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# MEADOWBANK MINE

## 2019 WILDLIFE MONITORING SUMMARY REPORT

FINAL

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## APPENDIX I

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### Remote Camera Protocol – Whale Tail Haul Road

## TECHNICAL MEMORANDUM

**DATE** 27 November 2019

**Project No.** 19124290-412-TM-Rev0

**TO** Robin Allard  
Agnico Eagle

**CC** Nancy Duquet-Harvey (Agnico Eagle)  
Corey De La Mare, Daniel Coulton (Golder)

**FROM** Carolina Leseigneur Torres and Lynnette Dagenais

**EMAIL**  
[Carolina\\_LeseigneurTorres@golder.com](mailto:Carolina_LeseigneurTorres@golder.com)

### REMOTE CAMERA PROTOCOL – WHALE TAIL HAUL ROAD

#### 1.0 INTRODUCTION

This technical memorandum outlines a standard protocol for the remote camera program for the Whale Tail Haul Road. The remote camera program is part of the on-site caribou monitoring program as outlined in the Terrestrial Ecosystem Management Plan (TEMP; Agnico Eagle 2019). A pilot camera monitoring program was initiated in October 2018 to assess the suitability of the use of remote cameras to collect supplemental data on caribou crossings along the Whale Tail Haul Road. For reference, details on the 2018 program are included in Appendix A.

During the Technical Meetings for the Whale Tail Pit Expansion Project that were held from June 11 to 13, 2019 in Baker Lake, Nunavut, Agnico Eagle Mines Limited (Agnico Eagle) committed to develop a study design to examine the permeability of the Whale Tail Haul Road to caribou movement as those interactions relate to the physical parameters of the road, including backfill height, slope and material grain size (Commitment #13). As the 2018 program was not designed to monitor caribou use relative to the physical parameters of the Haul Road, a new program design was required. The 2019 protocol outlined in this document allows for comparisons to determine if caribou crossing locations along the Whale Tail Haul Road are related to the physical parameters of the road. Further details about the design of the 2019 camera monitoring program are provided in the sections below.

#### 2.0 OVERVIEW AND BACKGROUND INFORMATION

The Whale Tail Haul Road (hereafter referred to as the 'Haul Road') is approximately 65 kilometres (km) in length and connects the Meadowbank Mine to the Whale Tail Pit. The Haul Road is an extension of the All-Weather Access Road (AWAR) that connects the Meadowbank Mine to the community of Baker Lake, Nunavut. As described in the Final Environmental Impact Statement (FEIS) and FEIS Addendum for the Whale Tail Project (Golder 2016, 2018), the general area around the Meadowbank Mine (including the Whale Tail Pit) is largely composed of low sloping uplands, plains, and valleys, with frequent lichen-covered rock outcrops and tundra vegetation. Closer to the mine, Whale Tail Pit, and the Haul Road there are rolling hills with abundant lakes and ponds.

Barren-ground caribou (*Rangifer tarandus tarandus*) cross the Haul Road during the spring and fall migrations to reach calving and wintering areas, respectively (Golder 2016). Per the FEIS Addendum for the Whale Tail Expansion Project (Golder 2018), the Haul Road is currently 9.5 metres (m) wide but is proposed to be expanded to 15 m in width for improved traffic safety. If the road is expanded, it will maintain design parameters that allow caribou and other wildlife to cross (i.e., a 4:1 slope). The majority of the Haul Road has an average height of 1.2 m, with approximately 75% of the Haul Road having a height of less than 1.5 m from the ground surface. The Whale Tail and IVR pits, the underground mine, and associated components will operate as a satellite of the main Meadowbank Mine and will be accessed via the Haul Road. Haul Road traffic volumes will remain the same as those previously assessed under the FEIS for the Whale Tail Project (see Volume 4, Appendix 4-B, Table 4-B-15 in Golder 2016; and Volume 4, Appendix B, Table 4-B-20 in Golder 2018). As a commitment during the Whale Tail Expansion Project review phase (Commitment #8), a caribou crossing analysis was completed for the Haul Road to inform on potential areas where physical parameters might be modified to improve caribou passage (Golder 2019a). This analysis considered caribou collar data, Meadowbank Mine monitoring data and Traditional Knowledge on caribou migration through the area.

Motion-triggered cameras have been in use for wildlife research for many years (Cutler and Swann 1999), and their use has increased in recent years as the technology has become more affordable and accessible. The use of remote cameras along roads to monitor various activities, including wildlife activity, is becoming more common (Noel et al. 2006; Braden et al. 2008; Dunne and Quinne 2009). The advantage of cameras over other methods such as track counts, radio telemetry and visual and drive-by surveys is that remote cameras can be deployed year-round with minimal invasiveness to wildlife, whereas the other methods can often be tied down to 'snapshots in time' or limited in visual area observed.

### 3.0 2019 REMOTE CAMERA PROTOCOL

Remote cameras are to be deployed year-round, with regular visits to complete photo downloads and maintenance. Remote camera effort is determined as the number of days a camera is operational and taking at least one timed photo per day.

Procedures for software settings for camera and memory card settings, time settings, data recording and additional instructions on camera setup are provided in the Specific Work Instructions and Technical Procedures in Appendix B.

#### 3.1 Equipment

- 20 Reconyx HyperFire 2 Professional Covert IR Camera OD Green cameras
  - Field of View (FOV) angle: 38°
- 20 SD Cards, 32GB Reconyx-certified memory cards
- Lithium batteries (AA size – 12 per camera)
- 20 sets of combination locks and bungee cords for field setup
- Data sheets for camera deployment, maintenance checks, and retrieval

## 3.2 Camera Monitoring Locations

The 2019 remote camera monitoring locations are based on recent analyses completed using available caribou collar data from 1998 to 2019 for the Lorillard herd, as well as Meadowbank Mine monitoring data and Traditional Knowledge on caribou migration (Golder 2019a). The study design for camera monitoring at the Ekati mine was also considered (ERM 2016). Golder (2019b) found that caribou crossing locations along the Haul Road varied along the length of the road. Common crossing locations occur between KM 113 (previously KM 0) to KM 123, KM 145 to KM 151, KM 154 to KM 158, KM 161 to KM 165 and KM 168 to KM 177 (end of Haul Road). The locations with the highest crossing frequencies, based on collar data, occur within the first 10 km of the Haul Road (Golder 2019a). Selected locations also considered the distribution of categories of road height, which is described below. Other physical attributes of the Haul Road such as slope and material size are unknown at this time but will be measured in the field.

The 2019 remote camera locations are presented in Table 1 and shown (in pairs) on Figure 2. These locations take into account high-frequency crossing locations along the Haul Road (Golder 2019a), as well as road elevation (per data provided by Agnico Eagle in 2019). A coarse-level engineering assessment of Haul Road height indicates that approximately 48.8 km (75%) of the Haul Road is less than 1.5 m, 11.7 km (18%) is from 1.5 m to 3.0 m and 4.6 km (7%) is greater than 3.0 m. To determine if road elevation (and other physical parameters) influences caribou movements across the Haul Road, three sets of camera pairs were placed at locations where the road height is 1.5 to 3 m and >3 m above the surrounding landscape, respectively. Four camera pairs were placed in road elevations <1.5 m as most of the Haul Road is within this height category and caribou crossing most commonly occur where the road is <1.5 m higher than the surrounding landscape.

**Table 1: 2019 Remote Camera Locations -**

Remote Camera Label	KM Location Reference	Road Height (m)	UTM Coordinates (NAD83; Zone 14W)	
			Easting	Northing
AECC01/AECC02	117	>3	638160	7221584
AECC03/AECC04	132	>3	631978	7233582
AECC05/AECC06	136	1.5 to 3	628561	7235925
AECC07/AECC08	138	<1.5	626880	7236344
AECC09/AECC10	146	>3	619900	7235277
AECC11/AECC12	153	<1.5	618375	7239006
AECC13/AECC14	157	1.5 to 3	620722	7243305
AECC15/AECC16	161	<1.5	619336	7246442
AECC17/AECC18	170	<1.5	612382	7250114
AECC19/AECC20	172	1.5 to 3	611528	7251979

> = greater than; < = less than; KM = kilometre; m = metre; UTM = Universal Transverse Mercator

During deployment in early November 2019, it was noted that four cameras were no longer available; these cameras will be replaced. The remaining 16 active cameras were deployed at the locations indicated in Table 2, to monitor a range of locations with varying road heights. The cameras will be re-deployed per the locations in Table 1 once the additional cameras are purchased.

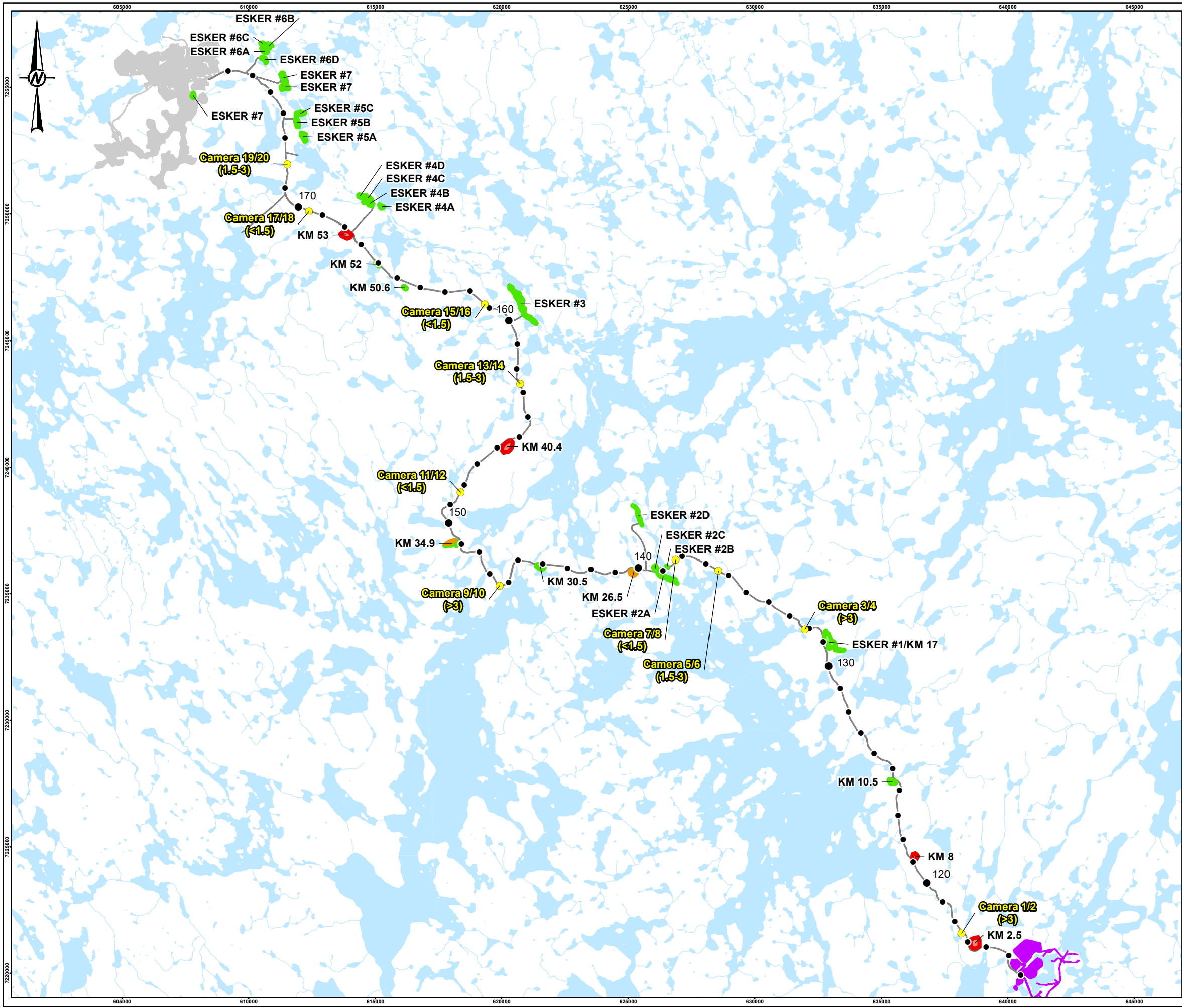
**Table 2: 2019 Remote Camera Locations – Deployed November 2019**

Remote Camera Label	KM Location Reference	Side of Road	Road Height (m)	UTM Coordinates (NAD83; Zone 14W)	
				Easting	Northing
AECC01/AECC02	117	West	>3	631995	7233610
AECC03/AECC04	132	West	>3	631995	7233610
AECC05/AECC06	136	West	1.5 to 3	628545	7235909
AECC07/AECC08	172	East	<1.5	611531	7251976
AECC09/AECC10	157	East	>3	620735	7243322
AECC11/AECC12	152	East	<1.5	618378	7239002
AECC15/AECC16	161	East	<1.5	612385	7250126
AECC17/AECC18	170	West	<1.5	612385	7250126

> = greater than; < = less than; KM = kilometre; m = metre; UTM = Universal Transverse Mercator



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**LEGEND**

- 2019 CARIBOU REMOTE CAMERA MONITORING LOCATION
- KILOMETRE MARKER
- WHALE TAIL
  - ESKER/QUARRY (APPROVED)
  - ESKER/QUARRY (EXPANSION)
  - ESKER/QUARRY (NEW)
- INFRASTRUCTURE
- HAUL ROAD
- MEADOWBANK OPERATION AND INFRASTRUCTURE
- WATERCOURSE
- WATERBODY

0 3,000 6,000  
1:150,000 METRES

**REFERENCE(S)**

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

CLIENT

**AGNICO EAGLE**

PROJECT

WHALE TAIL PIT - EXPANSION PROJECT

TITLE

**2019 CARIBOU REMOTE CAMERA MONITORING LOCATIONS**

CONSULTANT	YYYY-MM-DD	2019-10-24
	DESIGNED	LD
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO. 19124290

CONTROL 8000/8020

REV. A

FIGURE 1

28mm

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### 3.3 Camera Deployment and Settings

The cameras will be deployed by Agnico Eagle technicians. At each location (Section 3.2) the first camera in the pair (camera A) will be placed facing parallel to the Haul Road (i.e., recording observations of caribou crossing the Haul Road) in one direction (e.g., north) (Figure 2). The second camera in the pair (camera B) will be placed facing parallel to the Haul Road in the opposite direction of camera A (e.g., south) (Figure 2). Cameras will be placed in close proximity to the Haul Road (within 5 m, approximately 1 m above ground level, see Appendix B). This configuration provides a field of view that will capture Haul Road traffic and caribou interactions with the Haul Road. This configuration is also consistent with camera-road monitoring completed at the Ekati mine (ERM 2016). Where possible, cameras should be positioned facing NE, NW, or N to avoid sun glare.

Camera timing will be set to the continuous motion-triggered setting, with additional timed interval photos occurring every hour.

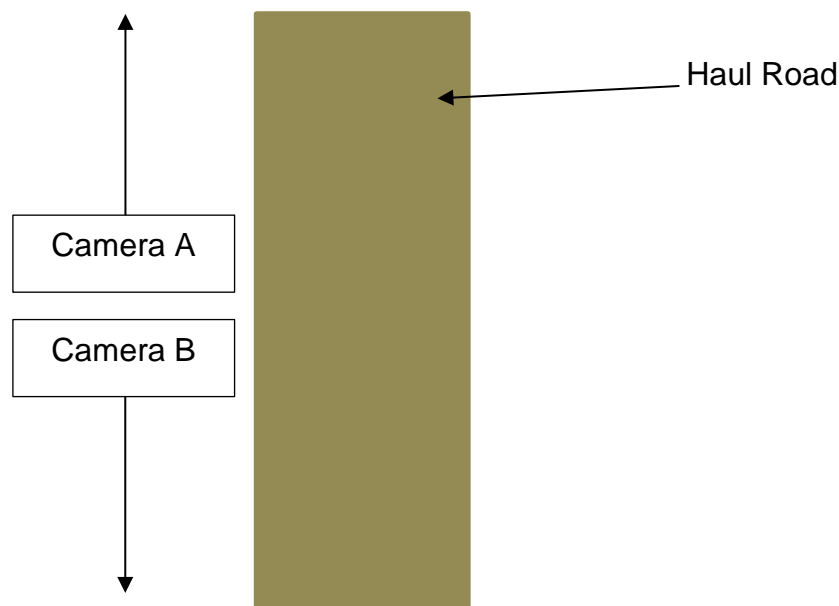


Figure 2: Example of 2019 Camera Positioning to Capture Caribou Crossing of the Haul Road

### 3.4 Camera Maintenance and Data Downloads

Maintenance checks and data downloads will occur at least every 1-2 months by Agnico Eagle technicians. Camera integrity and battery life will be checked during each maintenance visit. Additionally, the 32 GB memory cards will also be downloaded during each maintenance visit. The easiest way for crews to download the data is to have duplicate SD cards for the cameras and switch them out periodically. Memory cards must be of a certain type (speed and size) and programmed to properly function in the camera (see Appendix B and the HyperFire Instruction Manual).

If cameras require repair or replacement, they should be re-deployed at the earliest opportunity to minimize data loss.



### 3.5 Data Transfer

Data downloads from the remote cameras will be completed by Agnico Eagle technicians (Section 3.4) and saved on Agnico Eagle's computer systems. It is recommended that, at a minimum, downloaded data be transferred to Golder every quarter of any given year (e.g., January, April, July, and October).

Given the size of data files to be transferred, it is recommended to upload data to an external hard drive for shipment to Golder. The original files on Agnico Eagle's computer systems should be retained to minimize risk of data loss or corruption.

### 3.6 Photograph Review and Quality Assurance/Quality Control (QA/QC)

Remote camera photographs have inherent limitations tied to the field of view of the camera as well as potentially recording the same individual(s) more than once. As such, the quantitative analyses will be restricted to motion-trigger photos to eliminate potential bias of recording the same individual(s), and additional photos will be considered for supplementary or qualitative information.

The number of photos for each species will be determined by counting the number of separate detections, initiated by the first trigger of an identified wildlife species. For a particular species event, additional photos will not be counted until an hour had passed or until there is a distinguishable difference between separate individuals triggering the camera.

All data will undergo a QA/QC process, whereby at least 15% of the photos from each camera will be reviewed to determine if species and number of individuals observed are identified correctly.

### 3.7 Data Analysis

Species detections are defined as the number of individual observations for a given species or group.

A photo rate will be calculated for each species recorded and will be used as a metric for species relative abundance. A photo rate will be determined for each species photographed and will include vehicles. The photo rate is the number of detections of a given species divided by the camera station sampling effort in months. The number of active months for each camera will be calculated as follows:

$$\text{number of months} = (\text{number of active days} / 365 \text{ days}) * 12 \text{ months}$$

Statistical analyses will focus on investigating the interactions between caribou during spring and fall migrations and road elevation.

Additional analyses looking at caribou behaviour (Table 3) and if caribou crossing is influenced by the number of vehicles using the road may also be completed.

**Table 3: Animal Behaviours**

Behaviour	Description
Crossing Event	Caribou recorded crossing the road (fully crossed, walking or running)
Deflection Event	Caribou deflected or deterred from crossing (no full cross/return, walking or running)
Stressed Behaviour (Alert, Run)	Alert – evidence of stress or being startled (head up/down, tail flicks, quick run or change of direction) Deflection Event Running – can be split into running away from/along/off road
Neutral Behaviour (Stay/Stand, Walk)	Stay or standing Normal walking (along road)
Calm Behaviour (Resting, Foraging, Curiosity)	Resting/Laying Down away from or near road Foraging away from/near road Foraging while walking Curiosity (e.g. approach to investigate remote camera or parked vehicle in field or view)

### 3.8 Reporting

Results of the remote camera monitoring program will be reported as part of the TEMP Annual Report to the Nunavut Impact Review Board (NIRB), in compliance with Project Certificate No.008 Terms and Conditions and its respective amendments.

## 4.0 CLOSURE

We trust the above meets your needs. Please contact the undersigned if any questions or concerns.



Carolina Leseigneur Torres, M.Sc.  
*Project Manager, ESIA Specialist and Biologist*



Lynnette Dagenais, M.Sc.  
*Terrestrial Ecologist*



Corey De La Mare  
*Principal - Project Director, Senior Ecologist*

CLT/LD/CD/jr

[https://golderassociates.sharepoint.com/sites/110051/project files/5 technical work/05\\_reporting\\_data\\_mgmt/remote camera monitoring plan-rprt/rev0/19124290-412-tm-remotecameraprotocol-mbk-wt-rev0.docx](https://golderassociates.sharepoint.com/sites/110051/project%20files/5%20technical%20work/05_reporting_data_mgmt/remote%20camera%20monitoring%20plan-rprt/rev0/19124290-412-tm-remotecameraprotocol-mbk-wt-rev0.docx)

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**APPENDIX A**

**2018 Remote Camera Program -  
Whale Tail Haul Road**



## WHALE TAIL HAUL ROAD – 2018 REMOTE CAMERA PROGRAM

The remote camera program was initiated on the Whale Tail Haul Road (Haul Road) on 22-30 October 2018, during the fall caribou migration. The purpose of the 2018 camera program was to obtain preliminary photographic data to examine if there were any observable trends related to the distribution of caribou road crossings and effects of traffic or road activities. These data can inform mitigation measures for traffic and road activities in tandem to data observed through ongoing caribou surveys and analysis of collared caribou data. Remote cameras were deployed in a simple paired design at select locations, within 15 to 25 m off the Haul Road on either side as follows:

- Camera 1: Facing the road, looking West (to capture crossing/avoidance of the road by caribou)
- Camera 2: Facing away from the road, looking West (to capture deflection/avoidance of the road by caribou)
- Timing: continuous motion-triggered setting, with timed interval photos every hour
  - Remote camera effort is tracked as number of days a camera was operational at a location and taking at least one timed photo per day.



Camera 1: Towards Road  
(Camera 2 circled in red)



Camera 2: Away from Road

### Figure A-1: Sample Camera Setup – October 2018

This camera setup allowed to observe caribou crossings and deflections to obtain preliminary observations and to inform future study design.

The majority of the remote camera pairs were placed between kilometer (KM) 116 (previously KM 2.5) and KM 159 (previously KM 46) along the Haul Road, with most placed between KM 116 and 142. These locations were selected based on a review of 2017 caribou collar data during the fall migration, as received from the Government of Nunavut (GN) under a data sharing agreement. The 2017 collar data indicated the majority of collared caribou crossed at locations between these two kilometer points, though this did not account for considerations of ground elevation and was based on a small number of collared caribou. The remote camera locations are summarized in Table A-1 and shown (in pairs) on Figure A-2.

**Table A-1: Remote Camera Locations - October 2018**

Remote Camera Label	KM Location Reference	UTM Coordinates (WGS 1984)	
		Easting	Northing
AECC01	KM 116	638850.715	7221003.392
AECC02	KM 116	638870.129	7220970.823
AECC03	KM 123	635713.623	7226020.663
AECC04	KM 123	635667.163	7226011.172
AECC05	KM 118	637976.932	7221904.714
AECC06	KM 118	638011.854	7221913.7
AECC07	KM 133	631236.581	7234210.812
AECC08	KM 133	631221.63	7234217.284
AECC09-02	KM 129	633423.422	7231113.989
AECC10-02	KM 129	633448.363	7231130.857
AECC11	KM 158.5	620616.892	7244380.36
AECC12	KM 158.5	620655.409	7244367.662
AECC13-2	KM 133.5	630998.124	7234324.403
AECC14-2	KM 133.5	631019.539	7234340.085
AECC15	KM 141	624700.038	7235822.134
AECC16	KM 141	624708.686	7235854.52
AECC17	KM 136	628944.039	7235753.636
AECC18	KM 136	628925.231	7235728.712
AECC19	KM 148.5	618657.106	7236612.722
AECC20	KM 148.5	618662.597	7236639.041

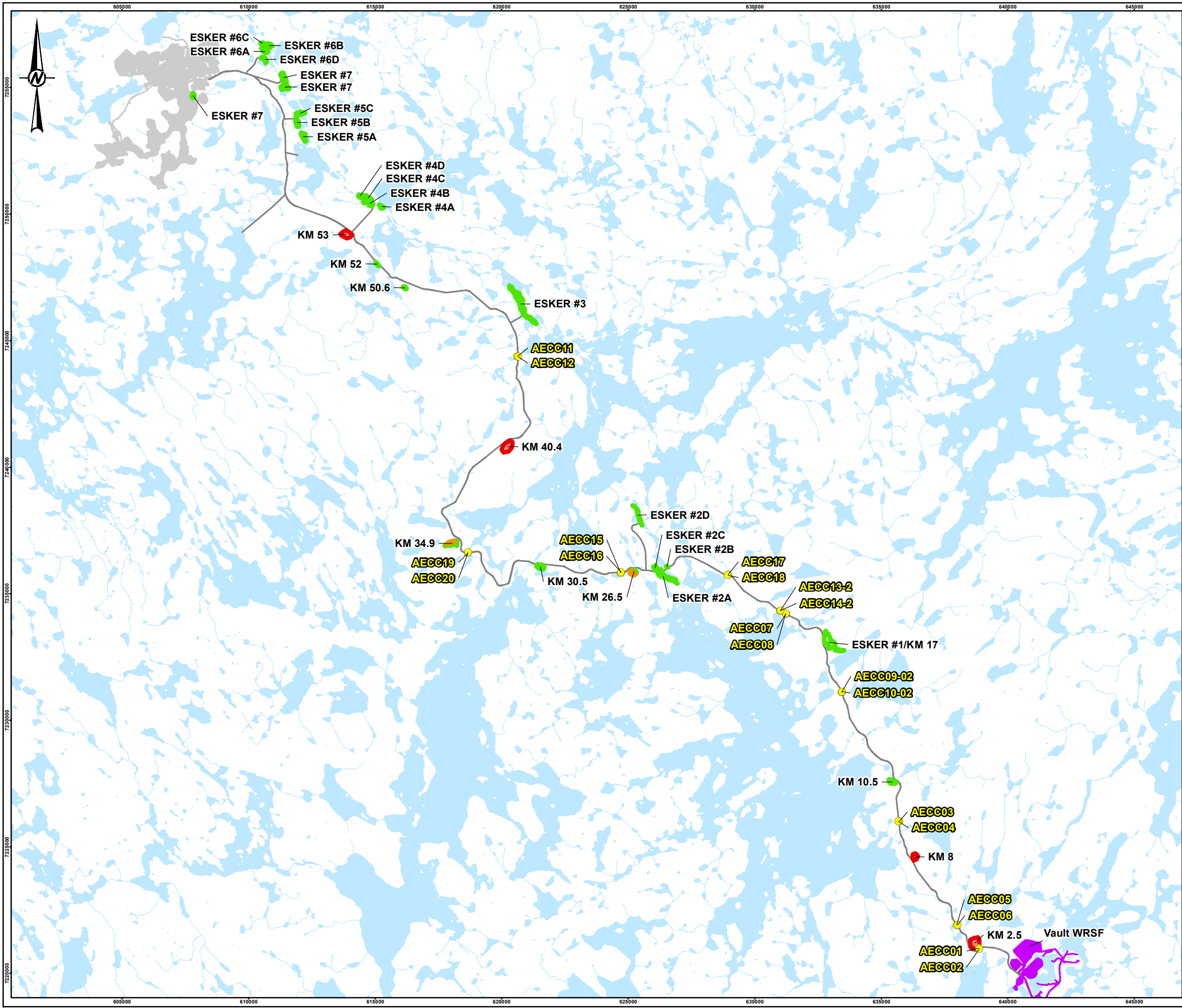
The remote camera monitoring locations are revised for the 2019 program moving forward, as outlined in the main document, based on recent analyses completed for available caribou collar data sourced from the GN between 1998 and 2019 for the Lorillard herd including a review of available literature (Golder 2019a,b). As reported, there is quantitative evidence (Boulanger et al. 2012, Golder 2014, 2016; Johnson et al. 2005; Plante et al. 2018) alongside Traditional Knowledge (Sadownik and Harries 1995; Jacobsen 2011) that caribou movements are relative to the presence of lakes, forage quality and topography, where movement rates are reduced in rugged terrain or where high quality habitat is encountered while large lakes are avoided.

The caribou movements for the Lorillard herd in relation to the Haul Road and the AWAR indicated that movement is reduced in high quality habitat and where large lakes are encountered, reflecting longer residencies and navigation to avoid lakes, respectively (Golder 2019b). Crossing locations along the Haul Road were varied along the length of the road – the more common crossing locations occur between KM 113 (previously KM 0) to 123, KM 145 to 151, KM 154 to 158, KM 161 to 165 and KM 168 to 177 (end of Haul Road), though the locations with the highest crossing frequencies, based on collar data, occur within the first 10 km of the Haul Road (Golder 2019a).

## References

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**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)**

- INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED, DRAWING AMQ 202504V5.DWG.
- 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 CAMERA MONITORING LOCATIONS

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

GOLDER

PROJECT NO.	CONTROL	REV.	FIGURE
18101195	4000/4030	0	A-2

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**APPENDIX B**

# Specific Work Instructions and Technical Procedures