Den Sites

*Methods:* For existing operations, data will be collected on Arctic wolf abundance and behaviour during ground surveys, vehicle surveys, and HOL surveys. Should the wildlife technician suspect or confirm that a den is present within the active footprint and vicinity of Project facilities or roads, a den management plan will be prepared (see **Appendix I** for required components of den management plans). For new development sites, suitable habitat within 1 km of new development site will be investigated on foot for active wolf dens. In the event that wolverine or grizzly bear dens are discovered, den management strategies with appropriate timing windows will be

developed for these species. The thresholds beyond which further mitigation will be required is discovery of one active den (see **Figure 13** and **Table 18**).

*Frequency:* See **Table 14** for frequency of ground, road, and HOL surveys, see **Figure 13, Section 3.5.3** for further mitigation strategy to be undertaken upon discovery of an active Predatory Mammal den.

### **3.5.3 Thresholds**

Should the thresholds outlined in **Table 18** be exceeded, the following actions will be undertaken.

#### **3.5.3.1 Project-Related Mortality**

The basic course of action is to contact the appropriate conservation officer with the Hamlet of Baker Lake and the GN, and to discuss additional mitigation options. At the discretion of the Agnico Eagle Environment Supervisor, GN conservation officer and the KivIA land inspector, if grizzly bears, wolverines, or wolves become problems and need to be dispatched or get killed in vehicle collisions (i.e., thus exceeding the threshold mortality of two despite efforts to avoid habituation and/or food conditioning), alternative mitigation action may be required. Regular inspections of waste streams will identify possible attractants and respond immediately with improved waste management approaches. Detailed reports for dealing with problem wildlife will be issued and are provided as an example in **Appendix C**.

#### **3.5.3.2 Disturbance of Den Sites**

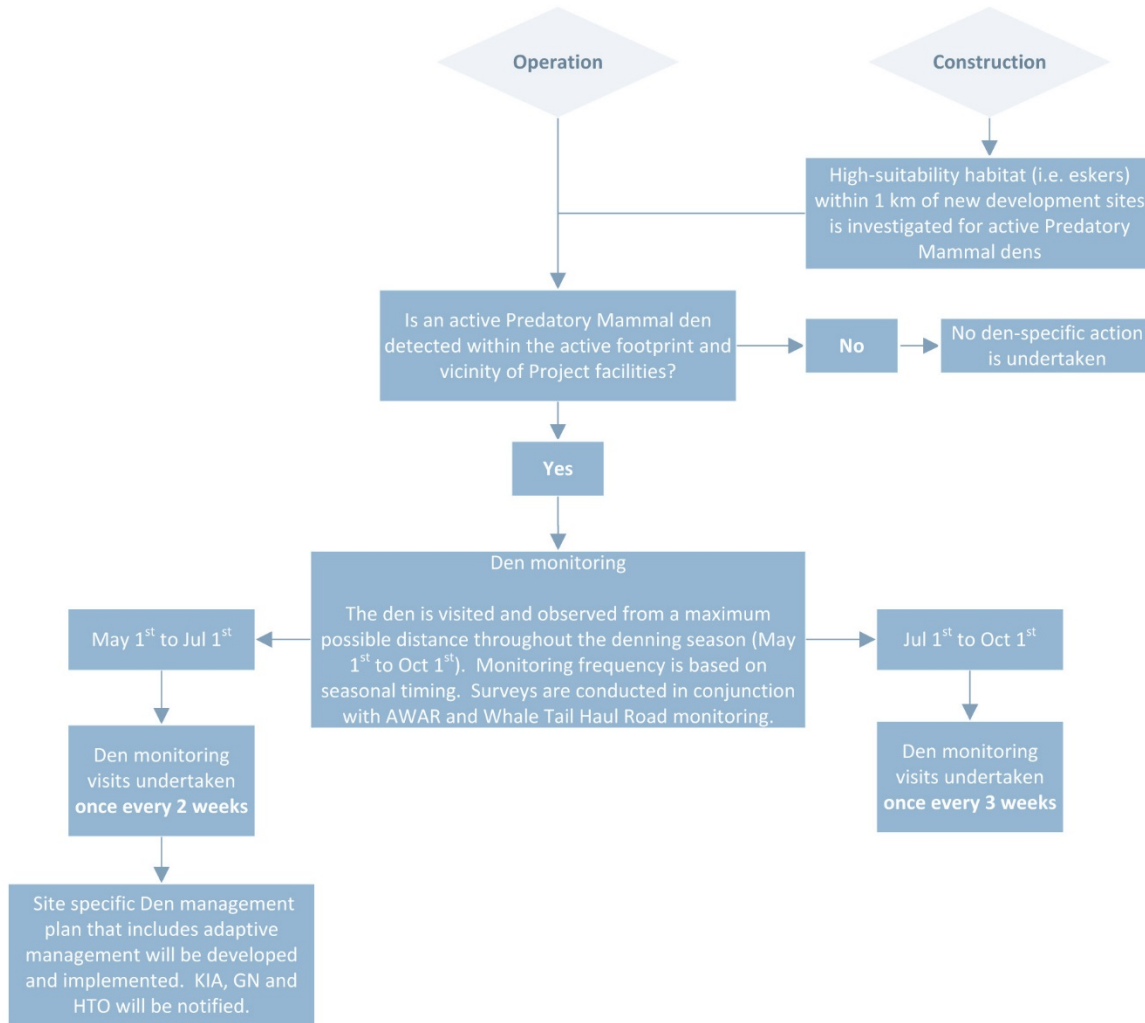
If an active Predatory Mammal den is detected within the active footprint or in the vicinity of Project facilities, a den management plan will be developed (see **Figure 13** and **Appendix I** for details). The plan will include consultation with the GN with respect to obligations under *The Wildlife Act*, SNU 2003, c. 26. Ground personnel and vehicle access will be restricted in the vicinity of the den as needed to minimize disturbances at the den. The den management plan outlines a monitoring schedule (dependent on seasonal timing) and will inform further mitigation strategies as required. See **Appendix I** for Den Management and Protection Plan components.

Based on the findings from den monitoring, disturbance mitigation may be required, including increased frequency of den site monitoring, vehicle access restrictions, alterations to Project operation, or work stoppage in the vicinity of the den. Dens will be observed from a distance of at least 300 m with a spotting scope, and information on location, behaviour and number of juveniles will be determined, where possible. **Figure 13** below outlines the steps to be taken if a den is found during monitoring activities.

*Example of mitigation and monitoring in action:* if construction is proposed within 1 km of high-suitability denning habitat (i.e., eskers), these areas will be investigated for signs of denning (wolf pack, defensive behaviour, pups). If a den is confirmed within the active footprint or in the vicinity of Project facilities, monitoring will be undertaken from the maximum possible distance to determine if Project activities are inducing stress responses. See **Figure 13** for monitoring frequencies. If Wolves are showing signs of stress, further restrictions on vehicle access or other adaptive mitigation options may need to be considered.

See **Appendix I** for recommended Den Management and Protection Plan components.

**Figure 13:** Thresholds for Monitoring and Mitigation of Predatory Mammal Dens in Proximity to the Project



### 3.6 RAPTORS

#### 3.6.1 Objectives

The primary objective of ongoing monitoring surveys for nesting Raptors evaluate the success of mitigation to prevent disturbance to raptors or raptor nests, to test for thresholds, and to determine the level of Project-related effects. Nest-specific management plans for nesting birds will reduce the potential for birds to abandon nests due to high noise or activity levels.

### 3.6.2 Monitoring Approach

**Table 19:** describes the framework that has been established for monitoring effects to Raptors.

**Table 19:** Monitoring Approach for Raptors at the Meadowbank, Whale Tail Project and proposed Whale Tail Expansion

Potential Effect	Impact Prediction	Quantitative Monitoring Variable	Thresholds	Monitoring Activity	Frequency
Disturbance of Nesting Raptors	Nest failures are not Project-related	Nest success	Failure of nest monitored through a Nest Protection Plan	Active Raptor nest monitoring	Daily during nesting season (May 1 to September 15) if active nest on Project facilities or within 500 m of activity Weekly if not within area of concern (see <b>Figure 13</b> )
Project-related Mortality	Raptors will not be killed at the Project site or along roads	Number of raptors killed	1 individual	Pits and mine site ground surveys	Weekly, at least
				Road surveys	Weekly, at least
				Incident and vehicle encounter reports	Ongoing (when incidents with wildlife occur)

#### 3.6.2.1 Nest Monitoring

*Methods:* For existing operations, data will be collected on Raptor abundance and behaviour during ground, road, and height-of-land surveys. For active nests within the active footprint and within 1.5 km (AANDC 2011) of Project facilities a site-specific raptor response plan will be developed and implemented. Daily surveys will be conducted for nests within the area of concern while weekly surveys will be conducted for nests outside the area of concern. The plan will outline automatic minimum no-disturbance buffers around all raptor nests located in proximity to the Project. Project activities including the operation of vehicles, heavy equipment, aircraft and blasting shall be prohibited within these buffers unless an exception is specified within a nest specific management plan that has been reviewed and approved by the GN, subject matter experts and other relevant parties. The size of minimum, no-disturbance buffers shall be based on the BC guidelines for Raptor Conservation or similar guidelines as recommended by the TAG.

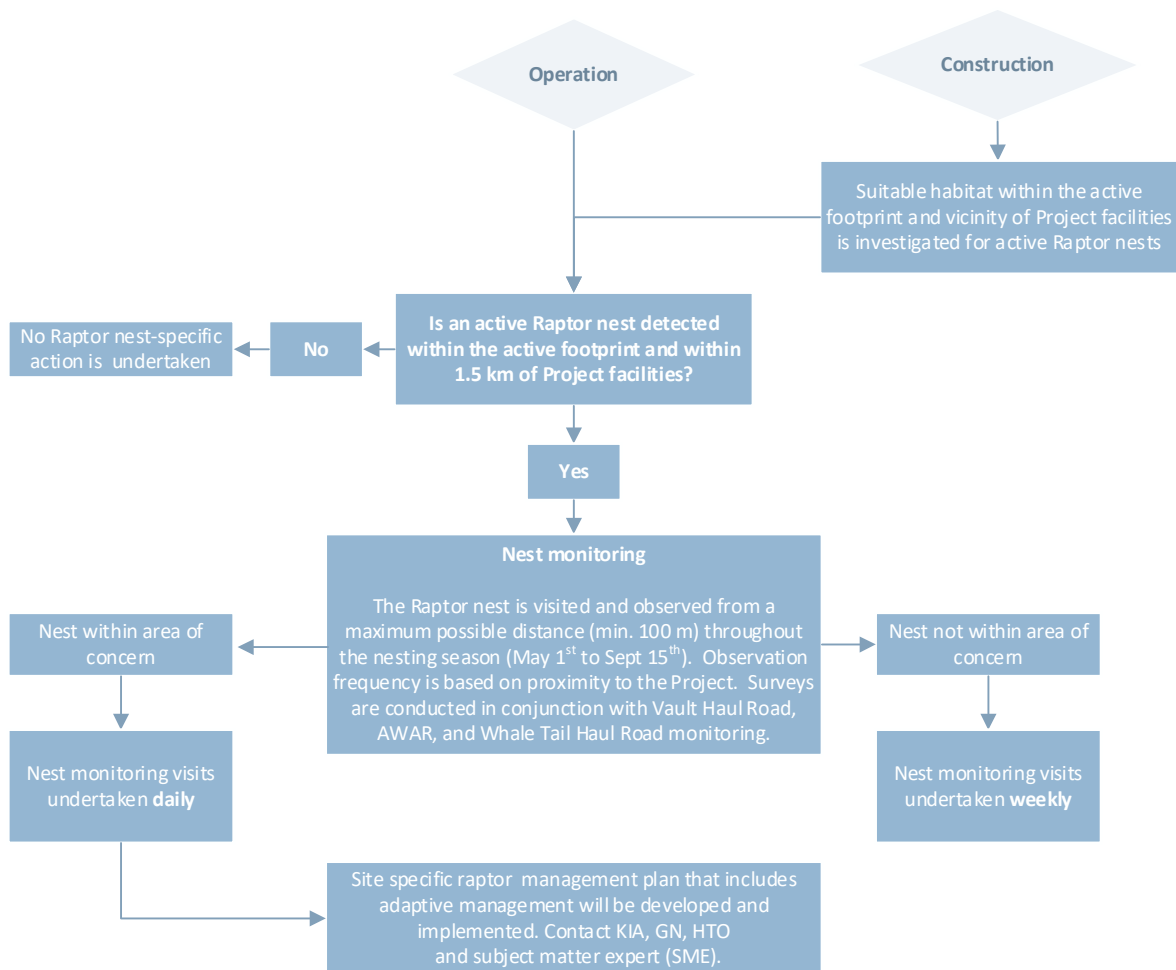
In accordance with Project Certificate No.008, Condition 36, Agnico Eagle will consult and review the raptor mitigation plan with the GN, prior to undertaking discouragement and in accordance with obligations under the *Wildlife Act* (SNU 2003, c. 26). Furthermore, the GN will be contacted prior to removal or deterrence of raptors to obtain a permit if required. To discourage raptors from nesting on pit walls and Project facilities, protocols outlined in the 'Peregrine Falcon Management and Protection Plan on the Meadowbank Gold Project Site' will be followed (see **Appendix E**). The plan also outlines management and mitigation around nests that have become established on Project facilities.

For new development sites, suitable habitat within 1.5 km of the sites will surveyed on foot for active Raptor nests. No-disturbance buffers will be established around detected active nests, in line with British Columbia Guidelines for Raptor Conservation (2013) or similar guidelines, and will be

monitored from a distance of 100 m with a spotting scope (or closer if not interfering with no-disturbance buffers), and information on location, behaviour, number of eggs, number of chicks, and number of fledged young will be determined, if possible. A raptor researcher or subject matter expert will be consulted as needed. The threshold beyond which further mitigation will be required is disturbance of one active Raptor nest (**Table 19**).

*Frequency:* During the nesting season (May 1 to September 15), if an active nest is within the active footprint and vicinity of Project facilities and within an area of concern, surveys will be conducted as per **Figure 14**. If disturbance to an active raptor nest is detected, mitigation and monitoring will be initiated (see **Figure 14**).

**Figure 14:** Thresholds for Monitoring and Mitigation of Raptor Nests in Proximity to the Project



### **3.6.2.2 Project-Related Mortality**

*Methods:* Methods are the same as for the ground surveys, road surveys, and Incident reports described for Ungulates (**Section 3.5.2**). The threshold level of mortality beyond which further mitigation will be required is one (1) Raptor per year (see **Table 19** and **Appendix E** for details).

*Frequency:* Incident reports are filed when a Raptor mortality occurs. The number of Raptor mortalities will be analyzed on an annual basis with findings presented in the annual Wildlife Monitoring Summary Report.

### **3.6.3 Thresholds**

Should the thresholds outlined in **Table 19** be exceeded, the following actions will be undertaken.

#### **3.6.3.1 Nesting Monitoring**

In consultation with the subject matter expert, a nest management plan will be developed for active nests established within an area of concern (e.g., within active footprint or in close vicinity of Project facilities) and will include a monitoring schedule based on the proximity of the nest to the Project. The management plan will also review disturbance levels at the nest to inform active management requirements (see **Figure 14**). Where recommended mitigation are not considered adequate for reducing disturbance to nesting raptors (determined through the nest management plan monitoring), more stringent mitigation, such work stoppage for nearby operations, may be implemented.

#### **3.6.3.2 Project-Related Mortality**

If the threshold mortality level for Raptors is exceeded, further mitigation will be implemented as described for Ungulates (**Section 3.5.3**).

## **3.7 Waterbirds**

### **3.7.1 Objectives**

The primary objective will be to determine the effectiveness of mitigation efforts to prevent or reduce effects from the Project, to test for thresholds, and to describe Project-related effects to Waterbirds.

### **3.7.2 Monitoring Approach**

**Table 20** describes the framework that has been established for monitoring effects to Waterbirds.



**Table 20:** Monitoring Approach for Waterbirds at the Meadowbank, Whale Tail Project and proposed Whale Tail Expansion

Potential Effect	Impact Prediction	Quantitative Monitoring Variable	Thresholds	Monitoring Activity	Frequency
Habitat Loss and Degradation <b>Meadowbank Mine and Vault Site</b>	Loss <EIA prediction and subsequent approvals (see Gebauer et al., 2015)	Area of altered habitat	10% above predicted EIA High suitability values. <b>Meadowbank Mine and Vault</b> – 518 ha	Habitat monitoring	Every three years post-construction
Habitat Loss and Degradation <b>Meadowbank AWAR</b>	Loss <EIA prediction and subsequent approvals (see Gebauer et al., 2015)	Area of altered habitat	10% above predicted EIA High suitability values. <b>Meadowbank AWAR</b> – 22 ha	Habitat monitoring	Every three years post-construction
Habitat Loss and Degradation <b>Whale Tail Pit and Haul Road</b>	Given the minimal effects associated with the Meadowbank project, habitat loss effects on Waterbird were not considered an issue and were screened out during the EA (Golder 2016)				
Loss of nests due to flooding <b>Whale Tail Pit</b>	Nests will be lost due to flooding during nesting season	See the Migratory Bird Protection Plan ( <b>Appendix F</b> )			
Project-related Mortality	Waterbird will not be killed at the Project	Number of Waterbird killed	1 individual	Pits and mine site ground surveys	Weekly, at least
				Road surveys	Weekly, at least
				Incident and vehicle encounter reports	Ongoing (when incidents with wildlife occur)

### 3.7.2.1 Habitat Loss & Degradation

*Methods:* Habitat loss and degradation will be monitored and assessed through the Wildlife Habitat monitoring program (see **Section 3.3.2** for details). An analysis of the loss of High suitability habitats will be conducted and compared to thresholds (see **Table 20 and Appendix F**).

*Frequency:* See **Section 3.3.2**.

### 3.7.2.2 Project-Related Mortality

*Methods:* Methods are the same as for the ground and road surveys, and Incident reports described for Ungulates (**Section 3.5**). However, reporting for migratory bird mortalities and incidents need to be directed to ECCC (reports are to be sent to: ec.dalfnord-wednorth.ec@canada.ca, ec.eenordrpnnu-eanorthpnnu.ec@canada.ca). The threshold level of mortality beyond which further mitigation will be required is one (1) Waterbird per year (see **Table 20**).

*Frequency:* See **Table 20**. The number of Waterbird mortalities will be analyzed on an annual basis with findings presented in the annual Wildlife Monitoring Summary Report.

### **3.7.3 Thresholds**

Should the thresholds outlined in **Table 20** be exceeded, the following actions will be undertaken.

#### **3.7.3.1 *Habitat Loss & Degradation***

See **Section 3.3.2**.

#### **3.7.3.2 *Disturbance of Nesting Waterbird***

Where disturbances to nesting Waterbirds are observed beyond the acceptable threshold (see **Table 20**), further mitigation will be discussed and implemented in consultation with ECCC to minimize effects. As per Project Certificate No.008, Condition 34, Agnico Eagle will maintain a Migratory Bird Protection Plan (**Appendix F**), which will be updated as needed in consultation with Environment and Climate Change Canada (ECCC). Studies will be undertaken in collaboration with Trent University beginning in 2018 and through the flooding phases of the Whale Tail Pit and proposed expansion project. As per condition 34, results will be presented to NIRB on an annual basis.

#### **3.7.3.3 *Project-Related Mortality***

If the threshold mortality level for Waterbirds is exceeded, further mitigation will be discussed and implemented in consultation with ECCC to minimize effects.

## **3.8 UPLAND BREEDING BIRDS**

### **3.8.1 Objectives**

The primary objective of the monitoring program for ptarmigan, shorebirds, passerines, and other upland breeding birds is to collect information that contributes to national monitoring databases by undertaking the Protocol for Regional and International Shorebird Monitoring (PRISM) and complete a North American Breeding Bird Survey Route every three years, or as agreed upon by ECCC, for contribution to this program, and mitigation monitoring. While these protocols will contribute data to national databases, they are unsuited to detecting Project-related effects. Previous studies at other similar developments have found that effects to upland birds are either undetectable or not biologically significant at a population level (see **Section 2.3.6**).

### **3.8.2 Monitoring Approach**

The PRISM and North American BBS surveys are intended to contribute to national databases administered by ECCC (2012), and are not linked to an impact prediction or threshold. PRISM plots and North American BBS surveys will be conducted every three years; stations locations and methods will be developed in consultation with ECCC.

### **3.8.2.1 Habitat Loss & Degradation (monitored via habitat monitoring)**

*Methods:* Habitat loss and degradation will be monitored and assessed through the Wildlife Habitat monitoring program (see **Section 3.3.2** for details). An analysis of the loss of High suitability habitats will be conducted and compared to thresholds (see **Table 20**).

*Frequency:* See **Section 3.3.2**.

## **3.9 TRAFFIC MANAGEMENT**

A Traffic Management Program will be implemented along the AWAR and Whale Tail Haul Road. Drivers will report all caribou and wildlife observations, and speed limits will be enforced to reduce potential interactions with wildlife. Traffic data along the AWAR and Whale Tail Haul Road to be collected include:

- Unique vehicle descriptions (haul truck, light vehicle, bus, etc.), including:
  - Vehicle class
  - Grouped vehicle descriptions (convoy, single, etc.)
- Unique to/from abbreviations
- Departure/Arrival times

Currently, vehicle passages are recorded by dispatch for the AWAR and the Whale Tail Haul Road. This information can be used to determine the intensity of traffic, particularly as it relates to caribou interactions with the mine and associated infrastructure, and any mitigation implemented. In addition, caribou will be given right-of-way on all roads, and drivers will be required to slow down and/or stop if caribou are near the road. Vehicle-specific mitigation measures to minimize effects to ungulates on the AWAR and Whale Tail Haul Road are presented in Table 7 (Section 2.3.2.2).

Traffic data collected annually for the AWAR and Whale Tail Haul Road will be checked for accuracy and evaluations against predictions made in the FEIS will be completed. This information will be presented on an annual basis as part of the TEMP annual report. Adaptive management measures will be considered if evaluations demonstrate an exceedance of predictions made in the EIAs with regards to traffic related to the Project.

Currently Agnico Eagle is reviewing stockpile management as an adaptive management strategy to reduce traffic frequency on the Haul Road during caribou migration periods while increasing hauling frequency between these sensitive seasons. This information will be shared as available (e.g., review process for Whale Tail Expansion Project) and at the fall 2019 TAG meeting.

## **4. REPORTING**

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A Wildlife Monitoring Summary Report will be provided annually summarizing the terrestrial ecosystem monitoring activities and results of the previous calendar year. The summary report will discuss the accuracy of predictions of the effect of the Project on the various wildlife VECs, the success of mitigation (i.e., whether any thresholds are exceeded), briefly describe new measures taken through the adaptive management approach, visually present results of all monitoring activities, and recommendations for mitigation and monitoring activities in the current year. An attempt will be made to distinguish between Project-related changes and natural variations in wildlife populations.

The annual Wildlife Monitoring Summary Report will allow regulators and other stakeholders to review and contribute insight, expertise, and suggestions for improving wildlife management activities within the Project area. To ensure the reported information is accessible for all stakeholders, the summary report will be concise, visual and simple in format.

As per Project Certificate No.008, Condition 33, Agnico will provide wildlife incident reports to the appropriate authorities in a timely fashion (ECCC and the GN, amongst others as required). These reports will provide the following information: location coordinates (i.e., latitude and longitude or UTM), species, number of animals, sex, age class (if possible), and a description of the animal activity.

Further, a comprehensive data analysis report will be prepared at three-year intervals (in addition to the annual Wildlife Monitoring Summary Report). The comprehensive report will consider questions such as the ZOI, deflection of caribou by the road, the efficacy of mitigation, or other such questions depending on the availability of data. The comprehensive reports should focus on specific areas of concern and specific VCs, as the Wildlife Monitoring Summary Report provides this overview.

Agnico Eagle will have the full responsibility for all aspects of the monitoring program (implementation, monitoring, reporting) and the plan will be reviewed and updated as deemed necessary.

### **4.1 MITIGATION AUDIT**

The mitigation described in this document stems from current practices at existing mines, or was suggested during the environmental assessment process. However, an auditing system is required to evaluate the use and effectiveness of the mitigation, following the principals of adaptive management. In other words, it should be confirmed that the mitigation proposed here is used and that it works. Further, new mitigation should be documented. As an example, per Project Certificate No.008, Condition 32, Agnico Eagle will engage with the Baker Lake Hunters and Trappers Organization and other relevant parties to ensure that safety barriers, berms, and designed crossings associated with project infrastructure, including the haul road are constructed and operated as necessary to allow for the safe passage of caribou and other terrestrial wildlife. The audit will be undertaken annually, specific to audit the mitigation listed in Section 2, which requires Agnico Eagle to evaluate:

- if all mitigation has been implemented
- which mitigation is perceived to be or shown to be successful
- if new mitigation has been implemented in response to new issues
- if some mitigation is redundant

This audit is implemented annually, as part of the annual report.

#### **4.2 TERRESTRIAL ADVISORY GROUP**

As per Project Certificate No.008, Condition 27 Agnico Eagle is committed to the establishment of a Terrestrial Advisory Group (TAG) consisting of representatives, at a minimum, from the following organizations:

- Agnico Eagle
- the Government of Nunavut Department of Environment (GN-DoE)
- the Kivalliq Inuit Association (KivIA)
- the Hunters and Trappers Organization (HTO) of Baker Lake

Other organizations that may participate in the TAG include ECCC, Nunavut Tunngavik Inc (NTI), and others.

The terms of reference for this TAG will be discussed and completed by Q3 2019. Items that will be identified as part of the TAG terms of reference will include the following:

- Reporting frequency for annual and comprehensive analysis (e.g., every 3 years)
- Monitoring outcomes
- Mitigation summary (i.e., operation cessation, shutdowns, etc.)
- Mitigation improvements
- Learnings from other mines
- Opportunity for all parties to contribute for continuous improvement of the TEMP

Agnico Eagle will provide a summary of the outcomes from the TAG meetings to the NIRB on an annual basis in the annual report.

## 5. LITERATURE CITED

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- AANDC (Aboriginal Affairs and Northern Development Canada). 2011. Northern Land Use Guidelines – Volume 9a Seismic Operations.
- Agnico Eagle. 2016. Meadowbank Mine 20145 Wildlife Monitoring Summary Report.
- Agnico Eagle. 2014. Wildlife Screening Level Risk Assessment for the Meadowbank Gold Project.
- Agnico Eagle. 2018. Air Quality and Dustfall Monitoring Plan. In Accordance with NIRB Project Certificate Terms and Conditions No.004 and No.008. May 2018. Version 3.
- Benitez-Lopez, A., R. Alkemade, and P. A. Verweij. 2010. The impacts of roads and other infrastructure on mammal and bird populations: a meta-analysis. *Biological Conservation* 143(6): 1307-1316.
- BHPB (BHP Billiton Diamonds Inc.). 2004. EKATI Diamond Mine 2003 Wildlife Effects Monitoring Program. Prepared by Golder Associates Ltd. for BHP Billiton Diamonds Inc., Yellowknife, Northwest Territories. January 2004
- Boulanger J, K.G. Poole, A. Gunn, and J. Wierzchowski. 2009. The zone of influence for migratory tundra Caribou around Canada's Arctic diamond mines: estimation and implications. Unpublished report.
- Boulanger, J., K. G. Poole, A. Gunn, and J. Wierzchowski. 2012. Estimating the zone of influence of industrial developments on wildlife: a migratory Caribou and diamond mine case study. *Wildlife Biology* 18: 164-179.
- British Columbia (Government). 2013. Guidelines for Raptor Conservation.
- Chen, W.J., S.G. Leblanc, H.P. White, C. Provost, B. Milakovic, C. Rock, G. Sharam, H. O'Keefe, L. Corey, B. Croft, A. Gunn, S. van der Wielen, A. Football, B. Tracz, J. S. Pellissey and J. Boulanger. 2017. Does dust from arctic mines affect caribou forage? *Journal of Environmental Protection*, 8: 258–276.
- Cluff, H. D., L. R. Walton, and P. C. Paquet. 2002. Movements and habitat use of wolves denning in the central Arctic Northwest Territories and Nunavut, Canada. West Kitikmeot/Slave Study Society. Yellowknife, NT.
- Cumberland (Cumberland Resources Ltd.) 2005a. Meadowbank Gold Project. Environmental Impact Assessment. October 2005.
- Cumberland. 2005b. Meadowbank Gold Project. Baseline Terrestrial Ecosystem Report. October 2005.
- DOE, Nunavut Department of Environment. 2005. KIA Land Use Application for Meadowbank Gold Project. Letter to NIRB, April 13, 2005.

- DOE, Nunavut Department of Environment. 2009. Environmental Guideline for Contaminated Site Remediation. Available online at: <http://www.gov.nu.ca/sites/default/files/Guideline%20Contaminated%20Site%20Remediation.pdf>
- Dougan & Associates (Dougan & Associates and Nunavut Environmental Consulting). 2015. Whale Tail Pit & Whale Tail Haul Road Terrestrial Baseline Characterization Report. Prepared for Agnico Eagle Mines Ltd.
- Dougan & Associates. 2017. Whale Tail Pit, V-Zone & Whale Tail Haul Road Project Area, Comprehensive Terrestrial Baseline Characterization Report. Prepared for Agnico Eagle Mines: Meadowbank Division. December 2017.
- Environment and Climate Change Canada (ECCC). 2012. Arctic Program for Regional and International Shorebird Monitoring (Arctic PRISM). Available online at: <http://www.ec.gc.ca/reom-mbs/default.asp?lang=En&n=FC881C1B-1>
- ERM. 2017. Back River Project Wildlife Mitigation and Monitoring Program Plan. Prepared for Sabina Gold and Silver Corp. by ERM Ltd.
- Everett, K. R. 1980. Distribution and properties of road dust along the northern portion of the haul road. In J. Brown and R. L. Berg (ed.). Environmental engineering and ecological baseline investigations along the Yukon River-Prudhoe Bay Haul road. Cold Regions Research and Engineering Laboratory. Pp 101-128.
- Flydal, K., A. Hermansen, P.S. Enger and E. Riemers. 2001. Hearing in reindeer (*Rangifer tarandus*). Journal of Comparative Physiology A. 187: 265 - 269.
- Gebauer, M., A. Crampton, C. Lee, J. Boulanger, J. Shaw, and I. Laing. 2012. Meadowbank Mine: 2011 Wildlife Monitoring Summary Report. Can be found in Agnico Eagle Mines Ltd. 2011 Annual Report.
- Gebauer, M., A. Crampton, J. Shaw, and I. Laing. 2015. Meadowbank Mine: 2014 Wildlife Monitoring Summary Report. Can be found in Agnico Eagle Mines Ltd. 2014 Annual Report.
- Gebauer, M., A. Crampton, J. Shaw, and I. Laing. 2016. Meadowbank Mine: 2015 Wildlife Monitoring Summary Report. Can be found in Agnico Eagle Mines Ltd. 2015 Annual Report.
- Gebauer, M., A. Crampton, M. Huntley, J. Boulanger, J. Shaw, and I. Laing. 2013. Meadowbank Mine: 2012 Wildlife Monitoring Summary Report. Can be found in Agnico Eagle Mines Ltd. 2012 Annual Report.
- Golder (Golder Associates Ltd.). 2008. Snap Lake Mine: analysis of environmental effects on wildlife 1999 to 2007. Prepared by Golder Associates Ltd. for De Beers Canada Ltd, Yellowknife, NWT, Canada.

- Golder. 2011a. Analysis of environmental effects from the Diavik Diamond Mine on wildlife in the Lac de Gras Region. Prepared for Diavik Diamond Mines Inc., Yellowknife, NWT.
- Golder. 2011b. Effects of development on Barren-ground Caribou: insight from IQ and an ecological model. Prepared by Golder Associates Ltd. for the Kugluktuk Hunters and Trappers Organization.
- Golder. 2016. Whale Tail Pit Final Environmental Impact Statement Amendment.
- Golder. 2018. Final Environmental Impact Statement (FEIS) Addendum: Whale Tail Pit – Expansion Project. Submitted to the Nunavut Impact Review Board (NIRB), November, 2018.
- Golder. 2017. Caribou Road Mitigation Plan for the Jay Project. Prepared for Dominion Diamond Ekati Corporation by Golder Associates Ltd.
- Griffin, P.C., B.C. Lubow, K.J. Jenkins, D.J. Vales, B.J. Moeller, M. Reid, P.J. Happe, S.M. Mccorquodale, M.J. Tirhi, J.P. Schaberl and K. Beirne. 2013. A hybrid double-observer sightability model for aerial surveys. *Journal of Wildlife Management* 77: 1532–1544.
- Hines, J. E., and M. O. Wiebe. 1997. Recommended minimum altitudes for aerial flying near birds in the Inuvialuit Settlement Region. Canadian Wildlife Service, Yellowknife, NT. Unpublished document.
- Inman, R. N., A. J. Magoun, J. Persson, and J. Mattisson. 2012. The Wolverine's niche: linking reproductive chronology, caching, competition, and climate. *Journal of Mammalogy* 93(3): 634-644.
- Johnson, C. J., M. S. Boyce, R. L. Case, H. D. Cluff, R. J. Gau, A. Gunn, and R. Mulders. 2005. Quantifying the cumulative effects of human developments: a regional environmental assessment for sensitive Arctic wildlife. *Wildlife Monographs* 160.
- Male, S.K. and E. Nol. 2005. Impacts of roads associated with the Ekati Diamond Mine TM, Northwest Territories, Canada, on reproductive success and breeding habitat of Lapland Longspurs. *Canadian Journal of Zoology* 83: 1286-1296.
- May, R., L. Gorini, J. V. Dijk, H. Broseth, J. D. C. Linell, and A. Landa. 2012. Habitat characteristics associated with Wolverine den sites in Norwegian multiple-use landscapes. *Journal of Zoology* 287(3): 195-204.
- Mueller, F. P. 1995. Tundra esker systems and denning by Grizzly Bears, wolves, foxes and ground squirrels in the central Arctic, Northwest Territories. Department of Renewable Resources, Government of the Northwest Territories. Yellowknife, NT.
- OMOE (Ontario Ministry of Environment). 1978. Model Municipal Noise Control By-Law – Final Report. Noise Pollution Control Publication 119.
- Poole, K, and A. Gunn. 2012. Mobile Caribou Conservation Measures. Kivalliq Wildlife Board Caribou Workshop, Rankin Inlet.



- Poole, K. and A. Gunn. 2016. Management of caribou post-calving areas in the Kivalliq Region, Nunavut. Prepared for the Kivalliq Inuit Association.
- Reijnen, R., R. Foppen, and H. Meeuwsen. 1996. The effects of traffic on the density of breeding birds in Dutch agricultural grasslands. *Biological Conservation* 75: 255-60.
- Reimers, E. J.E. Colman. 2001. Reindeer and caribou (*Rangifer tarandus*) response towards human activity. *Rangifer* 26: 55 – 71.
- Rescan (Rescan Environment Services Ltd.). 2007. Ekati Diamond Mine 2006 Wildlife Effects Monitoring Program. Yellowknife, NWT, Canada.
- Rescan. 2010. 13-Year Breeding Bird Monitoring Program Summary. Report prepared for BHP Billiton Canada Inc. by Rescan Environmental Services Ltd., March 2010.
- Smith, A. C., J. A. Virgl, D. Panayi, and A. R. Armstrong. 2005. Effects of a diamond mine on tundra-breeding birds. *Arctic* 58(3): 295-304.
- Young, M.Y. 2017. Landscape Architect, Ecologist. Dougan & Associates – Ecological Consulting & Design, Guelph, ON. E-mail with R. Vanengen (Agnico Eagle). July 2017.
- Vale, C. G., S. L. Pimm, and J. C. Brito. 2015. Overlooked mountain rock pools in deserts are critical local hotspots of biodiversity. *PLoS one*, 10(2), e0118367.
- Walker, D. A., and K. R. Everett. 1987. Road dust and its environmental impact on Alaskan taiga and tundra. *Arctic and Alpine Research* Vol. 19, No. 4, Restoration and Vegetation Succession in Circumpolar Lands: Seventh Conference of the Comité Arctique International (Nov., 1987), pp. 479-489.
- Walsh, D.P., C.F. Page, H. Campa III, S.R. Winterstein, and D.E. Beyer Jr. 2009. Incorporating estimates of group size in sightability models for wildlife. *Journal of Wildlife Management* 73: 136–143.

# APPENDIX A

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## Screening Level Risk Assessment Plan

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MEADOWBANK DIVISION

**Wildlife Screening Level Risk Assessment Plan**

In Accordance with NIRB Project Certificate No.004

Version 3

April, 2019

## **IMPLEMENTATION SCHEDULE**

This Plan will be implemented immediately subject to any modifications proposed by the NIRB as a result of the review and approval process.

## **DISTRIBUTION LIST**

AEM – Environment Superintendent

AEM – Environmental Coordinator

AEM – Environmental Technician

## DOCUMENT CONTROL

Version	Date (YMD)	Section	Revision
1	2016-03-31	All	Comprehensive plan for Meadowbank Project
2	2018-06-01	2.5	ROC based on a commitment made during the Whale Tail Final Hearing through discussions with Environment and Climate Change Canada
3	2019-04-25	Throughout 3.4	Version 2 text expanded to describe assessment of risks to semi-palmated sandpiper from exposure to contaminants in the TSF. Updated time-in-area for caribou from 33% to 12% based on collaring data.

Prepared By: Meadowbank Environment Department

Approved by: Robin Allard  
General Supervisor Environment

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# 1 INTRODUCTION

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## 1.1 BACKGROUND

In 2006, Azimuth Consulting Group Inc. conducted a pre-construction wildlife screening level risk assessment (WSLRA) for the Meadowbank site to assess potential risks to wildlife via dietary uptake of mine-related contaminants (Azimuth, 2006). Specifically, the pre-construction SLRA focused on determining the contaminants of potential concern (COPCs) from predicted minesite activities, evaluating potential risks to wildlife from exposure to contaminants under baseline conditions, and determining the magnitude of increase in contaminant exposure required to cause concern for wildlife populations. Preliminary estimates of post-development contaminant concentrations were then obtained from models, and based on those potential future changes, expected potential risks to local wildlife were evaluated.

Under baseline conditions, negligible risks were found for all COPCs except chromium, which was determined to pose an improbable but potential risk for songbirds at baseline concentrations. COPC exposure concentrations were not expected to increase during operation, so potential risks were not expected to change from baseline conditions.

As required under the Nunavut Impact Review Board Project Certificate - Condition 67, the WSLRA is completed every 3 years during mine operation. Results to date indicate that the Meadowbank mine does not appear to be contributing significant incremental risk to wildlife from consumption of chemical contaminants.

In 2016, AEM submitted an Environmental Impact Statement (EIS) to NIRB for the Whale Tail Pit satellite deposit, located approximately 50 km north of the main Meadowbank minesite. The EIS includes an assessment of risk for wildlife in the Whale Tail Pit area under baseline conditions and the post-development scenario. Results indicated that:

“All concentrations in soil met their respective screening values and/or baseline plus 10%; as a result, no COPCs were retained in soil and no residual impacts due to changes to soil quality were identified. Furthermore, given that no COPCs were identified for soil, no residual impacts to vegetation quality were identified. This result is consistent with the results of the conclusions of the previous risk assessments conducted at the Meadowbank Mine.”

“Given that no COPCs were identified in soil (Section 4.3), concentrations of chemicals in prey items (i.e., plants and animals consumed as prey) were not anticipated to change. As a result, prey items were not assessed further with respect to potential wildlife health effects and no residual health impacts due to changes to prey item quality were identified.”

Nevertheless, due to stakeholder concerns with contaminant loadings due to dust, this plan presents the assessment approach and methodology that will continue to be used to assess potential risk to wildlife from chemical contaminants as a result of operations at the Meadowbank site as well as the Whale Tail Pit satellite deposit.

## 1.2 GENERAL APPROACH

The goal of the WSLRA is to determine whether there are potential risks to wildlife from the identified contaminants of potential concern (COPCs) under operational conditions. The general approach includes the common risk assessment components of problem formulation, exposure assessment, hazard assessment and risk characterization. In particular, assessments will aim to distinguish risk due



to operation of the mine from risk due to background conditions by taking soil and vegetation samples at on-site, near-site, AWAR, Whale Tail site, Whale Tail haul road, and reference locations.

Risk assessments will follow a hazard quotient approach, and are based on food-chain modeling developed by Azimuth Consulting Group Inc. for the baseline wildlife screening level risk assessment at the Meadowbank site (Azimuth, 2006). The risk assessment framework used by Azimuth was taken from various Canadian and American sources (Environment Canada, 1994; CCME, 1996; BCE, 1998; US EPA, 1992, 1998). The exposure assessment stage will be updated with field data collected in each assessment year. Toxicity reference values (TRVs) will be continually compared to those used in similar risk assessments in the Kiggavik region and published databases.

## **2 PROBLEM FORMULATION**

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### **2.1 LOCATION DESCRIPTION**

The main Meadowbank site is located 70 km north of the hamlet of Baker Lake, Nunavut, near the border of the Northern and Southern Arctic ecozones. Terrain in the Meadowbank area is typical barren-ground subarctic, with low-growing vegetation in poorly developed soil with continuous permafrost. The landscape is dominated by many interconnected lakes and isolated ponds with indistinct drainage patterns. Topography consists of rolling hills, boulder fields and bedrock outcrops. The main mine site is located at the headwaters of the Quioch River system, which flows southeast through Chesterfield Inlet into Hudson Bay. Lakes in this region are ultra-oligotrophic, with low productivity levels. This region supports few terrestrial mammals (15 species) and birds (62 species) (Azimuth, 2006). Migratory species (primarily caribou and Canada geese) are present.

### **2.2 SITE FACILITIES**

The Meadowbank project consists of several gold-bearing open-pit deposits (Portage, Goose, Vault, and Whale Tail). Much of the original infrastructure is located in close proximity to the mill and mine facilities, with the exception of the Vault Pit which is approximately 10 km northeast of the site. The Whale Tail Pit, which was permitted in 2018, is approximately 50 km northwest of the site.

Waste rock from the pits is stored in the Portage Waste Rock Storage Facility, Vault Waste Rock Storage Facility, and Whale Tail Waste Rock Storage Facility (RSFs). Rock Storage Facilities are constructed to minimize the disturbed area and will be capped with a layer of non-potentially acid-generating rock (NPAG). During the construction period, NPAG is also used for construction of dikes and roads. Mined ore is either processed in the mill or stockpiled for eventual processing.

Tailings are stored in the Tailings Storage Facility (TFS) adjacent to the main minesite. The TSF is defined by the series of dikes built around and across the basin of the dewatered northwest arm of Second Portage Lake. Tailings water is reclaimed for use in ore processing.

An onsite airstrip supports transportation of goods and personnel to and from the Meadowbank site by jet. A 110-km All Weather Access Road (AWAR) runs between the main minesite and the hamlet of Baker Lake, where Agnico Eagle maintains a bulk fuel storage and barge facility. The Vault Pit is connected to the main minesite by a 10-km haul road, and the Whale Tail Pit satellite deposit is connected by a 62-km haul road.

## 2.3 SOURCES OF CONTAMINANTS

Major mine site operations and their potential to contribute to COPCs (based on Azimuth, 2006) are summarized here.

*Open pits* – Along with ore, pits produce waste rock, which may contribute to COPCs through dust emissions.

*Rock storage facilities* – Waste rock (not containing ore) is moved to these areas. Dust may be blown from the rock piles during dumping and vehicle traffic during transport of material. Seepage from rock storage facilities is controlled in sumps and pumped back to attenuation ponds or the TSF.

*Borrow pits and quarries* – Borrow pits and quarries are used as necessary for the construction of mine site roads and the airstrip. The COPCs for borrow pits and quarries are similar to open pits.

*Tailings Storage Facilities (TSF)* – The northwest arm of Second Portage Lake was partitioned off by the East Dike and de-watered from 2009 to 2012. The northwestern portion of this area was further partitioned by the Stormwater Dike to create the North and South Cell TSF. Although permafrost is expected to freeze the tailings, the material is fine-grained and could be a source of dust emissions during dry periods.

*Roads and airstrip* – Frequently used gravel haul roads run throughout the mine site to connect pits, waste rock storage and processing facilities. An airstrip, receiving approximately 4 planes per week, was built at the mine site to receive deliveries and personnel. Dust from these sources could be a potential source of contaminants. A 110 km long all weather access road (AWAR) was constructed between the mine and the Hamlet of Baker Lake, using gravel from quarries along the road.

*Effluent discharge* – De-watering of lakes for pit development or TSF construction is considered effluent discharge and is regulated under the current NWB Water License. Lake water is treated for suspended solids removal before discharge, and since it is an existing surface water source, it is not likely to be a source of contaminants in the receiving water. Effluent is also periodically discharged from attenuation ponds into adjacent lakes, under NWB Water License and MMER requirements. As a result, metals regulated under MMER are considered as COPCs.

*Diesel generating plant, mine mill plant and associated facilities* – Three diesel generating plants provide power for the mine. The Air Quality Impact Assessment (2005) determined emission of PAHs was “very low” and did not require modeling. The milling of rock in the processing plant takes place under wet conditions, and is not a source of particulate emissions. All health and safety-related requirements to reduce particulate emissions during handling of the ore at the mine plant before processing are met, so these are not expected to be a significant source of contaminants.

Overall, roads, waste rock and tailings were determined to be the main sources potentially contributing to COPCs through dust emissions. Dewatering effluent discharge may potentially contribute to COPCs in water sources. In addition, risks to shorebirds from exposure to contaminants within the tailings storage facility are now considered, following discussions with Environment and Climate Change Canada during the Final Hearing for the Whale Tail Pit project.

## 2.4 CONTAMINANTS OF POTENTIAL CONCERN (COPCS)

In the baseline WSLRA, Azimuth (2006) identified COPCs for the main minesite area based on the chemical composition of the identified dust sources, the predicted effects of effluent on water quality in

Third Portage Lake (from Golder, 2005), and a review of metals regulated under MMER (see Azimuth, 2006, Section 2.5 for details).

Projected concentrations of metals in four dust sources (roads, waste rock and tailings) that exceeded the 90<sup>th</sup> centile of baseline soil concentrations or the CCME guidelines (CCME 1999, 2001) were included as COPCs for the main Meadowbank minesite. Five metals regulated under MMER (arsenic, copper, lead, nickel and zinc) were also included in the assessment. Although mercury was not predicted to exceed baseline soil concentrations or CCME criteria, it was included because it was found to be of concern to the general public in the Arctic.

No terrestrial wildlife COPCs were identified in the Whale Tail Pit FEIS (Golder, 2016), but those identified for the main Meadowbank site are applied to assessments for Whale Tail study locations.

In addition to the contaminants identified during baseline assessments, cyanide is now included as a COPC in the assessment of risks to shorebirds from consumption of tailings.

The COPCs for this assessment are therefore comprised of:

Antimony	Lead	Tin
Arsenic	Manganese	Uranium
Barium	Mercury	Vanadium
Beryllium	Molybdenum	Zinc
Cadmium	Nickel	Cyanide (TSF study area only)
Chromium	Selenium	
Cobalt	Strontium	
Copper	Thallium	

Certain chemicals which are controlled through best management practices and which were not addressed in the baseline SLRA include petroleum hydrocarbons, process chemicals, dioxins, nitrates, ammonia and PAHs. For each source of these chemicals, best management practices are in place and environmental exposures are not expected to occur.

## **2.5 RECEPTORS OF CONCERN**

The WSLRA originally considered four Receptors of Concern (ROCs): ungulates, small mammals, waterfowl and songbirds. These choices were determined from the project's initial EIA, which included discussions with stakeholders, public meetings, traditional knowledge and experience from other mines. Specifically, the WSLRA focussed on caribou, Canada goose, Lapland longspur and northern red-backed vole as representative species. An ecological description of the area and detailed descriptions of the biology of each of these receptors can be found in Azimuth (2006). This updated assessment framework also includes an assessment of risks to shorebirds (as represented by semi-palmated sandpiper) from contaminants within the TSF, based on a commitment made during the Whale Tail Pit project Final Hearing, following discussions with Environment and Climate Change

Canada (ECCC). Receptor-specific values such as dietary preferences that are used in this assessment are further discussed in Section 3.1 (Table 3-1).

Separate characterizations are conducted for the main Meadowbank minesite, near-site, AWAR, Whale Tail pit, Whale Tail haul road, and external reference locations for northern red-backed vole, Lapland longspur and Canada goose, and TSF for semi-palmated sandpiper, because these species have small territories when not migrating and would not be expected to move between the sampling areas. Main minesite and near-site samples are combined for the caribou risk characterization, because it is assumed that when caribou are present they can readily move between these sampling locations. See Section 3.2 for further information on these study areas, and Section 3.4 for a discussion of how residence time in each area is handled as a dose-adjustment factor.

## **2.6 PROTECTION GOALS AND ENDPOINTS**

Since the ROCs identified are not rare or endangered species, protection at the population level was determined to be appropriate (Azimuth, 2006). The assessment endpoint is no adverse effect of COPCs on populations of caribou, Canada goose, Lapland longspur, northern red-backed vole, and semi-palmated sandpiper.

The measurement endpoints will be calculated as exposure to the COPCs through ingestion of soil or sediment, water and food items. Ingested concentrations will be compared to literature-based ecotoxicological benchmarks equivalent to maximum acceptable exposure levels for each ROC. Specifically, the ecotoxicological benchmarks will be lowest observable adverse effect levels (LOAELs), which are generally considered to be appropriate for determining risk at the population level (Azimuth, 2006). Toxicity reference value (TRV) selection is further described in Section 4.

## **2.7 EXPOSURE PATHWAYS**

The following exposure pathways will be investigated:

- Small mammals – ingestion of plants, insects, water, soil

- Ungulates – ingestion of plants, water, soil

- Songbirds – ingestion of plants, insects, water, soil

- Waterfowl - ingestion of plants, insects, water, soil

- Shorebirds – ingestion of benthic invertebrates, water, sediment

Inhalation and dermal absorption of metals are generally considered to be insignificant in comparison to exposures through ingestion (USEPA, 2005), so they are not considered here.

## **3 EXPOSURE ASSESSMENT**

---

Exposure assessment is used to calculate the dose of each COPC received by each ROC. The exposure assessment uses the food chain model developed by Azimuth (2006). The model was developed to include the influence of COPC concentrations in exposure pathways, dietary preferences,

ingestion rates and dose-adjustment factors. Estimated daily intake of each COPC is calculated for each study area (main Meadowbank minesite, near-site, TSF, AWAR, Whale Tail site, Whale Tail haul road, external reference) as:

$$EDI = [\sum (I_{w,s,f} \times C_{w,s,f}) \times BF \times T]_{\text{study area}} + [\sum (I_{w,s,f} \times C_{w,s,f}) \times BF \times T]_{\text{ext ref}}$$

Where:

EDI = estimated daily intake (mg/kg body weight/day)

$I_{w,s,f}$  = intake of water, soil/sediment and food items (L/kg ww/d; kg dw/kg ww/d; kg dw/kg ww/d)

$C_{w,s,f}$  = concentration of COPC in water, soil/sediment and food items (L/kg ww/d; kg dw/kg ww/d; kg dw/kg ww/d)

BF = biotransfer factor (absorption factor)

T = proportion of time in area

Each component is described below, and an example calculation is provided in Appendix A.

### 3.1 INTAKE OF WATER, SOIL/SEDIMENT AND FOOD

Water, food and soil/sediment ingestion rates used in the assessments are shown in Table 3-1. All intake parameters are considered to be conservative. Water and food ingestion rates were derived from species profiles or allometric equations in USEPA (1993), as described in Table 3-1. Soil ingestion rates for Canada goose and Northern red-backed vole are also from USEPA (1993). Sediment ingestion rates for semi-palmated sandpiper are from Beyer et al. (1994). Although Beyer et al. (1994) was referenced as the source of most soil ingestion rates in the Meadowbank baseline assessment, the species chosen to represent caribou and Lapland longspur were not indicated. The soil consumption rate for caribou was increased in subsequent Meadowbank assessments and here from 2% of dry food consumption to 5%, which is the general rate for mammals in Beyer et al. (1994), as used in (Senes, 2008). The soil ingestion rate for Lapland longspur was increased from 2% to 7%, based on Hansen et al. (2011). This study identified a rate of 0.7% for Swainson's thrush, a ground-dwelling songbird that primarily feeds on flying insects and berries. A 10x safety factor was applied because Swainson's thrush is a foliage-gleaner, while Lapland longspur is considered a ground-forager (Cornell University, 2011). This factor is considered to be conservative however, because Lapland longspur does not scratch the ground to uncover food items as other ground foragers do (Harrison 1967, Greenslaw 1977).

**Table 3-1. Body weight (BW), water intake ( $I_{\text{water}}$ ), soil intake ( $I_{\text{soil}}$ ), and wet and dry ( $I_{\text{food}}$ ; FI) food intake for the identified ROCs.**

Parameter	Units	Value	Reference	Notes
Northern Red-backed Vole				
BW	kg wet	0.02	Nagorsen (2005)	Smallest body weight used
$I_{\text{water}}$	L/kg wet/day	0.253	USEPA (1993)	Species profile data for the Prairie Vole
$I_{\text{soil}}$	kg dry/kg wet/day	0.0008	USEPA (1993)	Assumed 2.4% of dry food ingestion

Parameter	Units	Value	Reference	Notes
				rate (similar to Meadow Vole)
I <sub>food</sub>	kg wet/kg wet/day	0.135	USEPA (1993)	Species profile data for the Prairie Vole
FI	kg dry/kg wet/day	0.049	Not available	Moisture in food assumed to be 64% as per diet moisture calculation
-----				
Caribou				
BW	kg wet	75	Dauphine (1976)	Smallest body weight used
I <sub>water</sub>	L/kg wet/day	0.064	USEPA (1993)	Based on allometric equation for all mammals (L/day) $(0.099*(BW)^{0.90})$
I <sub>soil</sub>	kg dry/kg wet/day	0.0013	Beyer et al. (1994)	Assumed 5% of dry food ingestion rate (general rate for mammals)
I <sub>food</sub>	kg wet/kg wet/day	0.047	Not available	Moisture in food assumed to be 43% as per diet moisture calculation
FI	kg dry/kg wet/day	0.027	USEPA (1993)	Based on total dry food intake for herbivorous mammals (g/day) $(0.577*(BW)^{0.727})$
-----				
Lapland Longspur				
BW	kg wet	0.023	Cornell University (2011)	Smallest body weight used
I <sub>water</sub>	L/kg wet/day	0.205	USEPA (1993)	Based on allometric equation for all birds (L/day) $(0.059*(BW)^{0.67})$
I <sub>soil</sub>	kg dry/kg wet/day	0.0174	Hansen et al. (2011)	Assumed 7% of dry food ingestion rate (rate of Swainson's thrush +10x safety factor)
I <sub>food</sub>	kg wet/kg wet/day	0.656	USEPA (1993)	Moisture in food of insectivorous birds; assumed 62% as per diet moisture calculation
FI	kg dry/kg wet/day	0.249	USEPA (1993)	Based on total dry food intake for passerine birds (g/day) $(0.398*(BW)^{0.850})$
-----				
Canada Goose				
BW	kg wet	2.000	Mowbray et al. (2002)	Smallest body weight used
I <sub>water</sub>	L/kg wet/day	0.044	USEPA (1993)	Species profile data for Canada Goose
I <sub>soil</sub>	kg dry/kg wet/day	0.0006	USEPA (1993)	Assumed 8.2% of dry food ingestion rate
I <sub>food</sub>	kg wet/kg wet/day	0.032	USEPA (1993)	Species profile data for Canada Goose
FI	kg dry/kg wet/day	0.011	Not available	Moisture in food assumed to be 66% as per diet moisture calculation
-----				
Semi-palmated Sandpiper				
BW	kg wet	0.030	CWS (2001)	-
I <sub>water</sub>	L/kg wet/day	0.188	USEPA (1993)	Allometric scaling for birds (L/day) = $0.059 Wt^{0.67}$ (kg)
I <sub>sediment</sub>	kg dry/kg wet/day	0.059	Beyer et al. (1994)	30% of dry food ingestion rate
I <sub>food</sub>	kg wet/kg wet/day	1.0	USEPA (1993)	Allometric scaling for birds (g (dw)/day) = $0.648 Wt^{0.651}$ (g); assumed moisture content of 80%

Parameter	Units	Value	Reference	Notes
FI	kg dry/kg wet/day	0.197	USEPA (1993)	per Senes (2008) Allometric scaling for birds (g (dw)/day) = 0.648 Wt <sup>0.651</sup> (g); assumed moisture content of 80% per Senes (2008)

### 3.2 DIETARY CONCENTRATIONS OF COPCS

Concentrations of COPCs will be measured in and around the Meadowbank site in water, soil and plant tissue (food items: sedges, lichens, berries) in assessment years. This includes five samples of each media type from four Meadowbank minesite (onsite) locations, three near-site locations, one AWAR location, two Whale Tail Pit locations, one Whale Tail Haul Road location, one TSF location and three external reference locations. Sample locations are shown in Figure 3-1. An SOP for methods of collection along with UTM coordinates is provided in Appendix C.

Water and sediment grab samples from the Core Receiving Environment Monitoring Program (CREMP) data collection will be used in the WSLRA analyses (Figure 3-1). Onsite (main Meadowbank minesite) concentrations will be from samples collected in Second Portage Lake (SPL) and the east and north basins of Third Portage Lake (TPE, TPN). AWAR concentrations will be from samples collected in TPN. Near-site concentrations will be from samples collected in Tehek Lake (TE). Whale Tail Pit concentrations will be from samples collected in Whale Tail Lake South. Whale Tail Haul Road concentrations will be from samples collected in Pipedream Lake (PDL). External reference samples are from Inuggugayualik Lake (INUG) and PDL. Exact coordinates are subject to slight changes each year – see CREMP Plan (Azimuth, 2015) for details.

Specific locations for the Whale Tail site will be determined following ground-truthing, but will target locations up to 5 km downwind (to the south/southeast) of site activity, and will include one location on the downwind side of the haul road. The general approach for selecting these sites will be consistent with a near-field/far-field method used for the main Meadowbank minesite since 2008, as illustrated in Figure 3-1.

Concentrations in soil and plant tissue used for food chain modeling will be the upper 95% confidence limit of the mean (UCLM). If values are below the detection limit, a value of ½ the detection limit will be used. Based on published literature, methyl mercury is assumed to comprise 1% of total mercury in water and soil, and 34% of total mercury in plant tissue, and inorganic mercury = total – methyl mercury (Azimuth, 2006).

Concentrations of COPCs in insects are not measured, but are modeled from soil concentrations using published bioaccumulation models for arsenic, cadmium, copper, lead, and zinc (Sample and Arenal, 2001; as described in Azimuth, 2006):

$$\ln[\text{insect}] = B0 + B1(\ln[\text{soil}]); \text{ concentrations are expressed in mg/kg dry weight}$$

This method is particularly conservative, because the modeled factors are for ground insects whereas the songbird population in this assessment consumes primarily flying insects. A bioaccumulation factor (BAF) of 1 is assumed for all remaining COPCs, which is also considered to be very conservative.

For benthic invertebrates, BAFs from USEPA (1999) will be used to estimate whole-body tissue concentrations based on measured sediment concentrations as:

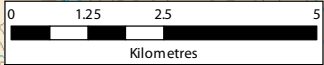
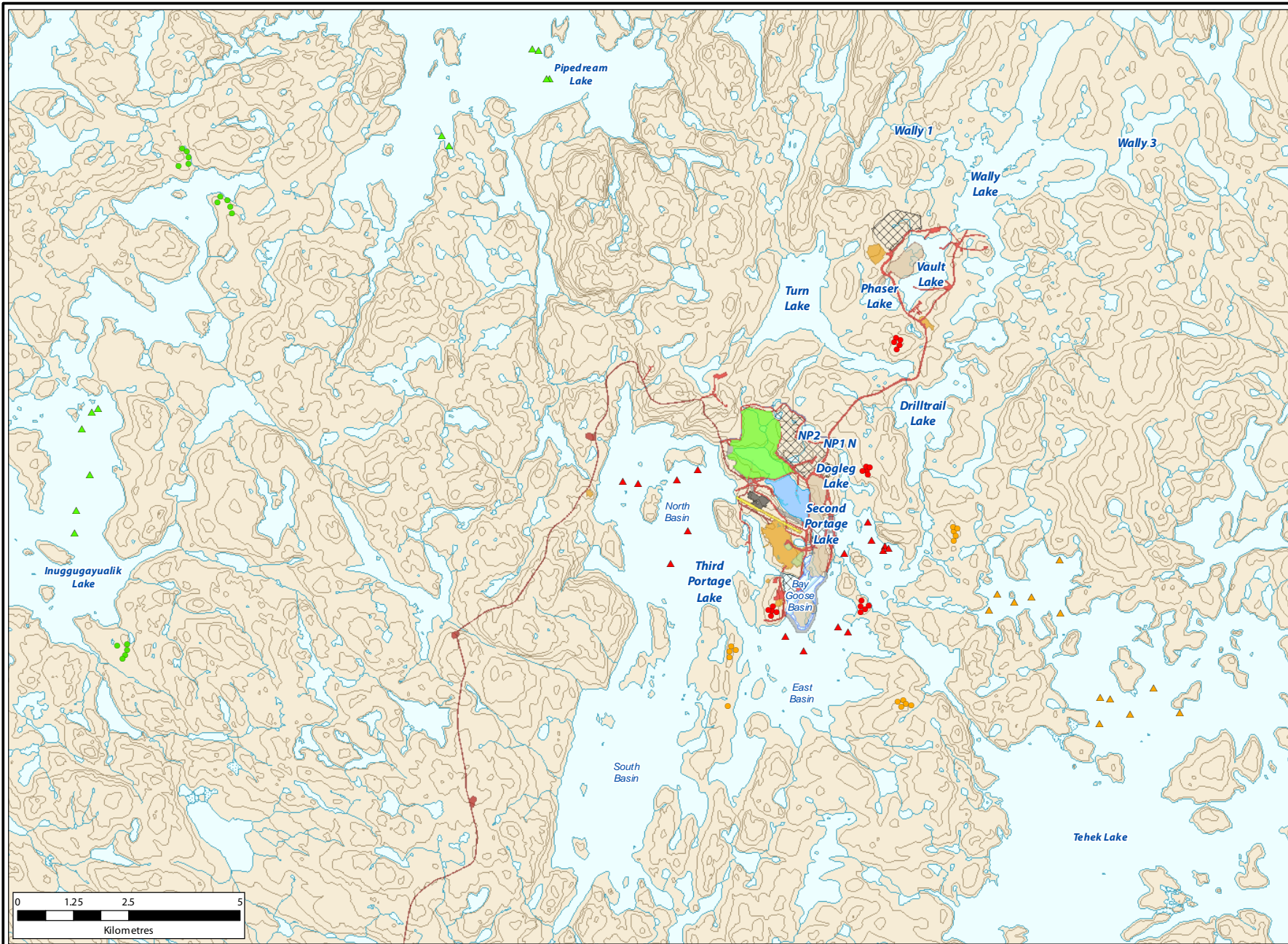
[benthic invertebrate] = BAF x [sediment]; concentrations are expressed in mg/kg dry weight Available BAFs are shown in Table 3-2. For all other COPCs, a BAF of 1 is assumed.

**Table 3-2. Bioaccumulation factors (BAFs) from USEPA (1999) used for estimating whole-body concentrations of COPCs in benthic invertebrates.**

<b>Parameter</b>	<b>BAF</b>
Aluminum	0.90
Arsenic	0.90
Barium	0.90
Chromium	0.39
Copper	0.30
Lead	0.63
Mercury	0.068
Nickel	0.90
Selenium	0.90
Silver	0.90
Thallium	0.90
Zinc	0.57
Cyanide	0.90

Prior to the initial assessment of risk for semi-palmated sandpiper (2020), sampling for benthic invertebrates will be conducted within the TSF to determine whether any significant populations are established in this area. Since the TSF is not intended as aquatic habitat, it is unlikely that any resident populations of invertebrates are substantial enough to fulfill the dietary needs of shorebirds. If insignificant numbers of invertebrates are found, dietary exposure for semi-palmated sandpiper will be calculated from onsite sediment monitoring locations (SPL, TPE, TPN). In this case, a comparative study will be conducted to determine any significant differences in COPC concentrations between the deeper-water CREMP sediment collection locations (typically ~ 3 m) and shoreline sediment samples. If differences are not significant, CREMP sediment samples will be considered appropriate for the purposes of the SLRA moving forward.





**Legend**

**Soil/Veg Sampling Location**

- Onsite
- Near Site
- External Reference

**Water Sampling Locations**

- ▲ Onsite
- ▲ Near Site
- ▲ External Reference

**2014 Mine Plan**

- Quarry
- AWPAR Quarry
- ▨ Dewatered Lake
- Portage Attenuation Facility
- Tailings Storage Facility
- Roads
- AWPAR
- Dikes
- Diversion Ditch
- Stockpiles
- Pits
- Facility
- Airstrip
- ▨ Waste Dump

**Wildlife Screening Level Risk Assessment**

**DOUGAN & ASSOCIATES**  
ECOLOGICAL CONSULTING & DESIGN

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PROJECT: DA11-062-03

CLIENT: Agnico-Eagle Mines Ltd., Meadowbank Div.

N  
DATE: MARCH 2015

SCALE: 1:80,000

W  
E  
DRAWN BY: LW

S  
UTM Zone 14N UTM  
CHECKED BY: MAY

FIGURE:

3-1

The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should not be relied on as being a precise indicator of locations, features, or roads, nor as a guide to navigation. MNR data provided by Queen's Printer of Ontario. Use of the data in any derivative product does not constitute an endorsement by the MNR or the Ontario Government of such products.

### 3.2.1 Dietary Preferences

The proportions of food items (sedge, lichen, berries, insects, benthic invertebrates) that comprise each diet (Table 3-3) were determined using the literature reviews referred to in Section 2.6. Similar values have been used in another recent risk assessment (Senes, 2008). Consistent with Azimuth (2006), sedges, lichens and berries will be considered surrogates for all plant matter ingested by the ROCs.

**Table 3-3. Estimated dietary preferences for the receptors of concern at the Meadowbank site.**

Dietary Item	Northern red-backed vole	Caribou	Lapland longspur	Canada goose	Semi-palmated sandpiper
Sedges	55%	30%	25%	50%	0%
Lichens	0%	65%	0%	0%	0%
Berries	40%	5%	5%	45%	0%
Insects	5%	0%	70%	5%	0%
Benthic Invertebrates	0%	0%	0%	0%	100%
Total	100%	100%	100%	100%	100%

### 3.3 BIOTRANSFER FACTOR

The uptake efficiency factor (biotransfer or absorption factor) describes the proportion of the COPC that is absorbed into the animal from any ingested sources. Uptake efficiency was conservatively assumed to be 100% for all COPC/receptor combinations. This is likely an extremely conservative assumption; for example, chromium compounds were found to have a maximum absorption efficiency of 10% in the GI tract (Outridge and Scheuhammer, 1993).

### 3.4 TIME IN AREA

Territory size (foraging range) affects the proportion of an animal's diet that could be affected by mine-related contaminants. In the baseline assessment for Meadowbank (Azimuth, 2006), an adjustment factor for foraging range was not applied (animals were assumed to spend 100% of time in the study area). For subsequent assessments, the only ROC assumed to spend 100% of its time in any study area is the northern red-backed vole, because of its small territory size. Canada geese, and Lapland longspur are migratory species, and the fraction of time spent in any study area for those species (main minesite, near-site, AWAR, Whale Tail site, Whale Tail Haul Road) is estimated at 33%, based on the 2008 Screening Level Environmental Effects Assessment for the Kiggavik Project (Senes, 2008).

While semi-palmated sandpiper are similarly migratory and estimated to spend 33% of the year in the minesite area (Senes, 2008), they are not expected to obtain 100% of their food and water from the TSF, since best management practices are in place to actively discourage wildlife from this area. During breeding season, inspections are performed at least once per day, and birds are deterred from the open-water areas of the TSF through the use of personnel presence, decoys, noise cannons, and flares. While bird presence around the TSF occurs for up to 2 weeks in the very early spring, prior to ice-off on natural lakes, very few birds are observed in this area after that time. Therefore, the proportion

of semi-palmated sandpiper exposure to COPCs originating from the TSF is nominally estimated at 4% (i.e. 2 weeks per year), with the remainder of exposure during their time onsite (29%) estimated from the onsite sample locations. This value may be refined in future years based on results of TSF wildlife surveys.

The time caribou spend in any study area (12%) was determined through an examination of collared caribou from the Meadowbank region, which found that any one animal spent no more than a maximum of 12% of the year within 25 km of the minesite (Martin Gebauer and Jason Shaw, personal communication, March 2012). This is similar to the estimate of 10% used in the 2004 assessment of the Lupin minesite (Golder, 2004).

The remaining fraction of exposure doses for each ROC will be calculated based on external reference samples.

Risk will be characterized for small-territory ROCs (Northern red-backed vole, Canada geese and Lapland longspur) for main Meadowbank minesite (onsite), near-site, AWAR, Whale Tail Pit, Whale Tail Haul Road, and external reference locations separately, in order to determine whether those animals choosing territories at any mine-related location are at increased risk compared to those choosing territories at nearby reference locations. Exposure data for main minesite and near-site locations will be combined for caribou because caribou can readily roam between the onsite and near-site locations in the course of a day. Risk for semi-palmated sandpiper is determined due to exposure to contaminants in the TSF only, based on recommendations from ECCC and commitments made during the 2018 Whale Tail Final Hearings.

Time-in-area adjustment factors are summarized in Table 3-3.

**Table 3-4. Time-in-area assumption for each study area and ROC. In each case, the remainder of exposure is calculated from COPC concentrations at external reference sites.**

Study Area	Northern red-backed vole	Caribou	Lapland longspur	Canada goose	Semi-palmated sandpiper
Onsite	100%	12%	33%	33%	-
Near-site	100%		33%	33%	-
AWAR	100%	12%	33%	33%	-
Whale Tail Pit area	100%	12%	33%	33%	-
Whale Tail haul road	100%	12%	33%	33%	-
TSF & Onsite	-	-	-	-	4% & 29%

## 4 TOXICITY ASSESSMENT

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The toxicity reference values (TRVs) used in the Meadowbank assessments (Appendix B) were collated from a review of the literature; mainly from Sample et al. (1996). This represents one of the most comprehensive and commonly used sources available for wildlife toxicity reference values and has been used in other similar assessments for this region (e.g. Senes, 2008). In order to ensure the selected TRVs were relevant to the Meadowbank site and the conditions of that risk assessment, several criteria were used in the baseline assessment in screening toxicity studies. These included selecting values from studies conducted on species of similar phylogeny (i.e. bird or mammal), and selecting studies that examined individual or population-level effects over chronic time periods. The following describes TRV selection, as performed by Azimuth (2006):

The TRVs chosen for use in the risk characterization include both no observable adverse effect levels (NOAELs) and lowest observable adverse effect levels (LOAELs) when available. If effects concentrations were reported in terms of food concentrations, these were converted to dose. If a LOAEL was reported but no NOAEL could be determined, it was estimated as 1% of the LOAEL (as in Sample et al. 1996, Chapman et al. 1998). LOAELs cannot be estimated if only a NOAEL is available. Since the protection goal of this risk assessment no adverse effect of COPCs on populations of the ROCs, LOAELs are the most relevant TRV, and are used in the final risk estimate.

Instead of species-to-species uncertainty factors, the baseline assessment used allometric scaling factors (Sample et al. 1996) to adjust mammalian TRVs from the test species (typically mouse or rat) to the ROC. A scaling factor of 1 was used for birds (Mineau et al. 1996).

Where toxicity information was found for multiple forms of a contaminant, the one with the greatest toxic potency was chosen. TRVs for chromium-VI were available for mammals, but only chromium-III was available for birds. No NOAELs or LOAELs were available for total mercury. Mammalian LOAELs were not available for inorganic mercury or beryllium. Avian LOAELs were not available for uranium or vanadium. Avian NOAELs were not available for antimony and beryllium and were extrapolated from the mammalian values. The avian LOAEL for antimony was extrapolated from the mammalian value.

The TRV for cyanide in the assessment of risks to semi-palmated sandpiper was obtained from Ma and Pritsos (1997), as applied for another Northern shorebird, the common snipe, in Golder (2004).

## 5 RISK CHARACTERIZATION

---

### 5.1 HAZARD QUOTIENTS

Risk characterization compares predicted exposure concentrations with the toxicity reference values from the literature, using the hazard quotient approach. Hazard quotients for all study areas (main Meadowbank minesite (onsite), near-site, AWAR, Whale Tail Pit, Whale Tail Haul Road, TSF, and external reference) will be calculated as:

$$HQ = EDI / TRV$$

Where:

EDI = estimated daily intake (ug/kg body weight/day)

TRV = toxicity reference value (ug/kg body weight/day)

See Appendix A for an example calculation and Appendix B for all TRVs used in assessments for Meadowbank. As discussed above, the TRV to be used is represented by the LOAEL, unless only a NOAEL was available (indicated).

Because of the conservative assumptions included at this level of assessment, there is generally considered to be a high degree of certainty associated with results indicating negligible risk. A hazard quotient > 1 indicates the possible need for more in-depth assessment, including analysis of assumptions used. However, when HQ values exceed 1 for both the baseline (or external reference) and the study areas, and are of similar magnitude, it may be assumed that the receptor is adapted to the measured exposure level, or that the assumptions used in calculating the HQ have resulted in an over-estimation of risk (Dominion Diamond, 2015).

HQ values and a characterization of risk for each ROC will be provided in the assessment report.

## **5.2 UNCERTAINTY ASSESSMENT**

The assumptions included in each section of the assessment are discussed here, along with implications for over- or under-estimating risk.

### **5.2.1 Uncertainty in Exposure Assessment**

ROCs used in the assessment are assumed to represent categories of species (e.g. ungulates, small mammals, waterfowl, shorebirds, song birds) that are found around the Meadowbank site. Exposure is assumed to be similar for other species in these categories. Compared to other Arctic animals, the exposure for the species chosen is expected to be realistic to conservative, because they all are assumed to forage in or on the soil.

Exposure concentrations in environmental media are assumed to be represented by the 95% UCLM of the measured concentrations. Since animals would be more likely to ingest food sources with a range of COPC concentrations, this is a conservative assumption.

Ingestion rates are applied using published values for similar but not identical species. Based on biological factors, these rates were chosen to be conservative.

Dietary preferences are from studies on the same or similar species, but are not from populations specifically inhabiting the study region.

It is assumed that flying insects accumulate the same proportion of metals from soil as ground-dwelling insects, because no flying insect BAFs were available. This assumption likely results in an over-estimation of risk for ROCs who primarily consume flying insects (Lapland longspur).

Absorption of COPCs in the gastrointestinal tract was assumed to be 100%. This assumption likely results in an over-estimation of risk for all COPCs/ROC combinations.

Methyl mercury proportions of total mercury concentrations are estimated from the available literature using the UCLM from two studies (Azimuth, 2006). While there is an unknown degree of uncertainty in the extrapolation of this data for use at the Meadowbank site, the fractions chosen were at the highest end of the published range, and are therefore designed to be conservative. Furthermore, mercury was

included as a COPC because it was found to be of concern to the general public in the Arctic, and no source of elevated mercury was identified at the mine.

Ingestion of COPCs was the only route of exposure considered in this assessment. While this assumption may slightly under-estimate actual exposure, inhalation and dermal absorption of metals are generally considered to be insignificant in comparison to exposures through ingestion (USEPA, 2005).

#### 5.2.2 Uncertainty in Toxicity Assessment

TRVs are not available for the ROCs considered in this assessment and species-to-species extrapolations are necessary. This includes allometric scaling for mammals, 1:1 scaling for birds, and the application of uncertainty factors in mammal-to-avian extrapolation. Food intake-to-body weight ratios are well studied and uncertainty factors are designed to be protective, so these extrapolations are likely to be realistic or conservative.

As is common in screening level risk assessments, the estimation of risk is for each COPC in isolation, and does not consider potential additive, synergistic or antagonistic reactions. Models for determining mixture toxicity of a large suite of metals are not yet widely available, and guideline values are for single compounds only. This factor may lead to under-estimation of actual risk from metals overall, but the otherwise conservative nature of an SLRA is assumed to compensate for this issue.

## **6 REPORTING AND ADAPTIVE MANAGEMENT**

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The SLRA for the Meadowbank site (including the Whale Tail Pit and Haul Road) will evaluate risks to wildlife from contaminant exposure in and around the mine site every three years during operation, and results will be reported to NIRB in the context of AEM's Annual Report for the Meadowbank site.

Because of the conservative assumptions included at this level of assessment, there is generally considered to be a high degree of certainty associated with results indicating negligible risk ( $HQ < 1$ ). In the case that hazard quotients exceed 1 and differ substantially (generally, by more than an order of magnitude) between mine-related and reference and/or baseline sites for a certain COPC, incremental risk due to mine operation will be classified as potentially unacceptable and more detailed investigations will be initiated. This may include a desk-top review and refining of the assessment parameters, and/or additional sampling in the subsequent year to confirm results. In the case that results of refined assessments continue to indicate unacceptable risk, adaptive management may include such interventions as capping of dust sources, increased road watering, delineation of contaminated areas, and deterrence methods pending reclamation.

## REFERENCES

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- Azimuth (Azimuth Consulting Group Inc.). 2006. Wildlife Screening Level Risk Assessment for the Meadowbank Site. Prepared by Azimuth Consulting Ltd. for Cumberland Resources Ltd. 2006.
- BCE. 1998. Checklist for the Tier-1 ecological risk assessment of contaminated sites in British Columbia. Environmental Protection Department, Industrial Waste and Contaminants Branch.
- Beyer, W.N., Connor, E.E., Gerould, S. 1994. Estimates of soil ingestion by wildlife. *The Journal of Wildlife Management*. 58(2):375-382.
- CCME (Canadian Council of Ministers of the Environment). 1996. A framework for ecological risk assessment: General guidance. National Contaminated Site Remediation Program. Winnipeg, Manitoba Branch.
- CCME (Canadian Council of Ministers of the Environment). 1999. Canadian environmental quality guidelines (with 2004 and 2005 Soil and Water Quality Revisions). Winnipeg, Manitoba Branch.
- Chapman, P.M., A. Fairbrother and D. Brown. 1998. A critical evaluation of safety (uncertainty) factors for ecological risk assessment. *Environmental Toxicology and Chemistry*. 17:99-108.
- Canadian Wildlife Service (CWS) 1991. Hinterland Who's Who. Semipalmated Sandpiper. Available at: <http://www.hww.ca/hww2.asp?id=74>
- Dauphine, T.C. Jr. 1976. Biology of the Kaminuriak population of barren-ground caribou: Part 4. Report Series No. 38, Canadian Wildlife Service.
- Dominion Diamond, 2015. Human and Wildlife Health Risk Assessment Report for the Jay Project. Prepared by Golder Associates Ltd. for Dominion Diamond Ekati Corporation. February, 2015.
- Environment Canada. 1994. A framework for ecological risk assessment at contaminated sites in Canada: Review and recommendations. National Contaminated Sites Remediation Program. Scientific Series #199. Ottawa, Ontario.
- Golder (Golder Associates Ltd.), 2004. Ecological Risk Assessment for the Lupin Mine Tailings Containment Area. Final Report. Prepared by Golder Associates Ltd. For Kinross Gold Corporation, December, 2004.
- Hansen, J.A., Audet, D., Spears, B.L., Healy, K.A., Brazzle, R.E., Hoffman, D.J., Dailey, A., Beyer, W.N. 2011. Lead exposure and poisoning of songbirds using the Coeur d'Alene River Basin, Idaho, USA. *Integrated Environmental Assessment and Management*. 7(4):587-595.
- Loos, M., Ragas, M.J., Tramper, J.J., Hendriks, A.J. 2009. Modeling zinc regulation in small mammals. *Environmental Toxicology and Chemistry*. 28(11):2378-2385.
- Mowbray, T.B., C.R. Ely, J.S. Sedinger and R.E. Trost. 2002. Canada Goose *Branta canadensis*. In: A. Poole and F. Gill (eds.). *The Birds of North America*. No. 682. Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Nagorsen, D.W. 2005. Rodents & Lagomorphs of British Columbia. Volume 4, The Mammals of British Columbia. Royal British Columbia Museum Handbook.
- Outridge, P.M. and Scheuhammer, A.M. 1993. Bioaccumulation and toxicology of chromium: implications for wildlife. *Reviews in Environmental Contamination Toxicology*. 130:31-77.



Sample, B. and C.A. Arenal. 2001. Development of literature-based bioaccumulation models for terrestrial arthropods. Platform presentation at the 2001 Annual Meeting of the Society of Environmental Toxicology and Chemistry.

Senes Consultants Ltd. 2008. Final Report – Screening Level Environmental Effects Assessment Proposed Kiggavik Project. Report prepared for Areva Resources Canada Inc.

USEPA (United States Environmental Protection Agency). 1993. Wildlife exposure factors handbook, EPA/600/R-93/187. December 1993. Available: [www.epa.gov/ncea/wefh.html](http://www.epa.gov/ncea/wefh.html).

USEPA (United States Environmental Protection Agency). 1999. Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. Volume 3A and 3B. EPA530-D-99-001C.

USEPA (United States Environmental Protection Agency). 2005. Guidance for Developing Soil Screening Levels. OSWER Directive 9287.7-55. Washington, DC. November, 2003. Revised 2005.

## **Appendix A**

### **Example Calculation**

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## Exposure of Lapland longspur to Pb (main minesite area)

### Exposure Assessment

$$EDI = T_{\text{onsite}}(DS_{\text{onsite}} + DW_{\text{onsite}} + DF_{\text{onsite}}) + T_{\text{ref}}(DS_{\text{ref}} + DW_{\text{ref}} + DF_{\text{ref}})$$

Where:

EDI = estimated daily intake of COPC

$T_{\text{onsite}}$  = fraction of time in study area (i.e. onsite) = 33%

$T_{\text{ref}}$  = remaining fraction of time = 67% (remainder of exposure based on external reference concentrations)

DS = dose from incidental soil ingestion

$I_{\text{soil}}$  = intake of soil

DW = dose from drinking water

$I_{\text{water}}$  = intake of water

DF = dose from food

$I_{\text{food}}$  = intake of food

$Pb_{\text{(media)}}$  = measured concentration of lead in media (95% UCLM of onsite or external reference values, accordingly)

Example:

$$DS_{\text{onsite}} \text{ (mg/kg ww/d)} = Pb_{\text{soil}} \text{ (mg/kg dw)} * I_{\text{soil}} \text{ (mg dw/kg ww/d)}$$

$$= 11.23 * 0.0174$$

$$= 0.195$$

$$DW_{\text{onsite}} \text{ (mg/kg ww/d)} = Pb_{\text{water}} \text{ (mg/L)} * I_{\text{water}} \text{ (L/kg ww/d)}$$

$$= 0.00 * 0.205$$

$$= 0.00$$

$$DF_{\text{onsite}} \text{ (mg/kg ww/d)} = Pb_{\text{sedge}} \text{ (mg/kg ww)} * 25\% + Pb_{\text{lichen}} \text{ (mg/kg ww)} * 0\% + Pb_{\text{berries}} \text{ (mg/kg ww)} * 5\% + Pb_{\text{insects}} \text{ (mg/kg ww)} * 70\% * I_{\text{food}} \text{ (kg ww/kg ww/d)}$$

$$= 0.35 * 25\% + 1.68 * 0\% + 0.03 * 5\% + 0.37 * 70\% * 0.656$$

$$= 0.228$$

$$DS_{\text{ref}} \text{ (mg/kg ww/d)} = Pb_{\text{soil}} \text{ (mg/kg dw)} * I_{\text{soil}} \text{ (mg dw/kg ww/d)}$$

$$= 8.757 * 0.0174$$

$$= 0.152$$

$$DW_{ref} \text{ (mg/kg ww/d)} = Pb_{water} \text{ (mg/L)} * I_{water} \text{ (L/kg ww/d)}$$

$$= 0.00 * 0.205$$

$$= 0.00$$

$$DF_{ref} \text{ (mg/kg ww/d)} = Pb_{sedg} \text{ (mg/kg ww)} * 25\% + Pb_{lichen} \text{ (mg/kg ww)} * 0\% + Pb_{berries} \text{ (mg/kg ww)} * 5\% + Pb_{insects} \text{ (mg/kg ww)} * 70\% * I_{food} \text{ (kg ww/kg ww/d)}$$

$$= 1.01 * 25\% + 2.85 * 0\% + 0.02 * 5\% + 0.31 * 70\% * 0.656$$

$$= 0.309$$

$$EDI_{Pb} \text{ (mg/kg ww/d)} = 33\% (0.195 + 0.00 + 0.228) + 67\% (0.152 + 0.00 + 0.309)$$

$$= 0.45$$

### **Risk Characterization**

$$HQ = EDI \text{ (mg/kg ww/d)} / LOAEL\text{-based TRV} \text{ (mg/kg ww/d)**}$$

$$= 0.45 / 11.30$$

$$= 0.04$$

\*\*see values in Appendix B

## **Appendix B**

### **Toxicity Reference Values**

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Parameter			Antimony <sup>2,3,4</sup>	Arsenic <sup>1</sup>	Barium <sup>1</sup>	Beryllium <sup>1,2</sup>	Cadmium <sup>1</sup>	Chromium <sup>1,5</sup>	Cobalt <sup>7</sup>	Copper <sup>1</sup>		
<b>TRVs for Test Species</b>												
<b>Mammals</b>	<b>NOAEL-based TRV:</b>	Test Species	Mouse	Mouse	Rat	Rat	Rat	Rat	Rat	Mink		
		BW <sub>NOAEL</sub> (kg wet)	0.03	0.03	0.435	0.35	0.303	0.35	0.15	1		
		NOAEL (mg/kg wet/day)	98.0	<u>0.126</u>	5.1	0.66	1	3.28	0.2	11.7		
	<b>LOAEL-based TRV:</b>	Test Species	Rat	Mouse	Rat	na	Rat	Rat	Rabbit	Mink		
		BW <sub>LOAEL</sub> (kg wet)	0.27	0.03	0.35	na	0.303	0.35	3	1		
		LOAEL (mg/kg wet/day)	112.9	1.26	19.8	na	10	13.14	2	15.14		
<b>Birds</b>	<b>NOAEL-based TRV:</b>	Test Species	Rat (see above)	Brown-headed cowbird	Chicken	Rat (see above)	Mallard	Black duck	Pek. Duckling	Chicken		
		NOAEL (mg/kg wet/day)	9.8	2.5	21	0.066	1.5	1	2.37	47		
		<b>LOAEL-based TRV:</b>	Test Species	Rat (see above)	Brown-headed cowbird	Chicken	na	Mallard	Black duck	Pek. Duckling	Chicken	
	LOAEL (mg/kg wet/day)	11.29	7.4	42	na	20	5	4.74	62			
	<b>TRVs for Wildlife Species</b>											
		<b>Body Weight (kg wet)</b>	<b>TRV (mg/kg wet/day)</b>									
<b>Mammals</b>	Northern Red-backed Vole	0.02	NOAEL-based TRV:	108.5	0.1	11.0	1.3	2.0	6.7	0.3	31.1	
	Northern Red-backed Vole	0.02	LOAEL-based TRV:	216.4	1.4	40.5	na	19.7	26.9	7.0	40.3	
	Caribou	75	NOAEL-based TRV:	13.9	0.0	1.4	0.2	0.3	0.9	0.0	4.0	
	Caribou	75	LOAEL-based TRV:	27.7	0.2	5.2	na	2.5	3.4	0.9	5.1	
<b>Birds</b>	Lapland Longspur	0.023	NOAEL-based TRV:	9.8	2.5	21.0	0.1	1.5	1.0	2.4	47.0	
	Lapland Longspur	0.023	LOAEL-based TRV:	11.3	7.4	42.0	na	20.0	5.0	4.7	61.7	
	Canada Goose	2	NOAEL-based TRV:	9.8	2.5	21.0	0.1	1.5	1.0	2.4	47.0	
	Canada Goose	2	LOAEL-based TRV:	11.3	7.4	42.0	na	20.0	5.0	4.7	61.7	
	Semi-palmated Sandpiper	0.03	NOAEL-based TRV:	9.8	2.5	21.0	0.1	1.5	1.0	2.4	47.0	
	Semi-palmated Sandpiper	0.03	LOAEL-based TRV:	11.3	7.4	42.0	na	20.0	5.0	4.7	61.7	

**Notes:**

Based on Sample et al. (1996), the following allometric equation was used for interspecies extrapolations among mammals:  $NOAEL_w = NOAEL_{ts} * (BW_w/BW_{ts})^{0.25}$ ; the equation also applies to the LOAEL

Based on Sample et al. (1996), an allometric scaling factor of 1 was considered appropriate for interspecies extrapolations among birds underline corresponds to an unbounded LOAEL (10X safety factor used to derive the NOAEL) (see text for details)

na indicates that there was no TRV (NOAEL or LOAEL) available

<sup>1</sup> Sample et al. (1996)

<sup>2</sup> Bird TRVs calculated by multiplying the mammal TRVs with a safety factor of 0.1 (see text for discussion)

<sup>3</sup> NOAEL from Dieter et al. (1991) as quoted in Lynch et al. (1999)

<sup>4</sup> LOAEL from Rossi et al. (1987)

<sup>5</sup> Mammals TRV based on chromium VI; bird TRV based on chromium III

<sup>6</sup> Ueberschar et al. (1986)

<sup>7</sup> Chetty et al. (1979) for mammal NOAEL TRV, Szakmary et al. (2001) for mammal LOAEL TRV, Van Vleet (1982) for bird TRVs.

<sup>8</sup> Ma and Pritsos (1997); uncertainty factor of 10 was applied to account for chronic exposure (Golder, 2004)

Parameter			Lead <sup>1</sup>	Manganese <sup>1</sup>	Total Hg	Inorg-Hg <sup>1</sup>	MeHg <sup>1</sup>	Molybdenum <sup>1</sup>	Nickel <sup>1</sup>	Selenium <sup>1</sup>	Strontium <sup>1,2</sup>	
<b>TRVs for Test Species</b>												
<b>Mammals</b>	<b>NOAEL-based TRV:</b>	Test Species	Rat	Rat	na	Mink	Mink	Mouse	Rat	Rat	Rat	
		BW <sub>NOAEL</sub> (kg wet)	0.35	0.35	na	1	1	0.03	0.35	0.35	0.35	
		NOAEL (mg/kg wet/day)	8	88	na	1	0.015	<u>0.26</u>	40	0.2	263	
	<b>LOAEL-based TRV:</b>	Test Species	Rat	Rat	na	Mink	Mink	Mouse	Rat	Rat	na	
		BW <sub>LOAEL</sub> (kg wet)	0.35	0.35	na	1	1	0.03	0.35	0.35	na	
		LOAEL (mg/kg wet/day)	80	284	na	na	0.025	2.6	80	0.33	na	
<b>Birds</b>	<b>NOAEL-based TRV:</b>	Test Species	Japanese quail	Japanese quail	na	Japanese quail	Mallard	Chicken	Mallard	Mallard	Rat (see above)	
		NOAEL (mg/kg wet/day)	1.13	977	na	0.45	0.0064	<u>3.53</u>	77.4	0.4	26.3	
		<b>LOAEL-based TRV:</b>	Test Species	Japanese quail	na	na	Japanese quail	Mallard	Chicken	Mallard	Mallard	na
	LOAEL (mg/kg wet/day)	11.3	na	na	0.9	0.064	35.3	107	0.8	na		
	<b>TRVs for Wildlife Species</b>											
			<b>Body Weight (kg wet)</b>	<b>TRV (mg/kg wet/day)</b>								
<b>Mammals</b>	Northern Red-backed Vole	0.02	NOAEL-based TRV:	16.4	180.0	na	2.7	0.0	0.3	81.8	0.4	537.9
	Northern Red-backed Vole	0.02	LOAEL-based TRV:	163.6	580.9	na	na	0.1	2.9	163.6	0.7	na
	Caribou	75	NOAEL-based TRV:	2.1	23.0	na	0.3	0.0	0.0	10.5	0.1	68.7
	Caribou	75	LOAEL-based TRV:	20.9	74.2	na	na	0.0	0.4	20.9	0.1	na
<b>Birds</b>	Lapland Longspur	0.023	NOAEL-based TRV:	1.1	977.0	na	0.5	0.0	3.5	77.4	0.4	26.3
	Lapland Longspur	0.023	LOAEL-based TRV:	11.3	na	na	0.9	0.1	35.3	107.0	0.8	na
	Canada Goose	2	NOAEL-based TRV:	1.1	977.0	na	0.5	0.0	3.5	77.4	0.4	26.3
	Canada Goose	2	LOAEL-based TRV:	11.3	na	na	0.9	0.1	35.3	107.0	0.8	na
	Semi-palmated Sandpiper	0.03	NOAEL-based TRV:	1.1	977.0	na	0.5	0.0	3.5	77.4	0.4	26.3
	Semi-palmated Sandpiper	0.03	LOAEL-based TRV:	11.3	na	na	0.9	0.1	35.3	107.0	0.8	na

**Notes:**

Based on Sample et al. (1996), the following allometric equation was used for interspecies extrapolations among mammals:  $NOAEL_w = NOAEL_b * (BW_b/BW_w)^{0.25}$ ; the equation also applies to the LOAEL. Based on Sample et al. (1996), an allometric scaling factor of 1 was considered appropriate for interspecies extrapolations among birds. underline corresponds to an unbounded LOAEL (10X safety factor used to derive the NOAEL) (see text for details). na indicates that there was no TRV (NOAEL or LOAEL) available.

<sup>1</sup> Sample et al. (1996)

<sup>2</sup> Bird TRVs calculated by multiplying the mammal TRVs with a safety factor of 0.1 (see text for discussion)

<sup>3</sup> NOAEL from Dieter et al. (1991) as quoted in Lynch et al. (1999)

<sup>4</sup> LOAEL from Rossi et al. (1987)

<sup>5</sup> Mammals TRV based on chromium VI; bird TRV based on chromium III

<sup>6</sup> Ueberschar et al. (1986)

<sup>7</sup> Chetty et al. (1979) for mammal NOAEL TRV, Szakmary et al. (2001) for mammal LOAEL TRV, Van Vleet (1982) for bird TRVs.

<sup>8</sup> Ma and Pritsos (1997); uncertainty factor of 10 was applied to account for chronic exposure (Golder, 2004)

Parameter			Thallium <sup>1,6</sup>	Tin <sup>1</sup>	Uranium <sup>1</sup>	Vanadium <sup>1</sup>	Zinc <sup>1</sup>	Cyanide <sup>8</sup>	
<b>TRVs for Test Species</b>									
<b>Mammals</b>	<b>NOAEL-based TRV:</b>	Test Species	Rat	Mouse	Mouse	Rat	Rat	na	
		BW <sub>NOAEL</sub> (kg wet)	0.365	0.03	0.028	0.26	0.35	na	
		NOAEL (mg/kg wet/day)	<u>0.0074</u>	23.4	3.07	<u>0.21</u>	160	na	
	<b>LOAEL-based TRV:</b>	Test Species	Rat	Mouse	Mouse	Rat	Rat	na	
		BW <sub>LOAEL</sub> (kg wet)	0.365	0.03	0.028	0.26	0.35	na	
		LOAEL (mg/kg wet/day)	0.074	35	6.13	2.1	320	na	
<b>Birds</b>	<b>NOAEL-based TRV:</b>	Test Species	Chicken	Japanese quail	Black duck	Mallard	White leghorn hen	Mallard	
		NOAEL (mg/kg wet/day)	0.202	6.8	16	11.4	14.5	na	
	<b>LOAEL-based TRV:</b>	Test Species	Chicken	Japanese quail	Black duck	Mallard	White leghorn hen	Mallard	
		LOAEL (mg/kg wet/day)	0.757	16.9	na	na	131	0.025	
<b>TRVs for Wildlife Species</b>									
		<b>Body Weight (kg wet)</b>	<b>TRV (mg/kg wet/day)</b>						
<b>Mammals</b>	Northern Red-backed Vole	0.02	NOAEL-based TRV:	0.0	25.9	3.3	0.4	327.2	na
	Northern Red-backed Vole	0.02	LOAEL-based TRV:	0.2	38.7	6.7	4.0	654.5	na
	Caribou	75	NOAEL-based TRV:	0.0	3.3	0.4	0.1	41.8	na
	Caribou	75	LOAEL-based TRV:	0.0	4.9	0.9	0.5	83.6	na
<b>Birds</b>	Lapland Longspur	0.023	NOAEL-based TRV:	0.2	6.8	16.0	11.4	14.5	na
	Lapland Longspur	0.023	LOAEL-based TRV:	0.8	16.9	na	na	130.9	na
	Canada Goose	2	NOAEL-based TRV:	0.2	6.8	16.0	11.4	14.5	na
	Canada Goose	2	LOAEL-based TRV:	0.8	16.9	na	na	130.9	na
	Semi-palmated Sandpiper	0.03	NOAEL-based TRV:	0.2	6.8	16.0	11.4	14.5	na
	Semi-palmated Sandpiper	0.03	LOAEL-based TRV:	0.8	16.9	na	na	130.9	0.025

**Notes:**

Based on Sample et al. (1996), the following allometric equation was used for interspecies extrapolations among mammals:  $NOAEL_w = NOAEL_s * (BW_s/BW_w)^{0.25}$ ; the equation also applies to the LOAEL. Based on Sample et al. (1996), an allometric scaling factor of 1 was considered appropriate for interspecies extrapolations among birds underline corresponds to an unbounded LOAEL (10X safety factor used to derive the NOAEL) (see text for details) na indicates that there was no TRV (NOAEL or LOAEL) available

<sup>1</sup> Sample et al. (1996)

<sup>2</sup> Bird TRVs calculated by multiplying the mammal TRVs with a safety factor of 0.1 (see text for discussion)

<sup>3</sup> NOAEL from Dieter et al. (1991) as quoted in Lynch et al. (1999)

<sup>4</sup> LOAEL from Rossi et al. (1987)

<sup>5</sup> Mammals TRV based on chromium VI; bird TRV based on chromium III

<sup>6</sup> Ueberschar et al. (1986)

<sup>7</sup> Chetty et al. (1979) for mammal NOAEL TRV, Szakmary et al. (2001) for mammal LOAEL TRV, Van Vleet (1982) for bird TRVs.

<sup>8</sup> Ma and Pritsos (1997); uncertainty factor of 10 was applied to account for chronic exposure (Golder, 2004)



## Appendix B – References

- Chetty, K.N., D.s.v. Subba Rao, L. Drummond, D. Desaiyah. 1979. Cobalt induced changes in immune response and adenosine triphosphate activities in rats. *Journal of Environmental Science and Health. Part B.* B14(5):525-544.
- Lynch, B.S., C.C. Capen, E.R. Nestmann, G. Veenstra and J.A. Deyo. 1999. Review of subchronic/chronic toxicity of antimony potassium tartrate. *Regulatory Toxicology and Pharmacology.* 30: 9-17.
- Ma, J. and C.A. Pritsos. 1997. Tissue-specific bioenergetic effects and increased enzymatic activities following acute sublethal peroral exposure to cyanide in the mallard duck. *Toxicology and Applied Pharmacology.* 142:297-302.
- Rossi, F., R. Acampora, C. Vacca, S. Maione, M.G. Matera, R. Servodio, and E. Marmo. 1987. Prenatal and postnatal antimony exposure in rats: effects on vasomotor reactivity development of pups. *Teratogenesis, Carcinogenesis, and Mutagenesis* 7: 491-496
- Sample, B., D.M. Opresko and G.W. Suter II. 1996. Toxicological benchmarks for wildlife: 1996 Revision. Prepared for the Oak Ridge National Laboratory (ORNL), Department of Energy. ES/ER/TM-86/R3
- Szakmary, E., G. Ungvary, A. Hudak, E. Tatrai, M. Nary. 2001. Effects of cobalt sulfate on prenatal development of mice, rats, and rabbits, an on early postnatal development of rats. *Journal of Toxicology and Environmental Health, Part A* 62:367-386.
- Ueberschar, K.-H., S. Matthes, and H. Vogt. 1986. Effect of thallium salts on broiler and leghorn hens (In German). A3.
- Van Vleet, J.F. 1982. Amounts of twelve elements required to induce selenium vitamin E deficiency in ducklings. *American Journal of Veterinary Research* 43(5):851-857.

## **Appendix C**

### **Standard Operation Procedure for Soil and Vegetation Sampling Based on Azimuth (2006)**

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## **Meadowbank Project - Standard Operating Procedure**

Collection of soil and vegetation samples for the Screening Level Risk Assessment program (from Azimuth, 2006)

March, 2016

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### 1. Sample Locations

Three external reference (control) areas and eleven treatment areas are to be sampled. Control areas were selected northwest and west of the project area, upwind from mine related activities (C-1 to C-3). Treatment areas (main minesite, near-field, AWAR, Whale Tail Pit, Whale Tail Haul Road) were selected to represent wind distribution of contaminants from mining related activities (T-1 to T-11). Within each control and treatment area, five sample sites (S1 to S5) were selected within a 200 to 300 m radius, at least 150 m apart from one another. Within each sample site, composite tissue and soil samples are collected within a 10 to 30 m radius, depending on tissue (particularly berry) availability. UTM coordinates for each sample site are presented in Table 1.

**Table 1. UTM coordinates for soil and vegetation sampling locations (NAD 83).**

<b>Sampling Area</b>	<b>Site #1</b>	<b>Site #2</b>	<b>Site #3</b>	<b>Site #4</b>	<b>Site #5</b>
T1 – Main minesite	14W 0639238 7215692	14W 0639137 7215734	14W 0639061 7215668	14W 0639109 7215569	14W 0639010 7215459
T2 – Near-site	15W 0359410 7214020	15W 0359403 7214128	15W 0359507 7214072	15W 0359459 7213912	15W 0359391 7213816
T3 – Main minesite	14W 0640069 7212342	14W 0640146 7212421	14W 0639967 7212281	14W 0639976 7212409	14W 0639991 7212541
T4 – Near-site	14W 0640916 7210294	14W 0640994 7210201	14W 0641112 7210194	14W 0640890 7210137	14W 0640802 7210271
T5 – Near-site	14W 0637020 7211270	14W 0636978 7211160	14W 0637013 7211394	14W 0637162 7211419	14W 0637057 7211513
T6 – Main minesite	14W 0638559 7213995	14W 0638651 7213953	14W 0638780 7214028	14W 0638515 7214226	14W 0638400 7214038
T7 – Near-site	14W 0640847 7218280	14W 0640872 7218395	14W 0640755 7218444	14W 0640719 7218338	14W 0640788 7218177
T8 - AWAR	14W 0626884 7200614	14W 0626837 7200520	14W 0626806 7200427	14W 0626746 7200306	14W 0626675 7200224
T9 – Whale Tail Pit	TBD	TBD	TBD	TBD	TBD
T10 – Whale Tail Pit	TBD	TBD	TBD	TBD	TBD
T11 – Whale Tail Haul Road	TBD	TBD	TBD	TBD	TBD
T12 – TSF (sediment and water)	TBD	TBD	TBD	TBD	TBD
C1 – External Reference	14W 0623453 7211586	14W 0623450 7211467	14W 0623416 7211345	14W 0623339 7211252	14W 0623217 7211558
C2 – External Reference	14W 0625518 7221488	14W 0625569 7221607	14W 0625743 7221542	14W 0625790 7221388	14W 0625825 7221244
C3 – External Reference	14W 0624717 7222685	14W 0624818 7222623	14W 0624850 7222504	14W 0624861 7222349	14W 0624636 7222313

## 2. Soil Sample Collection

Soil samples will be collected using a composite sampling method at each sample site. Representative grab samples will be collected from five separate test pits per sample site (generally no greater than a 5.0 m<sup>2</sup> area) using a stainless steel ladle. First, the organic layer (which ranges from 0 to 5 cm below the surface) will be removed and discarded. Second, two small scoops of soil, approximately 5-10 cm below surface, will be placed in a pre-labeled Ziploc bag and homogenized. Decontamination (i.e., cleaning to prevent cross-contamination) of soil sampling equipment (i.e. stainless steel spoons) will be conducted at the beginning of each day, between treatment and control areas and between sample site locations. The cleaning procedures will include:

- Rinsing with site water to remove any remaining sediment or organic matter
- Scrubbing with brushes using Liquinox detergent
- A final rinse with site water

## 3. Tissue Sample Collection

Sedges and lichen samples will be collected in close proximity to the composite soil samples. Sedges will be collected from an approximate 5.0 m<sup>2</sup> area, near the center of the sample site, by randomly selecting and simply grabbing/ pulling representative sedge, periodically including the roots. Samples will be placed in a pre-labeled Ziploc bag. Similarly, lichen tissue samples will be collected by hand and placed in a pre-labeled Ziploc bag. Collection of lichen and sedge should continue until the Ziploc bag is full. Berry collection sites were selected along moderately dry, rolling hills where berries are the most abundant. Approximately 2 cups of berries should be collected per site. No species of berries, sedges and lichen should be sampled preferentially, as each treatment and control area has a different variety and abundance of vegetation.

## 4. Sample Handling, Documentation and Analyses

### 4.1 Field Book

During the field-sampling program a field book will be used to maintain a record of sample collection and observations, including:

- field staff
- descriptions of photos taken
- date and time
- weather conditions
- sample identifications
- tissue and soil sample characteristics
- # of samples taken
- sample locations, including GPS coordinates
- sample time
- notes and general observations

The field logbook is intended to provide sufficient information such that personnel may reconstruct events that occurred during the sampling period, without having to rely on field personnel or memory of the individuals.

#### 4.2 Containers and Labeling

Samples will be collected in Ziploc bags for ease of sample collection and prevention of sample destruction and mixing during shipping:

- Soil samples – one (1) 950 mL (18cm x 20cm) Ziploc® bag per soil composite
- Tissue samples – one (1) 950 mL (18cm x 20cm) Ziploc® bag, per berries, sedge, and lichen sample
- Samples will be labeled with the following:
  - Site ID
  - Sample Date and Time
  - Sample ID
  - GPS Coordinates
  - Sample Type
  - Initials of Field Staff

Sample Identification (ID) will be coordinated to accommodate ease of organization and interpretation of analytical results. As an example, the ID for a Treatment Area 1, Site No. 2, Lichen tissue sample could be: T1 S2 Li.

#### 4.3 Tracking, Preservation, Storage and Transportation

Tissue and soil samples will be recorded in the field book following sample collection at each sample site within each area. Chain-of-custody forms will be filled out for transport. Care will be taken to ensure that the sample identification is clearly marked on each bag. A small piece of paper with the sample ID, date and sample type may be placed in the sample bag. Samples will be placed on ice in coolers and shipped, along with the chain of custody records, to an accredited laboratory (typically ALS Laboratories in Vancouver, BC).

#### 4.4 Laboratory Analysis

All soil and tissue analyses will be conducted by a CALA-accredited laboratory (typically ALS Environmental Laboratories in Vancouver, BC). The following laboratory analyses will be requested:

- Soil – soil pH and total metals; and
- Plant Tissue – Moisture content and total metals.

#### 5. Quality Assurance/Quality Control (QA/QC)

The following recommended sample collection and handling techniques will be employed during collection of vegetation tissue and soil samples:

- Sampling by qualified personnel
- Prevention of foreign material in samples or loss of sample material
- Minimization of sample handling and use of new nitrile or latex gloves during sample collection
- Use of appropriate clean containers and proper storage of samples
- Collection of sufficient sample volumes as specified by the data quality objectives
- Adequate decontamination
- Use of appropriate packaging, ice and shipping methods to ensure that holding times and storage conditions are met.

## **APPENDIX B**

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**Meadowbank Mine Project Certificate No.004,  
Whale Tail Pit Project Certificate No.008 Terms and Conditions, and  
Government of Nunavut Commitments**

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P.C.	T&C No.	Term or Condition	Location in TEMP Document
<b>Meadowbank Project Certificate</b>			
No. 004	32	<p>AEM shall operate the all-weather road as a private access road, and implement all such measures necessary to limit non-mine use of the road to authorized, safe and controlled use by all-terrain-vehicles for the purpose of carrying out traditional Inuit activities. The measures AEM shall undertake include, but are not limited to:</p> <ul style="list-style-type: none"> <li>a. Maintaining a gate and manned gatehouse at kilometre 5 of the Private Access Road;</li> <li>b. In consultation with the Hamlet of Baker Lake, the local HTO, and the KivIA, update the All-weather Private Access Road Management Plan to set out the criteria and processes to authorize and ensure safe and controlled non-mine use of the road by all-terrain vehicles for the purpose of carrying out traditional Inuit activities, and measure to limit all other non-mine use of the road. The updated Plan is to be submitted to the GN, INAC, and KivIA for approval no later than one (1) month after the approval of revised Condition 32.</li> <li>c. The posting of signs in English and Inuktitut at the gate, each major bridge crossing, and each 10 kilometres of road, stating that unauthorized public use of the road is prohibited;</li> <li>d. The posting of signs in English and Inuktitut along the road route to identify when entering or leaving crown land;</li> <li>e. Prior to opening of the road, and annually thereafter, advertise and hold at least one community meeting in the Hamlet of Baker Lake to explain to the community that the road is a private road with non-mine use of the road limited to approved, safe and controlled use by all-terrain-vehicles for the purpose of carrying out traditional Inuit activities.</li> <li>f. Place notices at least quarterly on the radio and television to explain to the community that the road is a private road with non-mine use of road limited to authorized, safe and controlled use by all-terrain-vehicles for the purpose of carrying out traditional Inuit activities.</li> <li>g. Record all authorized non-mine use of the road, and require all mine personnel using the road to monitor and report unauthorized non-mine use of the road, and collect and report this data to NIRB one (1) year after the road is opened and annually thereafter; and</li> <li>h. Report all accidents or other safety incidents on the road, to the GN, KivIA, and the Hamlet immediately, and to NIRB annually.</li> </ul>	Section 2; Table 3; Annual Reporting
No. 004	51	Cumberland shall engage the HTOs in the development, implementation and reporting of creel surveys within waterbodies affected by the Project to the GN, DFO and local HTO.	Section 3.4.2.8
No. 004	54	<p>Cumberland shall provide an updated Terrestrial Ecosystem Management Plan, to the GN, EC and INAC, within three (3) months of the issuance of the Project Certificate including:</p> <ul style="list-style-type: none"> <li>a. Updated terrestrial ecosystem baseline data;</li> <li>b. Details of the method and rationale for conducting monitoring surveys prior to the commencement of construction;</li> <li>c. Statistical validation to support the conclusions drawn from monitoring impacts of the mine and infrastructure on wildlife;</li> <li>d. A detailed analysis of the method of distinguishing between cow/calf groups from other caribou group observations;</li> <li>e. Details of a comprehensive hunter harvest survey to determine the effect on ungulate populations resulting from increased human access caused by the all-weather private access road, including establishing preconstruction baseline harvesting data, to be developed in consultation with local HTOs, the GN-DOE and the Nunavut Wildlife Management Board;</li> <li>f. Details of annual aerial surveys to be conducted to assess waterfowl densities in the regional study area during the construction phase and for at least the first three (3) years of operation, with the data analyzed and compared to baseline data to determine if significant effects are occurring and require mitigation.</li> <li>g. Details of an annual breeding bird plot surveys and transects along the all-weather road to be conducted during the construction phase and for at least the first three (3) years of operation.</li> <li>h. Details of a monitoring program, including recording the locations and frequency of observing caribou and carnivores and any actions taken to avoid contact with or disturbance, and a specific mitigation plan for Shorteared owls and any other species of special concern pursuant to Schedule 3 of the Species at Risk Act located in the local study area or along the all-weather private access road</li> </ul>	Section 2.3 (methods of analysis); Section 3 (monitoring and impact prediction); Section 4 (TEMP annual report)
No. 004	55	<p>Cumberland shall provide the following analysis in the March 2007 Wildlife Summary Monitoring Report:</p> <ul style="list-style-type: none"> <li>a. Further review and analysis of the size of the regional study area;</li> <li>b. A summary of the involvement of Inuit in the monitoring program;</li> <li>c. A detailed report of the natural variability of VECs in the region;</li> <li>d. A detailed analysis on distribution and abundance of cows, bulls, and calves;</li> <li>e. Results of the 2006 monitoring program, including field methodologies and statistical approaches used to support conclusions drawn;</li> </ul>	TEMP Annual Report

P.C.	T&C No.	Term or Condition	Location in TEMP Document
		f. Any proposed changes to the TEMP survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program.	
No. 004	56	Cumberland shall plan, construct, and operate the mine in such a way that caribou migration paths through the Project, including in the narrows west of Helicopter Island, are protected. Maps of caribou migration corridors shall be developed in consultation with Elders and local HTOs, including Chesterfield Inlet and placed in site offices and upgraded as new information on corridors becomes available. Information on caribou migration corridors shall be reported to the GN, KivIA and NIRB's Monitoring Officer annually.	TEMP Annual Report
No. 004	57	Cumberland shall participate in a caribou collaring program as directed by the GN-DOE.	TEMP Annual Report
<b>Whale Tail Pit Project</b>			
No. 008	27	The Proponent shall participate in a Terrestrial Advisory Group with the Government of Nunavut, the Baker Lake Hunters and Trappers Organization, the Kivalliq Inuit Association, and other parties as appropriate to continually review and refine mitigation and monitoring details within the Terrestrial Ecosystem Management Plan. Additional caribou collar data, results from associated studies, and other monitoring data as available should be considered for incorporation as appropriate.	Section 4.2
No. 008	28	The Proponent shall maintain a Terrestrial Ecosystem Management Plan (TEMP) throughout all phases of the Project. The Plan shall include detailed monitoring, mitigation, and adaptive management measures for wildlife, with consideration for each Project activity predicted to affect wildlife, and with inclusion of specific triggers for mitigation and adaptive management intervention. The TEMP shall demonstrate consideration for all relevant commitments made by the Proponent throughout the Nunavut Impact Review Board's review of the Project.  Updates to the TEMP may be required when there are significant changes in project development plans, monitoring results indicating biologically-meaningful changes, significant updates to the scientific understanding of management methods relevant to wildlife at the project site, Inuit Qaujimagatuqangit, Traditional Knowledge, changes in climatic conditions that might subject wildlife to unexpected impacts, or as otherwise necessary.	Entire Document
No. 008	29	The Proponent shall, in collaboration with the Government of Nunavut, collect additional caribou collar data and conduct analyses of this data to quantify the zone of influence and associated effects of project components on caribou movement for a study area that includes the Whale Tail mine site, the haul road, the Meadowbank Gold Mine and its All-Weather Access Road	Outside of TEMP, but related
No. 008	30	The Proponent shall collect additional data on caribou group sizes in proximity to the Project, and shall work with the Terrestrial Advisory Group to refine appropriate caribou group size thresholds that trigger additional mitigation. Initially, the group size thresholds should be set at 110 (fall), 25 (winter and summer), and 12 (spring).	Section 3.4
No. 008	31	The Proponent shall develop and implement a Road Access Management Plan and maintain traffic monitoring logs along the haul road between the Whale Tail Pit project and the Meadowbank mine. Where traffic exceeds levels predicted within the Environmental Impact Statement, the Proponent shall develop and implement appropriate modifications to its wildlife protection measures.	Outside of TEMP, but will be reported within annual TEMP reports
No. 008	32	The Proponent shall engage with the Baker Lake Hunters and Trappers Organization and other relevant parties to ensure that safety barriers, berms, and designed crossings associated with project infrastructure, including the haul road, are constructed and operated as necessary to allow for the safe passage of caribou and other terrestrial wildlife.	TEMP Annual Report
No. 008	33	The Proponent shall provide wildlife incident reports to the appropriate authorities in a timely fashion. Wildlife incident reports should include the following information: a) Locations (i.e., latitude and longitude), species, number of animals, a description of the animal activity, and a description of the gender and age of animals if possible; b) Prior to conducting project activities, the Proponent should map the location of any sensitive wildlife sites such as denning sites, calving areas, caribou crossing sites, and raptor nests in the project area, and identify the timing of critical life history events (i.e., calving, mating, denning and nesting); and c) Additionally, the Proponent should indicate potential impacts from the project, and ensure that operational activities are managed and modified to avoid impacts on wildlife and sensitive sites  <i>Commentary: Items (b) and (c) are not typically included in the wildlife incidents reports, but rather are expected to be included in the Terrestrial Ecosystem Management Plan and will be provided in accordance with the requirements of term and condition #28.</i>	TEMP Annual Report

P.C.	T&C No.	Term or Condition	Location in TEMP Document
No. 008	34	<p>The Proponent will maintain a Migratory Birds Protection Plan for the Project in consultation with Environment and Climate Change Canada and other interested parties. The plan should include and/or demonstrate that the Proponent give consideration to the following:</p> <ul style="list-style-type: none"> <li>• Information obtained from baseline characterization of migratory bird and vegetation communities within the predicted flood area;</li> <li>• Results of field tests and/or the thorough literature review of the effectiveness of preferred deterrence prior to actual flooding; and</li> <li>• Details regarding monitoring the effectiveness of mitigation measures during flooding.</li> </ul>	Appendix F and TEMP Annual Report
No. 008	35	The Proponent shall ensure that the mitigation and monitoring strategies developed for Species at Risk are updated as necessary to maintain consistency with any applicable status reports, recovery strategies, action plans, and management plans that may become available through the duration of the Project.	TEMP Annual Report
No. 008	36	Prior to removal or deterrence of raptors, the Proponent will contact the Government of Nunavut – Department of Environment to discuss proposed mitigation options and, if required, will obtain the necessary permits.	Section 3.6 and Appendix F

**Commitments made to the GN, during the Whale Tail final hearing, regarding revisions to the Terrestrial Ecosystem Management Plan. (Commitments as submitted by AEM to final hearing and listed in the NIRB Final Hearing Report on the Whale Tail Project – Appendix B)**

No.	Subject	Commitment by AEM	Incorporated in TEMP (v7.0)?	Notes	Agnico Eagle Response
1	Evaluation of Caribou Protection Measures	<p>The Proponent shall conduct an evaluation of caribou protection measures employed by the Project. <u>The components</u> of this evaluation shall include the following: (a) Tests of the monitoring methods that are used to detect caribou near the Project in order to quantify: (i) the probability of detecting groups; (ii) the effective range of detection; and (iii) the spatial extent of detection capacity relative to the mitigation distance buffers; (b) The collection of additional data on caribou group sizes to confirm the relevance of group size thresholds used in mitigation; (c) Collection and analyses of collar data to quantify the Zone-of-Influence (ZOI) associated with the Whale Tail Project, its haul road and the existing Meadowbank mine (and all-weather-access-road [AWAR]); (d) Collection and analyses of collar data to quantify the effects of the Whale Tail Project, its haul road and the existing Meadowbank mine (and AWAR) on the movements of caribou, in particular during migratory periods; (e) Collection of accurate records documenting the detection of caribou and the subsequent implementation of mitigation measures; and (f) Analyses of collar data comparing the movements of individuals that were and were not subject to the implementation of mitigation measures. <u>The scope</u> of this evaluation shall include the following: (a) A study area or areas that encompass the Whale Tail mine site, haul road, Meadowbank mine and all-weather-access-road (including all activities utilizing this infrastructure including on-going exploration), all of which are integral components of the Project; (b) The use of accepted scientific methods and experimental designs to provide quantitative information; (c) The engagement of recognized subject matter experts in each area of the evaluation; (d) Collection of data with sufficient statistical power to detect potential impacts; (e) Guidance on study designs, analyses and interpretation from the Project’s Terrestrial Advisory Group (TAG); (f) The collection of data during both the construction and active mining</p>	Partially	<p>Section 3.5.2.3 states: “This is also directly related to GN Commitment No.1 (Appendix B), specifically around the collection of data, and data analysis to evaluate caribou protection measures.” Recommend that a reference linking back to table 4 in the TEMP be added. Table 4 is where details of this evaluation are listed.</p> <p>Section 3.5.2.3 states that: “As described above, ground-based monitoring is the major source of data collection on the mine site.” This should be revised. Ground based monitoring is a major source of data collection to support day-to-day mitigation per figures 6-10. However, it is not the major source of data for effects monitoring such as ZOI and caribou movements in response to roads.</p> <p>Section 3.5.2.3 states that: “The request of GN Commitment No. 1 (Appendix B) is for a robust study design and analysis with statistical power to detect effects. While this is ultimately the goal, the complexity and variability of the environment, caribou movements and behaviour, and confounding variables under the control of the mine operations and not under control of the mine operations may not allow for statistical power to be achieved. However, ongoing collaboration and dialogue with the TAG will help to provide continuous improvements toward this goal.”</p> <p>This text is not appropriate for the TEMP and should be removed. It seems to lay the foundation for not fulfilling commitment #1. Achieving statistical power and detecting an effect on caribou movement is</p>	<p>Section 3.5.2.3 – text added or revised for clarity in response to GN comments. However, as per discussions at the January 2019 TAG meeting, and follow-up discussions with the GN, a collaring study workplan needs to be initiated by the GN with support and collaboration from Agnico Eagle. To date, this workplan has not been received by Agnico Eagle. In addition, Agnico Eagle strongly suggests that although statistical significance is the desired outcome through a robust study and Agnico Eagle is committed to this, achieving statistical significance is not as simple as stating it is possible if the effect exists, we agree it’s possible just not as simple as stated – research questions need to be clear, parameters need to be well defined, and data collection needs to match the research questions/objectives. Collaring studies can be very informative but they also have their limitations. Data collection techniques need to align with the research questions and collaboration with the GN is essential. To date, a meaningful dialogue with the GN staff that are responsible for these studies</p>

No.	Subject	Commitment by AEM	Incorporated in TEMP (v7.0)?	Notes	Agnico Eagle Response
		<p>phases of the Project; (g) Completion of the evaluation within 5 years of Project commencement (beginning with construction) to ensure that any adverse effects or deficiencies in caribou protection measures are revealed prior to potential extensions in the use of Project infrastructure; (h) A technical report, as noted above in (g), for the evaluation to be submitted to NIRB; and If the Project's active mining life span is extended beyond that currently proposed (i.e. 2022), including extended use of the haul road to support other projects, the evaluation should be updated every 5 years.</p>		<p>certainly possible if the effect exists. The first and typically most limiting factor is sample size/intensity. <u>This is a matter of investing in a collaring program.</u> Attributing effect to a particular activity may be harder for AWAR (due to non-project traffic and hunting) but much less so for haul road since no hunting or public traffic expected. Also, even this problem can be addressed if there are good records of road traffic. For example, if there are no project vehicles on a road when caribou are deflected, it is clearly not project traffic causing deflection.</p>	
2	Seasonal Windows for Caribou	<p>The Proponent shall revise the Terrestrial Ecosystem Management Plan (TEMP) to define the fall caribou migration season as the period from September 22 to December 15 for the purposes of applying caribou protection measures, as detailed in the Project's TEMP. All caribou protection measures that are applied to the period from September 22 to November 7 in the current version of the TEMP (figures 6 to 9 of version 4) shall be applied to this revised period.</p>	No	<p>For the TEMP version 4 the fall migration season was specified as Sept 16 to Nov 7 (see figures 6 to 9). For TEMP version 5 and 6, fall season was specified as Sept 22 to Dec 15 (see figure 6 to 9) in-order align with commitment (#2) made to GN during WT hearing.</p> <p>For version 7 of the TEMP the fall season was revised back to Sept 16 to Nov 7 (see figures 6 to 9). This change is not consistent with the commitment made by AEM nor is it tracked in the tracked change version of the TEMP version 7.</p> <p>It is also not consistent with the seasons used in the FEIS for the Approved project and the Expansion project (FEIS addendum: Appendix 5-D, Tables of Collared Caribou Residency and Road Crossing; and Appendix 5-F, Table 2 - Caribou Incremental and Cumulative Encounter Rates Whale Tail Pit - Expansion Project)</p> <p>In TEMP version 7, the sensitive season for fall migration (as presented in section 2.3.2.1 and figures 6 to 9) should be revised back to Sept 22 to Dec 15. Observational data presented in Table 6</p>	<p>Dates in the various sections of the TEMP between Version 4 and draft Version 7 have been updated, but some updates were not carried through in all sections, leading to errors. Despite these errors, the season dates are used as a guide for management as migration start and end dates can vary from year to year, as indicated in Section 2.3.2.1. The dates have been thoroughly checked and updated throughout the TEMP Version 7 (including Figures 6-9) in line with GN commitment No.2.</p> <p>Text has been added in Section 2.3.2.1. to clarify that "The time frames aim to capture a wide enough window where caribou movements have been recorded to date, based on GN collar data and particularly for the migration periods, during which applicable monitoring and mitigations measures are to be employed."</p>

No.	Subject	Commitment by AEM	Incorporated in TEMP (v7.0)?	Notes	Agnico Eagle Response
				<p>should also be revised to reflect this change.</p> <p>In section 2.3.2.1, it is ok to acknowledge that the timing of migration may vary from year to year but variation in timing will only be detected by real-time monitoring. Caribou Protection Measures should be in effect over a defined season. This seasonal window must be wide enough to accommodate the annual variation in timing of migration.</p>	
4	Caribou Group Size Thresholds – Data Collection	The Proponent shall collect additional data on caribou group-sizes in proximity to the Project (including the haul road) to assess the relevance of the proposed group size thresholds. These data shall be collected using the same definition of caribou 'group' used to trigger caribou protection measures in the TEMP. The TAG shall be directly involved in this assessment. This shall occur within five years of the Project's start.	Partially	<p>Section 3.5.2.1: States that "Survey type will be considered when documenting group sizes to determine any bias...." Recommend substituting "recorded" for "considered".</p> <p>Table 16. Uses the wrong seasonal window for Fall rut/Fall migration. Should be Sept 22 to Dec 15 (see commitment #2 above). Group size data summarised in this table should be revised. Same comment for Table 17.</p>	<p>Survey type will be recorded – text revised in Section 3.5.2.1. for clarity.</p> <p>Dates for seasons in Table 16 and 17 have been updated per comment 2.</p> <p>Group size update completed, and discussion on GST frequency updates should be had within the TAG.</p>
5	Monitoring for CPM - Frequencies	Within 1 year of Project certification, the Proponent shall revise the TEMP to increase the frequencies of height-of-land, road and ground surveys for caribou compared to the current levels in the TEMP (v.4.0). Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall adhere to advice provided by the TAG, as per the terms of reference.	Partially	<p>Section 3.2.1 – Height of Land Surveys: Seasonal windows for these surveys are wrong (see comments under #2 above).</p> <p>Figures 6 &amp; 7. In version 7, survey effort is too infrequent, starting at level 1. Based on what we have seen in 2018 in terms of how quickly migrating caribou can reach the roads. Recommend that if you have 1 collared caribou within 50km during a migratory season, then level 3 monitoring and mitigation is initiated automatically (proactively), collar location maps are reviewed as fast as they can be provided to determine if the migration has begun. Outside migratory seasons, levels 1 through 3 apply, as is, with respect to the frequency of monitoring and mitigation measures. I.e. HOL surveys every 2 days and daily for levels 1 and 2 respectively.</p>	<p>Seasonal windows updated in Section 3.4.2.2 per comment 2.</p> <p>At January 2019 TAG meeting, Agnico Eagle concurred with checking collar data maps to prepare proactively for Level 3 mitigation and potential road shut-downs, as GN collar data for 2017-2018 (as shown at the TAG meeting through animations) suggests that caribou will reach roads/mine site within 2-3 days when observed within 50 km. This does not mean that Level 3 monitoring needs to be immediately implemented when 1 caribou is recorded within 50 km, particularly during the regular season. Also, the TEMP highlights the minimum monitoring and</p>

No.	Subject	Commitment by AEM	Incorporated in TEMP (v7.0)?	Notes	Agnico Eagle Response
				<p>Figure 8. Same comment as for figures 6 &amp; 7. Also note that level 3 monitoring on AWAR is daily rod surveys. This is the same as level 2. Should be a step up in frequency from level 2 to 3. Also note that under level 3 during sensitive seasons it states that: "If agreed upon, day time (700 to 1900) trips will be in a convoy accompanied by a pilot vehicle; 30 km/hr speed limits imposed; closure of AWAR at night (between 1900 to 700)"                      Agreed upon by whom? Which parties?</p> <p>Figure 9. The triggers for level 2 and 3 are the same. Should be different. Why is there no use of collar data to trigger a level 2 or 3 response? Recommend that a collar within 50km during sensitive season should trigger level 2. HOL surveys at level 2 should be sub-daily during sensitive seasons. Outside sensitive seasons, a collar within 25 km should trigger level 2 or incidental observation of caribou &gt; GST at &gt;4km away.</p> <p>Section 3.5.2.6 states: "When the caribou seasonal GST are observed within 1.5 km of the Whale Tail Haul Road, additional mitigation will be implemented of reducing speeds to 30 km/h and any caribou crossing the Whale Tail Haul Road will be given the right-of-way." This is not consistent with figure 7.</p>	<p>mitigation required and AEM may increase monitoring frequency or other measures if appropriate to meet PC and other environmental commitments.</p> <p>Text has been added in Section 3.4.2.6 to clarify on review and frequency of review of collar data maps. Text has also been revised regarding the example of mitigation measures for the Whale Tail Haul Road in response to GN's comment and for consistency with Figure 7.</p> <p>Additional text has been added to Figure 6-9 for Level 1 to indicate that additional monitoring and mitigation, consistent with Level 3, may be initiated by the Environmental Supervisor if required (dependent on caribou distribution, abundance and proximity to the respective components). Figure 8 Level 3 bullets have been rearranged for clarity with regards to measures tied to consultation with KivIA, GN and HTO. Monitoring frequency between Level 2 and 3 remains unchanged during the regular season, but steps up during the sensitive season, as described in the bullets per level in the figure. Text has been added that the Environmental Supervisor may initiate Level 3 (sensitive season) monitoring.</p> <p>Figure 9 – "&gt;GST within 25 km (or maximum distance observed)" triggers Level 2 has been included as suggested, but applicable year round. This is in consideration of</p>

No.	Subject	Commitment by AEM	Incorporated in TEMP (v7.0)?	Notes	Agnico Eagle Response
					no observable change in behaviour of caribou within 25 km of blasting activities. Also, as noted in the figure, GN satellite collar information is reviewed daily (or as frequently as made available to Agnico Eagle).
6	Monitoring for CPM – Height of Land and Road Surveys coverage	Within 1 year of Project certification, the Proponent shall revise the number of proposed height-of-land and road-side survey points to provide sufficient line-of-sight coverage to detect caribou within 4 km of the Project (including haul road and pit) with greatest coverage at known road crossing points (as determined from IQ, collar data and other observations, and reviewed by the TAG). Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall adhere to advice provided by the TAG, as per the terms of reference.	No	TEMP indicates intent to do some of this but not fulfilled.	Section 3.4.2.6 – now that road has been built, additional sites along the Haul Road will be selected for observation points to enhance and/or replace HOL locations. Early indications are that roadside survey points may provide similar vantage to HOL but easier to access and implement surveys.
7	Monitoring for CPM – Caribou GST	Within 1 year of Project certification, the Proponent shall revise caribou group-size thresholds for adaptive management, taking into account the frequency of monitoring effort, spatial coverage of monitoring and likelihood of detecting groups of caribou, in order to ensure a majority (70%) of caribou are subject to enhanced mitigation (i.e. levels 1 through 3 of mitigation and monitoring as illustrated in figures 6 through 9 of the Terrestrial Ecosystem Monitoring Plan (TEMP), v4.0). Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall adhere to advice provided by the TAG, as per the terms of reference.	No	TEMP does not do this or note the need to do this in future. Does not recognise that in setting an effective group size threshold (GST) to trigger caribou protection measures the relationships between frequency of monitoring, spatial coverage of monitoring efforts, and thus the likelihood detecting a group of caribou approaching Project must be considered. Less frequent or spatially more limit monitoring will lower the probability of detection and necessitate a lower GST.	GN commitment 7  As described in Section 3.5.2.3, GSTs trigger enhanced protection and the accuracy of group size determination is critical. In addition, GSTs are set at 75% protection and not 70%. GSTs will be adjusted annually as observation data accumulates, however, discussions within the TAG around the use of GST versus a more proactive approach on identification of lead caribou, could be more effective.
8	Monitoring for CPM – alternatives research	The Proponent shall actively engage in research to develop alternative monitoring methods that may revise monitoring range, spatial coverage, frequency and detection probabilities.	Yes?		Agnico Eagle is looking into the possibility of the use of drones or other unmanned aerial vehicles (UAV) for monitoring purposes to potentially address sightability and detection limitations on site – see Section 3.5.2.3.



No.	Subject	Commitment by AEM	Incorporated in TEMP (v7.0)?	Notes	Agnico Eagle Response
9	Caribou Monitor – Level 2	The Project's TEMP shall be revised to clarify that the definition of "non-essential vehicles and heavy equipment", as referenced in caribou mitigation procedures, includes vehicles and equipment used to continue mining operations or hauling of ore. "Essential vehicles" includes vehicles operated for the purpose of maintaining the safety of personnel, Emergency Response Team (ERT), security and wildlife monitoring.	Yes		No revisions/response required.
10	Caribou Monitor – Level 2	Within 1 year of Project certification, the Project's TEMP shall be revised to reduce reliance on the use of discretionary mitigation measures at level 2 of caribou adaptive management, and shall include the addition of specific automatic measures intended to prepare for an operational shutdown if caribou move closer to mine operations or roads. Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.	No	<p>No changes made to level 2 monitoring and mitigation in TEMP v7 relative to v4.</p> <p>During January 2019 TAG meeting it was discussed that 3 or 4 measures to prepare for shutdown could be listed (e.g. not initiating new road transits) and that the decision trees (figure 6 to 8) would be revised to indicate that at least one of these measure would be automatically implemented at level 2.</p> <p>Section 3.5.2: The added material is confusing. Discusses use of discretionary measures by on-site environmental supervisors. To be consistent with figures 6-10 this should say that: "At level 2, on-site environmental supervisors may use on a discretionary basis mitigation measures that would normally be applied automatically at level 3. At level 2, they will automatically apply <u>at least one of these measures</u> in-order to prepare for a level 3 response such as an operational shutdown of activity. At level 3, mitigation measures are applied automatically (i.e. are not discretionary). Must be clear what is triggered automatically versus discretionary.</p> <p>Section 3.5.2: Discusses automatic measures that would be implemented when caribou approach the mine site of roads in large numbers and are widespread..... What does "large numbers" and "widespread" mean? This</p>	<p>Addressed through text in Section 3.5.2.3 (Evaluating Mitigation and Protection Measures)?</p> <p>Text revised/added to in Section 3.5.2 to clarify "large numbers" and "widespread" in the context of the paragraph.</p> <p>Automatic measures are shown by bold text in Figures 6-10 (note added below definition for non-essential vehicles in each figure).</p>

No.	Subject	Commitment by AEM	Incorporated in TEMP (v7.0)?	Notes	Agnico Eagle Response
				paragraph should just say that will follow figures 6-10. Figures 6 - 10 should make it clear what are automatic versus discretionary measures.	
11	Caribou Monitor – suspension of vehicles, Heavy Equip. With	With respect to monitoring and mitigation of caribou in proximity to mine operations, the Project’s TEMP shall be revised such that the provision for suspension of non-essential vehicles and heavy equipment operation (Level 3 in Figure 6, TEMP, v.4.0), when seasonal caribou group size thresholds are exceeded within a 500 m radius of the vehicle, is applied year-round and increased to 1 km during the calving and post-calving periods. This distance buffer may be revised periodically throughout the life of the Project whenever relevant information becomes available. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.	Yes		No revisions/response required.
12	Caribou Monitor – non essential vehicle	The Project’s TEMP shall be revised to clarify that the definition of “non-essential vehicles and heavy equipment”, as referenced in caribou mitigation procedures, includes vehicles and equipment used to continue mining operations or hauling of ore. “Essential vehicles” includes vehicles operated for the purpose of maintaining the safety of personnel, Emergency Response Team (ERT), security and wildlife monitoring.	Yes		No revisions/response required.
13	Caribou Monitor – Level 2	Within 1 year of Project certification (and again thereafter whenever relevant information becomes available), the Project’s TEMP shall be revised to reduce reliance on the use of discretionary mitigation measures at level 2 of caribou adaptive management and shall include the addition of specific automatic measures intended to prepare for an operational shutdown if caribou move closer to mine operations or roads. Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.	No	See comments for commitment #10	See response to comment 10.

No.	Subject	Commitment by AEM	Incorporated in TEMP (v7.0)?	Notes	Agnico Eagle Response
14	Caribou Monitor – Level 3	Within 1 year of Project certification, the Project's TEMP shall be revised to further specify the provision for limitation of nonessential vehicles on the Whale tail haul and Meadowbank all weather access roads when caribou are in proximity to these roads (i.e. level 3 responses, Figs. 7 & 8, TEMP v4.0) outside sensitive seasons. Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.	No	No changes to level 3 (figures 7 and 8) monitoring and mitigation in TEMP	No changes have been required to date, however, this should be a topic at the next TAG meeting. Per collar data and observations on the ground to date, caribou are crossing the AWAR and Whale Tail Haul Road well, including during the migratory periods.
15	4km and 5km - Blasting Buffer	The TEMP shall be revised such that blasting activities at the Whale Tail site are suspended when caribou above the specified seasonal group size threshold are present within 4 km of the blast site. This provision shall apply year-round except during calving season when the buffer shall be increased to 5 km when cows with calves are present. These buffer thresholds are preliminary pending the results of further studies. These no-blasting buffers may be reviewed periodically throughout the life of the Project whenever relevant information becomes available taking into account ongoing project monitoring. Any revisions shall adhere to advice provided by the TAG, as per the terms of reference.	Partially	Table 7 should say "postpone blasting..." rather than "Limit blasting.." to be consistent with figure 9.	Table 7 revised for consistency with Figure 9.
16	Blasting - Study	A noise, vibration and visual cues study shall be conducted that: (1) will validate blasting noise and vibration predictions in the Project's EIS; (2) will document the scale and range of visual cues generated by blasting activities (i.e. the distance and duration over which dust plumes can be observed by the naked eye); and (3) may be used to revise the Project's no-blasting buffers for caribou. Notwithstanding the no blasting buffers, Agnico Eagle may conduct studies on caribou within the buffer distance for the purposes of determining whether the buffer distance can be modified. The design and conduct of the study shall be consistent with advice provided by the TAG, as per the terms of reference.	Partially	As per January meeting, TAG is to be provided with study design for review and comment.	The scope for the blasting measuring program was provided to TAG members on May 24, 2019.

No.	Subject	Commitment by AEM	Incorporated in TEMP (v7.0)?	Notes	Agnico Eagle Response
17	Blasting Surveys	Prior to each blast, surveys shall be conducted to detect caribou and other wildlife within the no-blasting buffers specified in the Terrestrial Ecosystem Monitoring Plan (TEMP).	No	Not referenced in TEMP. These surveys should be conducted within the 4 and 5km buffer committed to (see commitment 15)	Refer to Section 3.4.2.4 and Figure 9.
18	Helicopter – Distance buffers for caribou	The Proponent shall apply mandatory, minimum distance buffers of 300m vertically and 1000m horizontally for the operation of all helicopters and fixed winged aircraft in proximity to caribou, subject to exception for safety considerations or the fulfillment of regulatory compliance activities only.	Yes		No revisions/response required.
19	Helicopter – Distance buffers for landing and take-offs	The Proponent shall apply the mandatory, minimum distance buffers to landings and take-offs of helicopters, such that engine starts and takeoffs are suspended when caribou are observed within the buffer distance.	No	Not included in TEMP. Table 7 should clarify that buffers apply to landings and take-offs also.	Pilots are instructed to avoid caribou and other wildlife, so this is inherent. Text has been added for clarity.
20	Helicopter – Monitor Traffic	The Proponent shall revise the Project's TEMP to include a program to monitor and report helicopter traffic associated with the Whale Tail project (including existing Meadowbank infrastructure) and all associated exploration activities so that the spatial scale and intensity of this activity can be documented. This should include the collection and analysis of GPS track logs for all helicopter flights contracted by the Proponent.	No	Program committed to is not included in TEMP	Helicopters are seldom used on site – usually only to access remote survey locations for other programs for a handful of days during the summer season. Helicopter traffic is typically grounded during the migratory (sensitive) seasons.
21	Traffic Monitoring – Program through TAG	Prior to Project commencement, the Proponent shall develop a traffic-monitoring program. This program shall be designed to collect data on vehicle type, time, date, location (i.e. specific road segment utilized), point of origin and destination for all vehicles (Proponent-owned or contracted) using the Project's roads including the Whale Tail haul road and Meadowbank all-weather-access road. The design of this program shall be consistent with advice provided by the TAG, as per the terms of reference.	Partially	<ul style="list-style-type: none"> <li>• Need to confirm the data (parameters) that will be recorded and list in the TEMP under a heading for <i>Traffic Management Program</i>.</li> <li>• Need to simplify and ensure standardization of codes for vehicle types and other parameters to ensure consistency in data.</li> <li>• Section 1.3 – Recommend referring to this as a Traffic Management Program.</li> <li>• Section 3.10. Needs to clarify that ALL traffic (project and public) will be recorded (since it is unclear if public traffic is still being recorded ...see minutes from Jan 2019 TAG meeting). Needs to distinguish between project related and public traffic. Needs to use a limited number of standardized codes for</li> </ul>	<p>A description for traffic management was added in Section 3.10 for the draft TEMP Version 7. As indicated in the bullet points under this section, data with unique vehicle descriptions, to/from abbreviations and departure/arrival times will be recorded. Agnico Eagle has communicated with the GN and Caslys (mapping contractor to the GN) in early 2019 on data provided to date and is working on a standard data collection and provision approach for consistency.</p> <p>Reference to "Traffic Management Program" have been made throughout the TEMP as</p>

No.	Subject	Commitment by AEM	Incorporated in TEMP (v7.0)?	Notes	Agnico Eagle Response
				<p>parameters like vehicle type, to/from etc. to avoid previous problems discovered by GN. Needs to verify/prove data annually (to make sure errors, omissions etc. addressed) and report annually, per commitments 21 and 22 to the GN.</p>	<p>suggested (particularly Section 1.3 and 3.10).</p> <p>As mentioned at the January TAG meeting, Agnico Eagle cannot control public (i.e., ATV) traffic permitted on the AWAR (to KM 85) to and from Baker Lake. ATV users are required to sign in when using the road, but many times they exit elsewhere. As such, a specific commitment to record public transit has not been included in the TEMP, though Agnico Eagle continues to collect ATV user records when made at the road dispatch and provide these as available. Agnico Eagle is also currently working with the HTO to develop better tracking tools.</p>
22	Traffic Monitoring – Traffic Data Accuracy	The Proponent shall verify annually traffic data to ensure its accuracy and shall summarize traffic data for each road segment including the Whale Tail haul road and Meadowbank all-weather-access road. In addition to daily rates, any seasonal or monthly variation in traffic shall be reported. The observed rates and composition of traffic shall be compared to predictions in the EIS.	No	This commitment is not reflected in TEMP. Should be included in the section outlining the Traffic Monitoring Plan.	While monitoring evaluations related to traffic are not explicitly stated under Section 3.10, the TEMP, as described in Section 1.1, is written to ensure consistency with the environmental impact assessments (EIAs) completed for the Meadowbank Complex since 2005, which identify potential residual effects of the Project to the terrestrial environment. To measure residual effects (i.e., after mitigation), monitoring per the plans presented [in the TEMP] evaluate the response of vegetation communities and wildlife to the effects of the Project and Project-related activities, and measures effects against thresholds. Where unacceptable residual effects are identified through monitoring, adaptive management approaches are employed.

No.	Subject	Commitment by AEM	Incorporated in TEMP (v7.0)?	Notes	Agnico Eagle Response
					For clarity, text has been added to Section 3.10.
23	Traffic Monitoring – Exceed traffic predictions	Where traffic rates or composition exceed predictions in the EIS, based on a 3-year average, the Proponent shall produce a revised assessment to examine the potential impacts of this excess traffic on wildlife. This revised assessment shall be submitted to NIRB for consideration.	No	No reference to this threshold or the exceedance response in the TEMP. Should be included in the section outlining the Traffic Monitoring Plan.	See response to comment 22.
24	Traffic Monitoring – Recording public use	The Proponent shall expand monitoring efforts for recording public use of roads to include the collection of data by staff conducting wildlife road surveys.	Partially	Monitoring public use of roads is mentioned but appears to be based on logging vehicles at AWAR security gate and incidental observations only. Should also include haul road. Recommend including all of this in the section outlining the Traffic Monitoring Plan.	See response to comment 21.
25	Project tolerant animals - Definition	Within 1 year of Project certification, the Project's TEMP shall be revised to further define 'Project tolerant' animals as applied to wildlife mitigation and monitoring activities. Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.	Yes		No revisions/response required.
26	Project tolerant animals – consulting	Where mitigation measures are to be relaxed for project tolerant animals, the Proponent shall consult with the TAG prior to reducing/removing mitigation.	Yes		No revisions/response required.
27	Project tolerant animals - reporting	The Proponent shall document all cases where mitigation measures are relaxed for project tolerant animals and shall report these cases in the annual project monitoring report.	Yes		No revisions/response required.
28	Muskox - Group size thresholds	Within 1 year of Project certification, the Project's TEMP shall be revised to specify and justify the group-size threshold for triggering adaptive management for muskox. Justification of the group-size threshold should be based on available muskox group size data. Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.	Partially	Justification provided for the group size threshold is unclear. Section 3.5.2 states: "with approximately 2500 animals from 299 observation records, of which nearly 2/3 of observations consist of 5 animals or less. A specific monitoring and mitigation decision chart for muskox has also been developed (Figure 10). A group size threshold (GST) of 13 was	A group size of 13 or greater represents 1,804 muskox observations out of a total of 2,530 muskox observations, which encompasses 71.3% of all observations.

No.	Subject	Commitment by AEM	Incorporated in TEMP (v7.0)?	Notes	Agnico Eagle Response
				<p>developed for muskox based on current observation data for all seasons and desired protection level of 70%.”</p> <p>This doesn't make sense. If 2/3rd of muskox are in groups of 5 or less, how can 13 be protective of 70%? Please clarify.</p>	
29	Muskox - Blasting Suspension	<p>The Project's TEMP shall be revised to include a provision for mandatory suspension of blasting when groups of muskox above the specified group size threshold are observed within 1km of blasting activities. The suspension of blasting shall be maintained until the animals have moved away. The no-blasting buffer may be reviewed periodically throughout the life of the Project whenever relevant information becomes available. The revisions shall be completed annually within the TEMP, taking into account ongoing project monitoring, and will be consistent with advice provided by the TAG, as per the term of reference.</p>	No	No revision to TEMP on this matter	<p>The last bullets in Section 3.4.2.4 outline measures for caribou and other wildlife (i.e., including muskox). These additional measures will lead to a delay in blasting under the specified thresholds. An additional bullet specific to muskox per GN commitment No. 29 has been added for clarity. Also on Figure 10</p>
30	Muskox - Roads, vehicle speeds	<p>The Project's TEMP shall be revised to include a requirement for vehicles to slow to 30 km/hr when passing within 500m of a group of muskox above a specified group size threshold. This mitigation measure may be reviewed periodically throughout the life of the Project taking into account ongoing project monitoring. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.</p>	No	No revision to TEMP on this matter	<p>Though not explicitly stated, this measure is stated for caribou in the TEMP and is generally applied to muskox when they are near the mine and associated infrastructure. For clarity, this has been added to Figure 10.</p>
31	Muskox - Aircraft Buffers	<p>The Project's TEMP shall be revised to include a mandatory requirement for aircraft to maintain distances of at least 300m vertically and 1000m horizontally from groups of muskox; subject to exception for flight safety purposes. This mitigation measure may be reviewed periodically throughout the life of the Project taking into account ongoing project monitoring. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.</p>	No	No revision to TEMP on this matter	<p>Though not explicitly stated, this measure is stated for caribou and is generally applied to other wildlife, including muskox. For clarity, this has been updated in Table 7.</p>

No.	Subject	Commitment by AEM	Incorporated in TEMP (v7.0)?	Notes	Agnico Eagle Response
32	Raptor Nests – Buffers	The proponent shall establish automatic minimum no-disturbance buffers around all raptor nests located in proximity to the Project. Project activities, including the operation of vehicles, heavy equipment, aircraft and blasting, shall be prohibited within these buffers unless an exception is specified within a nest-specific management plan that has been reviewed and approved by the GN, subject matter experts and other relevant parties. The size of minimum, no-disturbance buffers shall be based on the BC Guidelines for Raptor Conservation or similar guidelines as recommended by the Project's TAG.	Yes		No revisions/response required.



## **APPENDIX C**

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**Wildlife Protection and Response Plan: Meadowbank Division**

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## **1. SECTION 1 – INTRODUCTION**

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As part of this Terrestrial Ecosystem Management Plan (TEMP; 2017), mitigation measures and monitoring initiatives have been proposed to lessen the likelihood that wildlife will become habituated to the Meadowbank Mine, which includes Vault Pit, the All-Weather Access Road, Whale Tail Pit, and the Whale Tail Haul Road, and all associated infrastructure. The TEMP identified measures to deter wildlife from obtaining food rewards, finding shelter around the Project site, gaining access to harmful substances present on the site, being injured as a result of vehicle collisions, and damaging mine property.

Despite these mitigation measures, personnel may occasionally come into contact with wildlife that inhabits the Project area. To manage these incidents, a specific Wildlife Protection and Response Plan has been developed. Incidents must be managed to keep both humans and wildlife safe, using only humane control methods.

Furthermore, all staff must be familiar with the standard operating procedures and best practices aimed at ensuring human-wildlife conflicts are minimized during the life of the Project. All personnel, including contractors, on site have a role to play in ensuring human safety, conservation of wildlife and documenting wildlife activities in the Project area.

The following Wildlife Protection and Response Plan provides information on general human-wildlife conflicts policies and regulations, species-specific response plans for Ungulates and Predatory Mammals, and wildlife awareness.

## **2. SECTION 2 – HUMAN-WILDLIFE CONFLICTS**

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### **2.1 OVERVIEW**

Wildlife encounters can take many forms. A conflict occurs when either human or wildlife health, and/or safety are put at risk. Human health and safety can be affected by contact or conflict with wildlife in several ways, including direct or indirect physical injury, and exposure to animal diseases that can infect humans (i.e., known as zoonotic diseases).

The most common conflict faced by wildlife is the increased risk of mortality from human encounters, which most often occurs when wildlife become habituated to human activity and lose their natural fear of people. The most serious form of habituation is directly correlated to the animal obtaining food, which is known as food conditioning. Food-conditioned animals become dependent on humans as sources of food. Because these human-induced habits become engrained in the animal, attempts to deter the habituated behavior generally fail with the end result usually the death of the animal. Loss of habitat effectiveness (how the animal uses its available habitat), and effects to wildlife movement (how the animal travels through its available habitat) can also result from wildlife in conflict with human development. Ultimately, this will affect both the health and safety of the wildlife species involved. While it is impossible to remove all risk to human and wildlife health and safety, approaches to minimize the risk do exist. Reactive measures do have their place in stopping the conflicts when they occur, but proactive strategies are the most effective means of preventing potential conflicts.

### **2.2 MINE POLICIES AND REGULATIONS**

The following summarizes the general rules regarding wildlife on the site and will form the basis of the Wildlife Awareness Orientation and Courses (see below).

Employees and contractors are advised to report all incidents of unauthorized activities on or in the vicinity of the mine site to the Environment Department.

#### **2.2.1 General Restrictions for Wildlife Protection**

The following are general restrictions for Project workers and contractors, intended to minimize the potential for negative Project-related effects (e.g., increased mortality risk) on wildlife in and around the site.

- Wildlife shall have the right-of-way except where it is judged to be unsafe to do so. All species of wildlife (i.e., from small mammals to large carnivores, songbirds to raptors) when encountered by personnel on foot or in vehicles will be given the right-of way.
- Non-mine-registered firearms are not permitted on site (i.e., carrying of firearms in private vehicles to and from the project site on workdays).
- Feeding wildlife is prohibited at all times on or in the vicinity of the Project, including during travel to and from the site.

## Wildlife Protection and Response Plan

- Harassment (defined as to kill, injure, seize, capture or trap, pursue and includes to stalk, track, search for, lie in wait for, or shoot at - for any of those purposes not authorized by the Environment Department) of wildlife is prohibited at all times on or in the vicinity of the Project, including during travel to and from the site.
- The deliberate destruction or disruption of wildlife nests, eggs, dens, burrows, and the like, is prohibited at all times on or in the vicinity of the Project, including during travel to and from the site.
- Hunting and fishing is prohibited at all times on or in the vicinity of the Project, including during travel to and from the site on workdays.
- Pets are prohibited at all times on or in the vicinity of the Project, including during travel to and from the site on workdays.
- Maximum speed limit on all access roads is 50 km/h (30 mph).
- Traffic (including ATVs and snowmobiles) is restricted to designated access roads and trails.

The mine site refers to any mine facility present during the operations phase of the Project, including but not limited to, outbuildings (e.g., machine shop, offices), pits, parking areas, tailings storage facilities, and waste piles.

### 2.2.2 Wildlife Attractants

A list of potential wildlife attractants is provided below. The list is intended as a general summary of attractants but may not be comprehensive of all potential attractants.

- Food wastes and garbage.
- Chemicals (e.g., road salt) and their refuse (e.g., empty fuel containers).
- Wildlife carcasses (e.g., road kills, hunter kills).
- Movement and human activity (e.g., movement of people and equipment outdoors).
- Roads, which may create preferential travel corridors for wildlife, can lead to vehicle collisions and increased exposure to wildlife encounters at the Project site.

General recommendations directed at minimizing wildlife concerns related to food wastes and garbage is presented under **Section 2.2.3** (Garbage Management).

Protocols for dealing with chemical storage, disposal, and spills are presented in Meadowbank's Hazardous Materials Management Plan and Spill Contingency Plan. These protocols will minimize the potential for adverse wildlife effects, and are referenced under **Section 2.2.3** (Garbage Management) and **Section 2.2.4** (Wildlife Health).

Requirements related to the reporting and removal of wildlife carcasses are presented under **Section 2.2.7** (Reporting Wildlife Observations and Incidents).

### 2.2.3 Garbage Management

General recommendations directed at minimizing wildlife concerns related to food wastes and garbage are provided below.

- Littering is prohibited on and in the vicinity of the Project site, which includes all access roads. All garbage (e.g., lunch bags) must be returned to temporary storage containers. Note: organic wastes (e.g., orange peels, apple cores) are included.
- Food-related waste (including packaging) will be incinerated on a daily basis and general waste will be sent to the landfill and then buried.
- Wastes associated with mechanical maintenance and repairs (e.g., motor oil and antifreeze) will be disposed of as per the Hazardous Materials Management Plan.
- All temporary (small) storage containers for food waste garbage (yellow bin) will be wildlife protective (i.e., have bear proof lids).
- No open top buckets or anything similar will be tolerated outside buildings.
- Feeding wildlife is prohibited at all times on or in the vicinity of the Project, including during travel to and from the site on workdays.
- Wildlife incidents related to garbage or human food attractants will be reported as soon as possible. See **Section 2.2.7** (Reporting Wildlife Observations and Incidents) for more information.
- Improperly disposed of garbage, particularly food wastes will be reported as soon as possible.

See **Section 2.2.7** (Reporting Wildlife Observations and Incidents) for more information.

While Arctic Fox tend to be the greatest concern with respect to access to garbage, other animals (e.g., Wolverines, Wolves and Grizzly Bears) may be attracted to uncontained garbage sources. Problem wildlife data at the Meadowbank Mine to date indicate that Arctic Fox and Wolves are the most likely species to be attracted to the site.

### 2.2.4 Wildlife Health

The following recommendations are intended to reduce potential Project-related effects on wildlife health (including non-vehicle related accidents and consumption of toxic substances).

- Feeding wildlife is prohibited at all times on or in the vicinity of the Project, including during travel to and from the site. If caught feeding wildlife, an employee can be suspended and/or dismissed.
- Company procedures on the safe and prompt clean-up of any chemical spills will be followed. See Spill Contingency Plan for a more detailed protocol.
- Any observations of wildlife in and around potential sources of contaminants (e.g., fuelling sites) will be reported. See **Section 2.2.7** (Reporting Wildlife Observations and Incidents) for details.

## 2.2.5 Wildlife and Vehicles

The following recommendations are intended to reduce the incidence of wildlife-vehicle collisions and near misses.

- Wildlife has the right-of-way except where it is judged to be unsafe to do so.
- Obey all traffic signs.
- Maximum speed limit on all access roads is 50 km/h (30 mph).
- Verbally report wildlife carcasses observed on and in the vicinity of the Project, including along all access roads, as soon as possible. See **Section 2.2.7** (Reporting Wildlife Observations and Incidents) for more information.
- Restrict traffic (including ATVs and snowmobiles) to designated access roads and trails.
- Push and spread out the snow with a dozer when clearing the road to avoid build-up snow banks on the side of the road.
- Report all wildlife-vehicle collisions that results in the death or injury of wildlife as soon as possible. See **Section 2.2.7** (Reporting Wildlife Observations and Incidents) for details.
- A near miss between a vehicle and an animal should be reported as a wildlife 'incident'. See **Section 2.2.7** (Reporting Wildlife Observations and Incidents) for details.

## 2.2.6 Wildlife and Buildings

The following recommendations are intended to reduce the risk of close encountering situations between wildlife and people.

- Skirting will be added around the building to avoid having wildlife under the buildings.
- Under building access ways must be closed at all time.
- Keep c-can doors close at all time to avoid wildlife using them as shelter.
- Open top bins and containers for food waste will not be permitted outside buildings. If needed, a bear-resistant container shall be used.

## 2.2.7 Reporting Wildlife Observations and Incidents

### 2.2.7.1 Reporting Requirements of Project Workers and Contractors

Project workers and contractors are required to verbally notify the Environment Department of the following wildlife observations or incidents as soon as possible.

- Signs of animal presence (e.g., tracks, scat, nests, burrows) in close proximity (visible to the eye from within the mine site footprint) to site facilities, vehicles, equipment, or areas frequented by workers.
- Sightings of animals in close proximity (visible to the eye from within the mine site

footprint) to site facilities, vehicles, equipment, or areas frequented by workers.

- Aggressive or unusual wildlife behavior in and around Project facilities.
- Instances of workers feeding wildlife.
- Instances of improper disposal of garbage or other waste materials.
- Observed maintenance issues (e.g., improper placement or maintenance of garbage containers).
- Instances of workers not following vehicle use guidelines (e.g., speed limits).
- Vehicle collisions with wildlife or near misses.
- Observations and locations of dead (e.g., road kill) or injured animals.

Following the verbal report of a wildlife incident or observation, completion of a Wildlife Incident Report Form may be requested at the discretion of the Environmental Coordinator or designate (s).

#### **2.2.7.2 Reporting Requirements of Wildlife Occurrences**

Wildlife Incident Reports (found in Appendix B to the TEMP) provide essential information that may identify: 1) potentially dangerous situations requiring intervention (e.g., problem wildlife); 2) situations that require notification of the Department of Environment; 3) weaknesses in garbage-handling and problem wildlife prevention measures; and 4) areas that may require warning signs (e.g., poor visibility road corners). The Environmental Coordinator or designate(s) should ensure that records of wildlife observations and incidents are thoroughly documented. Reports should attempt to include the following information wherever possible.

- Identification and number of wildlife observed.
- Specific timing and location of the observation(s).
- Details regarding the animal behavior, including direction of approach and departure, what it was doing, any aggressive behavior, etc.
- Assessment of local attractants, such as garbage, odors, movement of people, other wildlife, etc.
- If local attractants are identified as a factor, determination of what steps were or will be taken to address/remove potential attractants.
- Identification of any potential mitigation measures available to deter wildlife or limit access and how they will be implemented (refer to **Section 2.2.7** for additional information on dealing with problem wildlife).
- If an animal is destroyed, a description of the lethal measures deployed (e.g., rifle), statement of the rationale for use of lethal measures (e.g., proximity to workers, repeated incidents, observed condition of the animal, etc.), and indication of what previous non-lethal measures were employed (e.g., deterrents, hazing, trapping, and relocating [with permission from GN] etc.).

### 2.2.8 Protocols for Dealing with Problem Wildlife

A problem wildlife situation may arise where animal acts in an aggressive manner and/or is a repetitive nuisance or threat to worker safety. The following protocols should be used to deal with problem wildlife.

- Immediately notify the Environmental Coordinator or designate(s) of any problem wildlife issue. Reporting wildlife incidents as they occur will ensure that proactive rather than reactive measures can be taken to prevent a serious outcome (e.g., human injury, destruction of the problem animal). See **Section 2.2.7** (Reporting Wildlife Observations and Incidents) for details.
- If deemed necessary by the Environmental Coordinator, notify the Conservation Officer in the Hamlet of Baker Lake or other designated Government of Nunavut representative, inform them of the problem wildlife encountered on site, discuss appropriate aversive and mitigation actions, and determine timing when lethal methods should be implemented, if necessary.
- The Environmental Coordinator or designate(s) will initiate the appropriate actions in response to a problem wildlife issue, Recommended actions include:
  - Assess potential local attractants and address or remove all those identified, where practical;
  - Utilize non-lethal deterrents (e.g., aversive conditioning, hazing, trapping and relocating), projectiles (e.g., rubber bullets) or consider trapping and relocation of animals (e.g., Arctic Fox), where it is considered appropriate and safe to do so (refer to **Sections 3 and 4** for species-specific deterrents); and
  - Use lethal measures. Lethal measures should only be considered as a last resort in the event of aggressive animal behavior and/or repeated nuisance animals that pose a threat to worker safety and/or site facilities.
- Only authorized personnel (Environment Department) are permitted to use lethal and non-lethal projectiles (e.g., rubber bullets) or deploy traps for problem wildlife interventions.
- Do not attempt to deal with a problem wildlife issue on your own. Problem wildlife can be dangerous.
- Conform to recommendations regarding predator safety. All staff should have received a predatory mammal (i.e., Grizzly Bear, Wolverine, Wolf, and Arctic Fox) awareness training orientation. See **Section 5**.



### **3. SECTION 3 – SPECIES-SPECIFIC RESPONSE PLANS**

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#### **3.1 PURPOSE**

Response plans specific to species groups (i.e., ungulates and predatory mammals) are required to ensure that all personnel working for the Project are provided guidance on how to respond in a manner that is safe to both humans and wildlife should they encounter wildlife on or around the Project site.

#### **3.2 SPECIES GROUPS ADDRESSED**

Ungulates (Caribou and Muskoxen) and predatory mammals (Grizzly Bear, Wolverine, Wolf, and Arctic Fox) have the highest potential for interactions with humans during the life of the Project, and thus require specific response plans. If other wildlife are encountered, adaptive management strategies will be implemented if mitigation techniques and the policies and regulations mentioned in this document are not effective for these species. The proposed wildlife monitoring program will be the preferred measure of identifying potential areas in need of new mitigation strategies, or changes in policies or regulations.

For each of the species groups described below, the seasonal activity in the Project area is discussed, as well as the protocol in the event of an encounter.

##### **3.2.1 Ungulates (Caribou and Muskoxen)**

###### **3.2.1.1 Seasonal Activity in the Project Area**

Results from baseline surveys indicate that Caribou and Muskoxen are present in the Project area in all four seasons, but are observed in greatest abundance in the fall (e.g., October) when thousands of animals may be present in the vicinity of the Project, and in lowest abundance in the summer (see the baseline reports for Meadowbank [Cumberland Resources 2005a] and Whale Tail [Dougan and Nunavut Environmental 2015], and annual Wildlife Monitoring Reports for more details). Calving or post-calving aggregations or movements of Caribou have not been observed within the Project study areas since baseline studies were initiated in 1999.

###### **3.2.1.2 Response to Encounters**

Humans rarely have physical altercations with Caribou. Caribou do rut in the fall when they are at relatively high numbers on the Project site and the levels of aggression displayed, particularly by males, increases substantially. There is some anecdotal information suggesting that a bull Caribou may attack a person or vehicle during the rut; therefore, a close encounter with Caribou (during the fall) could be dangerous. Although considered rare, Muskoxen will charge humans if they are threatened (especially lone bulls). Being a sedentary species, Muskoxen will have the tendency to stand their ground when threatened, defending their territory or their young.

If you encounter a single or herds of Caribou or Muskoxen, the following actions should be taken.

- Back away slowly.
- Ensure animal(s) have an escape route.
- Do not make sudden movements.
- Do not make loud noises or attempt to scare the animal(s).
- Use radio/satellite phone to report presence of the animal(s) to the Environment Department.
- Stay in radio/phone contact until the animal(s) moves away or you have returned to a safe area (e.g., inside vehicle or building).
- Wait for the animal(s) to pass before continuing work in the area.

### **3.2.2 Predatory Mammals**

#### **3.2.2.1 Seasonal Activity in the Project Area**

##### ***Grizzly Bear***

Baseline surveys indicated limited use of the Project area by Grizzly Bears, which is consistent with what would be expected for Grizzly Bears in the north, given their wide-ranging habits and low densities. In the fall, when Caribou (a prey item) are more abundant, the Project area may have higher value for Grizzly Bears (see annual Wildlife Monitoring Reports, and Meadowbank and Whale Tail baseline reports for more details). Furthermore, increasing hunting and food caches along the Meadowbank access road in all seasons may also attract Grizzly Bears to the area.

##### ***Wolverine***

Wolverines occur in the Project area on a year-round basis. Records of Wolverine sightings or their sign were infrequent in the Project area during baseline and monitoring studies beginning in 1999. Similar to Grizzly Bears, the limited evidence for Wolverine in the area is not surprising given their wide-ranging movements and characteristically low population densities (see annual Wildlife Monitoring Reports, and Meadowbank and Whale Tail baseline reports for more details). Only two occurrences (i.e., in 2011 and 2014) of a habituated Wolverine has reported at the Project site since baseline studies began in 1999.

##### ***Wolf***

Although they do occur year-round in the Project area, Wolves were observed infrequently during all survey sessions, but were most common in the fall, perhaps in response to the increased Caribou abundance at that time of the year (see annual Wildlife Monitoring Reports, and Meadowbank and Whale Tail baseline reports for more details). Wolves have been one of the most frequent problem wildlife species encountered since the Meadowbank Mine became operational in 2009. Most problem Wolves were single and emaciated.

##### ***Arctic Fox***

Camp personnel have regularly observed Arctic Foxes close to camp and in and around camp buildings during most months of operation, including winter (see annual Wildlife Monitoring

Reports, and Meadowbank and Whale Tail baseline reports for more details). Arctic Foxes are the most common predatory mammal species to be encountered at the Project site.

### **3.2.2.2 Responses to Different Levels of Encounters**

Predatory mammals (such as Wolves, Wolverine, Arctic Fox, and Grizzly Bears) rarely attack people; however, they are extremely strong and vicious, and should be given respect. Members of the dog family (such as wolves and foxes) are more at risk of carrying rabies, and other zoonotic diseases, and therefore should be avoided. Arctic Fox in particular is easily tamed, quickly losing their fear of humans, and often approaching very close. Sick or injured animals may no longer be able to feed themselves and could be in a state of starvation. Often they show few physical signs that something may be wrong, but typically act more aggressively or even 'friendly' towards humans; therefore, a close encounter with a predatory mammal could be dangerous. All bites and scratches from wildlife should be reported immediately to Health & Safety department since animals can be vectors for rabies.

If you encounter a predatory mammal, your response will depend on the situation at hand. There are different levels of sightings and predatory wildlife alerts that will affect the immediate decisions you make in the field (i.e. General Sighting, or a Green, Yellow, and Red Wildlife Alert). This system allows for workers to quickly determine if predatory wildlife on or near the Project footprint/personnel needs to be left alone to pass through the site, or moved away from hazards or if the animal presents a risk to humans.

#### **General Wildlife Sighting**

**Definition:** When a bear or other predatory mammal is sighted >1000 m away from human activity and/or Project footprint.

**Action:**

- Immediately inform the Environment Department of situation using a radio/phone. A general notice will be broadcasted by the Environment Coordinator via radio to all other departments;
- Workers on the ground or helicopters in the vicinity will monitor the wildlife's trajectory non-invasively;
- Follow up notifications will be issued if the sighting changes to an Alert status, which will be dependent on the worker's location and exposure; and
- Stay in radio/phone contact until the animal(s) moves away or you have returned to a safe area (e.g., inside vehicle or building).

#### **Green Wildlife Alert**

**Definition:** When a bear or other predatory mammal is sighted <1000 m away from human activity and/or Project footprint.

**Action:**

- Immediately inform the Environment Department of situation using a radio/phone. A Green Wildlife Alert will be broadcasted by the Environment Coordinator via radio to all other departments;

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- Workers on the ground or helicopters in the vicinity will monitor the wildlife's trajectory non-invasively and report the animals location regularly so that a trajectory of movement can be estimated;
- Follow up notifications will be issued if the sighting changes to a higher Alert status, which will be dependent on the worker's location and exposure;
- Workers in the affected area should be ready in case the situation escalates to a Yellow Alert Status by having a safe area (e.g., inside a building or vehicle) in the immediate vicinity that they can access quickly; and
- Stay in radio/phone contact until the animal(s) moves away or you have returned to a safe area (e.g., inside vehicle or building).

### ***Yellow Wildlife Alert***

**Definition:** When a bear or other predatory mammal is sighted <500 m away from human activity or Project footprint where an encounter, near miss, incident, or injury to a person or animal may be possible. If the wildlife's trajectory is aimed at human activity and/or Project footprint, or if the wildlife demonstrates abnormal behavior (such as interest or fixation), the following actions must be taken.

#### **Action:**

- Avoidance and distancing measures between workers and the animal should take place first by moving all workers away from the predicted trajectory of the animal, which may lead to a temporary closure of activities in that area. Preparation of personal deterrents should take place. Actively move personnel away from the work area, cease activities in the area and the predicted trajectory of the animal and go to a safe place (e.g., inside a building or vehicle);
- Immediately inform the Environment Department of the situation using a radio/phone. A Yellow Wildlife Alert will be broadcasted by the Environment Coordinator via radio to all other departments;
- Should avoidance and distancing measures not be possible for wildlife deterrence, possible mobilization of helicopters and the Environment Department Response Team may occur; and
- Stay in radio/phone contact until the animal(s) moves away or you have returned to a safe area (e.g., inside vehicle or building).

### ***Red Wildlife Alert***

**Definition:** When a bear or other predatory mammal is sighted <250 m away from human activity and/or Project footprint where an encounter, near miss, incident, or injury to a person or animal may be imminent if the animal does not change their trajectory. Wildlife deterrence must be placed into action immediately by trained wildlife responders and the following actions must be taken.

#### **Action:**

- Sound air horn with two long blasts. This will help deter the bear/predatory animal and inform all other workers of dangerous wildlife in close proximity;

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- Avoidance and distancing measures between workers and the animal should take place first by moving all workers away from the predicted trajectory of the animal, which will lead to a temporary closure of activities in that area. Preparation of personal deterrents should take place. Actively move personnel away from the work area and cease activities in the immediate area of the animal and the predicted trajectory of the animal and go to a safe place (e.g., inside a building or vehicle);
- Immediately inform the Environment Department of the situation using a radio/phone. A Red Wildlife Alert will be broadcasted by the Environment Coordinator via radio to all other departments;
- ***If the predatory mammal does not back away, or shows interest in you:***
  - Continue to back away slowly and ensure a 10 m distance between yourself and the animal;
  - Make sure the animal has a safe route of escape;
  - Make noise to alert the animal of your presence or to scare it off;
  - Avoid provoking it;
  - Return to a safe area as soon as possible (e.g., inside a building or vehicle);
  - Keep the Environment Department informed of situation using the radio/phone;
- Immediate mobilization of helicopters (if available) and the Environment Department Response Team will occur to remove personnel from the area and/or deter the animal; and
- Stay in radio/phone contact until the animal(s) moves away or you have returned to a safe area (e.g., inside vehicle or building).

**Table A-1 Summary of Predatory Wildlife Sightings and Alerts**

<p><b><u>General Wildlife Sighting</u></b>  <b><u>If wildlife is more than 1 km away:</u></b></p> <ol style="list-style-type: none"> <li>1. Inform Environment Department of location, distance, and number of animals.</li> <li>2. Continue to monitor the bear and notify is sighting changes to Alert status.</li> <li>3. Stay in radio/phone contact</li> <li>4. Helicopters and Environment Department Team prepared to remove personnel or deter bear if needed.</li> </ol>
<p><b><u>Green Wildlife Alert</u></b>  <b><u>If wildlife is less than 1 km away:</u></b></p> <ol style="list-style-type: none"> <li>1. Inform Environment Department of location, distance, and number of animals.</li> <li>2. Continue to monitor the bear and notify if Alert status changes.</li> <li>3. Stay in radio/phone contact.</li> <li>4. Workers are ready to go to safe area if needed.</li> <li>5. Helicopters and Environment Department Response Team prepared to remove personnel or deter bear if needed.</li> </ol>
<p><b><u>Yellow Wildlife Alert</u></b>  <b><u>If wildlife if less than 500 m away:</u></b></p> <ol style="list-style-type: none"> <li>1. Inform Environment Department of location, distance, and number of animals.</li> <li>2. Temporary work area closures for areas in vicinity of the animal and along its trajectory. Workers to prepare their personal deterrents and to go to a safe area immediately.</li> <li>3. Stay in radio/phone contact.</li> <li>4. Helicopter and Environment Department Response Team may be deployed to remove personnel or deter bear.</li> <li>5. All personnel to stay in safe area until an all clear is given.</li> </ol>
<p><b><u>Red Wildlife Alert</u></b>  <b><u>If wildlife is less than 250 m away:</u></b></p> <ol style="list-style-type: none"> <li>1. Sound air horn with two long blasts.</li> <li>2. Temporary work area closures for areas in vicinity of the animal and along its trajectory. Workers to immediately go to a safe area and use personal deterrents if needed.</li> <li>3. Inform Environment Department of location, distance, and number of animals.</li> <li>4. Stay in radio/phone contact.</li> <li>5. Helicopter and armed Environment Department Response Team are deployed immediately to remove personnel or deter bear.</li> <li>6. All personnel to stay in safe area until an all clear is given.</li> </ol>

The Environment Department is to treat all predatory mammals that are threatening or aggressive as they would treat a Grizzly Bear, which is perceived to be the most dangerous. All predatory mammals that are showing interest in a person or Project facilities must be aggressively deterred to prevent habituation to the Project site. Detailed response recommendations are provided in **Section 3.2.2.3** below. If an animal is not of an immediate safety concern, the Wildlife Response team should discuss options to deter or remove the animal with Government of Nunavut Department of Environment (DOE) conservation personnel.

**3.2.2.3 Environment Department Protocols for Managing Problem Predatory Mammals**

As part of the detailed response plan, the Environment Department will follow the procedures included here when responding to predatory mammal sightings and encounters. It is assumed that the reporting person(s) has followed procedures for predatory mammal incidents, and has requested the Environment Department Response Team to be dispatched due to the failure of human presence to deter the predatory mammal. If an animal is not of an immediate safety concern, the Environment Department should discuss options to deter or remove the animal with Government of Nunavut DOE conservation personnel. All wildlife problems are to be recorded in the wildlife database.

**In case of a General Wildlife Sighting or a Green Wildlife Alert, the Environment Department will:**

- Conduct on-going monitoring and radio communication will continue in case the situation escalates and Alert status increases.

**In the case of a Yellow Wildlife Alert:**

- Environmental Coordinator or delegate will respond to the initial radio/call to confirm they have received the Alert message and that action is being taken;
- Environmental Coordinator or delegate will commence temporary area closures and collect all deterrent equipment and give a briefing to the Environment Department Response Team on location and circumstance of the call;
- The Environmental Coordinator will contact the helicopter dispatch and request immediate deployment (if required). Helicopter will prepare for deployment of Environment Department Response Team in to the field for emergency pick-up of field crews or a bear deterrence using the helicopter; and
- The Environmental Coordinator (or designate) should proceed to the security office to provision a firearm if needed and the site Medic should be on alert and monitor Alert updates.

**In the case of a Red Wildlife Alert:**

- The Environmental Coordinator or delegate will respond to the initial radio/call to confirm they have received the Alert message and that action is being taken;
- Environmental Coordinator or delegate will commence temporary area closures and collect all deterrent equipment and give a briefing to the Environment Department Response Team on location and circumstance of the call;
- The Environmental Coordinator will contact the helicopter dispatch and request immediate deployment (if required). Helicopter will prepare for deployment of Environment Department Response Team in to the field for emergency pick-up of field crews, or a bear deterrence using the helicopter;
- The Environmental Coordinator (or designate) should proceed to the security office to provision a firearm if needed and the site Medic and ERT should be on standby in the

unlikely event of a wildlife attack; and

- Updates on the situation will be broadcast if the situation or affected areas change, the Alert status changes, or when the hazard no longer exists and work may resume.

**Once the Environment Department Response Team is deployed in the field:**

- Prior to implementing any deterrence measures ensure the bear has a clear avenue of escape, and all workers have vacated the area;
- Depending on location, slowly drive or walk towards the animal staying a safe distance from the animal (minimum of 10 m);
- No firearms or deterrents should be discharged in a work area until all personnel are removed or are safely inside structures;
- When firearms are to be used there will always be two individuals, one person with a firearm (12 gauge) for deterrent use, the other as back up with lethal force. No lethal force will be taken without consent from the Environmental Superintendent / Coordinator in conjunction with the consultation of the Government of Nunavut DOE Wildlife Officer unless the situation is deemed to be life threatening;
- The appropriate less than lethal deterrent will be chosen and used in an effort to scare the predatory mammal away; and
- If the deterrent is successful, the incident will be recorded in the wildlife database and will detail the type and level of deterrent used, information on the predatory mammal involved, and all information on the circumstances leading up to the incident.

***If the deterrent is not effective and the predatory mammal continues to approach or doesn't move away from the area of human activity or Project footprint.***

- Increase deterrent efforts to less than lethal projectile (rubber bullet) if not already being employed;
- Ensure the animal has an open escape route; and
- Continue aggressive use of less than lethal projectile deterrents to try and chase the animal away.

All but the most aggressive animals should have been deterred at this point. The situation is now extremely dangerous and the Environment Department must be ready to use lethal force.

***The risk to human life or property is imminent since the predatory mammal has not responded to non-lethal deterrent options and the safety of the team or mine property is now compromised.***

- Shoot with the intention of stopping the threat, using the buckshot or 1-ounce lead slugs, as appropriate, to kill the animal;
- Shots should be aimed at the chest area, not the head or hind quarters;
- If lethal force has been used, the Environment Department must complete a full report



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detailing the event immediately;

- The Government of Nunavut DOE conservation officers will be notified by phone. Direction will then be given to properly dispose of the carcass; and
- Any wildlife showing signs of rabies will be killed (never shot in the head) and reported.

### **Helicopter Deterrence:**

- This method of deterrence is to be considered as a last resort depending on the circumstances (i.e., location of work);
- At least one member of the Environment Department must be onboard the helicopter to monitor the deterrence. The helicopter pilot is in charge of the safety of the aircraft and the passengers. The pilot will have the final say regarding where and how the aircraft is flown with regards to safety;
- To reduce stress on the animal, the helicopter must stay at least 100 m back and 30 m up from the animal during a helicopter deterrence;
- Animals cannot be pushed for more than ten minutes or 3 km (2.2 miles);
- The Environment Department passenger will notify the helicopter pilot once they are satisfied that the animal has been pushed a sufficient distance and that it is moving away from the site. They will then instruct the pilot to go up in altitude to continue monitoring the location of the animal and ensure that it is not returning;
- In the event that a firearm will need to be transported to a site via helicopter for deterrence (e.g., remote drill site), the firearm must be placed in a secure gun case and be unloaded; and
- A detailed record of all bear/wildlife activities and deterrence actions must be presented to the Environment Coordinator in a timely manner. This forms part of the reporting requirements for Wildlife Incident Tracking for regulatory authorities.

## **4. SECTION 4 – WILDLIFE AWARENESS INFORMATION AND ENCOUNTER STRATEGIES**

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This section deals with general predatory mammal (i.e., Wolves, Wolverines, and Grizzly Bears) awareness information and encounter strategies. It does not replace the need for all personnel to take a recognized wildlife awareness course.

### **4.1 FACTORS THAT INFLUENCE A PREDATORY MAMMAL'S REACTION**

Wolverines, Wolves, and Grizzly Bears will react differently to chance encounters with humans, depending upon many factors, including each animal's past experience with humans. Their reaction is difficult to predict because of the variability of factors with each encounter.

- Female mammals may aggressively defend her young ones (for example: Female bears with cubs are more likely to attack than to flee).
- Wolverines or bears may defend a food cache (for example: a bear's main objective is to eat from the time it leaves its den to the time it returns to a winter den. Hunting bears will cache food after eating part of it by covering the food with dirt, branches or leaves. They will often establish a daybed nearby and return later for another meal). Animals will aggressively defend their food cache.
- Individual Space: All predatory mammals have a minimum distance surrounding them within which any intrusion is considered a threat. A cornered or surprised predatory mammal may be dangerous. If there is no cover to retreat to, their usual response to danger is to attack or to stand its ground.
- Old, wounded or predatory mammals with teeth malformations can be dangerous because they are very hungry or starving (e.g., Wolves observed on-site in 2009).
- Wolverines, Wolves, Arctic Fox, and Grizzly Bears are easily attracted to human food sources and may become aggressive to obtain it. Predatory mammals that have obtained food from humans become "human food habituated". These mammals are accustomed to humans and link people as sources for obtaining food.
- Young animals which are inexperienced hunters and/or recently weaned are also at a greater risk to take advantage of human food source opportunities.

### **4.2 ANIMAL ENCOUNTERS**

Most of animal safety is prevention – avoiding an encounter is the best way to stay safe while working in the home ranges of Wolverines, Wolves, Arctic Fox, and Grizzly Bears.

### **4.3. HOW TO REACT TO ANIMAL ENCOUNTERS**

Your reaction should depend on circumstances and the behavior of the mammal.

- Stop and assess the situation before you act.

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- Does the predatory mammal know you are there?
- How is the animal reacting to the nearby activity?
- Remain calm.
- Do not turn your back on the animal.

**DO NOT RUN** – You will trigger the animal's natural response to chase you. Wolverines, Wolves and Grizzly Bears are extremely fast and you cannot outrun them.

### Some Simple Rules

- Respect them – they can kill you.
- Be alert at all times.
- Watch for sign.
- Make noise – don't surprise animals.
- Travel in groups when possible.
- Be cautious in noisy areas (streams).
- Know the types of areas animals use during the year.
- Do not approach them.
- Never feed them.
- Get trained and carry deterrents.
- Remember carcass equals danger – look for ravens, strong odours.
- Mentally rehearse encounters.

#### 4.3.1 Specific Situations: Animal Encounters

##### ***Wolverine, wolf, or bear is not aware of you.***

- Leave the area quietly in the same direction that you came from.
- Move while the predatory mammal is not aware of you and stop moving when the mammal lifts its head to check its surroundings.
- Stay downwind so the predatory mammal will not pick up your scent.
- When you have moved a safe distance away and preferably to your truck or shop where you can watch and wait until the predatory mammal leaves.
- Report event to Environment Department immediately.

##### ***If the wolverine, wolf or bear is unaware of you and approaching.***

- Allow the mammal the right-of-way. Make sure there is a safe escape route and that you

are not in the way.

- Return to vehicle or building when available or allow animal a wide berth.
- Report event to Environment Department immediately.

***If you cannot leave undetected***

- Move upwind so animal can pick up your scent; this will help them identify you as human.
- If it is possible, try to keep the predatory mammal in your sight.
- Watch to see if the predatory mammal leaves when it smells that a person is nearby.
- Report event to Environment Department immediately.

***If the wolverine, wolf or bear is aware of you but in the distance.***

- Continue walking at the same general pace and towards a safe area (vehicle or building).
- DO NOT RUN.

***The wolverine, wolf or bear is aware of you and close.***

- A predatory mammal will feel threatened in a close confrontation. Generally their natural tendency will be to reduce or to remove the threat. Assist the animal by acting as non-threatening as possible.
- Do not make direct eye contact.
- Do not make any sudden moves.
- DO NOT RUN.
- In the case of a bear, they need to identify you as a person, so talk in low tones and slowly wave your arms over your head.
- Attempt to give the predatory mammal an opportunity to leave. Be sure they have an open escape route.
- Try to back away slowly.
  - If the predatory mammal begins to follow you, drop your jacket, or pack or some other article (not food) to distract it. This may distract the animal long enough for you to escape.
  - Report to Environment Department immediately.

***The wolverine, wolf or bear is close and threatening.***

- If you have a deterrent such as a bear banger or bear spray, be prepared to use it depending on how close the predatory mammal is.

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- If you do not have a deterrent, or if using the deterrent is not successful, act as non-threatening as possible.
- Talk to the predatory mammal in a calm authoritative tone of voice.
- Do not startle or provoke the predatory mammal by making sudden moves.
- Back slowly away from the animal and drop a pack, jacket, or some other article in order to distract it momentarily.
- Remember that the predatory mammals may be defending their cubs that you have not yet seen or they may have a food cache nearby. Attempt to look as non-threatening as possible.
- Report to Environment Department immediately.

### ***The wolverine, wolf or bear is very close and approaching.***

A distance of less than 50 m in an open area is considered very close.

- If the predatory mammal continues to approach, use your deterrent when in range.
- If the predatory mammal does not respond to the deterrent you must now **STAND YOUR GROUND!**
- Report to Environment Department immediately.

### ***The wolverine, wolf or bear charges.***

In this case you have done something that has provoked the Wolverine, Wolf or Grizzly Bear into showing signs of aggression towards you. It is often not clear to the person what they have done to provoke the mammal until after the attack. It is important that you act passively, humble your posture, and do not look directly at the animal. Always keep the animal in sight. Never yell or throw things as these are obvious signs of aggression

When faced with a charging wolverine, wolf or bear.

- First use your deterrent, either a banger or pepper spray. If authorized (only Environment Department representatives or local security personnel) to carry a firearm, shoot the predatory mammal.
- **DO NOT PLAY DEAD IF THE PREDATORY MAMMAL CONSIDERS YOU FOOD.**
- You must defend yourself with whatever means are available, act aggressively towards the bear.
- Stand up on something high and try to make yourself look bigger. Try to appear dominant. Try to frighten it. Yell, scream, shout, and wave your arms. Jump up and down and fight back.
- Hold your jacket or backpack over your head to make yourself look bigger.
- If being aggressively attacked in a predatory attack, fight back. Concentrate your efforts on the face, eyes, and nose of the bear. Use whatever means you have, rocks, sticks,

tools, hardhat, or simply kick and punch with all the strength you can muster.

- Report to Environment Department immediately.

### **4.3.2 Types of Bear Attacks**

#### **Provoked Attacks**

- You have done something that has provoked the bear into showing signs of aggression towards you. It is often not clear to the person what they have done to provoke the bear until after the attack.
- It is important that you act passively, humble your posture and do not look directly at the bear. Always keep the bear in sight.
- Lie down on the ground in the prone position (i.e., play dead as this is a sign of submission to the bear and shows the bear that you are no longer a threat to them).
- Never yell at the bear or throw things at the bear, these are obvious signs of aggression towards the bear.
- Report to Environment Department immediately.

#### **Predatory Attacks**

- The bear is hunting or stalking you! You are being treated as potential food. **DO NOT PLAY DEAD IF THE BEAR CONSIDERS YOU FOOD.**
- You must defend yourself with whatever means are available, act aggressively towards the bear. Stand up on something high and try to make yourself look bigger.
- Try to appear dominant. Try to frighten the bear. Yell, scream, shout and wave your arms. Jump up and down and fight back. Hold your jacket or backpack over your head to make yourself look bigger.
- Use your deterrent; either a banger or pepper spray. If authorized to carry a firearm, shoot the bear.
- Report to Environment Department immediately.

## **4.4 WILDLIFE DETERRENTS**

### **4.4.1 Noise**

- Pencil Flare Guns are highly portable but many people have received injuries from this type of deterrent as the pen explodes while they are holding it. This deterrent is still sold and is not recommended. Canadian Conservation Officers no longer using pencil flares.
- Pyrotechnics, including bangers, screamers, whistlers, and flares. Requires a magazine launcher. These launchers look like a small handgun. There are different types available, some carry only a single shot, and some will carry multiple cartridges. The bangers, screamers and whistlers are charges that will explode and emit a variety of different noises. The name of the device indicates the noise it will make.

#### 4.4.2 Wildlife Chemical Deterrents

Bear Sprays are highly effective but they must be used correctly to be effective. As with all deterrents they have their good points and their bad points.

- The main ingredient in bear spray is Capsicum an extract from hot peppers.
- Capsicum needs to strike the eyes, nose or mouth of the mammal, (open membranes) to be effective.
- These sprays can only be used at very close range, 3 to 8 m or 10 to 25 ft.
- You cannot discharge the bear spray too early – or it will be completely ineffective.
- If the predatory mammal comes within the range of the bear spray – aim directly into their face and spray.
- You must be aware of the wind direction. If you the wind is blowing towards you, the spray will be carried by the wind into your face.
- Bear spray may not be effective in sub-zero weather (Spray cans do not fire well in very cold temperatures.) In colder weather, you need to keep the can of bear spray warm in order for it to fire effectively.
- Bear spray will not be effective in the rain. When you fire a can of bear spray, the spray will create a billowing cloud of capsicum and propellant. Rain can/will wash the spray right out of the air before it strikes the bear in the face.
- If you have used your can of bear spray to deter a mammal, wash the nozzle off with soap and water to remove the scent. Replace your can of spray as soon as possible. You do not want to have another bear encounter with a half a can of spray left.
- Bear sprays have a shelf life. Always replace your bear spray when you are nearing the end of the shelf life. The Capsicum does not deteriorate over time; it is the canister seals that deteriorate over time.
- Do not test your can of spray before going out into the field. You need to take a full can of spray into the field, not a partially used one.
- Wildlife chemical deterrents are only to be used for the purpose they are intended for. Misuse of wildlife deterrents such as chemical sprays, bangers, and pyrotechnics is considered a criminal offence.

## **5. SECTION 5 – TRAINING PROTOCOL**

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### **5.1 SCOPE**

The Wildlife Training Protocol outlines recommended levels of training that specific groups of people at the Project site should receive. It is important that human activity at the site does not result in wildlife encounters that put people or wildlife at risk. All personnel on site have a role to play in ensuring human safety, conservation of wildlife, and documenting wildlife activities in the Project area.

### **5.2 ASSUMPTIONS AND KEY CONSIDERATIONS**

Agnico Eagle, Meadowbank Division must assign overall accountability, recording and reporting responsibility to the Environmental Coordinator or designate(s) if the various wildlife response plans and training initiatives are to be effective.

The Environmental Coordinator or designates(s) will be responsible for ensuring that all employees, contractors, and visitors at the Project site receive wildlife training appropriate to their roles and responsibilities.

The Environment Department will be responsible for all deterrent action whenever it is necessary to deter wildlife from mine infrastructure or personnel. All members of the Environment Department will receive specialized training in various levels of deterrent use. Security personnel and the Environment Department will be the only onsite personnel to have access to a firearm.

### **5.3 TRAINING**

Mandatory wildlife awareness orientation for all staff will include the following components.

#### **5.3.1 Wildlife-Human Conflict**

- General restrictions for wildlife protection.
- Wildlife Attractants.
- Garbage Management.
- Wildlife Health.
- Wildlife and Vehicles.
- Preventing Problem Wildlife.
- Dealing with Problem Wildlife.
- Reporting Wildlife Observations and Incidents.



### **5.3.2 Wildlife Awareness**

The Wildlife Awareness and Working in the Wild brochure has been developed to provide Agnico Eagle staff and contractors with awareness of potential wildlife encounters that may occur at the Project site. This brochure discusses the following:

- Wildlife that commonly occur near the Project site;
- Behavior of wildlife that may be encountered near the Project site;
- Wildlife encounters; and
- Wildlife Deterrents.

### **5.3.3 Environment Department**

In addition to the required Project site orientation, the Environment Department may require additional training. The following training is recommended, especially for those without experience in situations where wildlife occurrences are common.

#### ***Bear Safety Training***

Provided by qualified contractor or territorial, provincial or federal Wildlife Officer, this course will provide:

- Instruction on the use of lethal and non-lethal deterrents for emergency response to bear incidents;
- Techniques for euthanizing bears during an emergency response;
- Other types of deterrent options available in non-emergency situations;
- In depth aversive conditioning techniques;
- Live trapping techniques and protocols;
- Necropsy techniques, and biological sampling; and
- Practicum.

#### ***Carnivore Safety Training***

Provided by qualified contractor or territorial, provincial or federal Wildlife Officer to include:

- Biology, ecology, and behavior of Wolverine, Wolf, Arctic Fox, and Grizzly Bear;
- Rabies and other zoonotic diseases;
- Detailed deterrent and aversive conditioning techniques;
- Live trapping techniques;
- Instruction on the use of lethal and non-lethal deterrents for emergency response to incidents involving large carnivores;
- Necropsy techniques and biological sampling; and
- Practicum.

## **APPENDIX D**

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**Field Data Forms and UTM Coordinates for Monitoring Programs**

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## **MEADOWBANK WILDLIFE INCIDENT PROCEDURES**

Wildlife incidents refer to a range of possible occurrences at the Mine, including:

- human-wildlife interactions that present a risk to either people or animals
- wildlife-caused damage to property or delay in operations
- wildlife deterrent actions
- wildlife injury or mortality

The objective of wildlife incident reporting is to document and mitigate impacts to wildlife, reduce risks to people, and identify new mitigation.

Natural processes should be left alone, unless intervention is required to reduce risk to either wildlife or staff from Project activities. Each incident requires unique responses, but each incident should be assessed to reduce or eliminate the chance that it will recur.

GN should be contacted in the case of problem wildlife, and prior to disturbing nests. Detailed wildlife incident reporting is critical for implementing adaptive management. As part of the TEMP, all wildlife incidents are reported and reviewed to determine patterns in incident occurrences and to develop management procedures.

All wildlife incidents should be documented by Meadowbank Environment Department staff using the attached form, and reported immediately to the Environmental Superintendent. The report should include photographs and conversations with the individuals involved. Please attached additional pages or information that may be useful to understand what occurred and what can be learnt from the incident.

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**Wildlife Incident Report Form**

<b>Date:</b>		<b>Time:</b>	
<b>Individuals involved:</b>			
<b>Species:</b>			
<b>Number, gender, age:</b>			
<b>Location (description):</b>			
<b>Location (UTM):</b>			
<b>Digital photo numbers:</b>			
<b>Describe the incident or accident that occurred. Was there a threat to wildlife or human safety? What was the situation that caused it?</b>			
<b>Describe any use of wildlife deterrents: Describe any wildlife mortality:</b>			
<b>Describe any communication with ECCC and/or GN-DOE:</b>			
<b>What immediate measures were taken to reduce risk or harm?</b>			
<b>What measures are recommended to prevent future occurrences?</b>			
<b>Report prepared by:</b>		<b>Reviewed by:</b>	

**UTM Coordinates (NAD 83) of PRISM plots Used for Long-term Monitoring At Meadowbank and Whale Tail Study Areas**

<b>MEADOWBANK STUDY SITE</b>				
	<b>UTM Coordinates of PRISM Plot Corners</b>			
<b>#</b>	<b>Southwest</b>	<b>Northwest</b>	<b>Northeast</b>	<b>Southeast</b>
2	14W 0637020 7216090	14W 0637020 7216490	14W 0637420 7216490	14W 0637420 7216090
3	14W 0637800 7216700	14W 0637800 7217100	14W 0638200 7217100	14W 0638200 7216700
6	15W 0359400 7212500	15W 0359400 7212900	15W 0359800 7212900	15W 0359800 7212500
8	14W 0637700 7214200	14W 0637700 7214600	14W 0638100 7214600	14W 0638100 7214200
9	14W 0637300 7214800	14W 0637300 7215200	14W 0637700 7215200	14W 0637700 7214800
11	14W 0639000 7215800	14W 0639000 7216200	14W 0639400 7216200	14W 0639400 7215800
12	14W 0639700 7215600	14W 0639700 7216000	14W 0640100 7216000	14W 0640100 7215600
14	14W 0639000 7216900	14W 0639000 7217300	14W 0639400 7217300	14W 0639400 7216900
15	14W 0639000 7217800	14W 0639000 7218200	14W 0639400 7218200	14W 0639400 7217800
19	14W 0635500 7217300	14W 0635500 7217700	14W 0635900 7217700	14W 0635900 7217300
20	14W 0636000 7216600	14W 0636000 7217000	14W 0636400 7217000	14W 0636400 7216600
22	14W 0636800 7217400	14W 0636800 7217800	14W 0637200 7217800	14W 0637200 7217400
24	14W 0636300 7218000	14W 0636300 7218400	14W 0636700 7218400	14W 0636700 7218000
28	14W 0640200 7221000	14W 0640200 7221400	14W 0640600 7221400	14W 0640600 7221000
29	14W 0641100 7220000	14W 0640100 7220400	14W 0640500 7220400	14W 0640500 7220000
31	14W 0636600 7208000	14W 0636600 7208400	14W 0637000 7208400	14W 0637000 7208000
32	14W 0636000 7208500	14W 0636000 7208900	14W 0636400 7208900	14W 0636400 7208500
33	14W 0636700 7209800	14W 0636700 7210200	14W 0637100 7210200	14W 0637100 7209800
34	14W 0640000 7218800	14W 0640000 7219200	14W 0640400 7219200	14W 0640400 7218800
36	14W 0633300 7212100	14W 0633300 7212500	14W 0633700 7212500	14W 0633700 7212100
37	14W 0634000 7212700	14W 0634000 7213100	14W 0634400 7213100	14W 0634400 7212700
38	14W 0632700 7212800	14W 0632700 7213200	14W 0633100 7213200	14W 0633100 7212800
42	15W 0359400 7219000	15W 0359400 7219400	15W 0359800 7219400	15W 0359800 7219000
43	15W 0359200 7218300	15W 0359200 7218700	15W 0359600 7218700	15W 0359600 7218300
45	14W 0640600 7210400	14W 0640600 7210800	14W 0641000 7210800	14W 0641000 7210400
<b>WHALE TAIL STUDY SITE</b>				
	<b>UTM Coordinates of PRISM Plot Corners</b>			
<b>#</b>	<b>Southwest</b>	<b>Northwest</b>	<b>Northeast</b>	<b>Southeast</b>
1	14N 0605500 7251900	14N 0605500 7272300	14N 0605900 7252300	14N 0605900 7241900
2	14N 0606300 7252300	14N 0606300 7252700	14N 0606700 7252700	14N 0606700 7252300
3	14N 0607900 7252300	14N 0607900 7252700	14N 0608300 7252700	14N 0608300 7252300
4	14N 0605500 7253100	14N 0605500 7253500	14N 0605900 7253500	14N 0605900 7253100
5	14N 0607500 7253100	14N 0607500 7253500	14N 0607900 7253500	14N 0607900 7253100
6	14N 0608700 7252300	14N 0608700 7252700	14N 0609100 7252700	14N 0609100 7252300
7	14N 0611500 7253100	14N 0611500 7253500	14N 0611900 7253500	14N 0611900 7253100
8	14N 0609100 7253500	14N 0609100 7253900	14N 0609500 7253900	14N 0609500 7253500
9	14N 0609100 7254300	14N 0609100 7254700	14N 0609500 7254700	14N 0609500 7254300
10	14N 0610700 7251500	14N 0610700 7251900	14N 0611100 7251900	14N 0611100 7251500
11	14N 0609900 7254700	14N 0609900 7255100	14N 0610300 7255100	14N 0610300 7254700
12	14N 0603900 7255500	14N 0603900 7255900	14N 0604300 7255900	14N 0604300 7255500
13	14N 0609500 7255900	14N 0609500 7256300	14N 0609900 7256300	14N 0609900 7255900
14	14N 0603500 7256300	14N 0603500 7256700	14N 0603900 7256700	14N 0603900 7256300
15	14N 0610300 7256300	14N 0610300 7256700	14N 0610700 7256700	14N 0610700 7256300
16	14N 0611500 7256300	14N 0611500 7256700	14N 0611900 7256700	14N 0611900 7256300
17	14N 0611900 7251500	14N 0611900 7251900	14N 0612300 7251900	14N 0612300 7251500
18	14N 0605500 7257100	14N 0605500 7257500	14N 0605900 7257500	14N 0605900 7257100
19	14N 0606700 7257900	14N 0606700 7258300	14N 0607100 7258300	14N 0607100 7257900
20	14N 0605500 7258300	14N 0605500 7258700	14N 0605900 7258700	14N 0605900 7258300

CONTROL OR REFERENCE SITE				
#	UTM Coordinates of PRISM Plot Corners			
	Southwest	Northwest	Northeast	Southeast
1	14W 0623000 7218000	14W 0623000 7218400	14W 0623400 7218400	14W 0623400 7218000
2	14W 0623600 7217600	14W 0623600 7218000	14W 0624000 7218000	14W 0624000 7217600
3	14W 0622600 7217000	14W 0622600 7217400	14W 0623000 7217400	14W 0623000 7217000
4	14W 0624600 7217000	14W 0624600 7217400	14W 0625000 7217400	14W 0625000 7217000
5	14W 0625000 7217600	14W 0625000 7218000	14W 0625400 7218000	14W 0625400 7217600
6	14W 0623600 7216000	14W 0623600 7216400	14W 0624000 7216400	14W 0624000 7216000
7	14W 0624600 7216400	14W 0624600 7216800	14W 0625000 7216800	14W 0625000 7216400
8	14W 0624600 7215600	14W 0624600 7216000	14W 0625000 7216000	14W 0625000 7215600
9	14W 0625600 7215000	14W 0625600 7215400	14W 0626000 7215400	14W 0626000 7215000
10	14W 0626200 7215000	14W 0626200 7215400	14W 0626600 7215400	14W 0626600 7215000
11	14W 0624500 7214000	14W 0624500 7214400	14W 0624900 7214400	14W 0624900 7214000
12	14W 0625000 7214000	14W 0625000 7214400	14W 0625400 7214400	14W 0625400 7214000
13	14W 0626200 7214400	14W 0626200 7214800	14W 0626600 7214800	14W 0626600 7214400
14	14W 0624600 7213300	14W 0624600 7213700	14W 0625000 7213700	14W 0625000 7213300
15	14W 0625200 7213000	14W 0625200 7213400	14W 0625600 7213400	14W 0625600 7213000
16	14W 0626100 7213000	14W 0626100 7213400	14W 0626500 7213400	14W 0626500 7213000
17	14W 0627000 7213600	14W 0627000 7214000	14W 0627400 7214000	14W 0627400 7213600
18	14W 0624600 7212800	14W 0624600 7213200	14W 0625000 7213200	14W 0625000 7212800
19	14W 0625600 7212600	14W 0625600 7213000	14W 0626000 7213000	14W 0626000 7212600
20	14W 0626000 7212000	14W 0626000 7212400	14W 0626400 7212400	14W 0626400 7212000

#### UTM Coordinates of Breeding Bird Transects along the Meadowbank AWAR and Whale Tail Haul Road

Meadowbank AWAR				
Transect	NAD	Start Coordinate	End Coordinate	Coordinate on AWAR
1	27	14W 0644200 7138000	14W 0647200 7138000	14W 0645524 7138000
2	27	14W 0639450 7152000	14W 0642450 7152000	14W 0640226 7152000
3	27	14W 0634800 7158000	14W 0637800 7158000	14W 0636319 7158000
4	27	14W 0631900 7163000	14W 0634900 7163000	14W 0633968 7163000
5	27	14W 0629000 7167000	14W 0632000 7167000	14W 0630098 7167000
6	27	14W 0624500 7178000	14W 0627500 7178000	14W 0625081 7178000
7	27	14W 0624000 7182000	14W 0627000 7182000	14W 0625872 7182000
8	27	14W 0625500 7189000	14W 0628500 7189000	14W 0626421 7189000
9	27	14W 0626500 7193000	14W 0629500 7193000	14W 0627284 7193000
10	27	14W 0626200 7203000	14W 0629200 7203000	14W 0627472 7203000
11	27	14W 0630000 7209000	14W 0633000 7209000	14W 0631031 7209000
12	27	14W 0633000 7217000	14W 0636000 7217000	14W 0634284 7217000
Whale Tail Haul Road				
Transect	NAD	Start Coordinate	End Coordinate	Coordinate on Proposed Haul Road
1	83	14N 0635400 7223500	14N 0638400 7223500	14N 0636853 7223500
2	83	14N 0633000 7229100	14N 0636000 7229100	14N 0634445 7229100
3	83	14N 0622300 7234600	14N 0622300 7237600	14N 0622300 7236106
4	83	14N 0616600 7238600	14N 0619600 7238600	14N 0618155 7238600
5	83	14N 0619100 7242800	14N 0622100 7242800	14N 0620588 7242800
6	83	14N 0610000 7250600	14N 0613000 7250600	14N 0611531 7250600

## **APPENDIX E**

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### **Peregrine Falcon Management and Protection Plan**

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## Peregrine Falcon Management and Protection Plan on the Meadowbank Gold Project Site

Version 2 - Updated June 18, 2012

### **Background and Purpose:**

Since 2009, peregrine falcons have been observed along the All Weather Access Road occurring in three to five quarries. In June 2012, for the first time, falcon activity was observed in the Portage Pit. Subsequently a falcon nest site was observed in the South Portage Pit. In response a general mine site peregrine falcon management and protection plan was developed in accordance with the Terrestrial Ecosystem Management Plan (TEMP).

The purpose of this plan is to protect peregrine falcons from mine activities by firstly preventing them from nesting within the perimeter of active mining Pits (Portage, Goose, or Vault pits) during operation. If falcons nest in the mine pits, operations will be adapted according to the management plan and monitoring will increase to ensure protection of the falcons and their nest(s). The peregrine falcon is listed as “may be at risk” by the Canadian Endangered Species Conservation Council (2001) and the Nunavut Government (Government of Nunavut, 2001). *Falco peregrinus tundrius*, the subspecies that breeds north of the treeline, is listed as being of special concern in Canada (COSEWIC, 2002). Therefore we must ensure all activities protect these species.

Throughout the year Meadowbank environment department staffs routinely monitor the pit and other areas on site for birds to ensure their protection and that the management plan is being implemented. The following document outlines specific management and mitigative measures to protect peregrine falcons in accordance with the Meadowbank TEMP.

### **Deterrence and Protection Plan Prior to Nesting in Portage, Goose and Vault Pit:**

**Level 1)** Prior to and during nesting season (May 25 – July 1) an inspection of the pit walls will be conducted daily. These inspections will include a visual assessment from the bottom of the pit looking up at the wall faces, and also from the top looking down the wall faces. Records shall be kept of the dates, times, and which individual(s) carried out the inspection.

**Level 2)** If falcons are reported to have been seen in the vicinity of the pit or are observed by environment department staff, inspections will increase to 3 times daily; once in early morning, once at mid-day, and once again in the later evening. All sightings shall be documented as to the date, time, location, and individual(s) spotting the falcons. Owl decoys will be erected in the



area where the falcons have been seen to attempt to deter the falcons from nesting in the pit areas. Noise cannons may also be utilized.

**Level 3)** If sightings become regular, inspections will increase to every 3 hours including incorporating a night shift to perform inspections.

**Level 4)** If perching is observed or if nests are being created within the pit, the following management measures will be under taken.

- A. Shoot off a pistol banger (non-pyro technique) to ease them away from their location of perching. At no time will a banger be shot in the direction of the falcon, all bangers will be shot from a safe distance away to avoid any physical harm to the bird, i.e. hearing impairment.
- B. When the bird flies away it will be observed. The reason for this is that Agnico-Eagle does not want any falcon to leave one active pit, ie., South Portage and move to North Portage or from either Portage pit to Bay Goose Pit. We must ensure the falcon is deterred from the active pit areas. If the falcon re-lands within one of the pit perimeters repeat step A.
- C. If a nest is being constructed, each nest will be treated on a case by case basis depending on its location. One option at this level would be to roll or place wire mesh fencing over the nesting area to prevent the return of the falcon to the nesting area.

With protective measures in place, our goal is to never have to get beyond *Level 4:A*.

### **Portage, Goose and Vault Pit Nest Monitoring and Protection Plan**

If a nest is established and/or eggs are observed blasts will be minimized within a protective zone of the nest. It is likely that the nest will occur near the top of the pit wall. Blast vibration and noise has not appeared to have deterred the falcons from nesting near pits at this time; therefore the greatest risk to the eggs and young would be from blast fly rock. To prevent falcon disruption, the frequency of blasts will be reduced, vehicle traffic and most importantly human traffic will be reduced within a radius of ~150m from the nest. Fly rock will be monitored by video to ensure no impacts. Through controlled blasts and video monitoring of fly rock in June and July AEM will ensure that fly rock is kept to a minimum height that does not exceed the height of the nests.

In accordance with the TEMP, daily monitoring by environmental staff will be conducted with binoculars or a scope from the west side of the pit and recorded. After all blasts, environmental staff will check on the nests and record observations. Portable motion sensor automatic cameras may also be installed to record movements in the nest on regular intervals.

Based on past monitoring results of the nests along the All Weather Road (2009-2011), there is no pattern that has indicated that some young have survived while others have not due to road or quarry operations. The activities in the pit need to continue to be protective of the nests and the environmental staff will continue to monitor the activity and nests daily between June and September if a nest is observed.

## **Portage, Goose and Vault Pit Mine Operation Mitigation**

### **Blasting**

As a protective measure, blasting in the south pit east wall will become less frequent with smaller controlled blasts. Over the past 6 months, blasting has been optimized to reduce dilution and control fly rock by modifying blast material density, timing and patterns.

Blasts should occur less frequently and should be minimized within 150m of the nest in June and July, operations will prevent blast fly rock from disturbing the nests and video record all blasts within a 150m radius. The blast vibration and noise does not appear to have deterred the falcons from nesting nearby. Through controlled blasts and video monitoring, fly rock will be monitored to ensure it has not flown towards the nests. If blasts occur within the radius, fly rock will not exceed 60m or the height of the nest in June and July.

### **Mine Operations and Reduced Vehicle Traffic**

Traffic should be reduced within 150m radius of the nest to protect it from dust; if traffic cannot be reduced, dust suppressant should be used.

If all above mentioned measures have failed and AEM environment are not able to conform to the TEMP, the Government of Nunavut Department of Environment will be contacted by the Environment Superintendent, Environment Biologist, or Environment Coordinator.

# APPENDIX F

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## Migratory Birds Protection Plan

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## TECHNICAL MEMORANDUM

**DATE** May 21 2019  
**TO** Manon Turmel  
Agnico Eagle Mines Limited  
**CC** David Brown, Jen Range  
**FROM** Dan Coulton, Corey De La Mare

**Project No.** 1658927.3100\_Rev2

**EMAIL** [daniel\\_coulton@golder.com](mailto:daniel_coulton@golder.com)

### MIGRATORY BIRDS PROTECTION PLAN

#### 1.0 INTRODUCTION

Agnico Eagle has planned two water diversions as part of water management activities for the proposed Whale Tail Project (the Project) and the proposed Whale Tail Expansion Project (Expansion Project). The purpose of the Migratory Bird Protection Plan (Plan) is to present the anticipated flooding area and schedule during the Whale Tail Lake (South Basin) flooding and present appropriate mitigation measures to reduce impacts to nesting migratory birds.

The Whale Tail Lake (South Basin) diversion consists of construction of the Whale Tail Dike, from June 2018 to February 2019, to divert Whale Tail Lake (South Basin) and tributary lakes through Lake A45, just south of Lake A16 (Mammoth Lake). Flooded tributary lakes (light blue shading in Figure 1) include Lake A18, Lake A19, Lake A20, Lake A21, Lake A22, Lake A55, Lake A62, Lake A63, Lake A65, Pond A-P1, and Pond A-P43 (Figure 1). Active flooding from elevation 152.5 to 156.00 masl of the area will occur from 2018 until 2020 causing approximately 157 ha of flooding; this flooding activity will require migratory bird mitigation. The flooded area will remain at elevation 156.00 masl from June 2020 until 2026, during operations.

The flooding has the potential for incidental disturbance and destruction of migratory birds and their nests. As per Nunavut Impact Review Board (NIRB) Project Certificate No.008 Condition 34, this Plan describes how these impacts will be mitigated; the mitigation will be focused between 2018 to July 2020, or until water levels reach their maximum. This Plan revision has been updated to include results from 2018 monitoring of migratory birds and the proposed monitoring design for 2019. The Plan revision also includes an additional section on monitoring of flooded areas.

The *Migratory Birds Convention Act* (1994) (*MBCA*) prohibits the harm of migratory birds and the disturbance or destruction of nests and eggs. The original aim of this legislation in the early 1900s was to conserve migratory bird populations from overharvest (CWS 2007). Inadvertent disturbance or destruction of migratory birds has been termed "Incidental Take" and Environment and Climate Change Canada (ECCC) currently lacks legal mechanisms to regulate Incidental Take (CWS 2007).

This Plan describes the likely effects pathways that may harm migratory birds (based on the Whale Tail FEIS, Agnico Eagle 2016), the mitigation options to reduce these impacts, and Agnico Eagle's preferred option for proceeding.

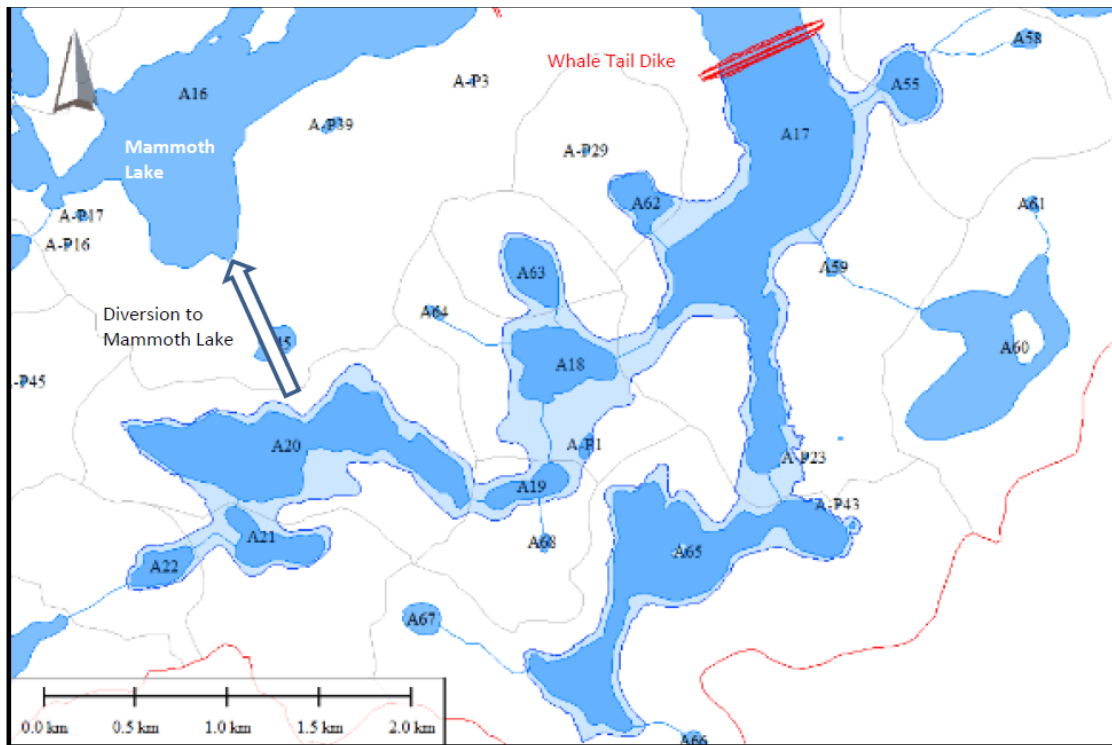


Figure 1: Whale Tail Lake (South Basin) Diversion Flooding occurring between June 2018 to July 2020, and during operation (July 2020 to 2026). Light blue shading shows flooded areas.

## 2.0 EFFECTS PATHWAYS AND MITIGATION

The flooding resulting from the Whale Tail Project and proposed Whale Tail Expansion Project water diversions will lead to incidental disturbance and destruction of migratory birds and their nests. There is less flooding predicted for the Expansion Project than for the Approved Project.

### 2.1 Effects Pathway

Flooding at the Project and proposed Expansion Project site is anticipated due to the construction of new dikes in Whale Tail Lake (South Basin) and downstream of Lake A46 and Lake A50. Some of the flooding will occur during the nesting season and may lead to the loss of nests near the shoreline of the lakes.

Shoreline surveys during the Project baseline field work examined 62.8 km of shoreline along lakes and streams (Agnico Eagle 2016, Volume 5, Appendix 5-C). In total, 24 species of birds and eight nests were observed including three semipalmated sandpiper nests, two semipalmated plover nests, one dunlin nest, one herring gull nest, and one cackling goose nest. Assuming that observers recorded nests that were observed within a 20 m swath surveyed by two people, the nest density for the Project is 0.06 nests per ha. Given the area of flooding expected to occur at the Project and proposed Expansion Project, and assuming densities are the same as that observed during baseline studies, approximately seven nests in 2019 and three nests in 2020 of the shorebirds, gulls and waterfowl groups may be displaced by flooding if no mitigation is undertaken (Table 1).

Upland birds have been surveyed at Meadowbank from 2003 to 2015 using PRISM protocols. PRISM surveys found 3.8 pairs of breeding birds per plot during 2015. As PRISM plots are 16 ha in size this indicates a density of 0.24 pairs per ha. The average nests observed per PRISM plot was 0.6 nests, or 0.04 nests per ha. It is assumed that not all the nests or breeding pairs were detected during the 2015 baseline studies so a nest density of 0.5 nests per ha was used to calculate the number of nests displaced due to flooding. It is predicted that approximately 61 upland bird nests will be displaced in 2019 and approximately 27 nests in 2020 if no mitigation is undertaken at the Project and proposed Expansion Project (Table 1).

**Table 1: Predicted Number of Bird Nests Displaced from Flooding**

Nesting Period Year <sup>a</sup>	Whale Tail Lake (South Basin) Diversion			Northeast Diversion		
	Change in Flooded Terrestrial Area (ha)	Predicted Number of Nests Displaced		Change in Flooded Terrestrial Area (ha)	Predicted Number of Nests Displaced	
		Shoreline Survey	PRISM Survey		Shoreline Survey	PRISM Survey
2018	0.21	0.01	0.10	0	0	0
2019	115.96	6.96	57.98	6.58	0.42	3.29
2020	41.38	2.48	20.69	11.86	0.75	5.93
2021	0	0	0	0	0	0
2022	-64.94 <sup>b</sup>	0	0	-18.45 <sup>b</sup>	0	0

<sup>a</sup> The nesting period used included the months of May, June, July, and August.

<sup>b</sup> Between May and August 2020 the total flooded habitat area and the flooded terrestrial area is expected to decrease in size.

PRISM = Program for Regional and International Shorebird Monitoring; ha = hectare.

In 2018, 18 experimental low-lying wet sedge habitat plots (6 ha each) were monitored regularly to evaluate changes in breeding behavior associated with flash tap and effigy mitigation devices relative to control plots (Agnico Eagle 2018). Fifty-nine nests were detected at these 18 plots for a density of 0.54 nests per ha. The density of breeding birds was estimated to be 1.2 per ha.

In 2018, surveys for breeding migratory birds and nests were completed in areas predicted to be flooded (Agnico Eagle 2018). A total of 8 species of birds and 50 nests (0.28 nests per ha) were recorded, which is less than the 0.5 nests per ha assumed in the FEIS. Based on the nests found, monitoring completed in 2018 indicates impacts may be less than predicted in the FEIS (Agnico Eagle 2018).

The density of breeding birds measured at the Whale Tail Project have varied through time and ranged from 1.4 per ha in 2016 to 3.4 per ha in 2018, although areas and observers have changed during this time (Dougan and Associates 2017; Agnico Eagle 2018). For example, in 2015 and 2016 PRISM methods at 16 ha plots and shoreline surveys were completed by subcontractors, whereas 2018 surveys included different 6 ha plots and more extensive searches in the areas predicted to be flooded completed by Trent University. Predictions of absolute birds impacted by Project-related flooding used area extrapolation of the highest mean observed density during baseline (1.41 observed in 2015). While monitoring in 2018 estimated a higher density of breeding birds, application through area extrapolation will only increase the absolute numbers of birds impacted while the relative magnitude will remain the same as predicted in the FEIS because the area does not change.

## 2.2 Mitigation

Based on field studies completed in the summer of 2017 and discussions with ECCC, the following mitigation options were selected:

- Deploying visual and audio bird deterrents.
- Regular sweeps to discourage nesting through human activity, and to move the visual and audio deterrents.

### Bird Deterrents

Agnico Eagle would consider hiring additional local staff from May to August 2019 and 2020 to actively deter by use of walking, rope drags, ATVs or boats to deter nesting.

A variety of predator type calls could be broadcast to prevent habituation for a variety of upland bird species. Noise makers can be equipped with a solar panel to provide power for continuous operation. Visual deterrents may include scare balloons, human, and predator effigies and other visual deterrents. Scare balloons have large predator eye designs that look threatening to the birds and reflective flash tape rustles in the breeze, preventing habituation in the area. Snow melt, ice melt and arrival of migratory birds will be documented, prior to the flooding activities, to inform mitigation. The location and distribution of visual deterrents will be rearranged occasionally to maintain their effectiveness, and will be deployed prior to migratory bird nesting period (i.e., the beginning of May, or prior to 50% snow melt).

Bird deterrents deployed in 2018 included flash tape and a hawk kite effigy (Section 2.1). These deterrents will be used in 2019 with the addition of an auditory stress call (Agnico Eagle 2018). In 2018, monitoring of bird activity was carried out in collaboration with Trent University and Environment and Climate Change Canada (Agnico Eagle 2018), which will continue in 2019.

## 2.3 Mitigation Effectiveness

Agnico Eagle is currently collaborating with Trent University and Environment and Climate Change Canada on monitoring impacts to nesting migratory birds and deterrent mitigation effectiveness. In 2018 deterrents were evaluated at 18 plots of low-lying sedge habitat (Agnico Eagle 2018). The deterrents tested included flash tape and a hawk kite effigy. Audio deterrents were planned for 2018 but did not arrive at site in time to be deployed. Preliminary results indicated no change in breeding behaviour between experimental and control plots.

Monitoring of mitigation effectiveness and breeding birds will continue from May to July 2019 and include the use of audio and visual deterrents. The deterrents will be deployed in May following snow melt and before nesting activity begins. Deterrent and control treatments will be assigned randomly to 18 plots. Two types of deterrent treatments are planned and include auditory distress calls with flash tape and audio with a hawk kite effigy. Control plots will have no deterrents and serve as the reference condition to quantify changes in breeding behaviour. New for 2019 is the use of temperature probes placed in nests as another line of evidence about whether deterrents influence breeding behaviour. Similar to 2018, nest surveys will also be completed in areas where flooding is predicted (Figure 2).

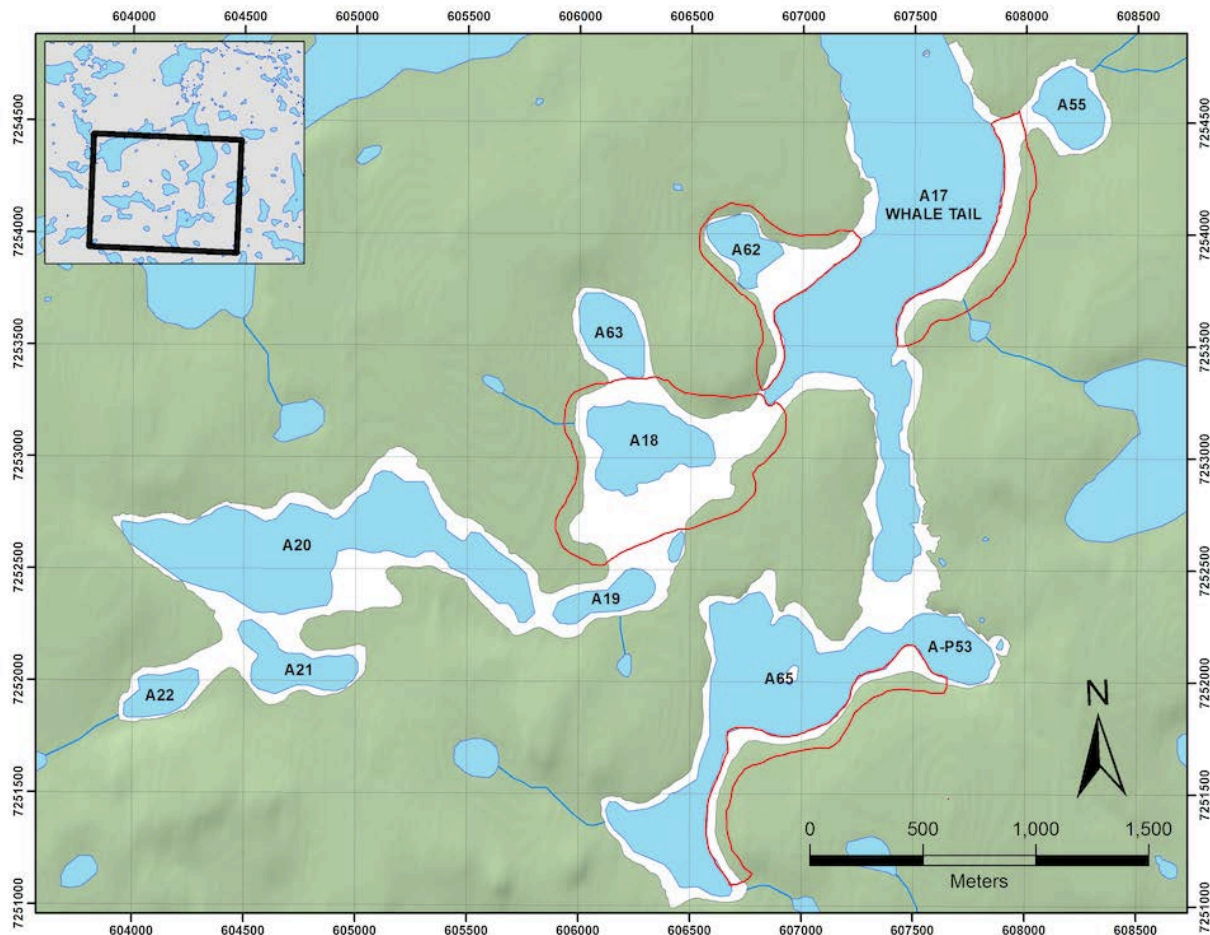


Figure 2: Planned monitoring areas (red outline) for 2019

### 3.0 EVALUATION OF FLOODING PREDICTIONS

The FEIS predicted that the Whale Tail Lake (South Basin) diversion would flood 148.5 ha of terrestrial habitat (Table 1). The predictions were derived from a mean annual water balance modeling as described in Appendix 6-F. A monitoring program was developed to monitor and compare the actual water levels resulting from the diversion, to those estimated by the mean annual water balance.

Agnico Eagle has committed to weekly monitoring (i.e. water level measurement) in water bodies where flooding will occur. As stated previously, the following 12 water bodies are expected to be impacted by the Whale Tail Lake (South Basin) diversion: A17, A18, A19, A20, A21, A22, A55, A62, A63, A65, A-P1, A-P43 (Figure 1) beginning in 2019.

In 2019 and 2020, the water level in Whale Tail Lake (South Basin) was predicted to range from 155.1 masl to 156.0 masl. At these elevations, all the water bodies listed above are expected to be inundated. Therefore, weekly monitoring will be required throughout. However, the frequency of monitoring may be adapted depending on actual conditions. For example, if there is little change recorded at the weekly frequency, then the monitoring frequency may be reduced following discussion with ECCC



Surveys will be performed in the lakes and ponds to determine the water levels. Staff gauges or data loggers (or both) will be installed in all 12 water bodies to allow visual confirmation of water levels. Care should be taken to ensure the gauges do not move (due to wind or wave action, or poor installation). The staff gauges will be referenced to fixed benchmarks (at wadable locations) references to the geodetic datum to maintain consistency in water level readings. Given the potential range of water levels during the Expansion Project life (approximately 152.5 masl to 156.0 masl), multiple, staggered staff gauges will be required in order to measure the full range of flows.

If regular access to any of the lakes and/or ponds proves difficult, Agnico may choose to supplement the staff gauges with remotely accessible data loggers in these water bodies. However, these loggers must be installed to prevent freezing or should be removed prior to winter (potentially missing water levels during the spring freshet).

The readings will be plotted with the predicted water levels (Appendix 6-F) and will include historical water levels for each lake or pond. This will allow Agnico Eagle to react quickly if water levels deviate from expected levels and provide input to the mitigation measures described in Section 2.2.

#### **4.0 REPORTING**

Results of Plan monitoring and mitigation effectiveness will be reported in the annual Terrestrial Ecosystem Monitoring Report including any adaptive management required. As per Project Certificate No.008 Condition 34, Agnico Eagle will report the results of the Migratory Birds Protection Plan to NIRB on an annual basis.

## 5.0 REFERENCES

- Agnico Eagle (Agnico Eagle Mines Limited). 2016. Whale Tail Pit Final Environmental Impact Statement. Submitted to Nunavut Impact Review Board and Nunavut Water Board. June 2016.
- Agnico Eagle. 2018. Meadowbank Gold Project: 2018 Migratory Bird Protection Plan Report. March 2019.
- CWS (Canadian Wildlife Service). 2007. Environment Canada Background Document on the Management of Incidental Take of Migratory Birds: Towards and updated Regulatory Approach. Available at: <https://www.ec.gc.ca/>. Accessed May 2017.
- De Beers. 2016. Gahcho Kué Mine 2015 Annual Wildlife Report. March 2016.
- Dougan and Associates. 2017. Whale Tail Pit, V-Zone & Whale Tail Haul Road Project Area Comprehensive Terrestrial Baseline Characterization Report. Prepared for Agnico Eagle Mines Limited by Dougan and Associates, Guelph, ON. December 2017.
- Environment Canada. 2013. Planning ahead to Reduce the Risk of detrimental effects to migratory Birds, and their nests and eggs. Available at: <http://www.ec.gc.ca/paom-itmb/>. Accessed May 2015.
- Environment Canada. 2014. General Nesting Periods of Migratory Birds in Canada. Available at: <https://www.ec.gc.ca/>. Accessed May 2015.
- Environment and Climate Change Canada (ECCC). Unpublished. Guidelines for deterrence and bird dispersal techniques used during pollution and non-pollution incidents in Canada. Appendix 1. Technical Overview of Recommended Hazing Devices.

[https://golderassociates.sharepoint.com/sites/26500g/6000\\_bird\\_support/migratory\\_bird\\_mitigation\\_plan\\_update/appendix\\_f\\_migratorybirdmitigationplan\\_may2019.docx](https://golderassociates.sharepoint.com/sites/26500g/6000_bird_support/migratory_bird_mitigation_plan_update/appendix_f_migratorybirdmitigationplan_may2019.docx)

# APPENDIX G

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## Viewshed Analysis

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## MEMORANDUM

**TO** Ryan Vanengen, Agnico Eagle Mines Ltd.

**DATE** July 14, 2017

**CC** Dionne Filiatrault, Jen Range, Damian Panayi

**FROM** Corey De La Mare, P.Biol.

**PROJECT No.** Doc 110-1658927.3200\_Rev1

### WHALE TAIL VIEWSHED ANALYSIS

#### Introduction

During the development and revisions of the Terrestrial Ecosystem Management Plan (TEMP) for the Whale Tail Project (the Project), which is an expansion of the existing Meadowbank Mine, several discussions revolved around caribou detection within and around the mine site, along the All Weather Access Road (AWAR) and the associated triggering mitigation actions. It became apparent that although caribou are regularly observed from roadside surveys along the existing Meadowbank AWAR, the sightability limit (i.e., maximum distance at which caribou could be observed based on topography) is largely unknown. This sightability distance is required to understand how much time Agnico Eagle Mines Limited (Agnico Eagle) may have to respond to caribou encountering the Project based on receiving GPS collar data and the lag time between receiving that data and caribou approaching the Project. The notion is that a greater distance of visible detection will allow for better caribou mitigation preparedness by Agnico Eagle.

The proposed Whale Tail Haul Road is a 65 km all weather haul road between the existing Meadowbank Operations (i.e., Vault Pit) and Whale Tail Pit. As part of the caribou monitoring component for this haul road, five height of land (HOL) survey locations are proposed in areas where caribou have been observed based on collar data, presence of caribou trails, caribou sign, and where topographic relief is greatest. The main methods for collecting caribou observation data are through roadside surveys along the existing Meadowbank AWAR and the proposed Whale Tail Haul Road, and at the five HOL survey locations.

To determine the extent of visibility from these locations, a viewshed analysis was completed within a GIS platform. The results of this memo are intended to validate the distance of visible detection using road surveys and HOLs will provide adequate caribou mitigation preparedness by Agnico Eagle.

#### Methods

The viewshed analysis shows the area where there is a line of sight based evaluation from elevations within the landscape, the observer height and the height of the target, in this case caribou. Visual aids, such as binoculars and spotting scopes, aid the observer to see at the extreme ends of the lines of sight so that caribou can be detected but the line of sight is not changed based on visual aids. The following assumptions were included in this viewshed analysis:

- An observer height of 2.0 m was added to each of the HOL locations, it is recognized that observers may not actually be 2.0 m but this is a standard observer measurement for viewshed analysis.
- A surface offset to simulate the height of caribou was added at 1.5 m.
- The observer height is set as: 2 m for the points and 1 m (default value) for the road; however, for the Whale Tail Haul Road the proposed road elevations based on the CAD profile was used.



## MEMORANDUM

The viewshed was required for the Regional Study Area; however, the availability of datasets was not consistent for the entire Regional Study Area in terms of data format and data resolution. Consequently, the datasets used and methods for harmonization are as follows:

- Road centerlines: Whale Tail Haul Road centerline and elevations (profile) provided by CAD, all weather road centerline generated semi-automatically using its footprint and linking its northern extremity to the Whale Tail Haul Road.
- 2016 HOL survey locations are only general and may have a high error range in their location precision, more specific coordinates will be acquired in 2017.
- Digital Elevation Model (DEM) for the haul road and the HOL survey points used a high resolution DEM (1 m). The DEM was down-sampled to 3 m resolution and merged with CDEM that has a 20 m resolution and then re-sampled back to 3 m resolution, but this is only to keep the 3 m precision where it exists and it does not make the CDEM more precise. Using a merging process avoiding edge effects and creates a smooth transition from one DEM source to the other.
- The high resolution DEM only covers the haul road (approximately 500 m on each side) and a large portion of the Whale Tail Pit and development area.
- For the AWAR, no high resolution DEM coverage exists, consequently we only used the CDEM (20 m resolution) for this.

The viewshed analysis was run on an ESRI ArcGIS 10.4.1 platform using the 3D analyst tool – Viewshed. The visibility analysis does not take into account any potential vegetation or any other obstructions (natural/human) that are not part of the bare ground. A viewshed was developed for the existing Meadowbank AWAR, the proposed Whale Tail Haul Road, and the five HOL survey locations.

### Results

The results of the viewshed analysis can be found in Figures 1 to 3, which each show the viewshed from the five HOL survey locations (Figure 1), the proposed Whale Tail Haul Road (Figure 2), and the existing Meadowbank AWAR (Figure 3). All three figures illustrate that with the naked eye, the sightlines from all three sources (HOL, Whale Tail Haul Road, AWAR) range from less than 1 km to greater than 8 km with a range of 3 to 5 km in several different directions from each location. When HOL locations are combined with the Whale Tail Haul Road as a point of observation, the visibility in general for all locations is around 5 km, with several vantage points of greater than 5 km.

A summary of field confirmation details regarding the viewscape analysis at HOL locations includes the following (M. Young, Dougan Associates, 2017, pers. comm.):



## MEMORANDUM

HOL Survey Point	Average Maximum Observable Distance	Comments
1	9.2 km	This site was slightly relocated to improve the visibility of the road. Small blind spots (50 to 100 m wide) facing S and NW
2	7.2 km	Small blind spots facing S, SW, and W
3	9.1 km	Small blind spots facing S, SE, NW, and E
4	8.9 km	Lars Qaqqaq identified this location as a movement corridor for Barren Ground Caribou Small blind spots facing SE, W
5	5.5 km	Road at this section is not currently built. Small blind spots facing SW, NW, NE. SW, and NE blinds spots to be opened up when eskers removed for road construction.

The viewshed analysis is an important component of the overall monitoring program as it provides direction for monitoring locations that best capture caribou movements through the Project area during the spring and fall migration periods. Consequently, the survey locations chosen based on the results of the viewshed analysis will be continually reviewed and updated with the Terrestrial Advisory Group. Additional tasks remaining prior to construction of the Whale Tail Pit and Haul Road include the following:

- Field crews are identifying ideal HOL survey locations and maximum line of sight distances during the summer of 2017, some of this information is incorporated in the table above and some will be compiled into this document at the end of the field season.
- Additional HOL survey location to be added on the west side of the Whale Tail Pit to capture areas not currently covered by survey locations as revealed in the viewshed analysis.
- Selected points along the road may fill in monitoring gaps in the viewshed, these sites have not yet been selected.
- Determine the amount of the landscape covered by height of land survey locations and roadside surveys within an area that buffers the height of land locations by 4 km and the road by 1.5 km to determine if there is sufficient monitoring coverage from the existing surveys.



## MEMORANDUM

### Closure

We trust this meets your needs, if you have any questions or concerns, feel free to contact the undersigned.

Regards,

**GOLDER ASSOCIATES LTD.**

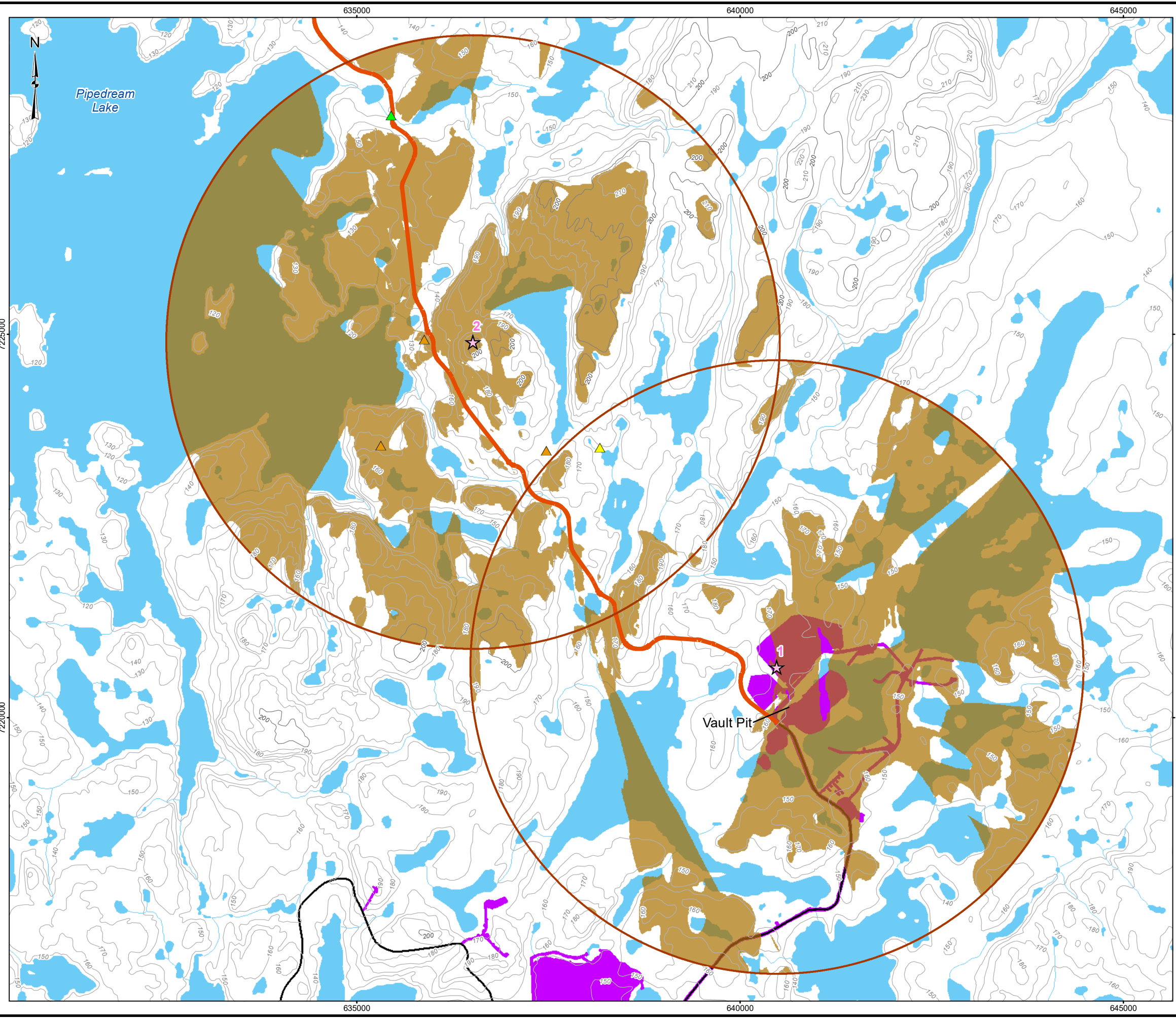
Corey De La Mare, P.Biol.  
Principal, Senior Wildlife Ecologist

### Citation

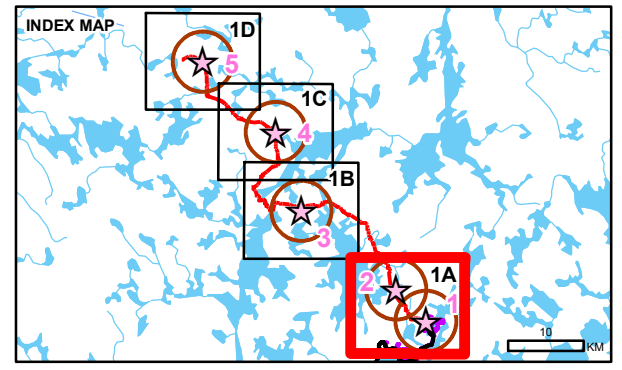
Young, M.Y. 2017. Landscape Architect, Ecologist. Dougan & Associates – Ecological Consulting & Design, Guelph, ON. E-mail with R. Vanengen (Agnico Eagle). July 2017.

[https://capws.golder.com/sites/1658927RegulatoryAffairs/p3100\\_TEMP\\_and\\_Workshops/TEMP/02\\_Appendices/Appendix H\\_Viewshed/Appendix H\\_Viewshed\\_Analysis\\_June5.docx](https://capws.golder.com/sites/1658927RegulatoryAffairs/p3100_TEMP_and_Workshops/TEMP/02_Appendices/Appendix H_Viewshed/Appendix H_Viewshed_Analysis_June5.docx)

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- ☆ 2016 HEIGHT OF LAND SURVEY POINT (D&A, JULY 2016)
  - BARREN-GROUND CARIBOU<sup>2</sup>**
    - ▲ SIGN
    - ▲ OBSERVATION
    - ▲ CARIBOU TRAIL
  - PROJECT DATA AND INFRASTRUCTURE**
    - HAUL ROAD
    - ALL WEATHER ROAD
    - WHALE TAIL PIT
    - MEADOWBANK OPERATION AND INFRASTRUCTURE
    - VISIBILITY ANALYSIS AREA (4 km)
    - AREA VISIBLE FROM PROPOSED HAUL ROAD
  - BASE DATA**
    - 10 m CONTOUR
    - 100 m CONTOUR
    - WATERCOURSE
    - WATERBODY



- REFERENCE**
1. HAUL ROAD OBTAINED FROM AGNICO EAGLE MINES LIMITED. 2015-10-14 FROM 6103-117-230-200\_R0.dwg
  2. 2015/16 BARREN-GROUND CARIBOU OBSERVATIONS FROM THE GROUND RECONNAISSANCE SURVEYS, WATERBIRD NEST SURVEYS, BREEDING BIRD ROAD TRANSECT SURVEYS & HEIGHT-OF-LAND SURVEYS.
  3. CONTOURS, WATERCOURSE AND WATERBODY DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
  4. KEY MAP DATA OBTAINED FROM ESRI.
- DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14
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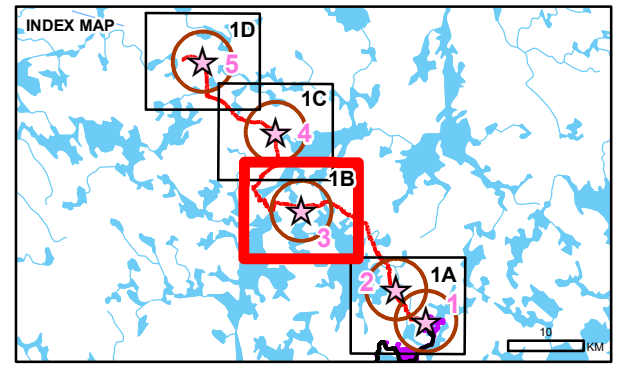
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			<b>FIGURE 1A</b>



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    - 100 m CONTOUR
    - WATERCOURSE
    - WATERBODY



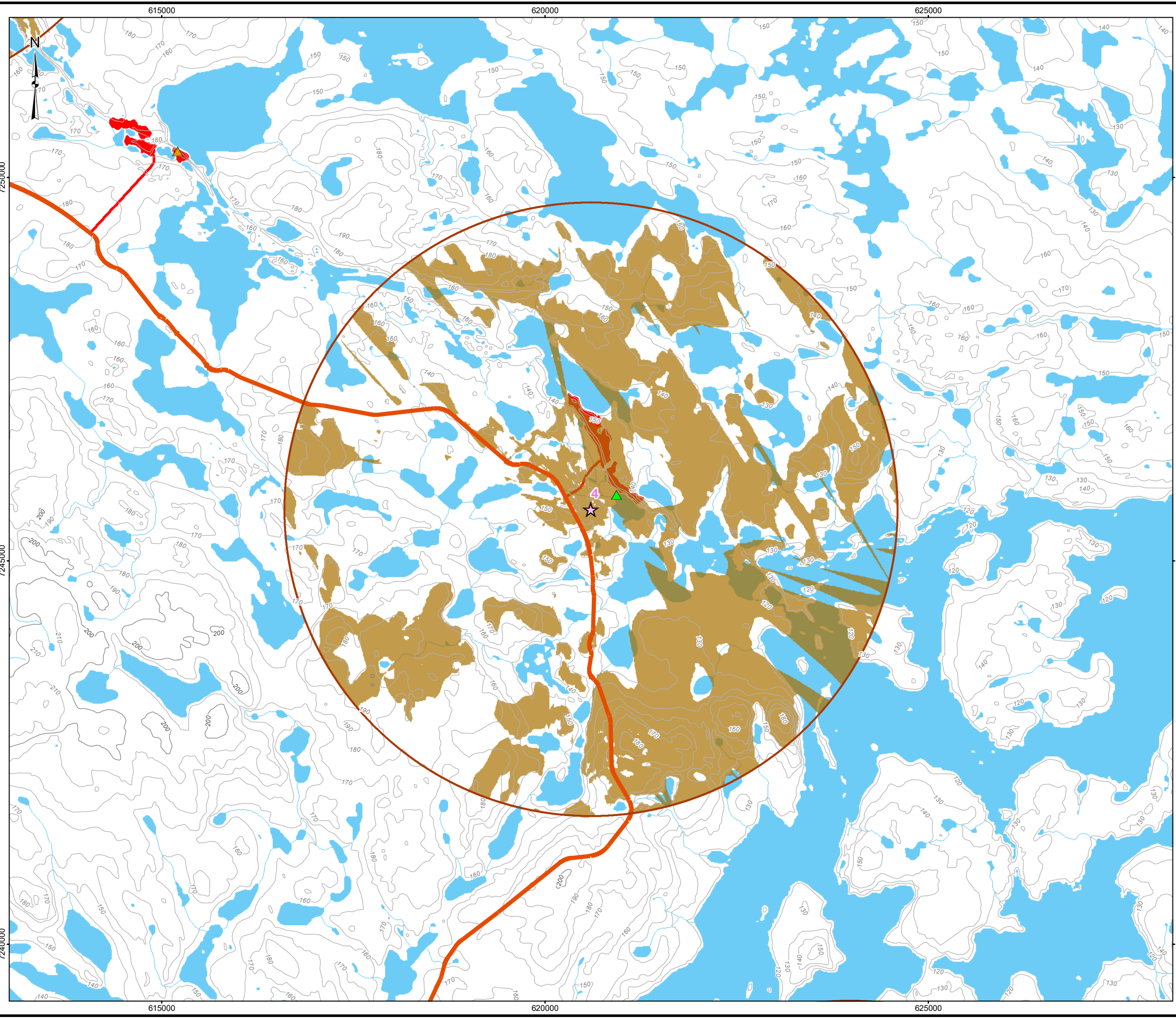
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4. KEY MAP DATA OBTAINED FROM ESRI.

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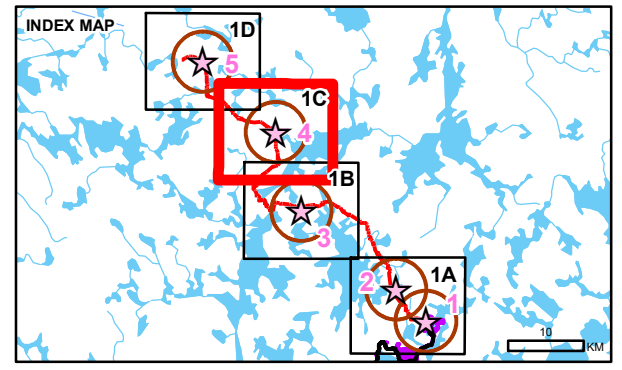
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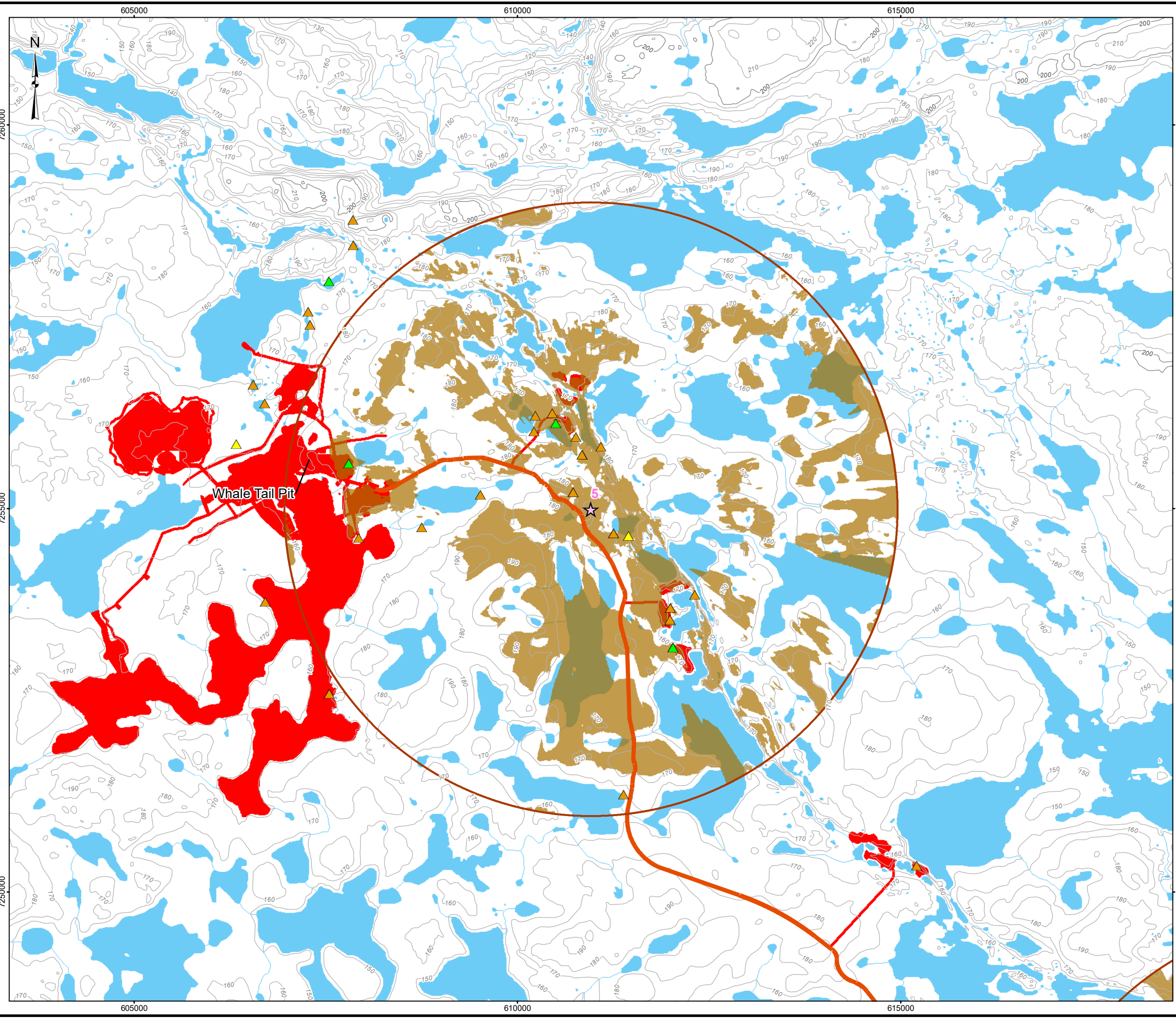
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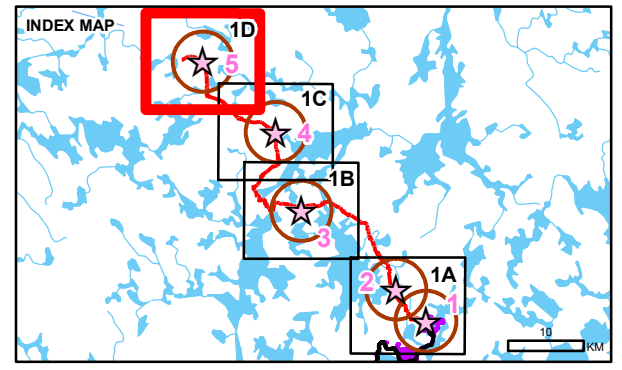
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			<b>FIGURE 1C</b>

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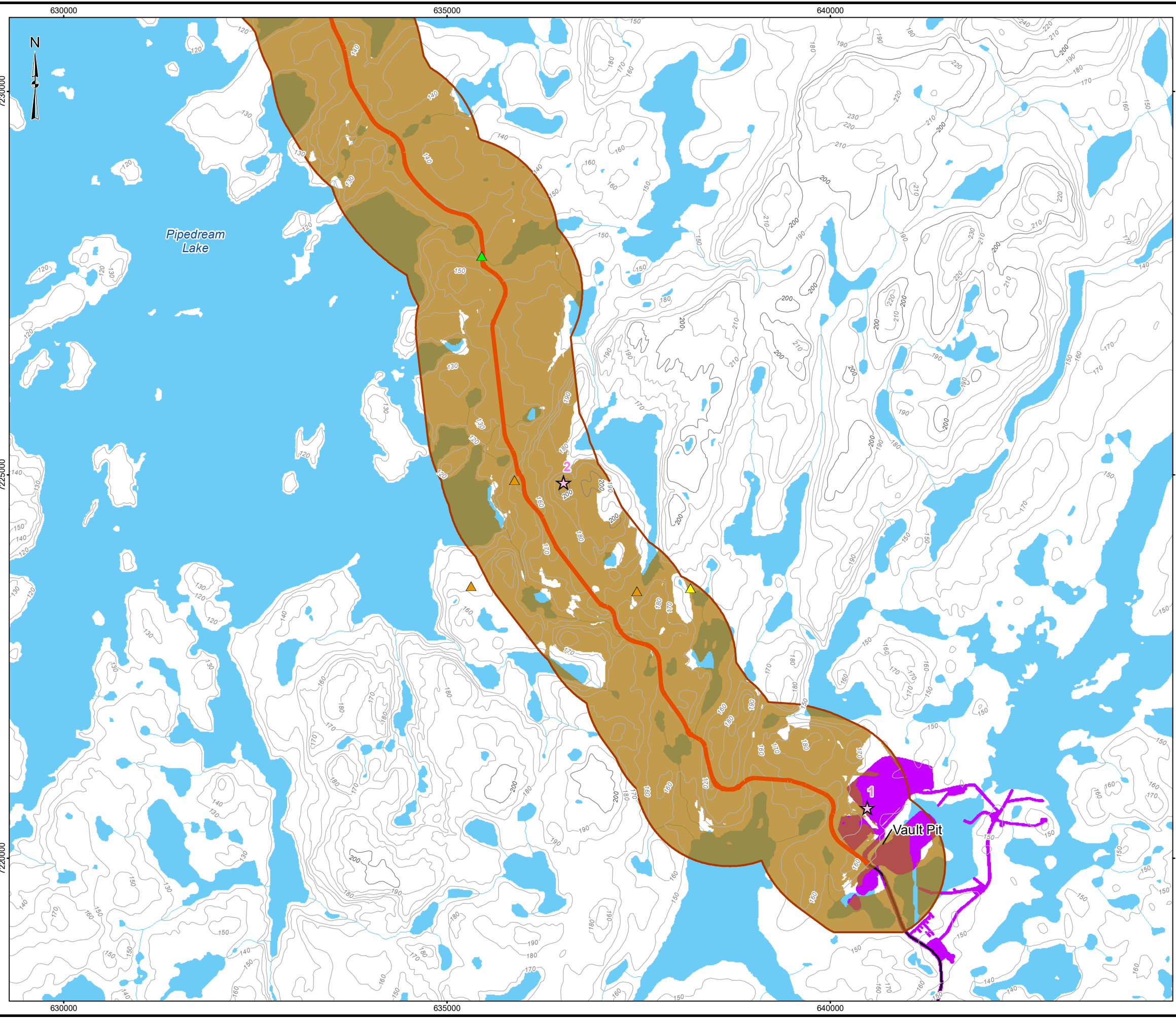
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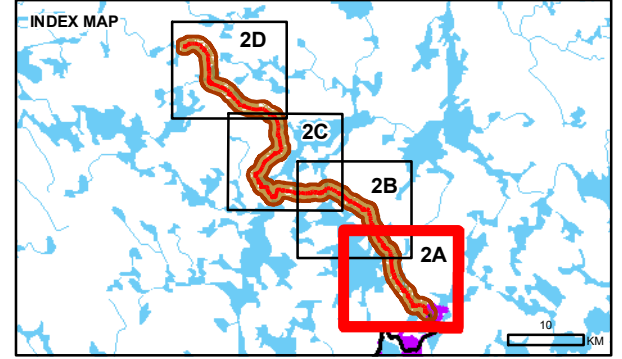
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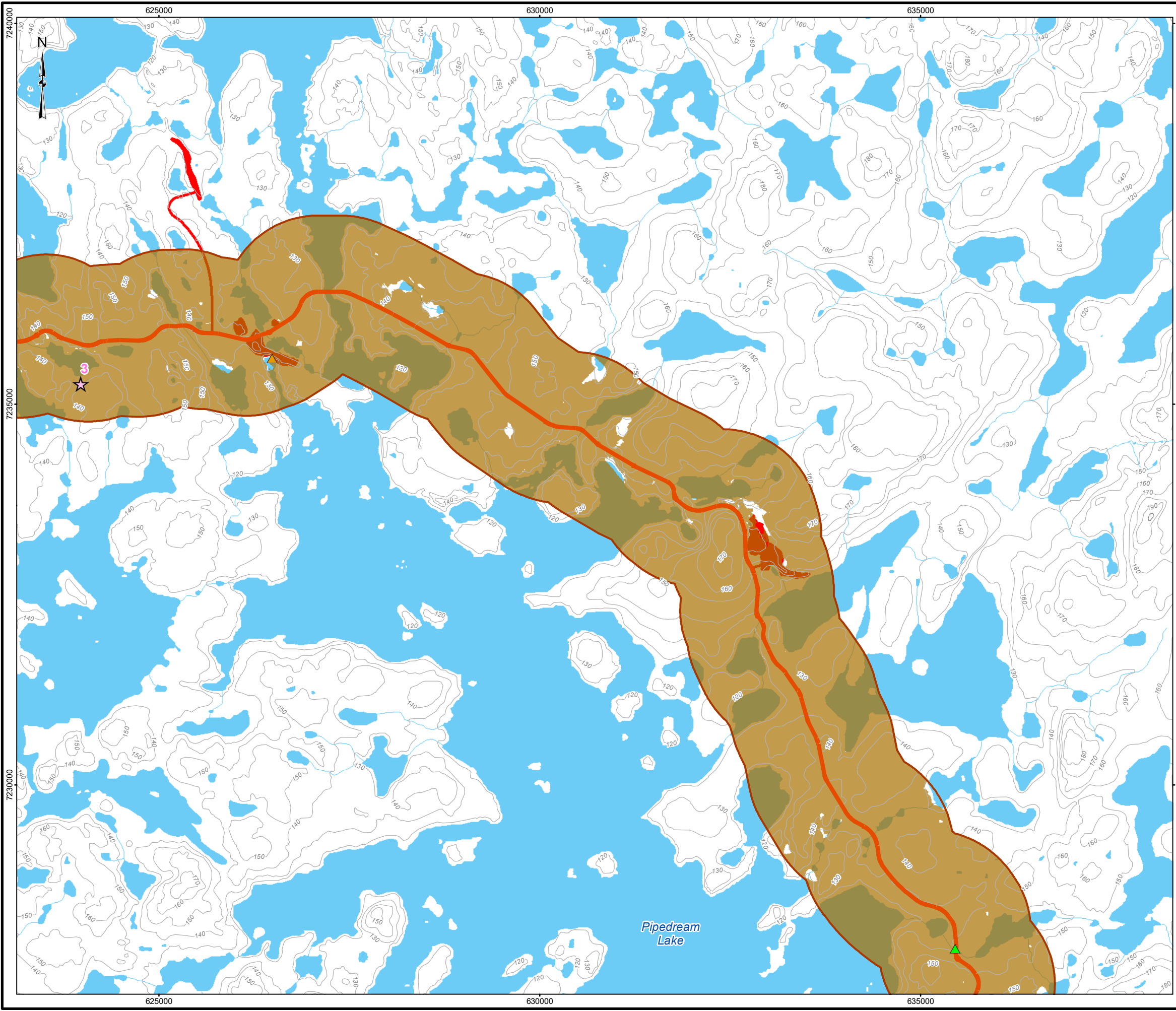
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    - 100 m CONTOUR
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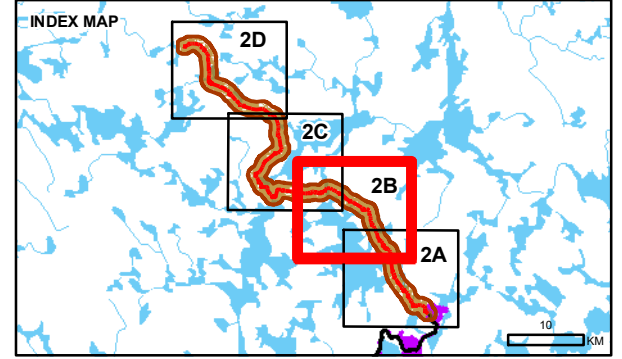
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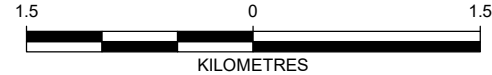


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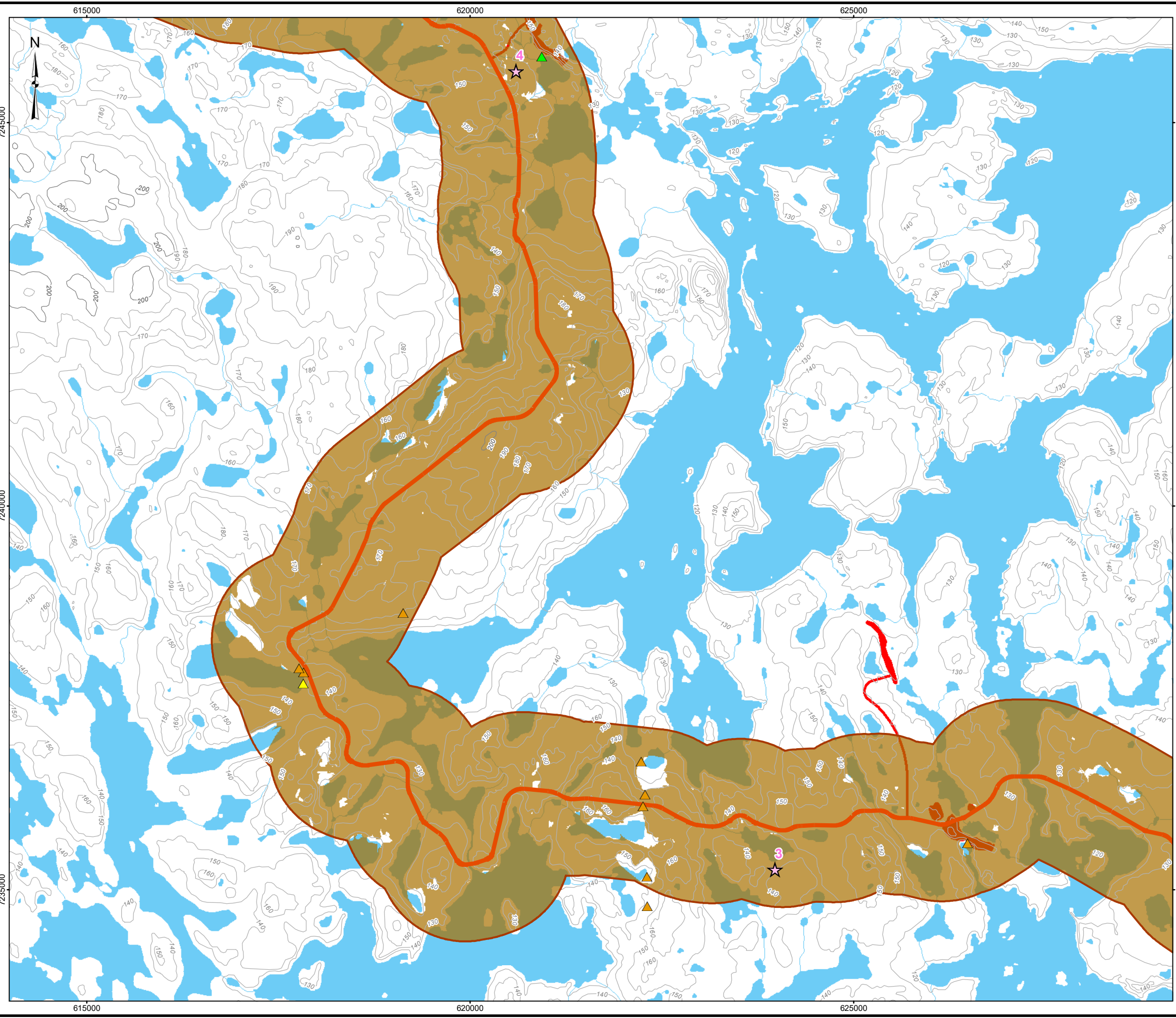


- REFERENCE**
1. HAUL ROAD OBTAINED FROM AGNICO EAGLE MINES LIMITED. 2015-10-14 FROM 6103-117-230-200\_R0.dwg
  2. 2015/16 BARREN-GROUND CARIBOU OBSERVATIONS FROM THE GROUND RECONNAISSANCE SURVEYS, WATERBIRD NEST SURVEYS, BREEDING BIRD ROAD TRANSECT SURVEYS & HEIGHT-OF-LAND SURVEYS.
  3. CONTOURS, WATERCOURSE AND WATERBODY DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
  4. KEY MAP DATA OBTAINED FROM ESRI.
- DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14

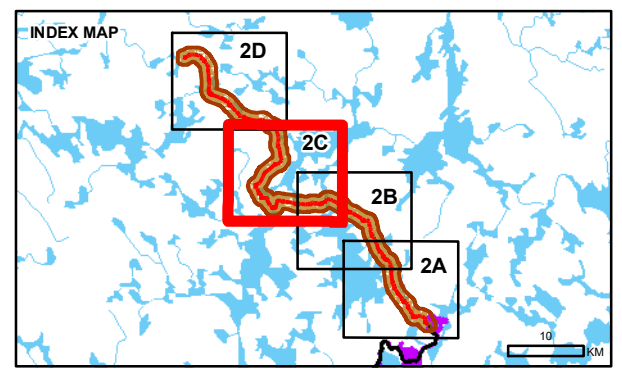


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	<b>VIEWSHED FROM HAUL ROAD</b>			
	PROJECT	1658927	FILE No.	
	DESIGN	CDM	3 May 2017	SCALE AS SHOWN
	GIS	SB	12 May 2017	REV. 0
	CHECK	JR	14 Jul. 2017	<b>FIGURE 2B</b>
REVIEW	CDM	14 Jul. 2017		

Y:\burnaby\CAD-GIS\Client\Agnico\_Eagle\_Mines\_Ltd\Whale\_Tail\99\_PROJECTS\1658927\_RegulatorySupport\02\_PRODUCTION\3100\MXD\Report\1658927\_FIG\_2\_Viewshed\_proposed\_haul\_road\_20181214.mxd



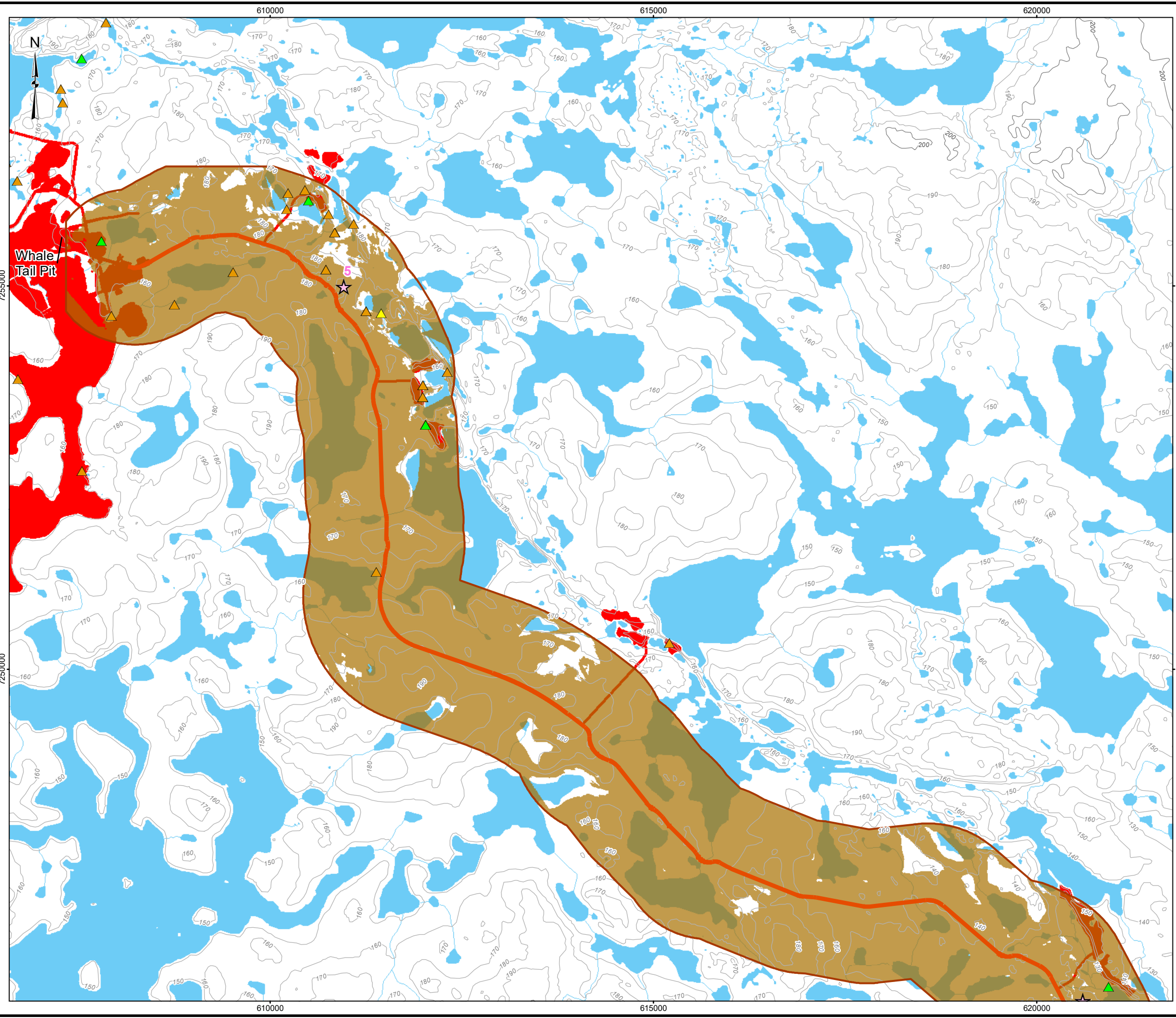
- LEGEND**
- ★ 2016 HEIGHT OF LAND SURVEY POINT (D&A, JULY 2016)
  - BARREN-GROUND CARIBOU<sup>2</sup>**
    - ▲ SIGN
    - ▲ OBSERVATION
    - ▲ CARIBOU TRAIL
  - PROJECT DATA AND INFRASTRUCTURE**
    - HAUL ROAD
    - WHALE TAIL PIT
    - VISIBILITY ANALYSIS AREA (1 km)
    - AREA VISIBLE FROM PROPOSED HAUL ROAD
  - BASE DATA**
    - 10 m CONTOUR
    - 100 m CONTOUR
    - WATERCOURSE
    - WATERBODY



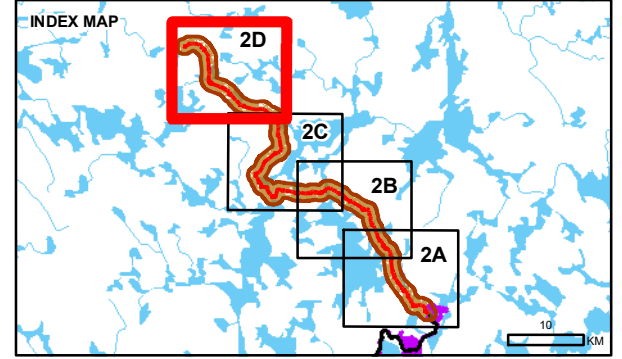
- REFERENCE**
1. HAUL ROAD OBTAINED FROM AGNICO EAGLE MINES LIMITED. 2015-10-14 FROM 6103-117-230-200\_R0.dwg
  2. 2015/16 BARREN-GROUND CARIBOU OBSERVATIONS FROM THE GROUND RECONNAISSANCE SURVEYS, WATERBIRD NEST SURVEYS, BREEDING BIRD ROAD TRANSECT SURVEYS & HEIGHT-OF-LAND SURVEYS.
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  4. KEY MAP DATA OBTAINED FROM ESRI.
- DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14
- 

	<b>AGNICO EAGLE MINES LIMITED: MEADOWBANK DIVISION WHALE TAIL PIT PROJECT</b>			
	<b>VIEWSHED FROM HAUL ROAD</b>			
	PROJECT	1658927	FILE No.	
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	GIS	SB	12 May 2017	REV. 0
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REVIEW	CDM	14 Jul. 2017		

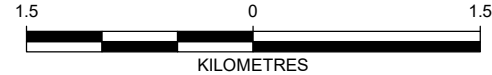
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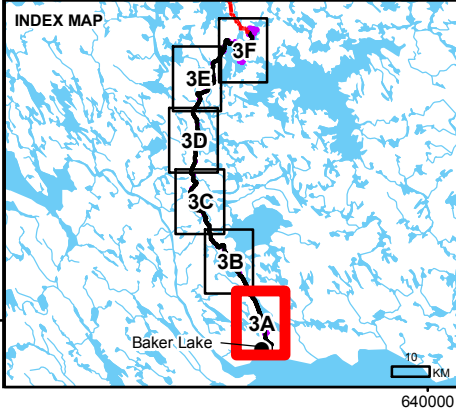
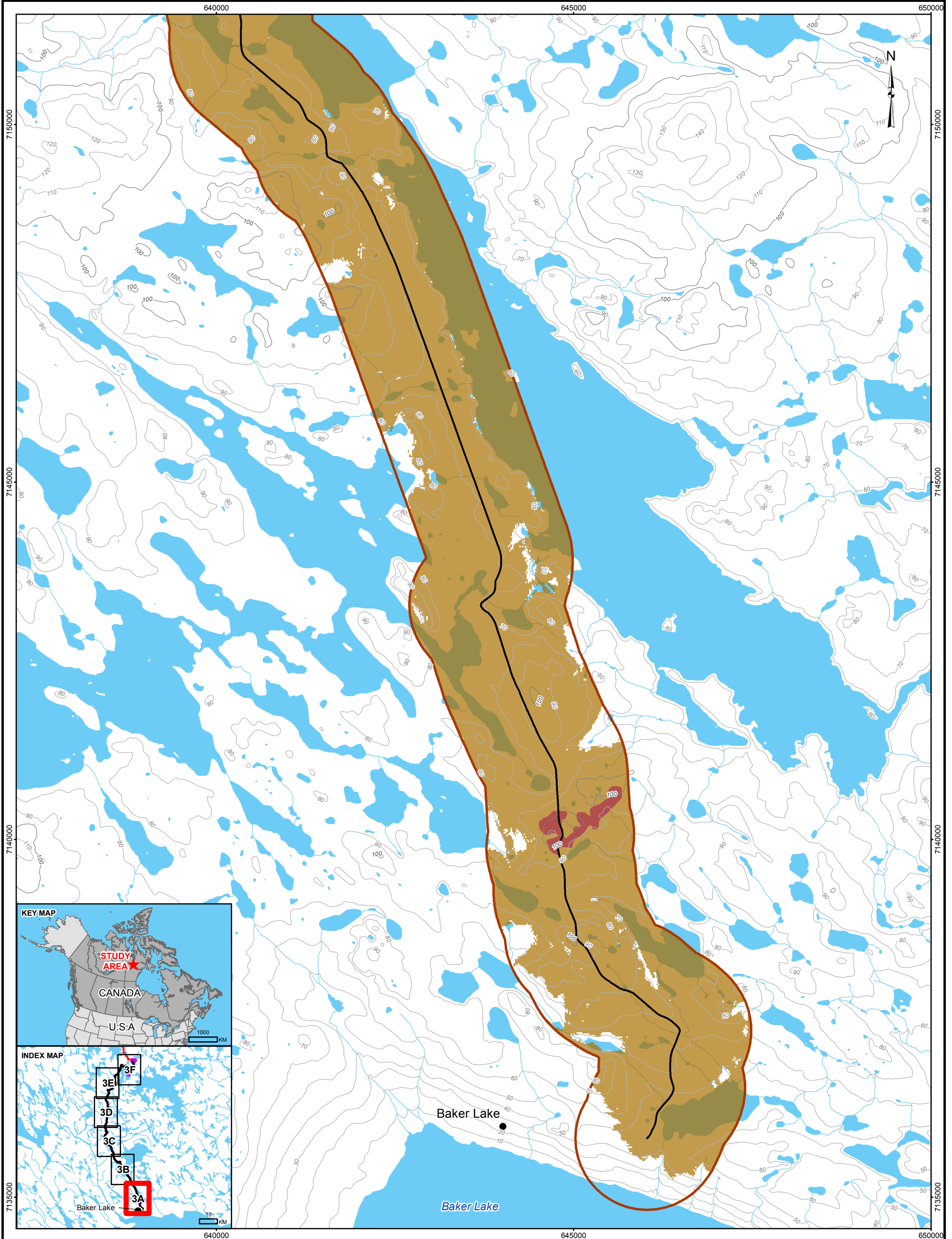
- LEGEND**
- ☆ 2016 HEIGHT OF LAND SURVEY POINT (D&A, JULY 2016)
  - BARREN-GROUND CARIBOU<sup>2</sup>**
    - ▲ SIGN
    - ▲ OBSERVATION
    - ▲ CARIBOU TRAIL
  - PROJECT DATA AND INFRASTRUCTURE**
    - HAUL ROAD
    - WHALE TAIL PIT
    - VISIBILITY ANALYSIS AREA (1 km)
    - AREA VISIBLE FROM PROPOSED HAUL ROAD
  - BASE DATA**
    - 10 m CONTOUR
    - 100 m CONTOUR
    - WATERCOURSE
    - WATERBODY



- REFERENCE**
1. HAUL ROAD OBTAINED FROM AGNICO EAGLE MINES LIMITED. 2015-10-14 FROM 6103-117-230-200\_R0.dwg
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  4. KEY MAP DATA OBTAINED FROM ESRI.
- DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14



PROJECT	AGNICO EAGLE				AGNICO EAGLE MINES LIMITED: MEADOWBANK DIVISION WHALE TAIL PIT PROJECT			
	TITLE							
<b>VIEWSHED FROM HAUL ROAD</b>								
	PROJECT	1658927	FILE No.					
	DESIGN	CDM	3 May 2017	SCALE AS SHOWN	REV.	0		
	GIS	SB	12 May 2017					
	CHECK	JR	14 Jul. 2017					
	REVIEW	CDM	14 Jul. 2017	<b>FIGURE 2D</b>				



**LEGEND**

<b>PROJECT DATA AND INFRASTRUCTURE</b>	<b>BASE DATA</b>
— ALL WEATHER ROAD	— 10 m CONTOUR
MEADOWBANK OPERATION AND INFRASTRUCTURE	— 100 m CONTOUR
VISIBILITY ANALYSIS AREA	— WATERCOURSE
AREA VISIBLE FROM ALL WEATHER ROAD	— WATERBODY

**REFERENCE**

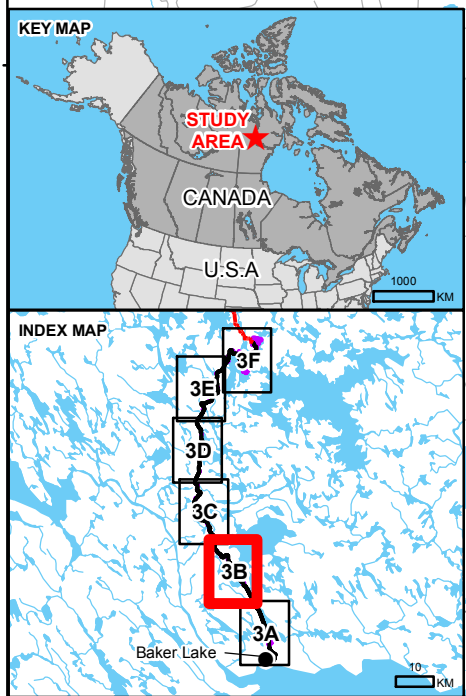
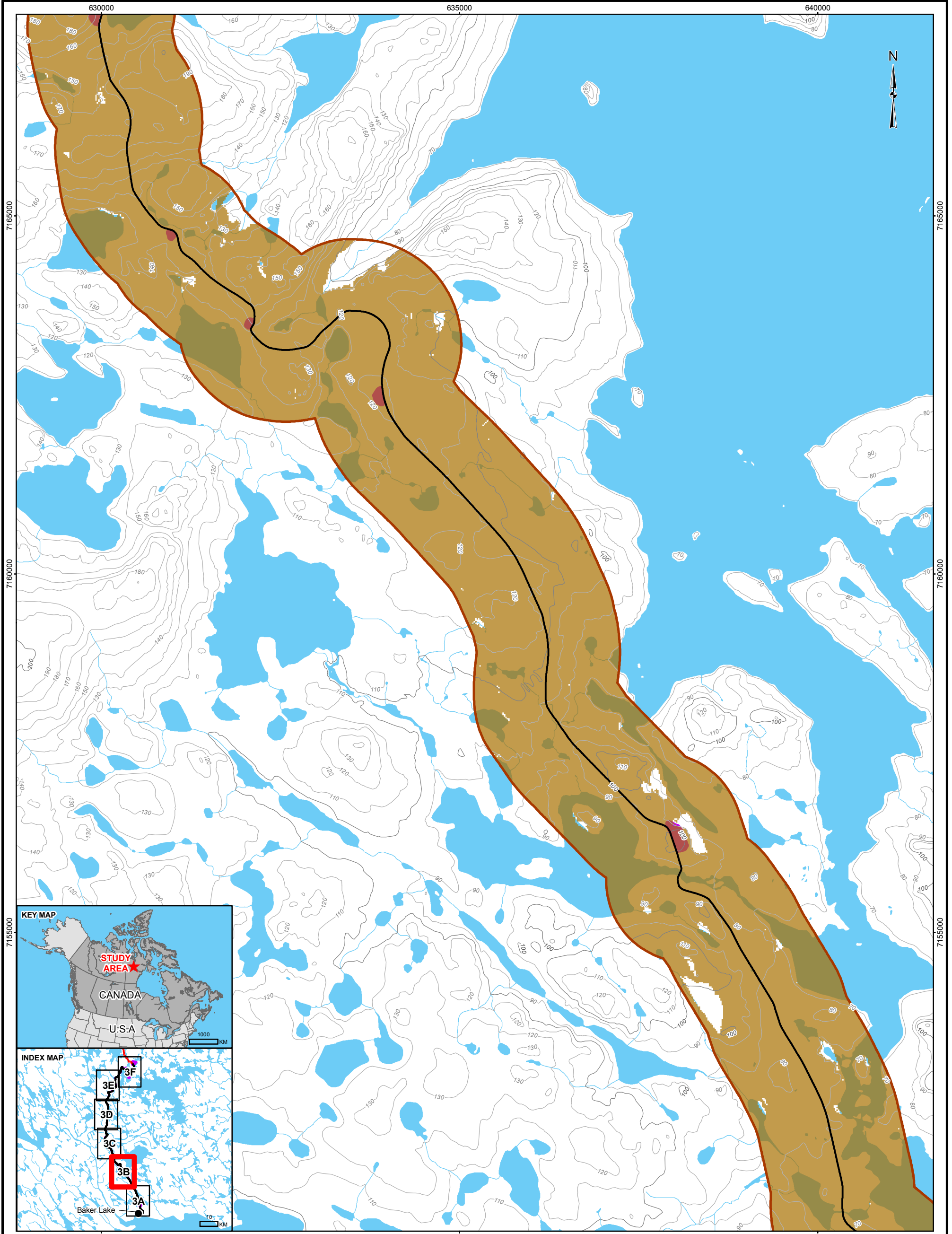
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- INSET MAP DATA OBTAINED FROM ESRI.

DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14



	<b>AGNICO EAGLE MINES LIMITED: MEADOWBANK DIVISION WHALE TAIL PIT PROJECT</b>		
	<b>VIEWSHED FROM ALL WEATHER ROAD</b>		
	PROJECT	1658927	FILE No.
	DESIGN	CDM	3 May 2017
	GIS	SB	12 May 2017
	CHECK	JR	14 Jul. 2017
	REVIEW	CDM	14 Jul. 2017
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			<b>FIGURE 3A</b>





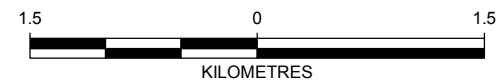
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**PROJECT DATA AND INFRASTRUCTURE**

- ALL WEATHER ROAD
- MEADOWBANK OPERATION AND INFRASTRUCTURE
- VISIBILITY ANALYSIS AREA
- AREA VISIBLE FROM ALL WEATHER ROAD

**BASE DATA**

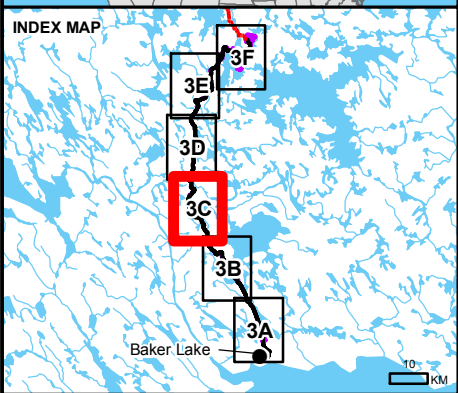
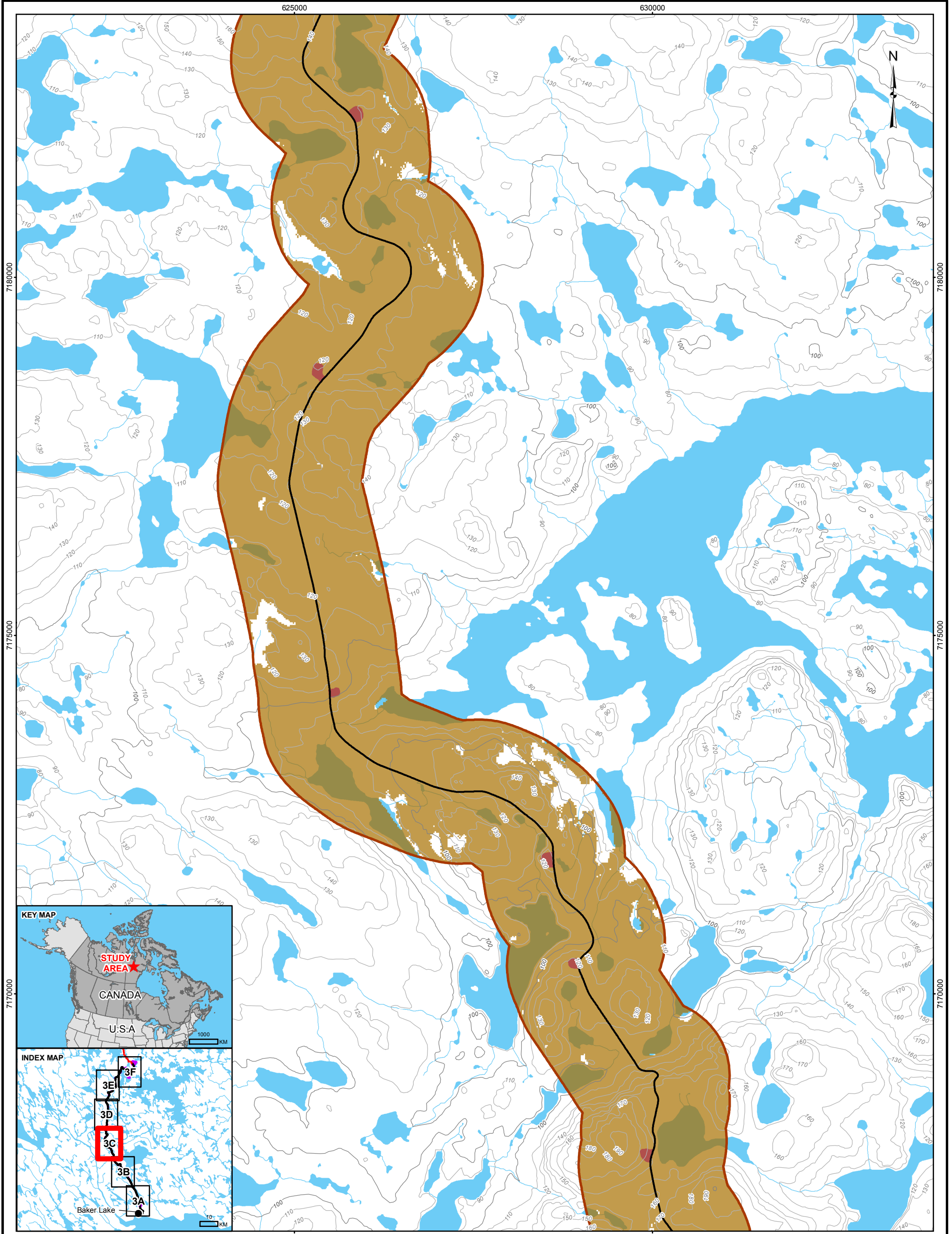
- 10 m CONTOUR
- 100 m CONTOUR
- WATERCOURSE
- WATERBODY



**REFERENCE**

1. HAUL ROAD OBTAINED FROM AGNICO EAGLE MINES LIMITED. 2015-10-14 FROM 6103-117-230-200\_R0.dwg
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  4. INSET MAP DATA OBTAINED FROM ESRI.
- DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14

		<b>AGNICO EAGLE MINES LIMITED: MEADOWBANK DIVISION WHALE TAIL PIT PROJECT</b>	
<b>VIEWSHED FROM ALL WEATHER ROAD</b>			
	PROJECT	1658927	FILE No.
	DESIGN	CDM	3 May 2017
	GIS	SB	12 May 2017
	CHECK	JR	14 Jul. 2017
REVIEW	CDM	14 Jul. 2017	<b>FIGURE 3B</b>



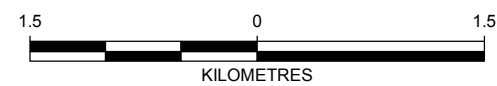
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**PROJECT DATA AND INFRASTRUCTURE**

- ALL WEATHER ROAD
- MEADOWBANK OPERATION AND INFRASTRUCTURE
- VISIBILITY ANALYSIS AREA
- AREA VISIBLE FROM ALL WEATHER ROAD

**BASE DATA**

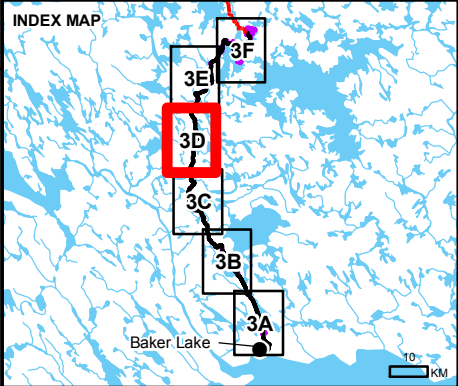
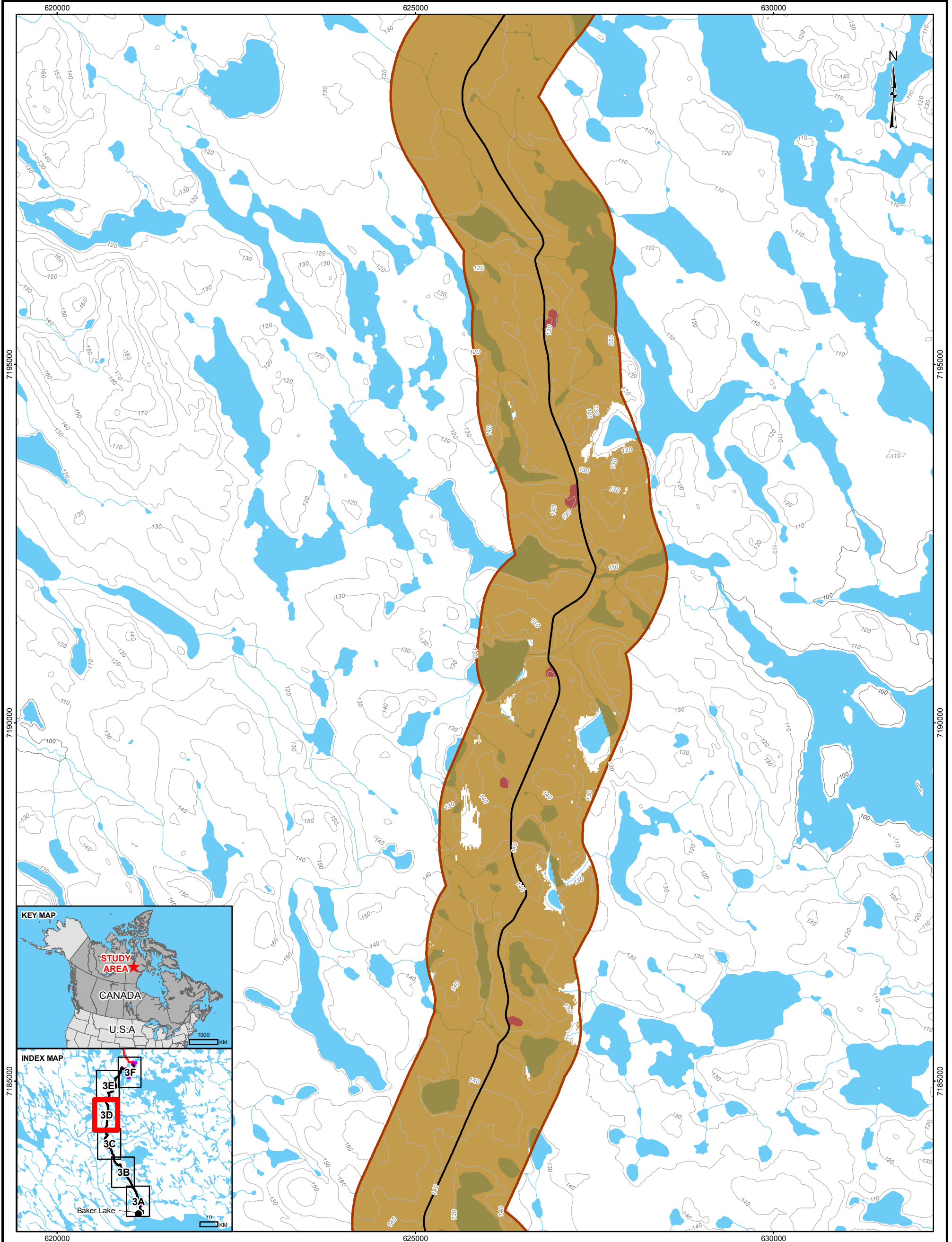
- 10 m CONTOUR
- 100 m CONTOUR
- WATERCOURSE
- WATERBODY



**REFERENCE**

1. HAUL ROAD OBTAINED FROM AGNICO EAGLE MINES LIMITED. 2015-10-14 FROM 6103-117-230-200\_R0.dwg
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- DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14

	<b>AGNICO EAGLE MINES LIMITED: MEADOWBANK DIVISION WHALE TAIL PIT PROJECT</b>			
	<b>VIEWSHED FROM ALL WEATHER ROAD</b>			
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	DESIGN	CDM	3 May 2017	SCALE AS SHOWN
	GIS	SB	12 May 2017	REV. 0
	CHECK	JR	14 Jul. 2017	
	REVIEW	CDM	14 Jul. 2017	
<b>FIGURE 3C</b>				



**LEGEND**

**PROJECT DATA AND INFRASTRUCTURE**

- ALL WEATHER ROAD
- MEADOWBANK OPERATION AND INFRASTRUCTURE
- VISIBILITY ANALYSIS AREA
- AREA VISIBLE FROM ALL WEATHER ROAD

**BASE DATA**

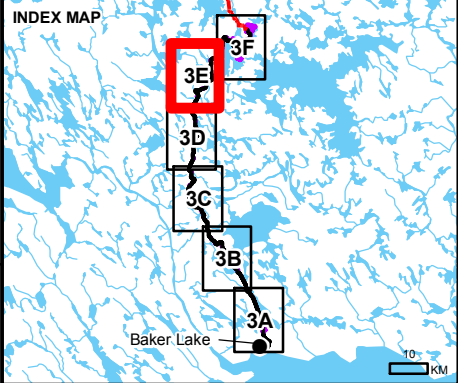
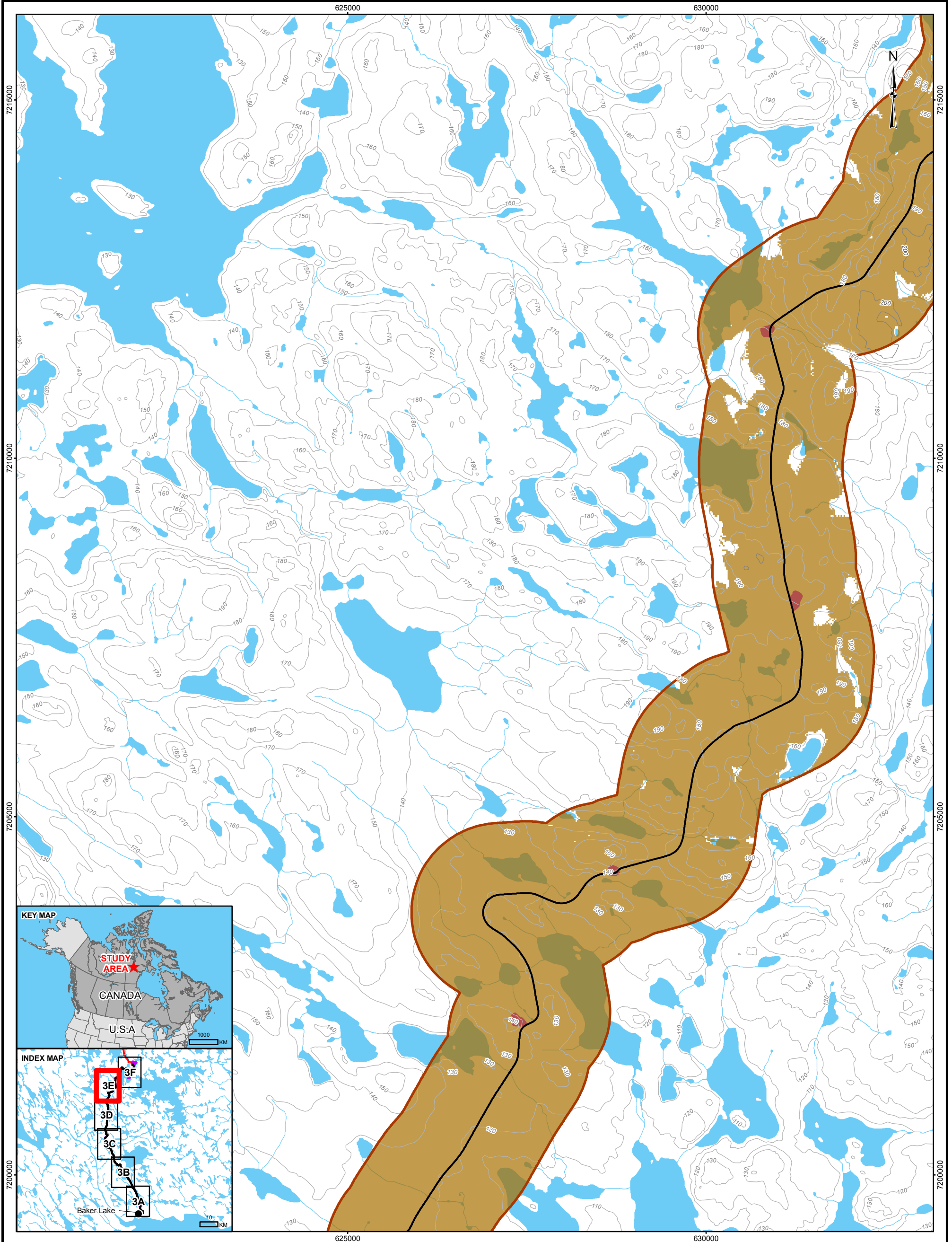
- 10 m CONTOUR
- 100 m CONTOUR
- WATERCOURSE
- WATERBODY

**REFERENCE**

1. HAUL ROAD OBTAINED FROM AGNICO EAGLE MINES LIMITED. 2015-10-14 FROM 6103-117-230-200\_R0.dwg
  2. 2015/16 BARREN-GROUND CARIBOU OBSERVATIONS FROM THE GROUND RECONNAISSANCE SURVEYS, WATERBIRD NEST SURVEYS, BREEDING BIRD ROAD TRANSECT SURVEYS & HEIGHT-OF-LAND SURVEYS.
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- DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14



	<p><b>AGNICO EAGLE MINES LIMITED:</b> MEADOWBANK DIVISION WHALE TAIL PIT PROJECT</p>																									
<p><b>VIEWSHED FROM ALL WEATHER ROAD</b></p>																										
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PROJECT	1658927	FILE No.																								
DESIGN	CDM	3 May 2017	SCALE AS SHOWN	REV. 0																						
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REVIEW	CDM	14 Jul. 2017																								



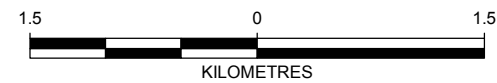
**LEGEND**

**PROJECT DATA AND INFRASTRUCTURE**

- ALL WEATHER ROAD
- MEADOWBANK OPERATION AND INFRASTRUCTURE
- VISIBILITY ANALYSIS AREA
- AREA VISIBLE FROM ALL WEATHER ROAD

**BASE DATA**

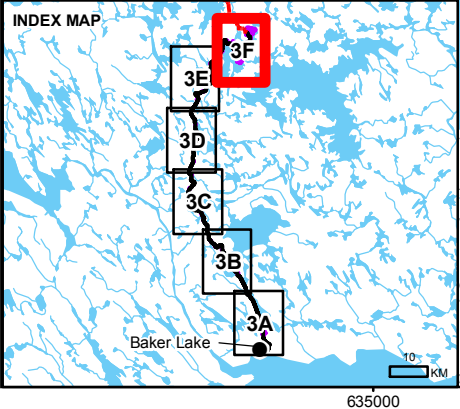
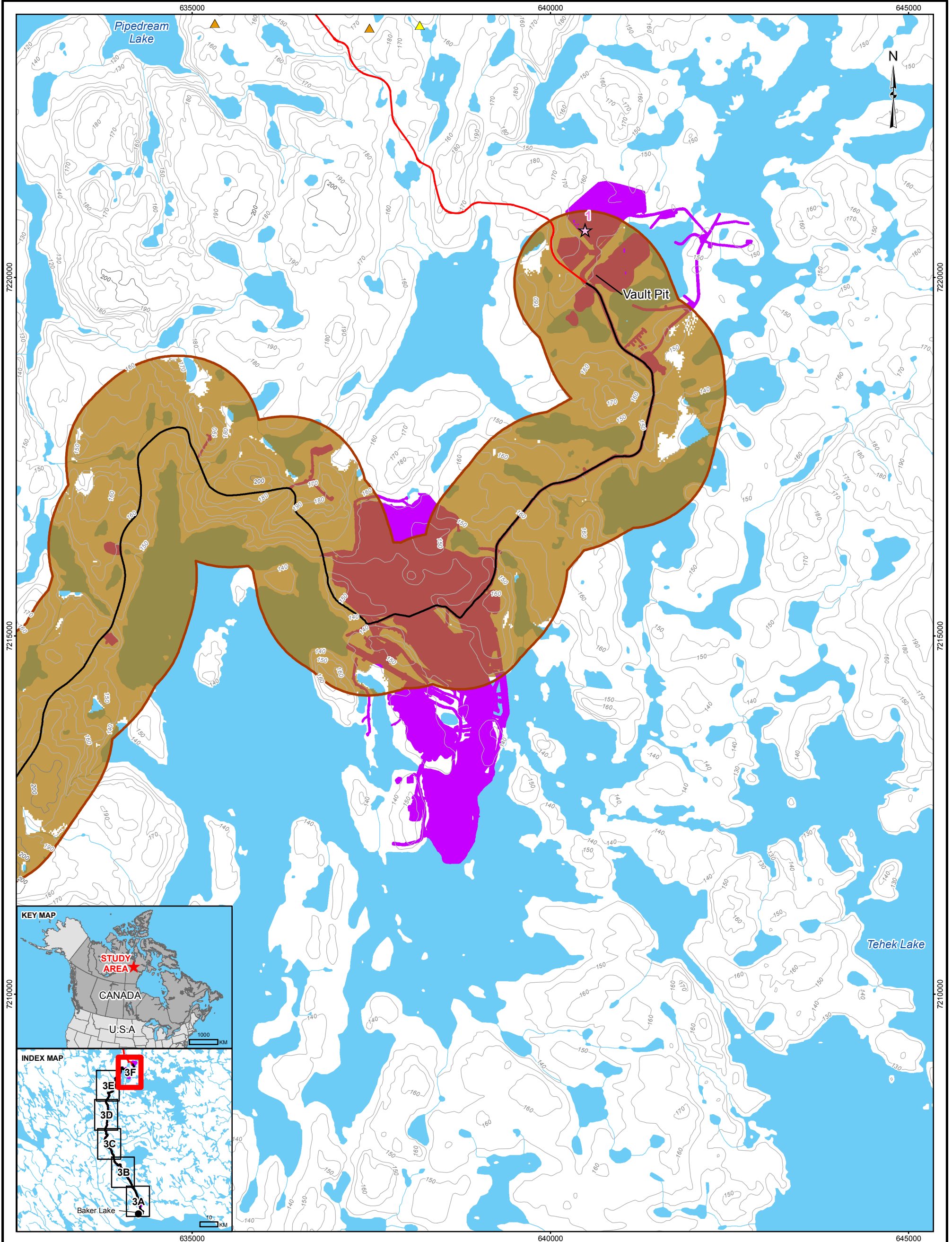
- 10 m CONTOUR
- 100 m CONTOUR
- WATERCOURSE
- WATERBODY



**REFERENCE**

1. HAUL ROAD OBTAINED FROM AGNICO EAGLE MINES LIMITED. 2015-10-14 FROM 6103-117-230-200\_R0.dwg
  2. 2015/16 BARREN-GROUND CARIBOU OBSERVATIONS FROM THE GROUND RECONNAISSANCE SURVEYS, WATERBIRD NEST SURVEYS, BREEDING BIRD ROAD TRANSECT SURVEYS & HEIGHT-OF-LAND SURVEYS.
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  4. INSET MAP DATA OBTAINED FROM ESRI.
- DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14

		<b>AGNICO EAGLE MINES LIMITED: MEADOWBANK DIVISION WHALE TAIL PIT PROJECT</b>	
<b>VIEWSHED FROM ALL WEATHER ROAD</b>			
		PROJECT 1658927 DESIGN CDM 3 May 2017 GIS SB 12 May 2017 CHECK JR 14 Jul. 2017 REVIEW CDM 14 Jul. 2017	FILE No. SCALE AS SHOWN REV. 0
		<b>FIGURE 3E</b>	

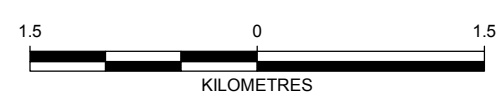


**LEGEND**

- |  |   |   |
|--|---|---|
| <ul style="list-style-type: none"> <li>★ 2016 HEIGHT OF LAND SURVEY POINT (D&amp;A, JULY 2016)</li> <li><b>BARREN-GROUND CARIBOU<sup>2</sup></b></li> <li>▲ SIGN</li> <li>▲ CARIBOU TRAIL</li> </ul> | <ul style="list-style-type: none"> <li><b>PROJECT DATA AND INFRASTRUCTURE</b></li> <li>— ALL WEATHER ROAD</li> <li>— PROPOSED HAUL ROAD</li> <li>— MEADOWBANK OPERATION AND INFRASTRUCTURE</li> <li>— VISIBILITY ANALYSIS AREA</li> <li>— AREA VISIBLE FROM ALL WEATHER ROAD</li> </ul> | <ul style="list-style-type: none"> <li><b>BASE DATA</b></li> <li>— 10 m CONTOUR</li> <li>— 100 m CONTOUR</li> <li>— WATERCOURSE</li> <li>— WATERBODY</li> </ul> |
|--|---|---|

**REFERENCE**

1. HAUL ROAD OBTAINED FROM AGNICO EAGLE MINES LIMITED. 2015-10-14 FROM 6103-117-230-200\_R0.dwg
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	<b>AGNICO EAGLE MINES LIMITED: MEADOWBANK DIVISION WHALE TAIL PIT PROJECT</b>		
	<b>VIEWSHED FROM ALL WEATHER ROAD</b>		
	PROJECT	1658927	FILE No.
	DESIGN	CDM	3 May 2017
	GIS	SB	12 May 2017
	CHECK	JR	14 Jul. 2017
	REVIEW	CDM	14 Jul. 2017
<b>SCALE AS SHOWN</b>			<b>REV. 0</b>
<b>FIGURE 3F</b>			

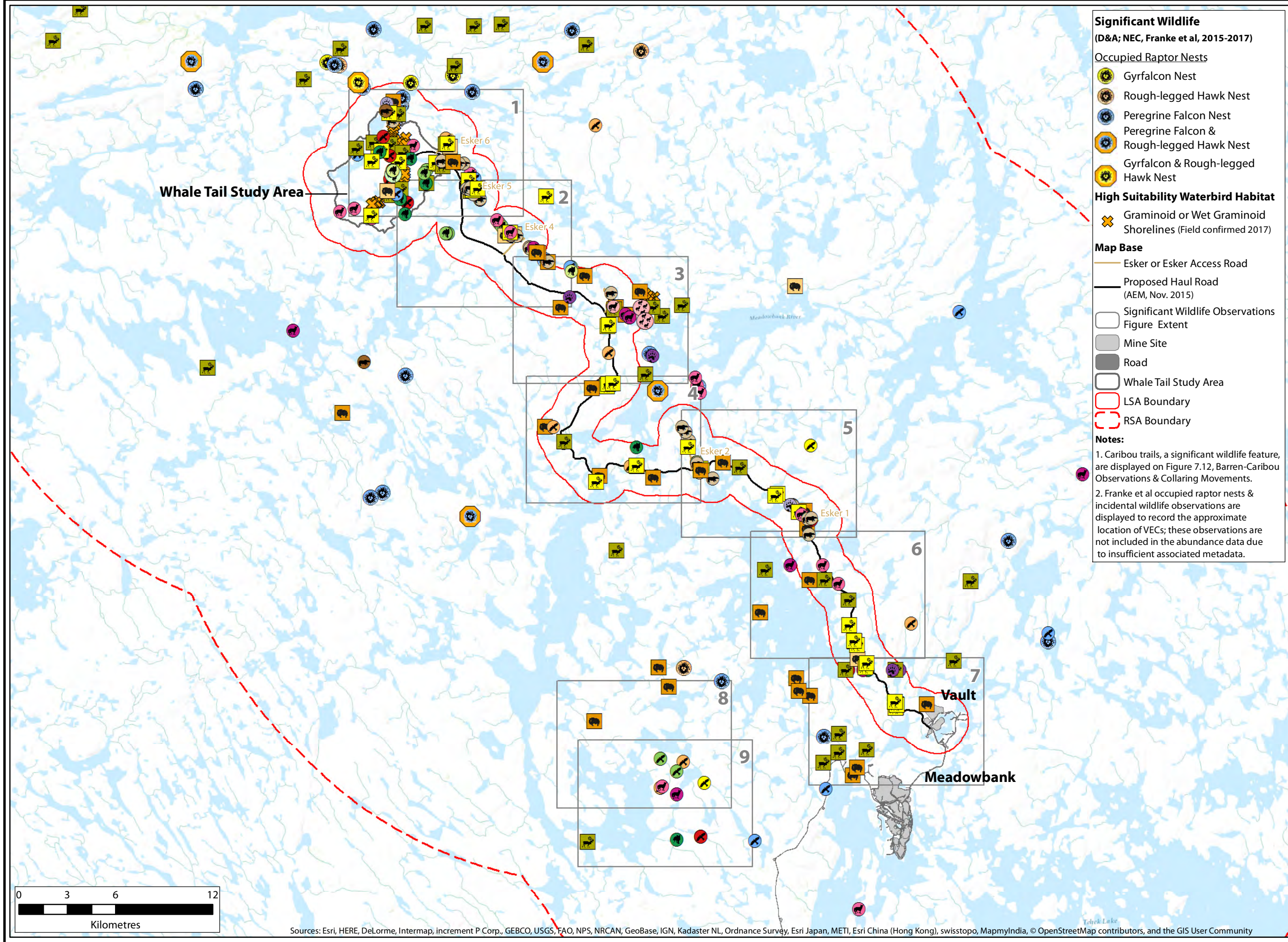
## **APPENDIX H**

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**Representative Figure from Baseline Characterization Report**

---



- Significant Wildlife**  
(D&A; NEC, Franke et al, 2015-2017)
- Occupied Raptor Nests**
- Gyrfalcon Nest
  - Rough-legged Hawk Nest
  - Peregrine Falcon Nest
  - Peregrine Falcon & Rough-legged Hawk Nest
  - Gyrfalcon & Rough-legged Hawk Nest
- High Suitability Waterbird Habitat**
- Graminoid or Wet Graminoid Shorelines (Field confirmed 2017)
- Map Base**
- Esker or Esker Access Road
  - Proposed Haul Road (AEM, Nov. 2015)
  - Significant Wildlife Observations Figure Extent
  - Mine Site
  - Road
  - Whale Tail Study Area
  - LSA Boundary
  - RSA Boundary
- Notes:**
1. Caribou trails, a significant wildlife feature, are displayed on Figure 7.12, Barren-Caribou Observations & Collaring Movements.
  2. Franke et al occupied raptor nests & incidental wildlife observations are displayed to record the approximate location of VECs; these observations are not included in the abundance data due to insufficient associated metadata.

- Significant Wildlife**  
(D&A; NEC, Franke et al, 2015-2017)
- Predatory Mammals**
- Arctic Fox Pups
  - Arctic Fox Den
  - Arctic Fox Sign
  - Arctic Fox Observation
  - Arctic Wolf Nursery
  - Arctic Wolf Den
  - Arctic Wolf Sign
  - Arctic Wolf Observation
  - Wolverine Sign
  - Wolverine Observation
  - Barren-ground Grizzly Bear Den
  - Barren-ground Grizzly Bear Sign
  - Barren-ground Grizzly Bear Observation
- Ungulates**
- Barren-ground Caribou Sign
  - Barren-ground Caribou Observation
  - Muskox Sign
  - Muskox Observation
- Raptors**
- Bald Eagle Observation
  - Gyrfalcon Observation
  - Peregrine Falcon Observation
  - Rough-legged Hawk Observation
  - Short-eared Owl Observation

Whale Tail Pit & Whale Tail Haul Road  
Comprehensive Terrestrial Baseline  
Characterization Report

**Significant Wildlife Observations**

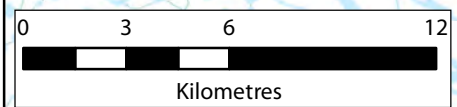


PROJECT: Whale Tail Pit & Haul Road

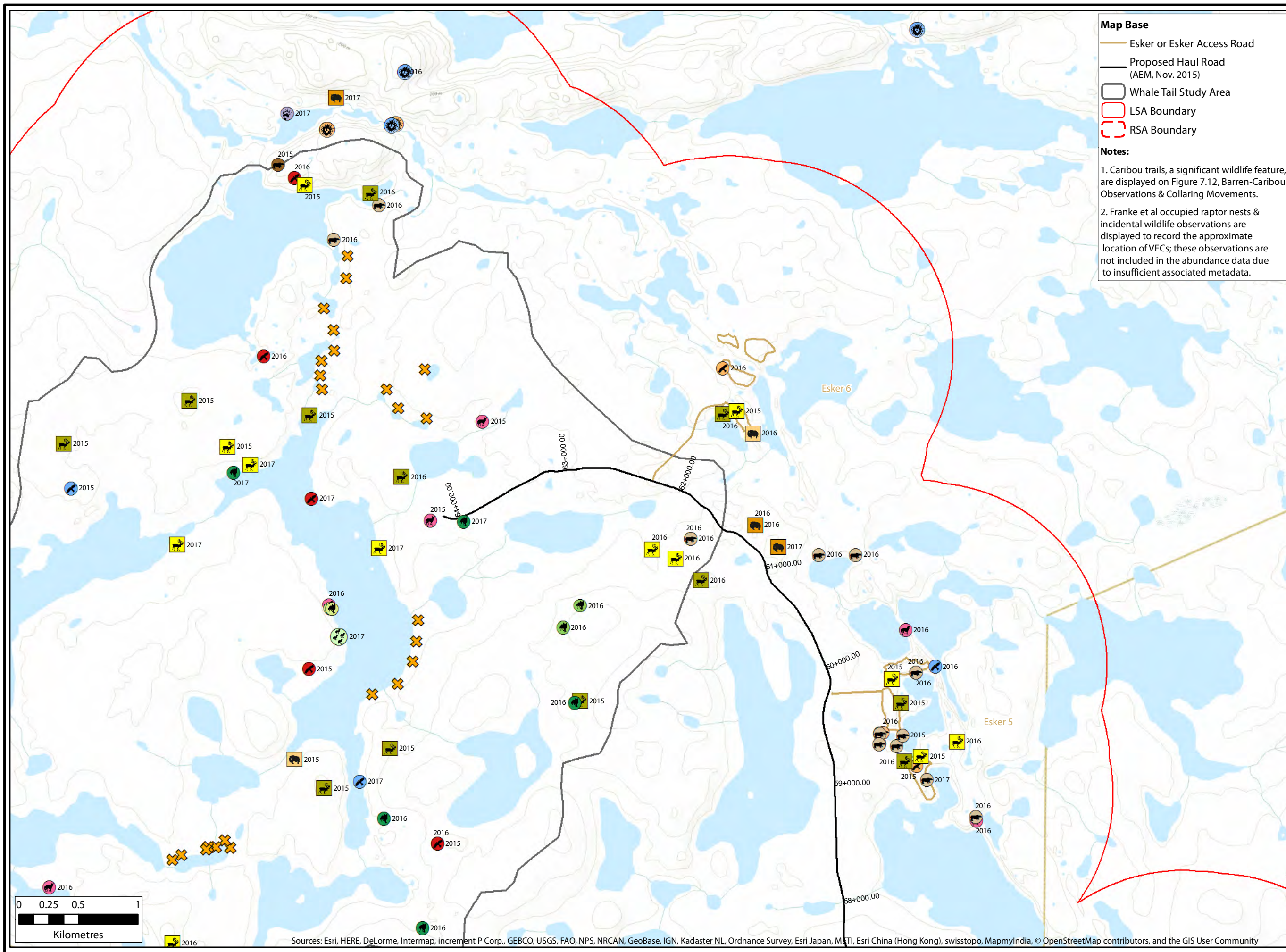
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	DATE: NOVEMBER 21, 2017
	SCALE: 1:220,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young

Figure:  
**9 - Key Map**



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



**Map Base**

- Esker or Esker Access Road
- Proposed Haul Road (AEM, Nov. 2015)
- Whale Tail Study Area
- LSA Boundary
- RSA Boundary

**Notes:**

1. Caribou trails, a significant wildlife feature, are displayed on Figure 7.12, Barren-Caribou Observations & Collaring Movements.
2. Franke et al occupied raptor nests & incidental wildlife observations are displayed to record the approximate location of VECs; these observations are not included in the abundance data due to insufficient associated metadata.

- Significant Wildlife (D&A; NEC, Franke et al, 2015-2017)**
- Predatory Mammals**
- Arctic Fox Pup
  - Arctic Fox Den
  - Arctic Fox Sign
  - Arctic Fox Observation
  - Arctic Wolf Sign
  - Wolverine Sign
  - Barren-ground Grizzly Bear Den
  - Barren-ground Grizzly Bear Sign
  - Barren-ground Grizzly Bear Observation
- Ungulates**
- Barren-ground Caribou Sign
  - Barren-ground Caribou Observation
  - Muskox Sign
  - Muskox Observation
- Raptors**
- Bald Eagle Observation
  - Peregrine Falcon Observation
  - Rough-legged Hawk Observation
- Occupied Raptor Nests**
- Rough-legged Hawk Nest
  - Peregrine Falcon Nest
- High Suitability Waterbird Habitat**
- Graminoid or Wet Graminoid Shorelines (Field confirmed 2017)

Whale Tail Pit & Whale Tail Haul Road  
Comprehensive Terrestrial Baseline  
Characterization Report  
**Significant Wildlife Observations**



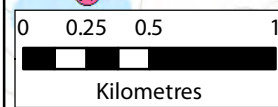
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	CHECKED BY: Mary Anne Young

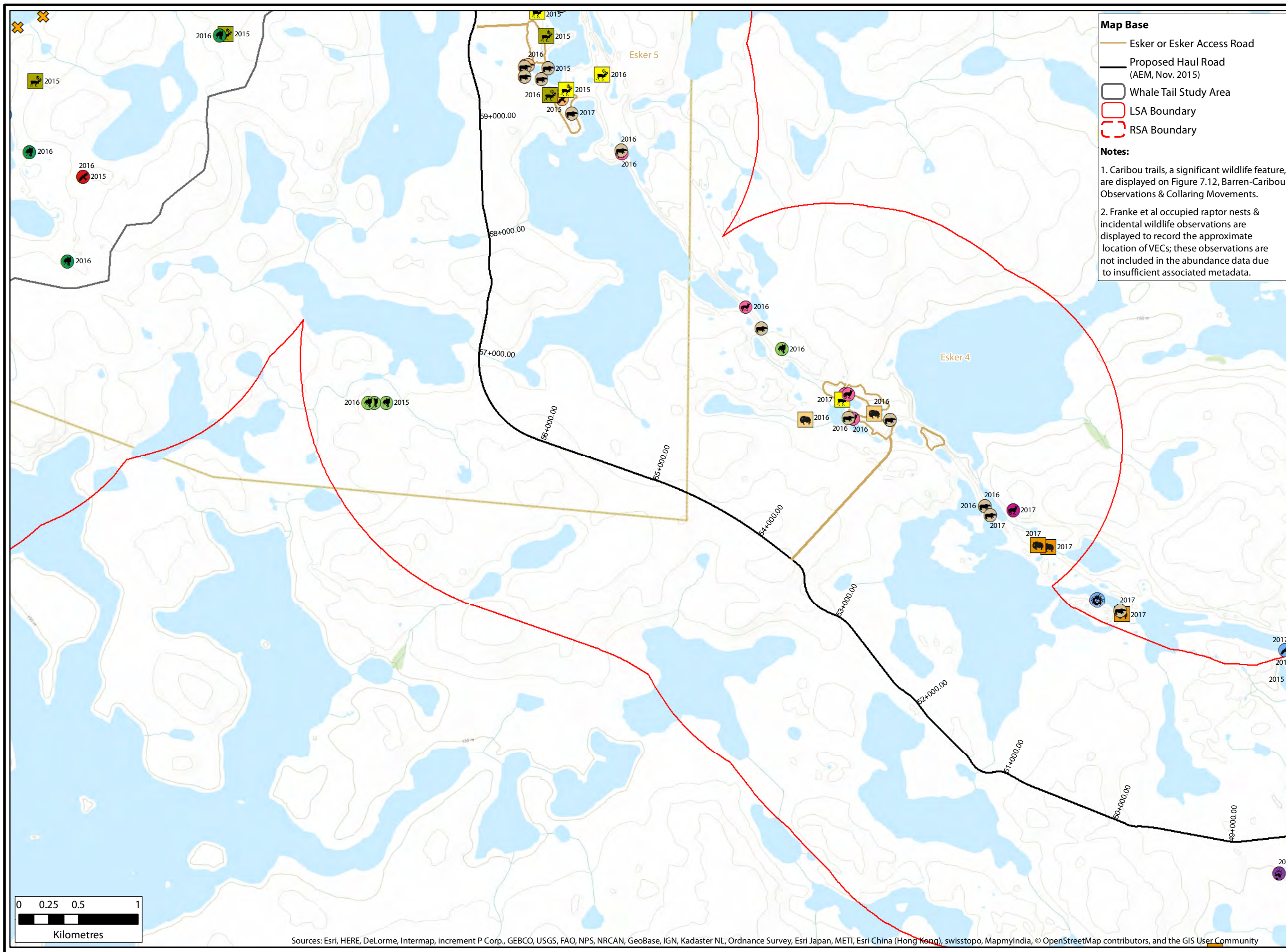
UTM Zone 14 NAD83

Figure: **9 - 1**

The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should not be relied on as being a precise indicator of locations, features, or roads, nor as a guide to navigation.







**Map Base**

- Esker or Esker Access Road
- Proposed Haul Road (AEM, Nov. 2015)
- Whale Tail Study Area
- LSA Boundary
- RSA Boundary

**Notes:**

- Caribou trails, a significant wildlife feature, are displayed on Figure 7.12, Barren-Caribou Observations & Collaring Movements.
- Franke et al occupied raptor nests & incidental wildlife observations are displayed to record the approximate location of VECs; these observations are not included in the abundance data due to insufficient associated metadata.

**Significant Wildlife (D&A; NEC, Franke et al, 2015-2017)**

**Predatory Mammals**

- Arctic Fox Den
- Arctic Fox Sign
- Arctic Fox Observation
- Arctic Wolf Sign
- Arctic Wolf Observation
- Wolverine Observation
- Barren-ground Grizzly Bear Den
- Barren-ground Grizzly Bear Sign

**Ungulates**

- Barren-ground Caribou Sign
- Barren-ground Caribou Observation
- Muskox Sign
- Muskox Observation

**Raptors**

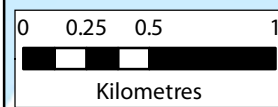
- Bald Eagle Observation
- Peregrine Falcon Observation
- Rough-legged Hawk Observation

**Occupied Raptor Nests**

- Peregrine Falcon Nest

**High Suitability Waterbird Habitat**

- Graminoid or Wet Graminoid Shorelines (Field confirmed 2017)



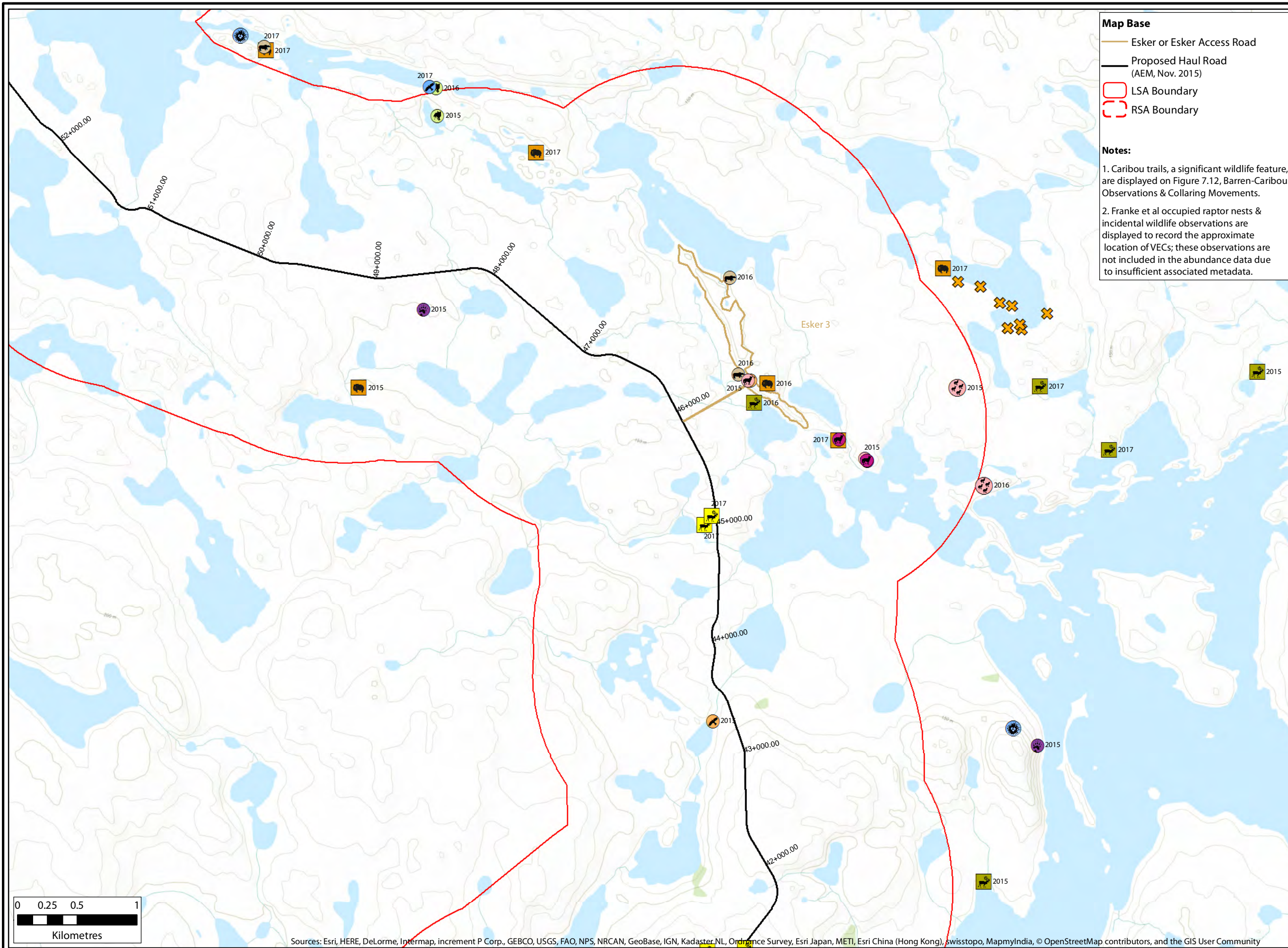
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Whale Tail Pit & Whale Tail Haul Road  
Comprehensive Terrestrial Baseline  
Characterization Report  
**Significant Wildlife Observations**

CLIENT: Agnico Eagle Mines Limited	DATE: NOVEMBER 21, 2017
	SCALE: 1:30,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young

Figure: **9 - 2**

The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should not be relied on as being a precise indicator of locations, features, or roads, nor as a guide to navigation.



**Map Base**

- Esker or Esker Access Road
- Proposed Haul Road (AEM, Nov. 2015)
- LSA Boundary
- RSA Boundary

**Notes:**

1. Caribou trails, a significant wildlife feature, are displayed on Figure 7.12, Barren-Caribou Observations & Collaring Movements.
2. Franke et al occupied raptor nests & incidental wildlife observations are displayed to record the approximate location of VECs; these observations are not included in the abundance data due to insufficient associated metadata.

- Significant Wildlife (D&A; NEC, Franke et al, 2015-2017)**
- Predatory Mammals**
- Arctic Fox Den
  - Arctic Wolf Nursery
  - Arctic Wolf Den
  - Arctic Wolf Observation
  - Wolverine Observation
  - Barren-ground Grizzly Bear Sign
- Ungulates**
- Barren-ground Caribou Sign
  - Barren-ground Caribou Observation
  - Muskox Observation
- Raptors**
- Peregrine Falcon Observation
  - Rough-legged Hawk Observation
- Occupied Raptor Nests**
- Peregrine Falcon Nest
- High Suitability Waterbird Habitat**
- Graminoid or Wet Graminoid Shorelines (Field confirmed 2017)

Whale Tail Pit & Whale Tail Haul Road  
Comprehensive Terrestrial Baseline  
Characterization Report

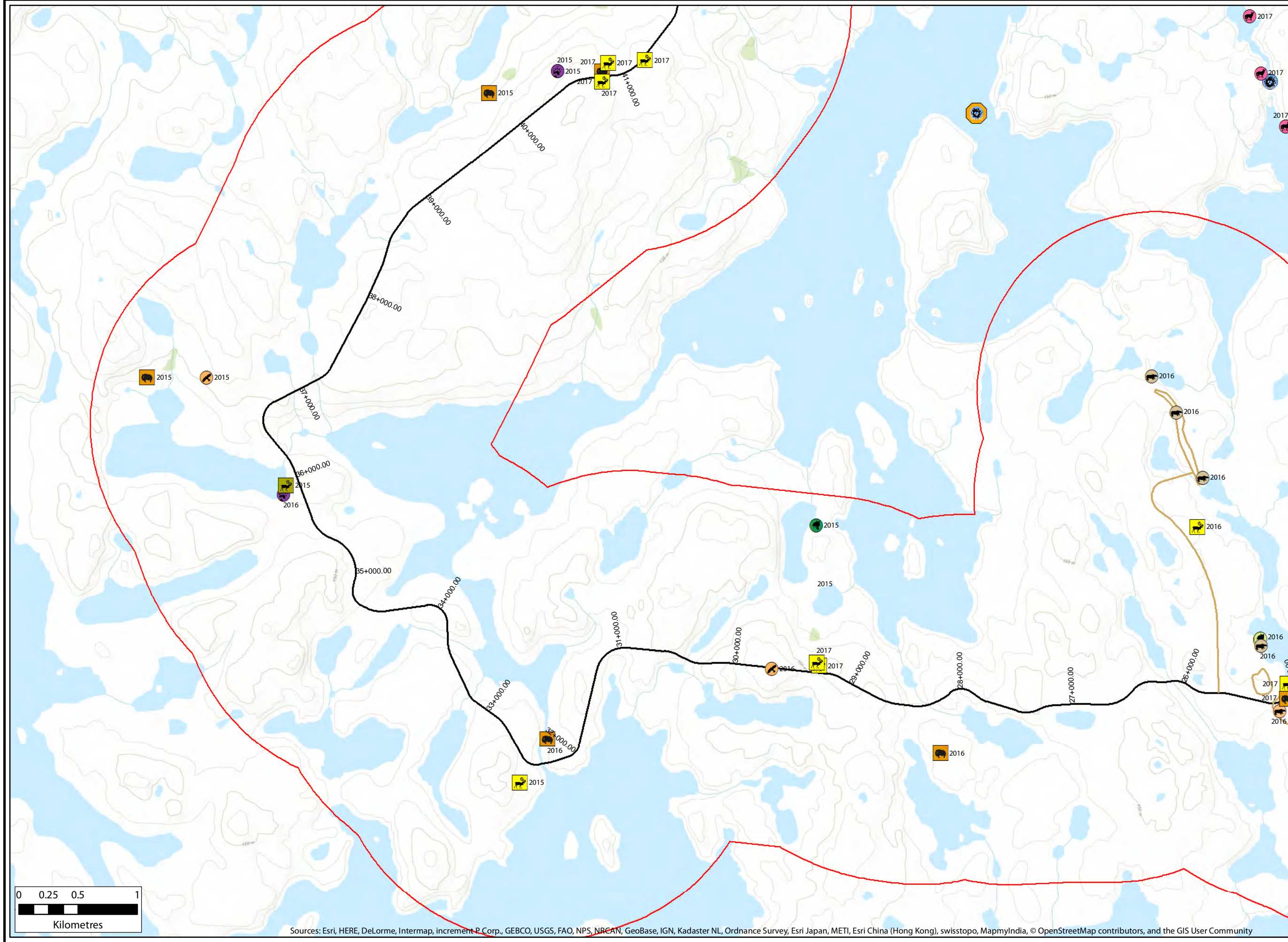
**Significant Wildlife Observations**



CLIENT: Agnico Eagle Mines Limited	
	DATE: NOVEMBER 21, 2017
	SCALE: 1:30,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young

Figure: **9 - 3**

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster\_NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



**Significant Wildlife**  
(D&A; NEC, Franke et al, 2015-2017)

- Predatory Mammals**
- Arctic Fox Den
  - Arctic Fox Observation
  - Arctic Wolf Sign
  - Wolverine Observation
  - Barren-ground Grizzly Bear Den
  - Barren-ground Grizzly Bear Sign

- Ungulates**
- Barren-ground Caribou Sign
  - Barren-ground Caribou Observation
  - Muskox Observation

- Raptors**
- Rough-legged Hawk Observation

- Occupied Raptor Nests**
- Peregrine Falcon Nest
  - Peregrine Falcon & Rough-legged Hawk Nest

- Map Base**
- Esker or Esker Access Road
  - Proposed Haul Road (AEM, Nov. 2015)
  - LSA Boundary
  - RSA Boundary

**Notes:**

- Caribou trails, a significant wildlife feature, are displayed on Figure 7.12, Barren-Caribou Observations & Collaring Movements.
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Whale Tail Pit & Whale Tail Haul Road  
Comprehensive Terrestrial Baseline  
Characterization Report  
**Significant Wildlife Observations**



PROJECT: Whale Tail Pit & Haul Road  
CLIENT: Agnico Eagle Mines Limited

	DATE: NOVEMBER 21, 2017
	SCALE: 1:30,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young

Figure:  
**9 - 4**

The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should not be relied on as being a precise indicator of locations, features, or roads, nor as a guide to navigation.



**Significant Wildlife**  
(D&A; NEC, Franke et al, 2015-2017)

- Predatory Mammals**
- Arctic Fox Den
  - Arctic Wolf Sign
  - Wolverine Sign
  - Barren-ground Grizzly Bear Den
  - Barren-ground Grizzly Bear Sign
- Ungulates**
- Barren-ground Caribou Sign
  - Barren-ground Caribou Observation
  - Muskox Observation
- Raptors**
- Bald Eagle Observation
  - Gyrfalcon Observation
- Map Base**
- Esker or Esker Access Road
  - Proposed Haul Road (AEM, Nov. 2015)
  - LSA Boundary
  - RSA Boundary

**Notes:**

- Caribou trails, a significant wildlife feature, are displayed on Figure 7.12, Barren-Caribou Observations & Collaring Movements.
- Franke et al occupied raptor nests & incidental wildlife observations are displayed to record the approximate location of VECs; these observations are not included in the abundance data due to insufficient associated metadata.

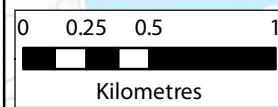
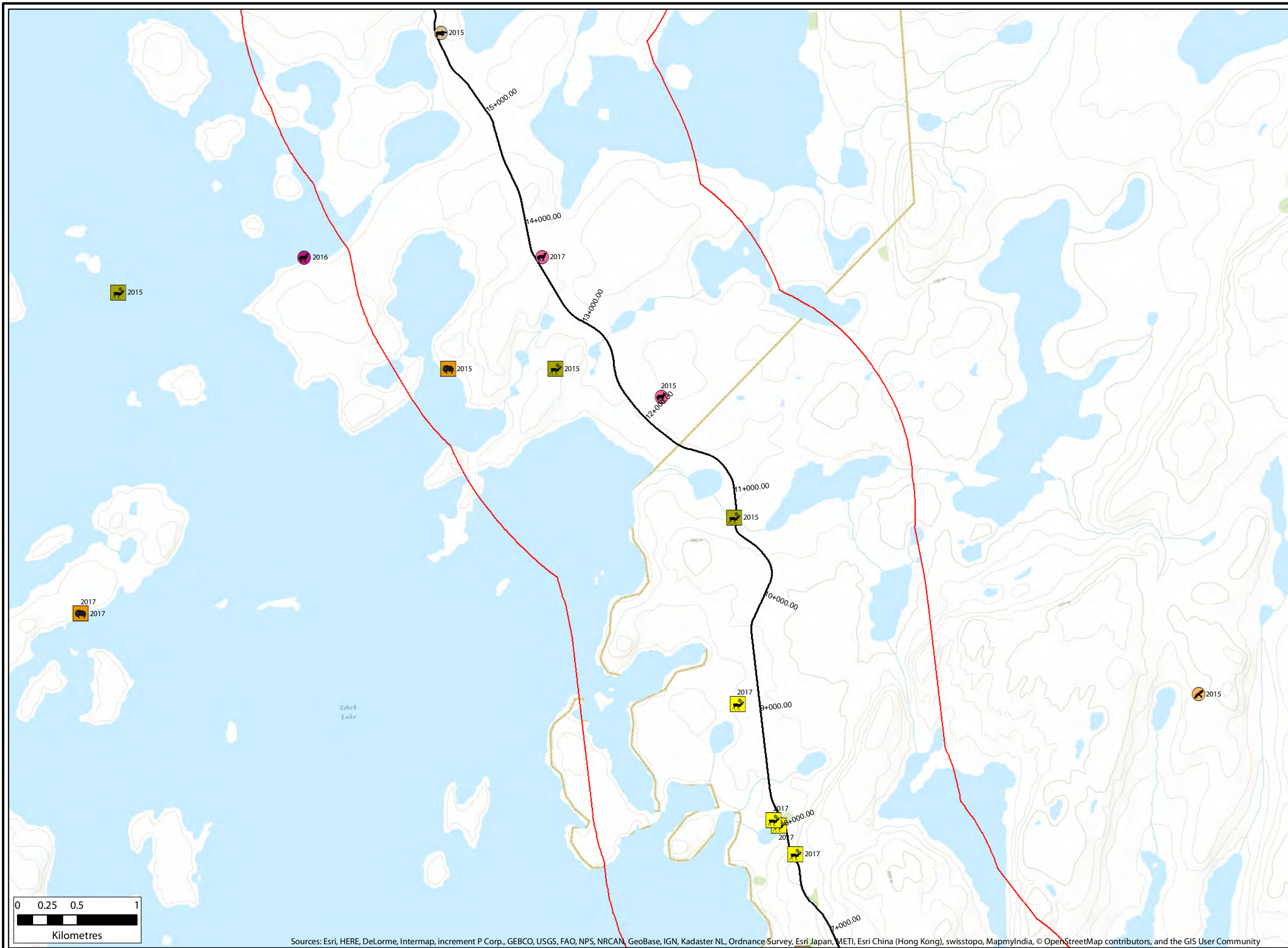
Whale Tail Pit & Whale Tail Haul Road  
Comprehensive Terrestrial Baseline  
Characterization Report  
**Significant Wildlife Observations**



CLIENT: Agnico Eagle Mines Limited	DATE: NOVEMBER 21, 2017
	SCALE: 1:30,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young

Figure:  
**9 - 5**

The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should not be relied on as being a precise indicator of locations, features, or roads, nor as a guide to navigation.



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

**Significant Wildlife**  
(D&A; NEC, Franke et al, 2015-2017)

- Predatory Mammals**
- Arctic Wolf Sign
  - Arctic Wolf Observation
  - Barren-ground Grizzly Bear Sign
- Ungulates**
- Barren-ground Caribou Sign
  - Barren-ground Caribou Observation
  - Muskox Sign
  - Muskox Observation
- Raptors**
- Rough-legged Hawk Observation

- Map Base**
- Proposed Haul Road (AEM, Nov. 2015)
  - LSA Boundary
  - RSA Boundary

- Notes:**
1. Caribou trails, a significant wildlife feature, are displayed on Figure 7.12, Barren-Caribou Observations & Collaring Movements.
  2. Franke et al occupied raptor nests & incidental wildlife observations are displayed to record the approximate location of VECs; these observations are not included in the abundance data due to insufficient associated metadata.

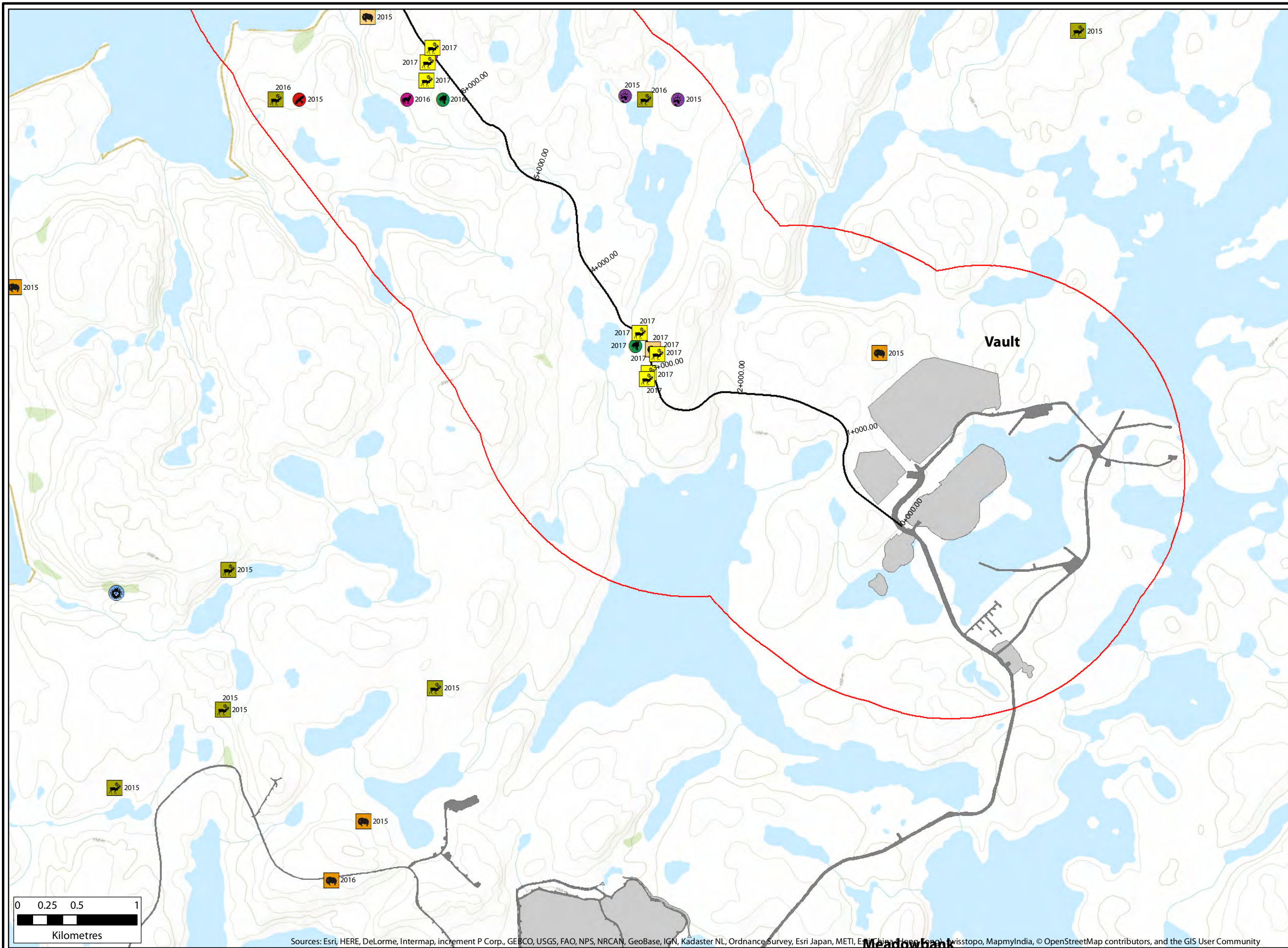
Whale Tail Pit & Whale Tail Haul Road  
Comprehensive Terrestrial Baseline  
Characterization Report  
**Significant Wildlife Observations**



PROJECT: Whale Tail Pit & Haul Road	
CLIENT: Agnico Eagle Mines Limited	
	DATE: NOVEMBER 21, 2017
	SCALE: 1:30,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young

Figure:  
**9 - 6**

The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should not be relied on as being a precise indicator of locations, features, or roads, nor as a guide to navigation.



**Significant Wildlife**  
(D&A; NEC, Franke et al, 2015-2017)

**Predatory Mammals**

- Arctic Fox Observation
- Arctic Wolf Observation
- Wolverine Observation

**Ungulates**

- Barren-ground Caribou Sign
- Barren-ground Caribou Observation
- Muskox Sign
- Muskox Observation

**Raptors**

- Bald Eagle Observation

**Occupied Raptor Nests**

- Peregrine Falcon Nest

**Map Base**

- Proposed Haul Road (AEM, Nov. 2015)
- Mine Site
- Road
- LSA Boundary
- RSA Boundary

**Notes:**

1. Caribou trails, a significant wildlife feature, are displayed on Figure 7.12, Barren-Caribou Observations & Collaring Movements.
2. Franke et al occupied raptor nests & incidental wildlife observations are displayed to record the approximate location of VECs; these observations are not included in the abundance data due to insufficient associated metadata.

Whale Tail Pit & Whale Tail Haul Road  
Comprehensive Terrestrial Baseline  
Characterization Report

**Significant Wildlife Observations**

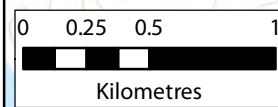


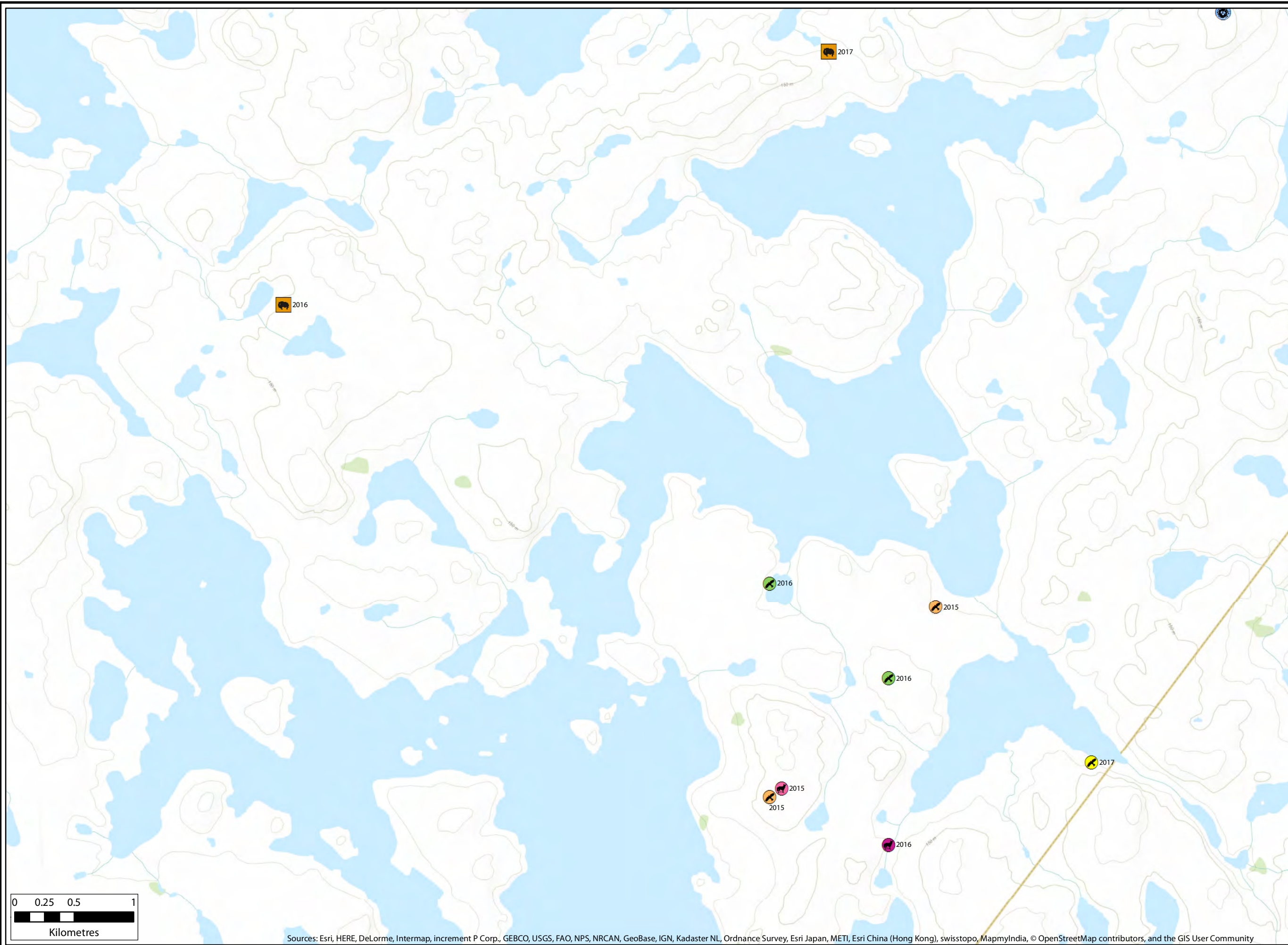
PROJECT: Whale Tail Pit & Haul Road

CLIENT: Agnico Eagle Mines Limited

	DATE: NOVEMBER 21, 2017
	SCALE: 1:30,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young



Figure:  
**9 - 7**






**Significant Wildlife**  
(D&A; NEC, Franke et al, 2015-2017)




**Predatory Mammals**

-  Arctic Wolf Sign
-  Arctic Wolf Observation

**Ungulates**

-  Muskox Observation


**Raptors**

-  Gyrfalcon Observation
-  Rough-legged Hawk Observation
-  Short-eared Owl Observation

**Occupied Raptor Nests**

-  Peregrine Falcon Nest

**Map Base**

-  RSA Boundary

**Notes:**

1. Caribou trails, a significant wildlife feature, are displayed on Figure 7.12, Barren-Caribou Observations & Collaring Movements.
2. Franke et al occupied raptor nests & incidental wildlife observations are displayed to record the approximate location of VECs; these observations are not included in the abundance data due to insufficient associated metadata.

Whale Tail Pit & Whale Tail Haul Road  
Comprehensive Terrestrial Baseline  
Characterization Report

**Significant Wildlife Observations**



CLIENT: Agnico Eagle Mines Limited

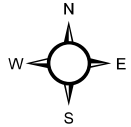
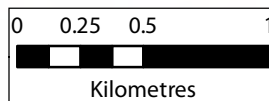
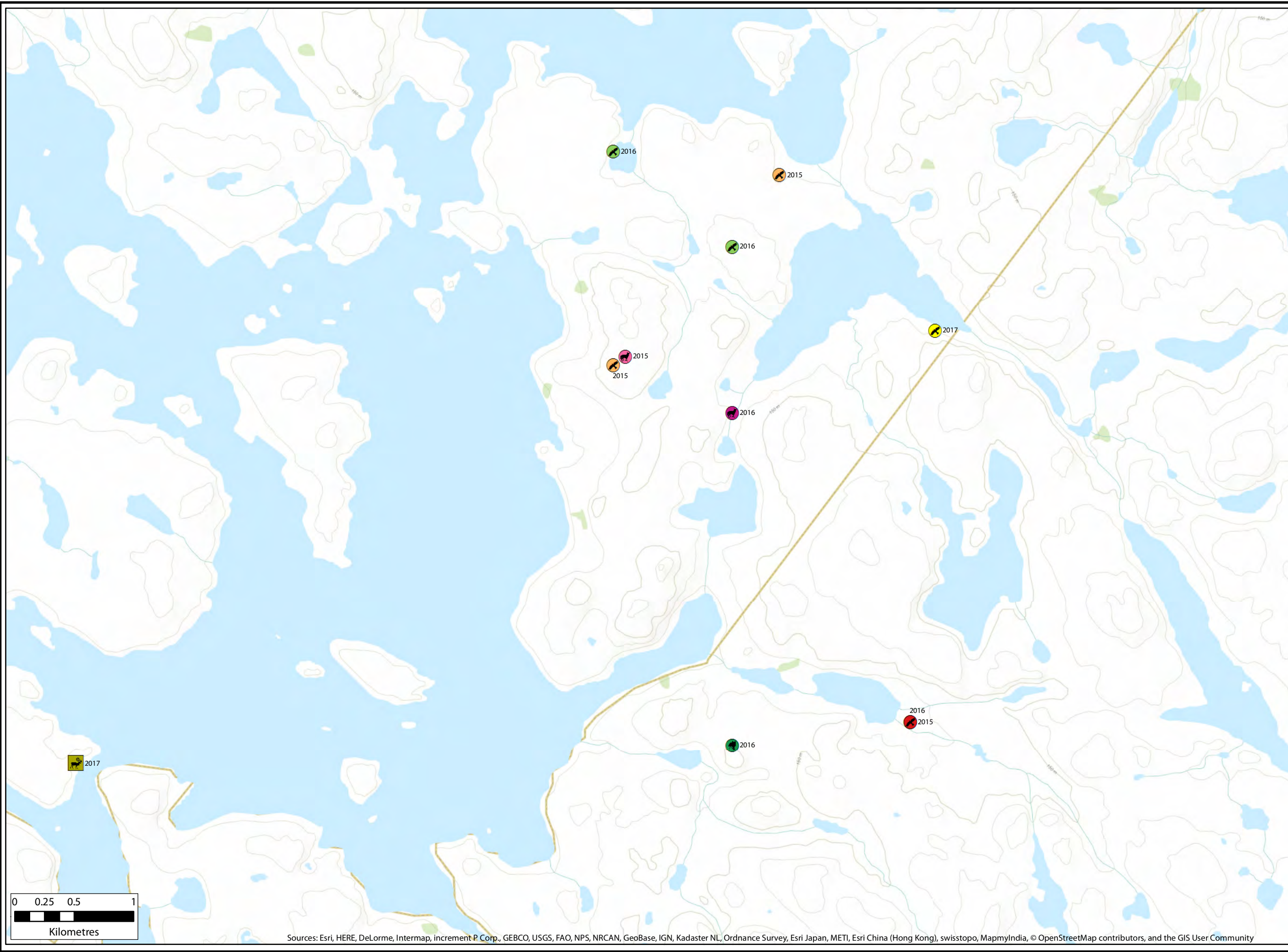
 <small>UTM Zone 14 NAD83</small>	DATE: NOVEMBER 21, 2017
	SCALE: 1:30,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young

Figure:  
**9 - 8**





**Significant Wildlife**  
(D&A; NEC, Franke et al, 2015-2017)

**Predatory Mammals**

- Arctic Fox Observation
- Arctic Wolf Sign
- Arctic Wolf Observation

**Ungulates**

- Barren-ground Caribou Observation

**Raptors**

- Bald Eagle Observation
- Gyr Falcon Observation
- Peregrine Falcon Observation
- Rough-legged Hawk Observation
- Short-eared Owl Observation

**Map Base**

- RSA Boundary

**Notes:**

1. Caribou trails, a significant wildlife feature, are displayed on Figure 7.12, Barren-Caribou Observations & Collaring Movements.
2. Franke et al occupied raptor nests & incidental wildlife observations are displayed to record the approximate location of VECs; these observations are not included in the abundance data due to insufficient associated metadata.

Whale Tail Pit & Whale Tail Haul Road  
Comprehensive Terrestrial Baseline  
Characterization Report

**Significant Wildlife Observations**



PROJECT: Whale Tail Pit & Haul Road

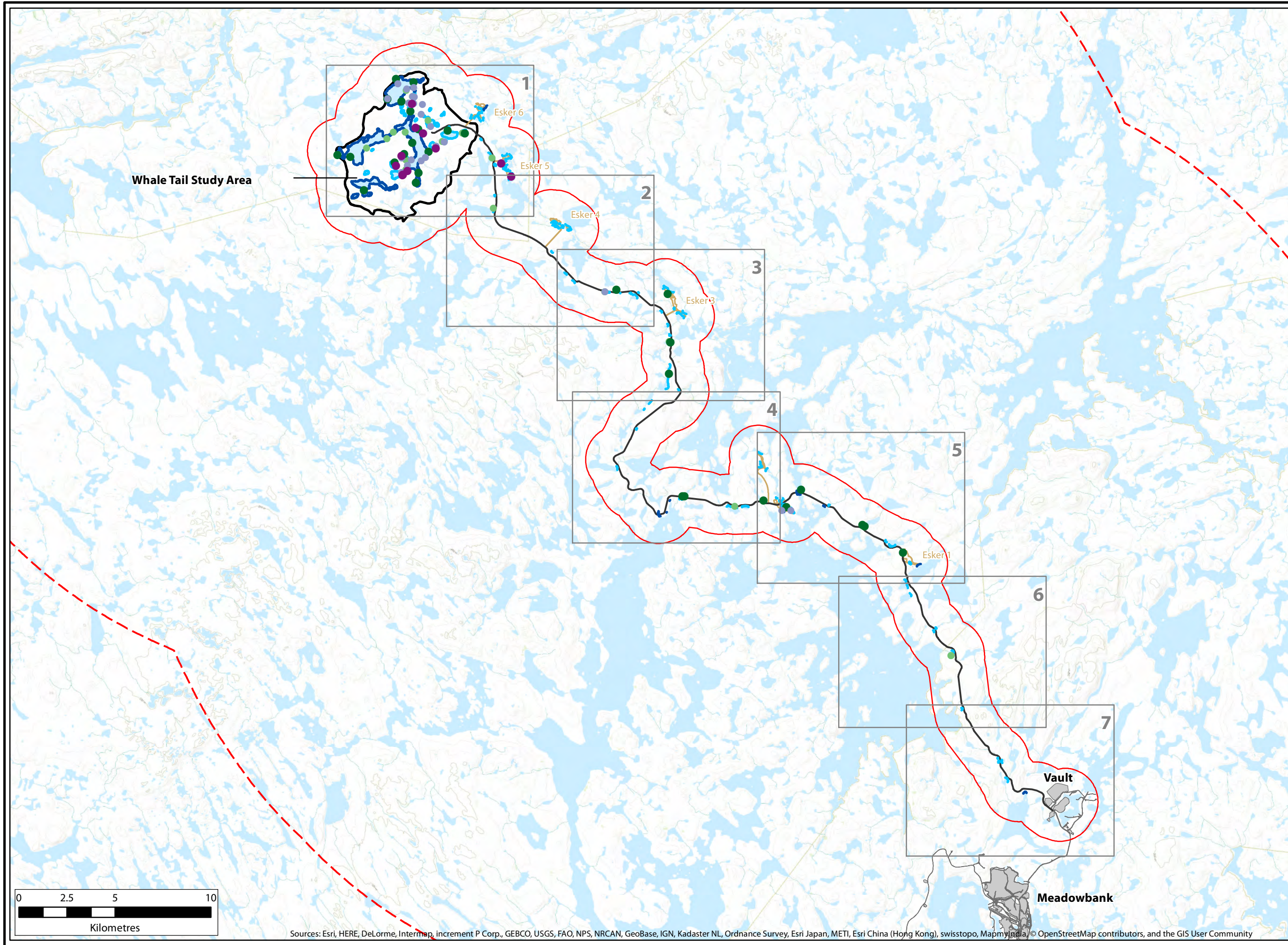
CLIENT: Agnico Eagle Mines Limited

<p>UTM Zone 14 NAD83</p>	DATE: NOVEMBER 21, 2017
	SCALE: 1:30,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young

Figure:  
**9 - 9**

The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should not be relied on as being a precise indicator of locations, features, or roads, nor as a guide to navigation.





**Legend**

**Confirmed Breeding<sup>1</sup> (2015-2017)**

**Waterbirds**

- Confirmed Nest (Purple dot)
- Additional Confirmed Breeding (Blue dot)

**Upland Birds**

- Confirmed Nest (Green dot)
- Additional Confirmed Breeding (Light Green dot)

**Waterbird Survey Transect (D&A, 2016)**

- Lake (Blue line)
- Pond (Light Blue line)

**Map Base**

- Esker or Esker Access Road (Orange line)
- Proposed Haul Road (AEM, Nov. 2015) (Black line)
- 2015 - 2017 Shoreline Surveys Figure Extent (White box with black border)
- Mine Site (Grey box)
- Road (Black box)
- LSA Boundary (Red dashed line)
- RSA Boundary (Red dashed line)
- Whale Tail Study Area (Black outline)

Whale Tail Pit & Whale Tail Haul Road  
 Comprehensive Terrestrial Baseline  
 Characterization Report  
**2015-2017 Shoreline Surveys**

77 Wyndham Street South • Guelph, ON N1E 5R7  
 T 519.822.1609 • F 519.822.5389 • www.dougan.ca

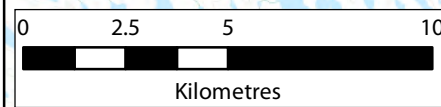
PROJECT: Whale Tail Pit & Haul Road

CLIENT: Agnico Eagle Mines Limited

	DATE: NOVEMBER 21, 2017
	SCALE: 1:185,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young

Figure:  
**11 - Key Map**

The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should not be relied on as being a precise indicator of locations, features, or roads, nor as a guide to navigation.



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

- Observed Waterbirds**  
*Species Code - (# in 2015, 2016, 2017)*  
 AGPL - American Golden-Plover (2,1,4)  
 CACG - Cackling Goose (15,3,1)  
 CANG - Canada Goose (4,127,67)  
 COLO - Common Loon (3,8,0)  
 COME - Common Merganser (0,0,2)  
 DUNL - Dunlin (1,2,1)  
 GLGU - Glaucous Gull (2,0,0)  
 GRWF - Greater White-fronted Goose (1,6,0)  
 HERG - Herring Gull (7,21,9)  
 LESA - Least Sandpiper (1,4,2)  
 LTDU - Long-tailed Duck (21,23,7)  
 PALO - Pacific Loon (0,1,0)  
 PESA - Pectoral Sandpiper (0,3,0)  
 PEEP - Sandpiper species (0,0,1)  
 RBME - Red-breasted Merganser (4,7,0)  
 RNPH - Red-necked Phalarope (0,0,2)  
 RTLO - Red-throated Loon (1,4,2)  
 SACR - Sandhill Crane (0,5,0)  
 SEPL - Semipalmated Plover (8,26,2)  
 SESA - Semipalmated Sandpiper (38,53,26)  
 SNGO - Snow Goose (1,0,0)  
 YBLO - Yellow-billed Loon (0,5,0)
- Confirmed Nests**  
*Species Code - (# in 2015, 2016, 2017)*  
 AGPL - American Golden-Plover (0,0,1)  
 AMPI - American Pipit (2,4,0)  
 CACG - Cackling Goose (1,0,0)  
 CANG - Canada Goose (0,2,0)  
 DUNL - Dunlin (1,1,0)  
 HERG - Herring Gull (0,1,1)  
 HOLA - Horned Lark (0,1,0)  
 HORE - Hoary Redpoll (1,1,1)  
 LALO - Lapland Longspur (11,14,6)  
 LESA - Least Sandpiper (0,1,0)  
 LTDU - Long-tailed Duck (0,0,1)  
 REDP - Redpoll Species (0,2,0)  
 ROPT - Rock Ptarmigan (0,1,0)  
 RTLO - Red-throated Loon (0,1,0)  
 SAVS - Savannah Sparrow (2,4,0)  
 SEPL - Semipalmated Plover (2,3,1)  
 SESA - Semipalmated Sandpiper (8,10,2)

- \* Notes:**  
 1. Shoreline Surveys were carried out on all waterbodies within the Whale Tail Pit Study Area & within 100 m of the alignments of the Proposed Haul Road, Esker Borrow Areas, & Esker Access Roads at the time of the Shoreline Survey (June 2016). The Proposed Haul Road alignment changed between the 2015 & 2016 surveys.  
 2. Only the Whale Tail Study area surveyed in 2017. Shoreline surveys were not conducted along the Haul Road in 2017.  
 3. Lakes 200-203 were added to the 2017 shoreline surveys due to proposed flooding.  
 4. For Upland bird observations by Shoreline Survey Transect see Appendix F: Shoreline Survey Results 2015, 2016, 2017  
 5. Refer to Appendix G: D&A to AEM Lake Names for the conversation between D&A Shoreline Survey Transects & AEM Lake Names

**Legend**

**Confirmed Breeding<sup>1</sup> (2015-2017) Waterbirds**

- Confirmed Nest
- Additional Confirmed Breeding

**Upland Birds**

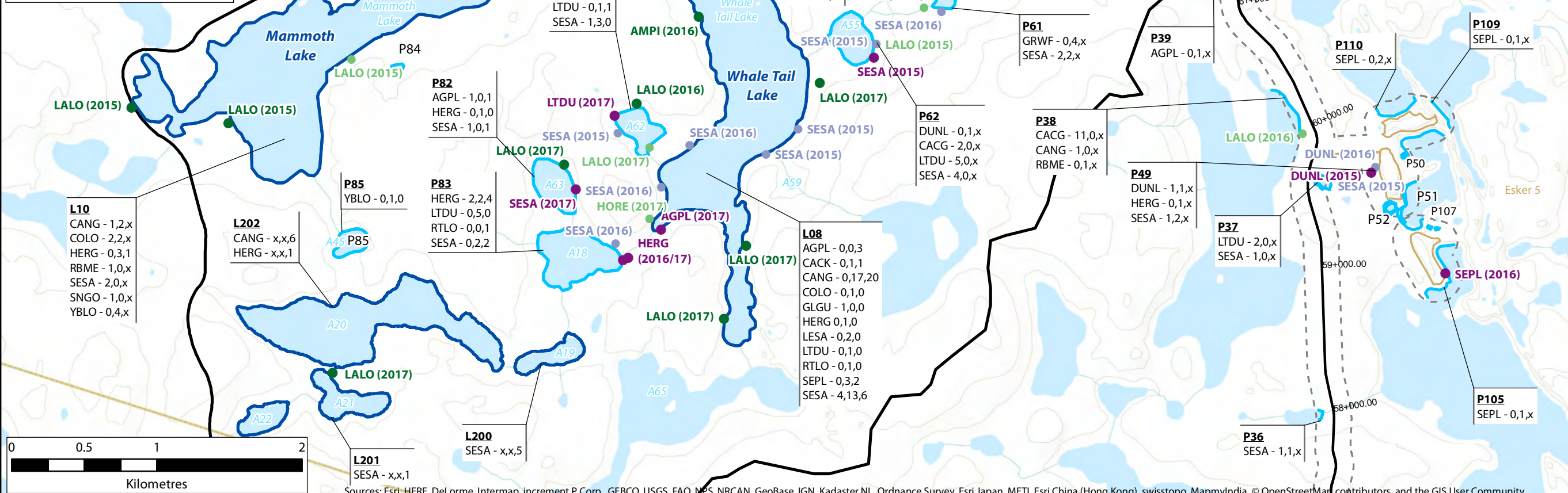
- Confirmed Nest
- Additional Confirmed Breeding

**Waterbird Survey Transect (D&A, 2015 - 2017)**

- Lake
- Pond

**Map Base**

- Esker or Esker Access Road
- Proposed Haul Road (AEM, Nov. 2015)
- Shoreline Survey Area \*
- Whale Tail Study Area
- LSA Boundary
- RSA Boundary



Whale Tail Pit & Whale Tail Haul Road  
 Comprehensive Terrestrial Baseline  
 Characterization Report  
**2015-2017 Shoreline Surveys**



PROJECT: Whale Tail Pit & Haul Road  
 CLIENT: Agnico Eagle Mines Limited

	DATE: NOVEMBER 21, 2017
	SCALE: 1:30,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young

Figure:  
 11 - 1

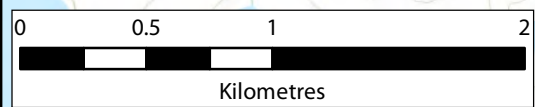
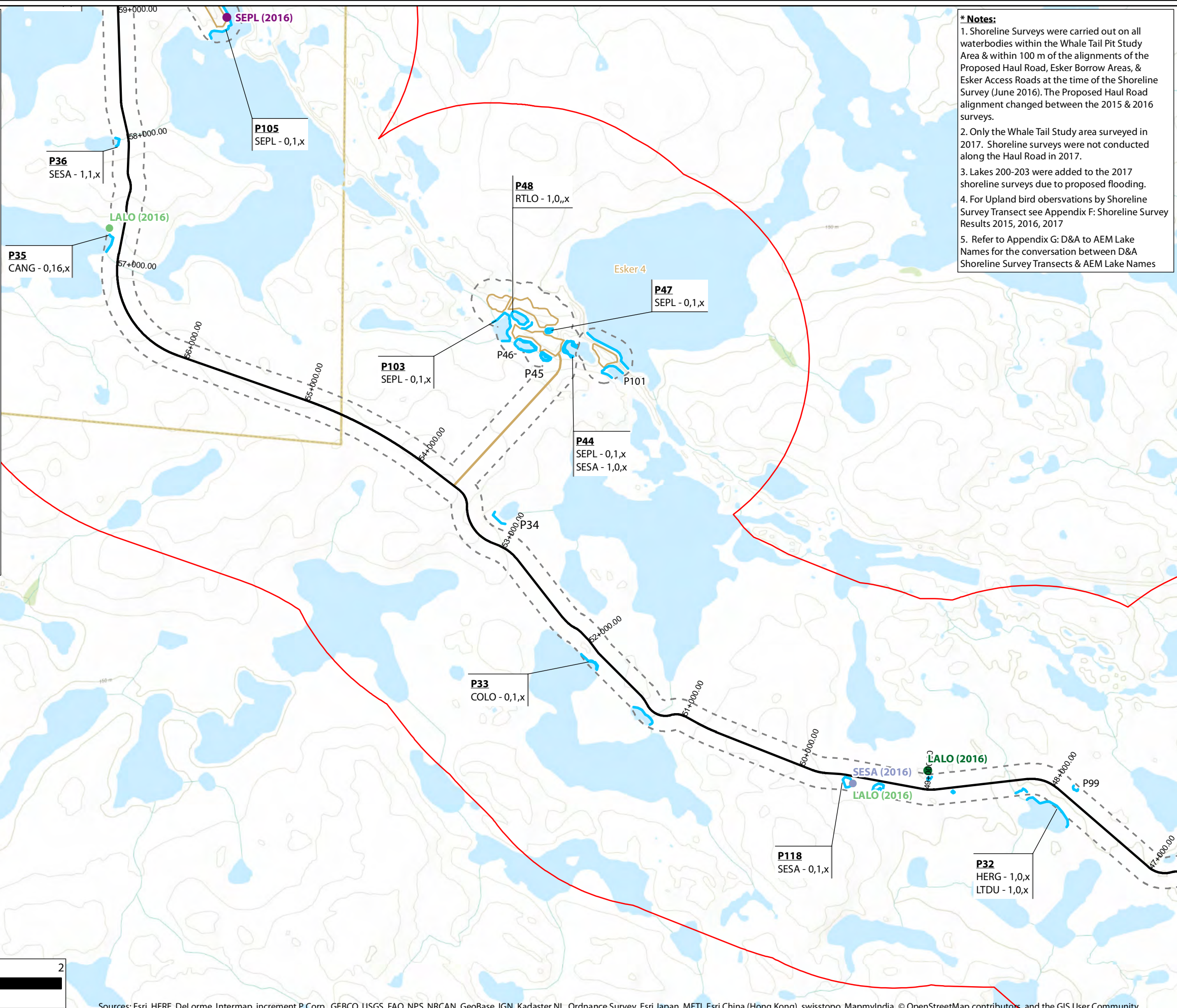
The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should not be relied on as being a precise indicator of locations, features, or roads, nor as a guide to navigation.

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- Observed Waterbirds**  
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 LTDU - Long-tailed Duck (21,23,7)  
 PALO - Pacific Loon (0,1,0)  
 PESA - Pectoral Sandpiper (0,3,0)  
 PEEP - Sandpiper species (0,0,1)  
 RBME - Red-breasted Merganser (4,7,0)  
 RNPH - Red-necked Phalarope (0,0,2)  
 RTLO - Red-throated Loon (1,4,2)  
 SACR - Sandhill Crane (0,5,0)  
 SEPL - Semipalmated Plover (8,26,2)  
 SESA - Semipalmated Sandpiper (38,53,26)  
 SNGO - Snow Goose (1,0,0)  
 YBLO - Yellow-billed Loon (0,5,0)
- Confirmed Nests**  
*Species Code - (# in 2015, 2016, 2017)*  
 AGPL - American Golden-Plover (0,0,1)  
 AMPI - American Pipit (2,4,0)  
 CACG - Cackling Goose (1,0,0)  
 CANG - Canada Goose (0,2,0)  
 DUNL - Dunlin (1,1,0)  
 HERG - Herring Gull (0,1,1)  
 HOLA - Horned Lark (0,1,0)  
 HORE - Hoary Redpoll (1,1,1)  
 LALO - Lapland Longspur (11,14,6)  
 LESA - Least Sandpiper (0,1,0)  
 LTDU - Long-tailed Duck (0,0,1)  
 REDP - Redpoll Species (0,2,0)  
 ROPT - Rock Ptarmigan (0,1,0)  
 RTLO - Red-throated Loon (0,1,0)  
 SAVS - Savannah Sparrow (2,4,0)  
 SEPL - Semipalmated Plover (2,3,1)  
 SESA - Semipalmated Sandpiper (8,10,2)

**\* Notes:**  
 1. Shoreline Surveys were carried out on all waterbodies within the Whale Tail Pit Study Area & within 100 m of the alignments of the Proposed Haul Road, Esker Borrow Areas, & Esker Access Roads at the time of the Shoreline Survey (June 2016). The Proposed Haul Road alignment changed between the 2015 & 2016 surveys.  
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 4. For Upland bird observations by Shoreline Survey Transect see Appendix F: Shoreline Survey Results 2015, 2016, 2017  
 5. Refer to Appendix G: D&A to AEM Lake Names for the conversation between D&A Shoreline Survey Transects & AEM Lake Names

- Legend**
- Confirmed Breeding<sup>1</sup> (2015-2017) Waterbirds**
- Confirmed Nest
  - Additional Confirmed Breeding
- Upland Birds**
- Confirmed Nest
  - Additional Confirmed Breeding
- Waterbird Survey Transect (D&A, 2015 - 2017)**
- Pond
- Map Base**
- Esker or Esker Access Road
  - Proposed Haul Road (AEM, Nov. 2015)
  - Shoreline Survey Area \*
  - Whale Tail Study Area
  - LSA Boundary
  - RSA Boundary



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Whale Tail Pit & Whale Tail Haul Road  
 Comprehensive Terrestrial Baseline  
 Characterization Report  
**2015-2017 Shoreline Surveys**



PROJECT: Whale Tail Pit & Haul Road  
 CLIENT: Agnico Eagle Mines Limited

	DATE: NOVEMBER 21, 2017
	SCALE: 1:30,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young

Figure:  
 11 - 2

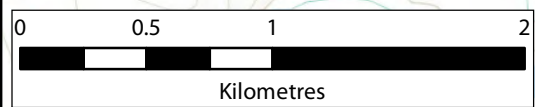
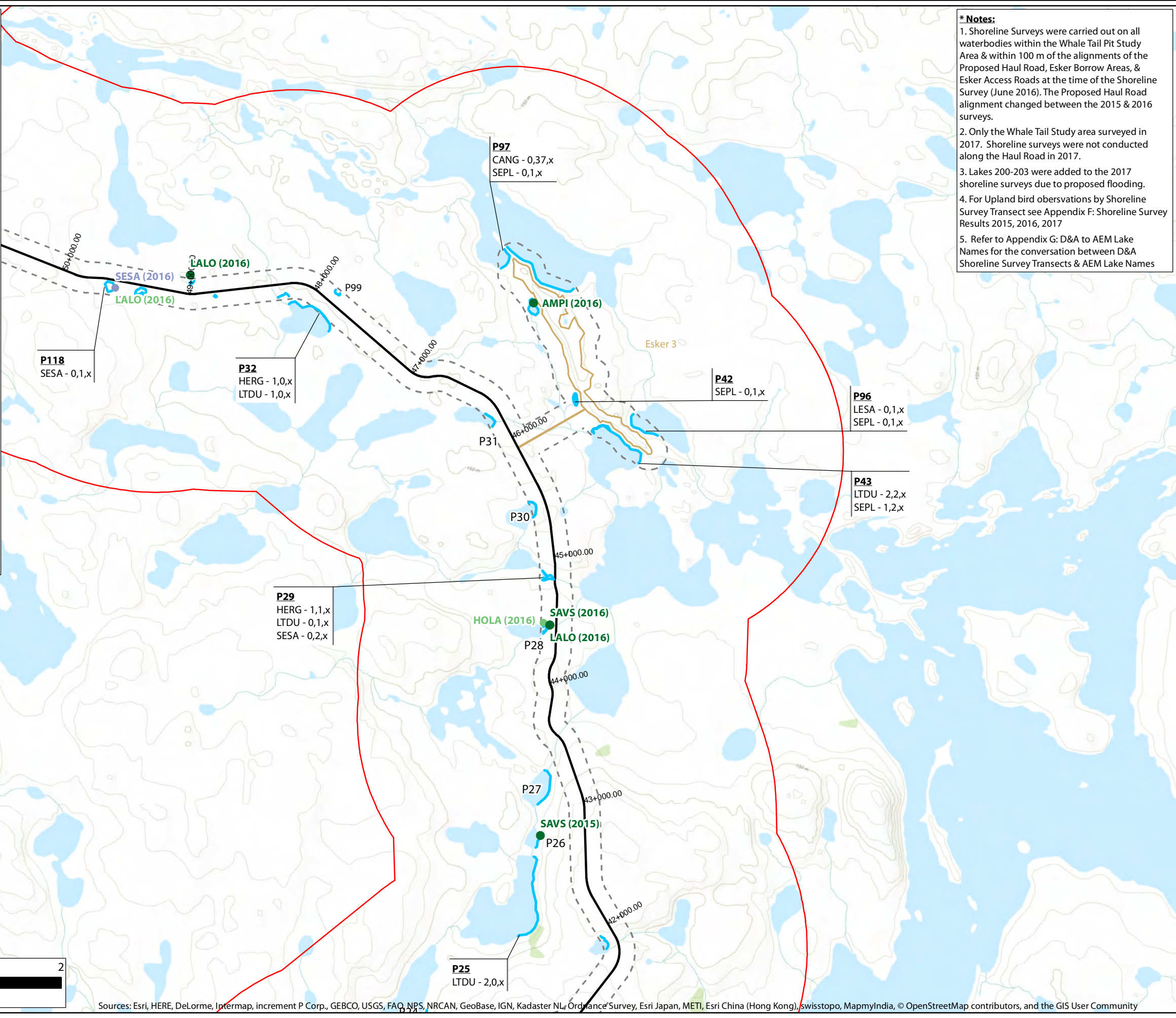
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- Observed Waterbirds**
- Species Code - (# in 2015, 2016, 2017)
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  - CACG - Cackling Goose (15,3,1)
  - CANG - Canada Goose (4,127,67)
  - COLO - Common Loon (3,8,0)
  - COME - Common Merganser (0,0,2)
  - DUNL - Dunlin (1,2,1)
  - GLGU - Glaucous Gull (2,0,0)
  - GRWF - Greater White-fronted Goose (1,6,0)
  - HERG - Herring Gull (7,21,9)
  - LESA - Least Sandpiper (1,4,2)
  - LTDU - Long-tailed Duck (21,23,7)
  - PALO - Pacific Loon (0,1,0)
  - PESA - Pectoral Sandpiper (0,3,0)
  - PEEP - Sandpiper species (0,0,1)
  - RBME - Red-breasted Merganser (4,7,0)
  - RNPH - Red-necked Phalarope (0,0,2)
  - RTLO - Red-throated Loon (1,4,2)
  - SACR - Sandhill Crane (0,5,0)
  - SEPL - Semipalmated Plover (8,26,2)
  - SESA - Semipalmated Sandpiper (38,53,26)
  - SNGO - Snow Goose (1,0,0)
  - YBLO - Yellow-billed Loon (0,5,0)
- Confirmed Nests**
- Species Code - (# in 2015, 2016, 2017)
- AGPL - American Golden-Plover (0,0,1)
  - AMPI - American Pipit (2,4,0)
  - CACG - Cackling Goose (1,0,0)
  - CANG - Canada Goose (0,2,0)
  - DUNL - Dunlin (1,1,0)
  - HERG - Herring Gull (0,1,1)
  - HOLA - Horned Lark (0,1,0)
  - HORE - Hoary Redpoll (1,1,1)
  - LALO - Lapland Longspur (11,14,6)
  - LESA - Least Sandpiper (0,1,0)
  - LTDU - Long-tailed Duck (0,0,1)
  - REDP - Redpoll Species (0,2,0)
  - ROPT - Rock Ptarmigan (0,1,0)
  - RTLO - Red-throated Loon (0,1,0)
  - SAVS - Savannah Sparrow (2,4,0)
  - SEPL - Semipalmated Plover (2,3,1)
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**\* Notes:**

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5. Refer to Appendix G: D&A to AEM Lake Names for the conversation between D&A Shoreline Survey Transects & AEM Lake Names

- Legend**
- Confirmed Breeding<sup>1</sup> (2015-2017) Waterbirds**
- Additional Confirmed Breeding
- Upland Birds**
- Confirmed Nest
  - Additional Confirmed Breeding
- Waterbird Survey Transect (D&A, 2015 - 2017)**
- Pond
- Map Base**
- Esker or Esker Access Road
  - Proposed Haul Road (AEM, Nov. 2015)
  - - - Shoreline Survey Area \*
  - LSA Boundary
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Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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Comprehensive Terrestrial Baseline  
Characterization Report  
**2015-2017 Shoreline Surveys**



PROJECT: Whale Tail Pit & Haul Road  
CLIENT: Agnico Eagle Mines Limited

	DATE: NOVEMBER 21, 2017
	SCALE: 1:30,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young

Figure:  
**11 - 3**

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 GRWF - Greater White-fronted Goose (1,6,0)  
 HERG - Herring Gull (7,21,9)  
 LESA - Least Sandpiper (1,4,2)  
 LTDU - Long-tailed Duck (21,23,7)  
 PALO - Pacific Loon (0,1,0)  
 PESA - Pectoral Sandpiper (0,3,0)  
 PEEP - Sandpiper species (0,0,1)  
 RBME - Red-breasted Merganser (4,7,0)  
 RNPH - Red-necked Phalarope (0,0,2)  
 RTLO - Red-throated Loon (1,4,2)  
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 SNGO - Snow Goose (1,0,0)  
 YBLO - Yellow-billed Loon (0,5,0)
- Confirmed Nests**  
*Species Code - (# in 2015, 2016, 2017)*  
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 AMPI - American Pipit (2,4,0)  
 CACG - Cackling Goose (1,0,0)  
 CANG - Canada Goose (0,2,0)  
 DUNL - Dunlin (1,1,0)  
 HERG - Herring Gull (0,1,1)  
 HOLA - Horned Lark (0,1,0)  
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 LESA - Least Sandpiper (0,1,0)  
 LTDU - Long-tailed Duck (0,0,1)  
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 ROPT - Rock Ptarmigan (0,1,0)  
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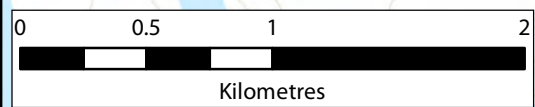
**P22**  
 CANG - 0,18,x  
 HERG - 0,3,x  
 SESA - 0,1,x

**P25**  
 LTDU - 2,0,x

**P94**  
 HERG - 0,3,x

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- Legend**
- Confirmed Breeding <sup>1</sup> (2015-2017)**
- Confirmed Nest
  - Additional Confirmed Breeding
- Waterbird Survey Transect (D&A, 2015 - 2017)**
- Lake
  - Pond
- Map Base**
- Esker or Esker Access Road
  - Proposed Haul Road (AEM, Nov. 2015)
  - Shoreline Survey Area \*
  - LSA Boundary
  - RSA Boundary



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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 Comprehensive Terrestrial Baseline  
 Characterization Report  
**2015-2017 Shoreline Surveys**



PROJECT: Whale Tail Pit & Haul Road

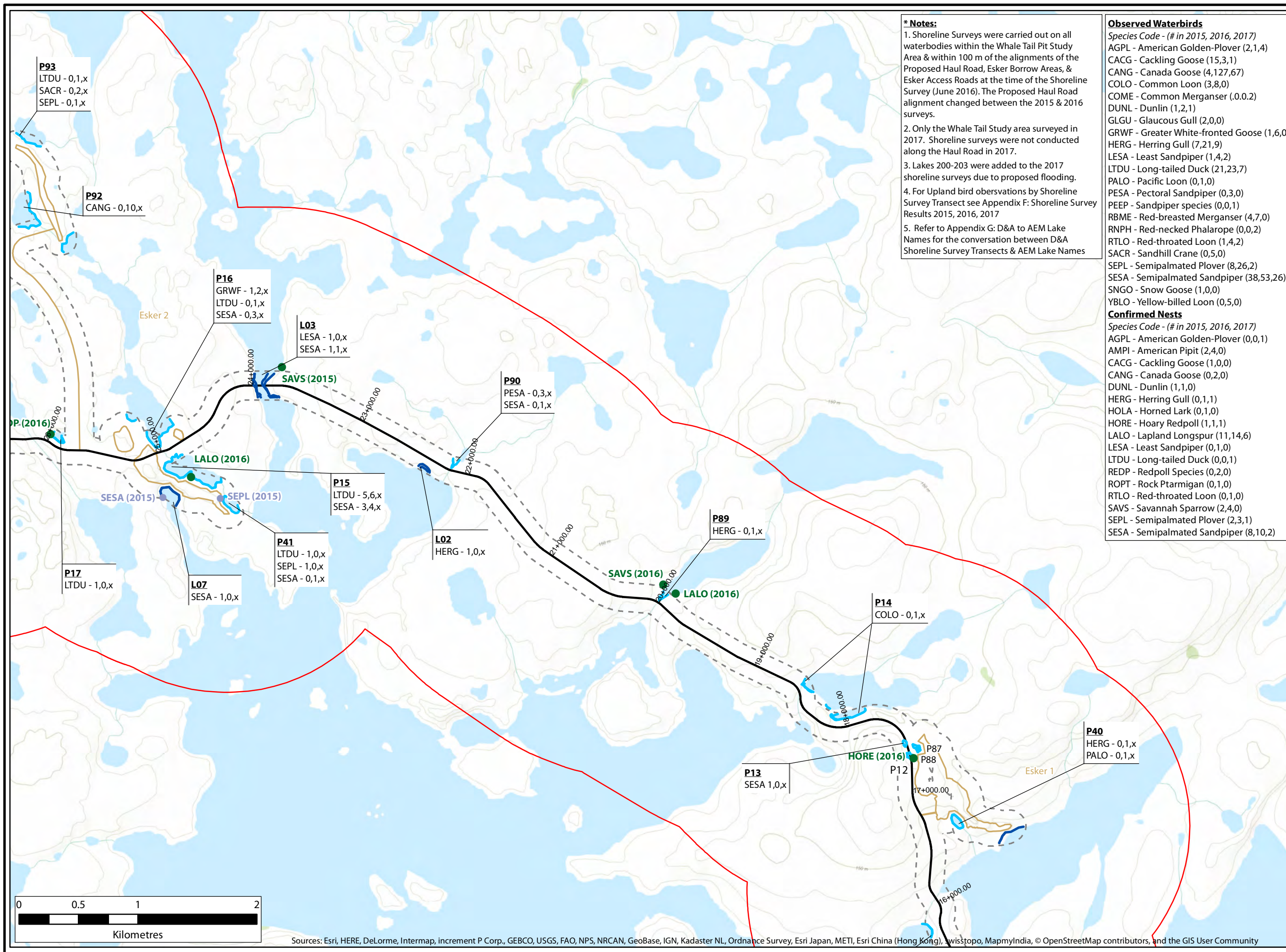
CLIENT: Agnico Eagle Mines Limited

DATE: NOVEMBER 21, 2017
SCALE: 1:30,000
DRAWN BY: Lindsey Carter
CHECKED BY: Mary Anne Young

UTM Zone 14 NAD83

Figure:  
 11 - 4

The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should not be relied on as being a precise indicator of locations, features, or roads, nor as a guide to navigation.



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  - COME - Common Merganser (0,0,2)
  - DUNL - Dunlin (1,2,1)
  - GLGU - Glaucous Gull (2,0,0)
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  - HERG - Herring Gull (7,21,9)
  - LESA - Least Sandpiper (1,4,2)
  - LTDU - Long-tailed Duck (21,23,7)
  - PALO - Pacific Loon (0,1,0)
  - PESA - Pectoral Sandpiper (0,3,0)
  - PEEP - Sandpiper species (0,0,1)
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  - RNPH - Red-necked Phalarope (0,0,2)
  - RTLO - Red-throated Loon (1,4,2)
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  - SNGO - Snow Goose (1,0,0)
  - YBLO - Yellow-billed Loon (0,5,0)
- Confirmed Nests**
- Species Code - (# in 2015, 2016, 2017)
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  - AMPL - American Pipit (2,4,0)
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  - HERG - Herring Gull (0,1,1)
  - HOLA - Horned Lark (0,1,0)
  - HORE - Hoary Redpoll (1,1,1)
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  - ROPT - Rock Ptarmigan (0,1,0)
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  - SEPL - Semipalmated Plover (2,3,1)
  - SESA - Semipalmated Sandpiper (8,10,2)

**Legend**

**Confirmed Breeding<sup>1</sup> (2015-2017)**

**Waterbirds**

- Additional Confirmed Breeding
- Confirmed Nest

**Upland Birds**

- Confirmed Nest

**Waterbird Survey Transect**  
(D&A, 2015 - 2017)

- Lake
- Pond

**Map Base**

- Esker or Esker Access Road
- Proposed Haul Road (AEM, Nov. 2015)
- - - Shoreline Survey Area \*
- LSA Boundary
- RSA Boundary

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Characterization Report  
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PROJECT: Whale Tail Pit & Haul Road  
CLIENT: Agnico Eagle Mines Limited

	DATE: NOVEMBER 21, 2017
	SCALE: 1:30,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young

Figure:  
**11 - 5**

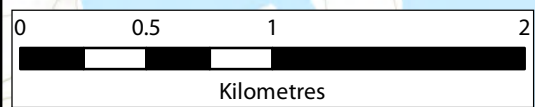
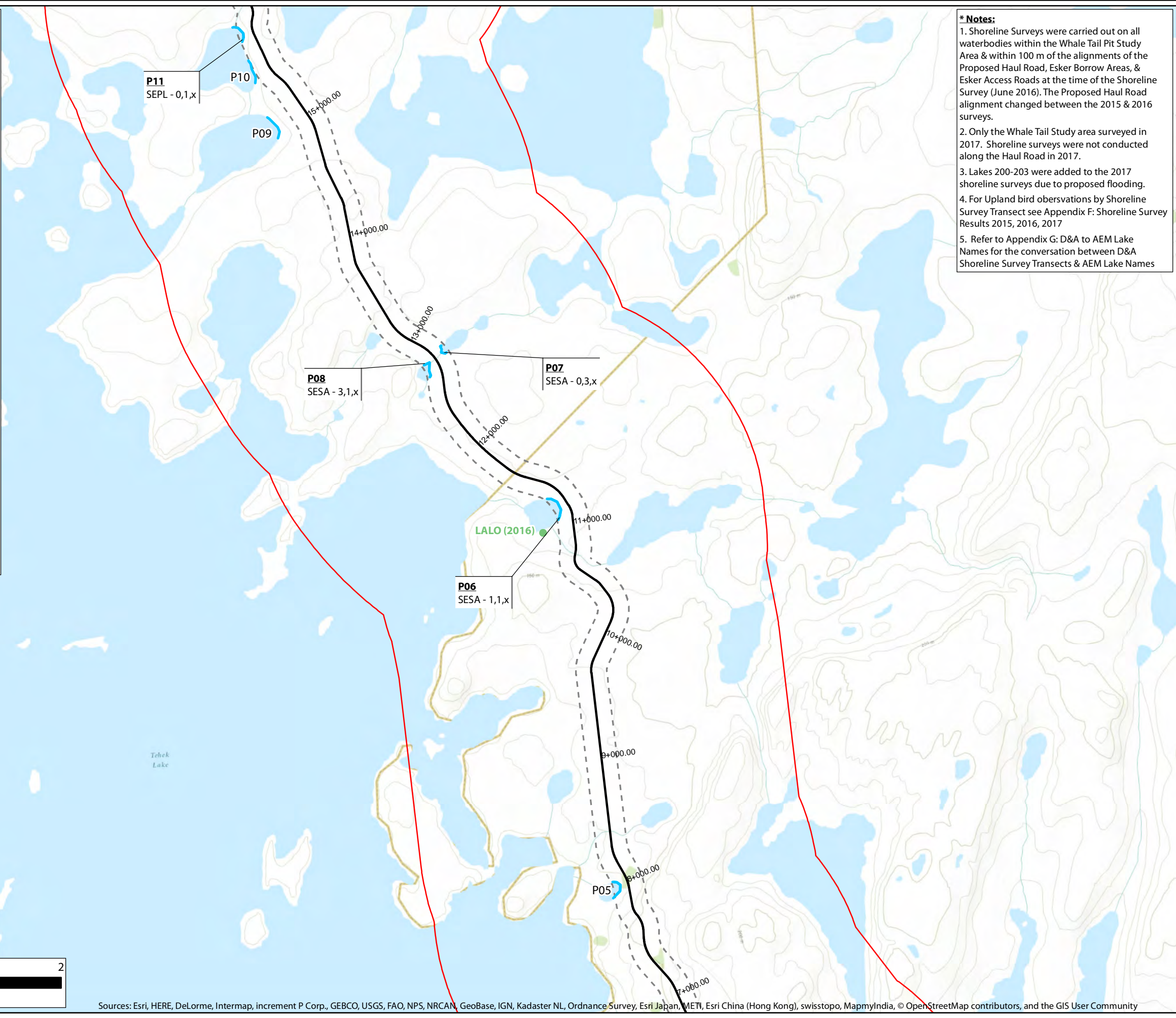
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 RBME - Red-breasted Merganser (4,7,0)  
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 SACR - Sandhill Crane (0,5,0)  
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 SNGO - Snow Goose (1,0,0)  
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- Confirmed Nests**  
*Species Code - (# in 2015, 2016, 2017)*  
 AGPL - American Golden-Plover (0,0,1)  
 AMPI - American Pipit (2,4,0)  
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- Legend**
- Confirmed Breeding <sup>1</sup> (2015-2017)**
- Upland Birds**
- Additional Confirmed Breeding
- Waterbird Survey Transect**  
(D&A, 2015 - 2017)
- Pond
- Map Base**
- Proposed Haul Road (AEM, Nov. 2015)
  - - - Shoreline Survey Area \*
  - LSA Boundary
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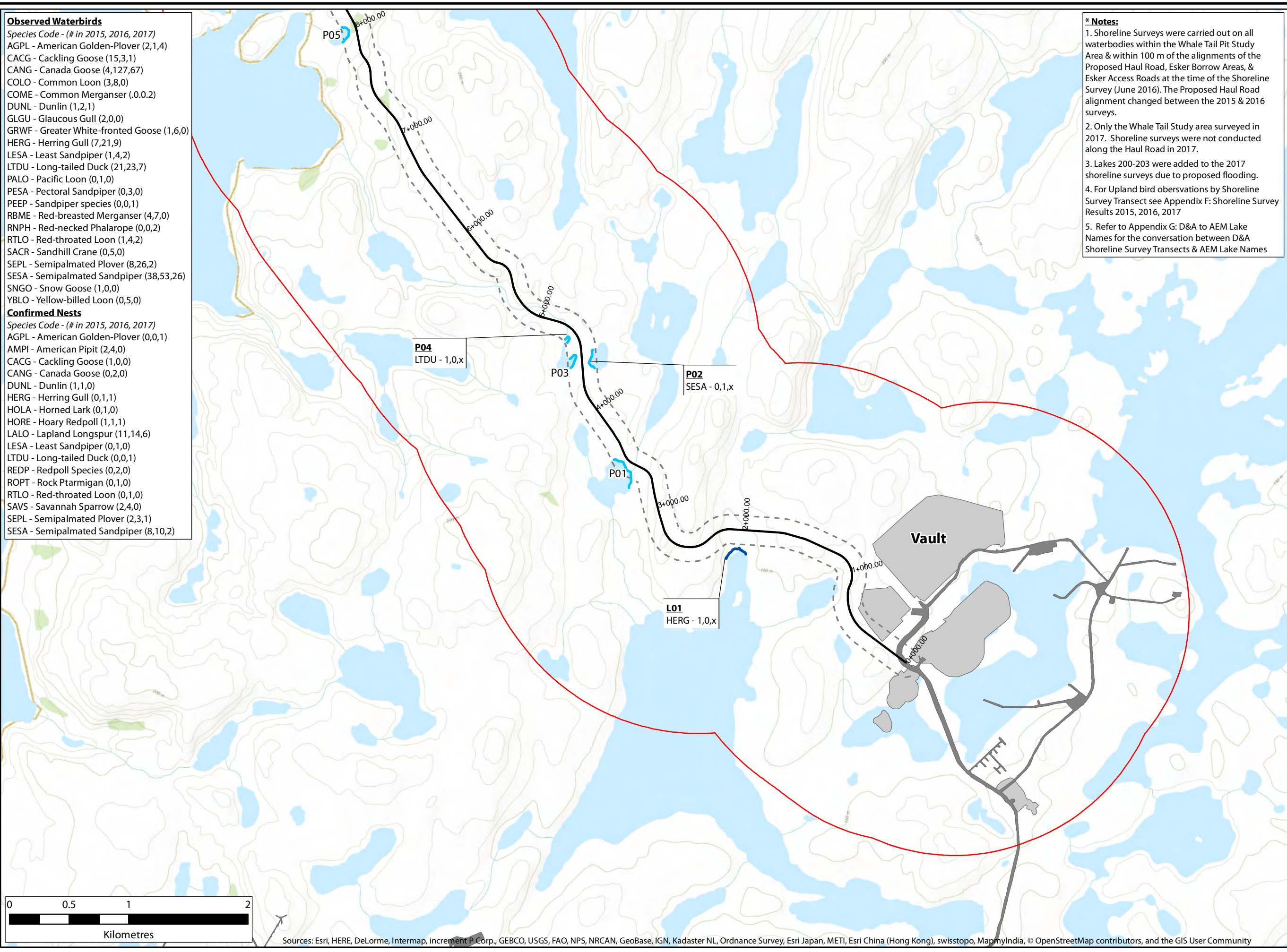
Figure:  
**11 - 6**

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- Legend**
- Waterbird Survey Transect**  
(D&A, 2015 - 2017)
- Pond
  - Proposed Haul Road (AEM, Nov. 2015)
  - Mine Site
  - Road
  - Shoreline Survey Area \*
  - LSA Boundary
  - RSA Boundary



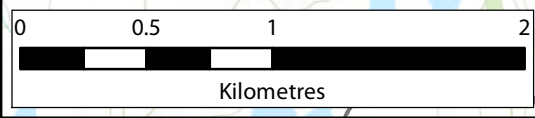
Whale Tail Pit & Whale Tail Haul Road  
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**2015-2017 Shoreline Surveys**



CLIENT: Agnico Eagle Mines Limited	DATE: NOVEMBER 21, 2017
	SCALE: 1:30,000
	DRAWN BY: Lindsey Carter
	CHECKED BY: Mary Anne Young

Figure:  
**11 - 7**

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# **APPENDIX I**

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## **Predatory Mammal Den Management and Protection Plan**

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## BACKGROUND AND PURPOSE

---

Predatory mammals represent a valued ecosystem component (VEC), which occur and are known to den in the vicinity of the Meadowbank and Whale Tail Project facilities. Sensory disturbances near to active dens such as blasting, vehicles and, most significantly, ground personnel, may negatively impact denning success by inducing stress responses in the adult mammals, which can result in den abandonment.

This plan is applicable to four species:

- Arctic wolf (*Canis lupus*) natal dens
- Grizzly bear (*Ursus arctos*) natal/overwintering dens
- Arctic fox (*Vulpes lagopus*) natal dens
- Wolverine (*Gulo gulo*) natal dens

The purpose of this plan is to provide a framework for identification, characterization, and monitoring of predatory mammal dens in order to protect any detected dens from disturbance throughout exploration and operation activities in the vicinity of all Meadowbank and Whale Tail Project facilities. The plan will include consultation with the Government of Nunavut (GN) with respect to obligations under the *Wildlife Act*, SNU 2003, c. 26.

## MANAGEMENT AND PROTECTION PLAN PROTOCOL

---

### Overview

All observation visits to any active predatory den site must be undertaken with utmost care to avoid disturbing the den. Observations will take place from the greatest possible distance that allows for accurate observation and will employ binoculars and spotting scopes.

### Stage 1 – Detection

Detection of predatory mammal dens will be completed using a combination of targeted surveys prior to new construction and ongoing wildlife monitoring during operation.

<b>OPTION A – DURING OPERATION</b>	<b>OPTION B – PRIOR TO CONSTRUCTION</b>
<b>During project facilities operation;</b>  Predatory mammal observations, including any indication of denning, will be recorded at any point during operation of project facilities. This detection will be supported by ongoing monitoring activities: road surveys and height-of-land surveys in conjunction with incidental observations by AEM personnel.	<b>Prior to construction of any new project facilities;</b>  High-suitability denning habitat (i.e. eskers) within 1 km of the project footprint will be investigated for active predatory mammal dens.

If active predatory mammal dens are detected during Option A or Option B of Stage 1 (listed above) then proceed to Stage 2 of the protocol. If no active dens are detected then continue with Stage 1: Option A is ongoing and Option B is to be utilized as needed.

### **Stage 2 – Identification and Characterization**

If an active predatory mammal den has been detected, Stage 2 of the protocol will be undertaken. In the table below, a list of the identification questions and examples of characterization answers are provided. This process will involve the completion of the following questions as well as dates, timing, identification information about the observer(s), and any additional comments. A blank version of this table, which can be used as a field data collection sheet, is provided at the end of this Appendix.

	<b>Identification Questions to be Answered</b>	<b>Characterization Answer Examples</b>
1	Unique ID?	e.g Wolf Den 01
2	What predatory mammal species is occupying the active den?	e.g. Arctic wolf; Grizzly bear; Arctic fox; Wolverine
3	Coordinates of the active den?	UTM Coordinates of den
4	Site description?	e.g. Arctic fox denning under trailer near Whale Tail helipad  e.g. Arctic wolf den located approximately 800 meters from Whale Tail haul road on the south facing side of an ~8m tall esker.
5	Juveniles Observed?	e.g. Yes; 3 fox pups observed in the entering the den.  e.g. No; wolf pups have not been observed directly. However, the behaviour of the adult wolves, the repeated observations of wolves at the site, the sandy ridge location of the site and the observations of wolf burrows at the site indicate that an active den with juveniles is highly probable.
6	Disturbance and impact considerations?	e.g. The wolf den occurs within 800 m of the Whale Tail haul road. As such vehicle noise, including helicopters, is frequently present within 1 km of the den site.
7	Adaptive management considerations?	e.g. Ground personnel access will be restricted within 1km of the den and, as much as possible, vehicles will not stop on the roadway at km 35. Helicopter routing will be advised and flybys of the esker at this location will be minimized.
8	Recommended monitoring program?	e.g. Weekly checks by the den monitoring survey team will be undertaken to monitor the progress of den development (i.e. age of pups), investigate for signs of adult stress responses and inform any additional adaptive management requirements. Checks will be undertaken from a height-of-land at (coordinates), approximately 300 m NW of the suspected den location.

### **Stage 3 – Monitoring**

Monitoring visits will be undertaken at the frequency, distance and location recommended by the identification and characterization stage (Stage 2). In addition to the information in the table below, dates, timing, identification information about the observer(s), and any additional comments will be recorded. A blank version of this table is provided at the end of this appendix.

	<b>Monitoring Questions to be Answered</b>	<b>Monitoring Characterization Answer Examples</b>
1	Unique ID?	Wolf Den 01
2	Changes to disturbance and impact considerations?	e.g. frequency of helicopter flybys within 1 km have increased in conjunction with construction activities at the Whale Tail site.
3	Development stage of den?	e.g. Pups are now more active outside of the den.
4	Changes to site location?	e.g. Adult wolves still display territorial behaviours, but the specific den has likely been relocated ~200m to the NE.
5	Recommended changes to monitoring program?	e.g. Weekly monitoring is considered sufficient.  e.g. Recommendation to reduce monitoring to bi-weekly visits: wolf den establishment appears stable, so reduction of personnel presence in the area is advisable
6	Recommended adaptive management considerations?	e.g. Continue restricting access to ground personnel within 1 km of the den.  e.g. Develop new flight path instructions with helicopter teams. Avoid flybys over the den by at least 1 km.

Monitoring (Stage 3) continues at the rate recommended by Stage 2 assessment and all subsequent monitoring visits. Monitoring of an active den will be discontinued once the pups have left the den, the den has been relocated to a distance greater than 1 km from operating facilities, or the potential impacts to the den are considered negligible.

### **ADAPTIVE MANAGEMENT**

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Based on findings from Stage 3 monitoring, new adaptive management solutions may be required to prevent negative impacts to the active predatory mammal den. This may include the restriction of movements or activities by certain vehicles or work teams to minimize disturbances. It may also include alterations to monitoring activities to reduce disturbances or increase the amount of information available to inform management decisions. See Chart 3 in 2016 TEMP for adaptive management timing and work flow.

**Data Sheet for Stage 2 – Identification and Characterization**

**Date:**

**Observer:**

	<b>Identification Questions to be Answered</b>	<b>Characterization Data</b>
1	Unique ID?	
2	What is the predatory mammal species is occupying the active den?	
3	Coordinates of the active den?	
4	Site description?	
5	Juveniles Observed?	
6	Disturbance and impact considerations?	
7	Adaptive management considerations?	
8	Recommended monitoring program?	

**Data Sheet for Stage 3 – Monitoring**

**Date:**

**Observer:**

	<b>Monitoring Questions to be Answered</b>	<b>Monitoring Data</b>
1	Unique ID?	
2	Changes to disturbance and impact considerations?	
3	Development stage of den?	
4	Changes to site location?	
5	Recommended changes to monitoring program?	
6	Recommended adaptive management considerations?	