DE BEERS GROUP

31 March 2025

James Hodson
Manager, Habitat and Environmental Assessment
Department Environment and Natural Resources
Government of Northwest Territories
P.O. Box 1320
Yellowknife, NT X1A 2L9

Via Email: WMMP@gov.nt.ca

Dear Mr. Hodson:

RE: Gahcho Kué 2024 Wildlife Report and Comprehensive Analysis

De Beers Canada is pleased to provide Gahcho Kué Mine's 2024 Annual Wildlife Report, in accordance with the Wildlife Management and Monitoring Plan (WMMP), Ver.1.2, which was approved by the Government of Northwest Territories on March 31, 2022. This report is also submitted to fulfill the reporting requirement in the Wildlife Research Permit (Permit #: WL501343).

A comprehensive analysis of mitigation and monitoring activities is undertaken every five years. This report includes the second comprehensive analysis of multi-year wildlife monitoring data, and includes data collected from 2014 to 2024. The monitoring analyzed within this report are related to annual commitments from the Mine's WMMP. A power analysis was completed, which determined that there was insufficient data to generate a reliable estimate of zone of influence for barren-ground caribou; as such, this commitment from the WMMP cannot be completed as initially planned.

De Beers trusts that this document addresses GNWT requirements in a clear and fulsome manner. If you have any questions or concerns regarding the content of the report, please contact the undersigned at 403-466-5967 or kurtis.trefry@debeersgroup.com.

Sincerely,

Kurtis Trefry M.SEM, P.Ag
Environment and Permitting Superintendent
De Beers Canada Inc.

cc:
Wildlife Management Information System
Angela Love – MVLWB
Stephinie Mallon – ECCC

DE BEERS GROUP

Gahcho Kué Mine

2024 Annual Wildlife Report

March 2025

TABLE OF CONTENTS

1 INTRODUCTION 1-1
1.1 Content 1-5
1.2 Engagement 1-7
2 SPECIES OF CONCERN 2-1
3 MONITORING AND RESULTS 3-1
3.1 Local and Regional Study Areas 3-1
3.2 Direct Habitat Loss 3-1
3.2.1 Mine Development Area 3-1
3.3 Indirect Habitat Loss 3-3
3.3.1 Noise 3-3
3.3.2 Dust 3-6
3.3.3 Wildlife Sightings Log 3-10
3.3.4 Site Surveillance 3-14
3.3.5 Public Use of the Winter Access Road 3-19
3.3.6 Wildlife Incidents 3-19
3.4 Caribou 3-21
3.4.1 Aerial Surveys 3-21
3.4.2 Behaviour Monitoring 3-22
3.4.3 Snow Berm Management 3-23
3.5 Arctic Program for Regional and International Shorebird Monitoring Surveys 3-24
3.6 Raptors 3-27
3.6.1 Regional Raptor Nest Monitoring Program 3-27
3.6.2 Pit-nest and Raptor Monitoring and Deterrence Program 3-27
3.7 Upland Breeding Birds 3-31
3.7.1 Nest Management Program 3-31
3.8 Small Mammals 3-32
3.9 Environmental Indicators 3-34
3.10 Mine Activity 3-35
4 WILDLIFE MITIGATION AND MONITORING PLAN AUDIT 4-1
5 REFERENCES 5-1
6 ACRONYMS AND ABBREVIATIONS 6-1
7 UNITS OF MEASURE 7-1
8 GLOSSARY 8-1

LIST OF MAPS

Map 1-1 Location of the Gahcho Kué Mine ... 1-3
Map 1-2 2024 Gahcho Kué Mine Site Infrastructure ... 1-4
Map 3-1 Wildlife Management and Monitoring Plan Study Areas ... 3-2
Map 3-2 Collection Pond Survey Locations, 2024 ... 3-15

LIST OF TABLES

Table 1-1 Schedule of Wildlife Monitoring under each Relevant Management Plan ... 1-5
Table 2-1 Species of Concern for the Mine, Potential Effects, and Related Monitoring Components in the Wildlife Management and Monitoring Plan ... 2-2
Table 3-1 Expected and Actual Loss of Habitat Types Associated with the Mine Footprint to the end of 2024 ... 3-3
Table 3-2 Year 8 Noise Monitoring Locations ... 3-4
Table 3-3 Comparison of Year 8 to Benchmark Values ... 3-5
Table 3-4 Comparison of Year 8 to Environmental Impact Statement Predictions ... 3-5
Table 3-5 Comparison of Year 8 to Baseline Levels ... 3-5
Table 3-6 Fixed Dustfall Deposition Rates at the Northeast Transect, 2024 ... 3-7
Table 3-7 Mean Fixed Dustfall Deposition Rates (mg/100 cm2/30 d) for Southwest Transect Sampling Locations during Baseline (2013-14), Construction (2015-2016) and Operational (2016-2024) Sampling Periods ... 3-9
Table 3-8 Wildlife Sightings Log Summary of Observations, 2013 to 2024 ... 3-11
Table 3-9 Locations of Collection Pond Stations, 2024 ... 3-15
Table 3-10 Wildlife and Wildlife Signs Observed during Site Surveillance Surveys, 2024 ... 3-16
Table 3-11 Bird Observations during Collection Pond Surveys, 2024 ... 3-17
Table 3-12 Bird Species Observed during Collection Pond Surveys, 2024 ... 3-18
Table 3-13 Snow Berm Monitoring Results for the Winter Access Road, 2024 ... 3-24
Table 3-14 Proportion of Snow Berm Height Measurements for the Winter Access Road, 2024 ... 3-24
Table 3-15 Species Observed during the 2024 PRISM Survey ... 3-25
Table 3-16 Incidental Species Observed during the 2024 PRISM Survey ... 3-26
Table 3-17 Recorded Observations of Individual Species Count and Total Number of Observations, 2024 ... 3-30
Table 3-18 Predicted Timing and Extent of Predicted and Actual Flooding at Lakes D2/D3, and E1 ... 3-32
Table 3-19 Small Mammal Monitoring Program Catch Summary, 2024 ... 3-34
Table 3-20 Gahcho Kué Environmental Indicators, 2024 ... 3-35
Table 3-21 Gahcho Kué Camp Occupancy, 2024 ... 3-35
Table 4-1 Summary of Mitigations Implemented in 2023 ... 4-2

LIST OF APPENDICES

APPENDIX A 5 Year Comprehensive Analysis of Wildlife Monitoring Data Collected from 2014 to 2024
APPENDIX B Gahcho Kué Mine – 2024 (Year 8) Noise Monitoring Program
APPENDIX C Gahcho Kué Mine – 2023 Wildlife Mitigation and Monitoring Plan Audit

1 INTRODUCTION

De Beers Canada Inc. (De Beers) operates the Gahcho Kué Mine (Mine), located at Kennady Lake about 280 kilometres (km) northeast of Yellowknife, Northwest Territories (NT). Kennady Lake is north of the East Arm of Great Slave Lake and the small community of Łutsel K'e by approximately 140 km (Map 1-1). Commercial operation of the Mine began in September of 2016. The construction and operation of the Mine are currently under Type A Water Licence (MV2005L2-0015) and Type A Land Use Permit (MV2021D0009), issued by the Mackenzie Valley Land and Water Board (MVLWB). Mine activities and infrastructure include dewatering of Kennady Lake, open pit mining of three kimberlite pipes, construction and operation of Coarse and Fine Processed Kimberlite (PK) Facilities, Mine Rock Piles, accommodation and maintenance facilities, all-season airstrip, site roads and annual Winter access road (Map 1-2).

In August 2019, the Government of the Northwest Territories (GNWT) issued a new guidance document for development of wildlife management plans (GNWT-ECC 2019) to meet requirements of the NWT *Wildlife Act*. The GNWT then issued a directive to De Beers in October 2020 instructing De Beers that a Tier 3 Wildlife Management and Monitoring Plan (WMMP) for the Gahcho Kué Mine would be required to meet compliance with the NWT *Wildlife Act*. This WMMP was developed from the existing Wildlife and Wildlife Habitat Protection Plan (WWHPP) and Wildlife Effects Monitoring Program (WEMP) and updated to align with the Wildlife Management and Monitoring Plan (WMMP) Process and Content Guidelines (GNWT-ECC 2019). In compliance with the *Wildlife Act* and Land Use Permit MV2005C0032 (expired on August 10, 2021), Version 1 of the WMMP was submitted to the GNWT and MVLWB on April 26, 2021, and was subsequently issued for public review. On June 29, 2021, as part of the issuance of the renewed Land Use Permit MV2021D0009 (MVLWB 2021), the MVLWB determined the WMMP is no longer required in the Land Use Permit. Version 1.1 of the WMMP was submitted to the GNWT addressing reviewer comments from the GNWT, Environment and Climate Change Canada (ECCC), Ni Hadi Xa, and MVLWB in January 2022. The Mine's Tier 3 WMMP (Version 1.2, De Beers 2022) was approved by the GNWT-ECC on March 31, 2022 (GNWT-ECC 2022).

The WMMP outlines the policies, practices, designs, and procedures aimed at preventing and reducing Mine-related effects to wildlife and wildlife habitat, and providing Mine managers with information for making environmental management decisions. The WMMP also provides opportunities for regulators and Indigenous groups and communities to participate in the development of protection, mitigation, and monitoring of wildlife at the Mine site.

This WMMP draws together lessons learned from other mine sites in the NT including the De Beers Snap Lake Mine, Ekati and Diavik mines, as well as Traditional Knowledge (TK). In doing so, the WMMP will meet the requirements of the *Species at Risk Act*, the *Species at Risk (NWT) Act*, the Mackenzie Valley Land Use Regulations, the NWT *Wildlife Act*, and the Migratory Bird Convention Act, 1994 and Migratory Bird Regulations, as well as Review Panel Measures and corporate commitments.

Pursuant to the WMMP (De Beers 2022), this report describes mitigation and monitoring activities at the Mine and in the Regional Study Area (RSA) from January to December of the current reporting year and includes:

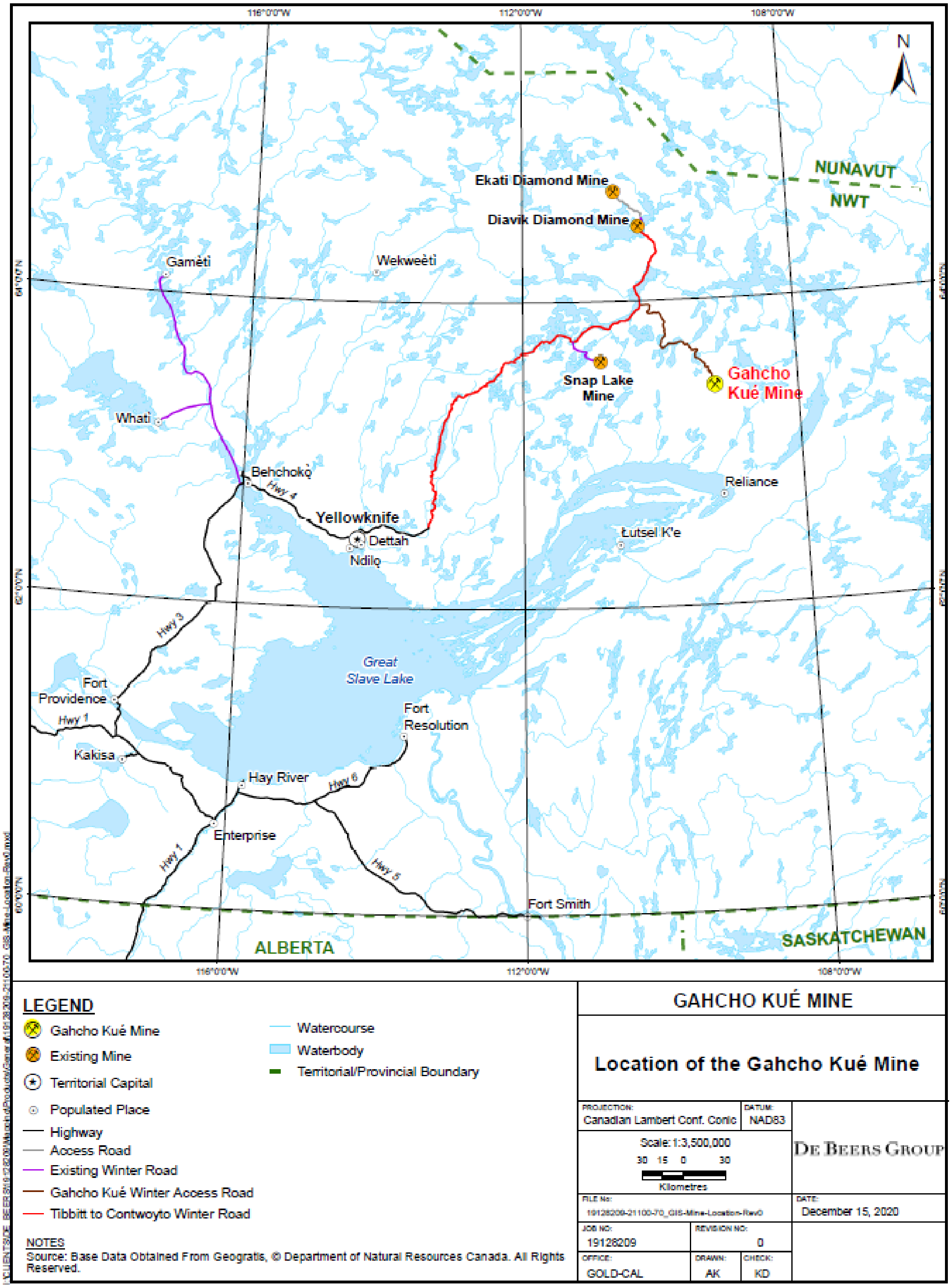
- a summary of all the monitoring programs that occurred at the Mine;
- updates or recommended changes to mitigation, environmental design features, or other actions required to meet the WMMP objectives;

- occurrences of human-wildlife interactions, and incidents, accidents, injuries, and mortalities involving wildlife;
- disturbances to wildlife and wildlife habitat that were not predicted in the Environmental Impact Statement (EIS; De Beers 2010); and
- observations of recreational, traditional, and non-traditional activities near the Mine, including the Winter access road.

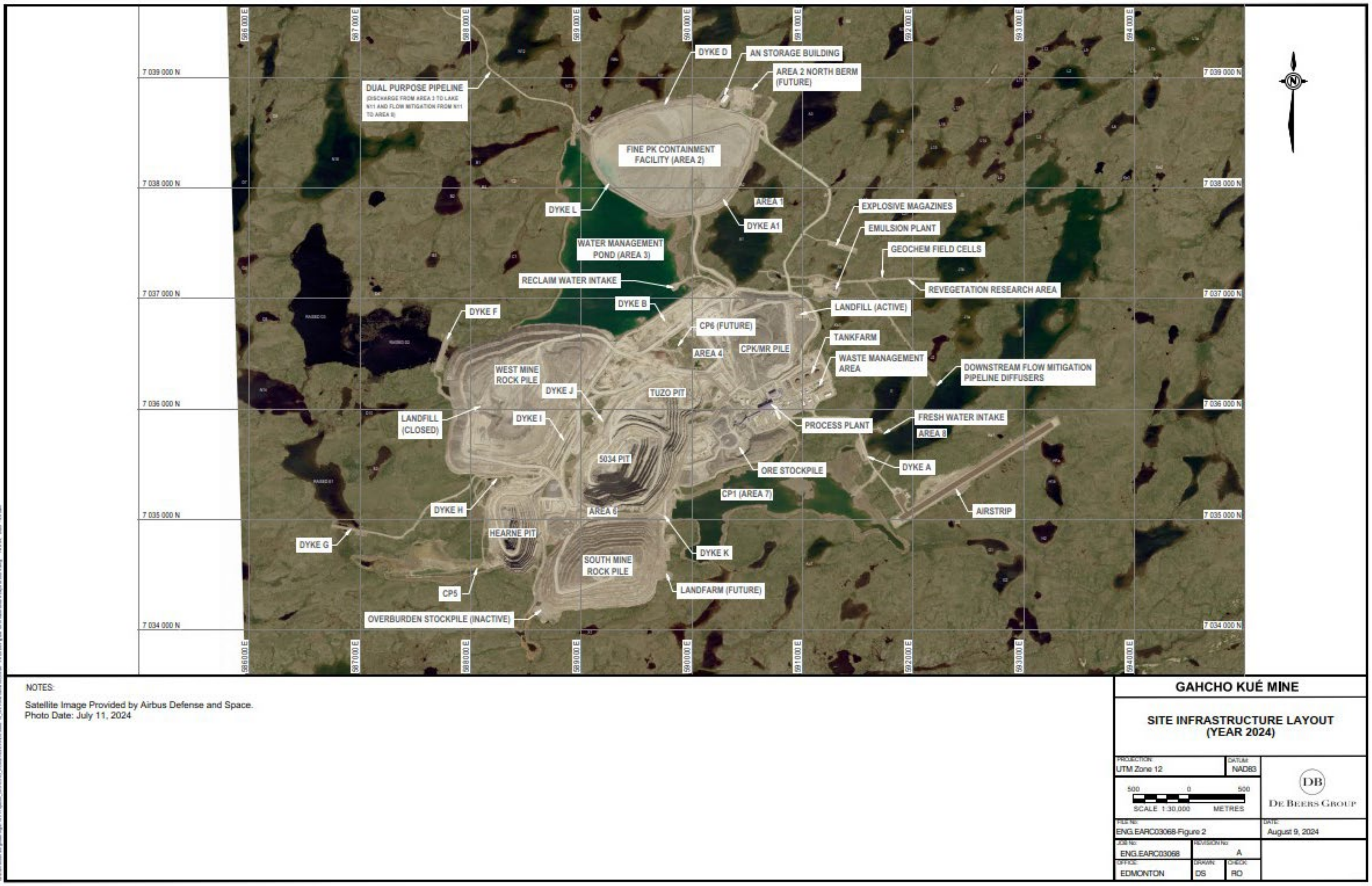
A comprehensive analysis of mitigation and monitoring activities is undertaken every five years. This report includes the second comprehensive analysis of multi-year wildlife monitoring data, and includes data collected from 2014 to 2024 (Appendix A). The comprehensive analysis report investigates Mine-related effects to wildlife, using all the relevant data available. In addition to programs designed for monitoring effects to wildlife from the Mine, monitoring of environmental indicators and contributed programs, such as small mammal monitoring, are completed to characterize natural changes or to contribute to regional monitoring initiatives. This schedule does not preclude focussed data analysis for specific issues or questions as they arise.

Wildlife monitoring for the Mine was developed in consultation with regulators and Indigenous communities. As a participant in wildlife monitoring workshops hosted by the Department of Environment and Climate Change of the GNWT (GNWT-ECC), De Beers updated monitoring programs for the Mine to be consistent with, and to support, regional monitoring for the assessment and management of cumulative effects by the GNWT. These changes included replacing past Mine-specific grizzly bear and wolverine monitoring with regional hair snagging programs for these species, and the addition of the Environment and Climate Change Canada's (ECCC) Arctic Program for Regional and International Shorebird Monitoring (PRISM) in 2015. De Beers will continue to participate in GNWT-ECC led monitoring initiatives and will update the wildlife monitoring and mitigation programs accordingly. In February 2021, the GNWT hosted wildlife monitoring workshops where it was determined among program partners that grizzly bear and wolverine hair snagging would be discontinued (GNWT-ECC 2021).

Map 1-1 Location of the Gahcho Kué Mine



Map 1-2 2024 Gahcho Kué Mine Site Infrastructure



1.1 Content

This annual report includes WMMP activities undertaken in 2024. The monitoring tasks may be continuous or seasonal, and on an annual or multi-year cycle. Supporting information is also collected through other monitoring programs (Table 1-1). This report includes descriptions and summaries of all of the wildlife monitoring that occurred during 2024.

Table 1-1 Schedule of Wildlife Monitoring under each Relevant Management Plan

Monitoring	Corresponding Monitoring Plans or Programs	Monitoring Schedule	Completed in 2024	Report Section
Mine Development Area and Direct Habitat Loss	WMMP	Mine development area updates will be provided at the end of construction and updated every year.	Yes	3.2
Noise	WMMP	Noise monitoring is anticipated to take place on a multi-year schedule at the Mine during operation in Years 1 (2017), 5 (2021), and 8 (2024).	Yes	3.3.1
Dust	WMMP Vegetation and Soils Monitoring Program	Dustfall collectors are monitored at the Mine annually and are measured every 30 days during the growing season (May to October).	Yes	3.3.2
Wildlife Sightings	WMMP	Wildlife sightings are monitored continually and reported annually.	Yes	3.3.3
Site Surveillance	WMMP	Monitoring is completed weekly, and reported annually.	Yes	3.3.4
Public Use of the Winter Access Road	WMMP	Monitoring is conducted daily when the Winter access road is operational (usually February to March).	Yes	3.3.5
Wildlife Incidents	WMMP	Wildlife incident monitoring has been ongoing and will continue to be undertaken as required. Wildlife incidents are reported immediately to GNWT-ECC, in addition to being reported annually.	Yes	3.3.6
Caribou	WMMP	Caribou aerial distribution surveys were completed from 1999 to 2005 and 2010 to 2012. As there were likely insufficient caribou in the study area to detect a change in distribution, aerial surveys were not undertaken from 2013 to 2022. Since 2023, De Beers uses collared caribou data moving forward to assess for Mine-related effects of indirect habitat loss per the Mine’s Tier 3 WMMP.	No	-
Caribou	WMMP	Caribou interactions and mortalities at the Mine are monitored through the wildlife sightings log, site surveillance, wildlife interactions and behaviour monitoring.	Yes	3.3.3, 3.3.4, 3.3.6
Caribou	WMMP	Aerial reconnaissance surveys are completed annually prior to the Winter access road opening. The purpose of these surveys is to determine if caribou are present near the Winter access road in numbers that would trigger caribou behaviour monitoring.	Yes	3.4.1

Table 1-1 Schedule of Wildlife Monitoring under each Relevant Management Plan

Monitoring	Corresponding Monitoring Plans or Programs	Monitoring Schedule	Completed in 2024	Report Section
Caribou	WMMP	Winter access road behaviour monitoring was first completed in 2014 and will occur annually when triggers for group size are met. Behavioural monitoring on the Winter access road or at site was last completed in 2022.	Yes	3.4.2
Caribou	WMMP	Snow berm measurements along the Mine's Winter access road began in 2014 and are recorded annually.	Yes	3.4.3
Grizzly Bear	WMMP	Grizzly bear interactions and mortalities at the Mine are monitored through the wildlife sightings log, site surveillance, and wildlife incidents.	Yes	3.3.3, 3.3.4, 3.3.6
Wolverine	WMMP	Wolverine interactions and mortalities at the Mine are monitored through the wildlife sightings log, site surveillance, and wildlife incidents.	Yes	3.3.3, 3.3.4, 3.3.6
Raptors	WMMP	Raptor interactions and mortalities at the Mine are monitored through the wildlife sightings log, site surveillance, and wildlife incidents, as well as incidents of raptor nesting activity on Mine infrastructure.	Yes	3.3.3, 3.3.4, 3.3.6
Raptors	WMMP	Raptor nest surveys in the RSA were completed in 2015. Results were contributed to GNWT-ECC for their regional nest monitoring database. A RSA survey was conducted by GNWT-ECC in 2020. Regional monitoring is anticipated to continue every five years with the next nest surveys scheduled for 2025.	No	3.6
Upland Birds	WMMP Migratory Bird Nest Management Plan	Upland bird interactions and mortalities at the Mine are monitored through the wildlife sightings log, site surveillance, and wildlife incidents.	Yes	3.3.3, 3.3.4, 3.3.6
Upland Birds	WMMP Migratory Bird Nest Management Plan	Vegetation removal in areas surrounding Lakes D2/D3 and E1 was completed in 2015, 2016 and 2017 to fulfill commitments made in the Migratory Bird Nest Management Plan. Vegetation removal will continue as needed.	No	3.7
Upland Birds	WMMP Migratory Bird Nest Management Plan	De Beers will deploy bird deterrent devices, as per the Migratory Bird Nest Management Plan, to mitigate the risk of birds nesting in the remaining low-lying vegetation or on the ground during the Spring in areas anticipated to flood.	Yes	3.7
Upland Birds	WMMP Migratory Bird Nest Management Plan	Arctic PRISM surveys were completed in 2017, 2019, 2022 and in 2024.	Yes	3.5
Small Mammals	WMMP	Monitoring and reporting of small mammal abundance will be completed annually. All small mammal samples collected are provided to the GNWT-ECC for identification and analysis.	Yes	3.8
Environmental Indicators	WMMP	Annual monitoring and reporting of weather-related variables began in 2015 and has continued since.	Yes	3.9

Table 1-1 Schedule of Wildlife Monitoring under each Relevant Management Plan

Monitoring	Corresponding Monitoring Plans or Programs	Monitoring Schedule	Completed in 2024	Report Section
Measures of Mine Activity	WMMP	Annual monitoring and reporting of staff numbers, fuel consumption, volume of mine rock removed and ore processed, and domestic water consumption began in 2015 and has continued since.	Yes	3.10

PRISM = Arctic Program for Regional and International Shorebird Monitoring; GNWT-ECC = Department of Environment and Climate Change, Government of the Northwest Territories; RSA = Regional Study Area; WMMP = Wildlife Management and Monitoring Plan.

1.2 Engagement

De Beers signed a legally binding environmental stewardship agreement, Ni Hadi Xa Agreement, with five Indigenous parties, including Deninu Kué First Nations (DKFN), Łutsel K'e Dene First Nation (LKDFN), North Slave Métis Alliance (NSMA), Northwest Territory Métis Nation (NWTMN) and the Tłı̨chǫ Government (TG), in 2014. Yellowknives Dene First Nation (YKDFN) became the signatory of the Agreement in February 2019. The purpose of Ni Hadi Xa is to provide a meaningful way for Indigenous communities to participate in the ongoing development and review of monitoring programs and management plans, review data generated from those plans, and to allow for TK to be incorporated into operations. Ni Hadi Xa also creates an opportunity to build on collaborative relationships, increase efficiency in regulatory processes, and provide more opportunity for TK monitoring. Ni Hadi Xa currently employs one full-time environmental monitor stationed at the site and works closely with the De Beers Environment staff. Two TK monitors and one TK administrator are monitoring any potential impacts of the mining operations based in the Ni Hadi Xa Cabin, established approximately 40 km north of the Mine.

De Beers engaged with Indigenous communities in multiple forums throughout 2024 as outlined in the Engagement Plan (De Beers 2015a). De Beers was able to continue hosting in-person engagement events, such as Mine site visits, community visits and fish tasting.

2 SPECIES OF CONCERN

The intent of the *Species at Risk Act* and the *Species at Risk (NWT) Act* is to protect species at risk from becoming extirpated or extinct as a result of human activity. While the former was enacted by the Government of Canada, the latter was enacted by the GNWT and applies only to wild animals and plants managed by the GNWT. For the purposes of this WMMP, species may be of concern due to their national, territorial, and/or Committee on Status of Endangered Wildlife in Canada (COSEWIC) status. As the *Species at Risk (NWT) Act* is implemented, the NWT Species at Risk Committee (NWT SARC) will make further assessments, and the Conference of Management Authorities will prepare the List of Species at Risk, providing legal protection for these species (NWT SARC 2025), and possibly leading to changes in the species at risk considered for the Mine.

There are twelve wildlife species of concern that may occupy or travel through the area of the Mine during part or all of the year. These species include barren-ground caribou (*Rangifer tarandus groenlandicus*), grizzly bear (*Ursus arctos horribilis*), wolverine (*Gulo gulo*), horned grebe (*Podiceps auritus*), peregrine falcon (*Falco peregrinus anatum-tundrius complex*), rusty blackbird (*Euphagus carolinus*), short-eared owl (*Asio flammeus*), bank swallow (*Riparia riparia*), barn swallow (*Hirundo rustica*), Harris's sparrow (*Zonotrichia querula*), red-necked phalarope (*Phalaropus lobatus*), and lesser yellowlegs (*Tringa flavipes*). Monitoring is proposed for species of concern (Table 2-1). In the WMMP, monitoring for species of concern is primarily focused on detection at the Mine site in order to implement site-specific protection.

As part of the comments regarding the 2021 Annual Wildlife report, the barn swallow was identified as a species of concern (COSEWIC 2023) not listed in this section. In the 2022 Annual Report, barn swallow was added to Section 2. Additional training and surveillance objectives were provided in 2024 to address these recommendations. Barn swallow is not currently listed in the WMMP (Version 1.2, De Beers 2022). Prior studies did not find evidence of the species' presence and the Mine was thought to be outside their habitat range. Components of the WMMP will still be used for potential effects and monitoring. Future revisions of the plan will receive updates to include barn swallow.

Table 2-1 Species of Concern for the Mine, Potential Effects, and Related Monitoring Components in the Wildlife Management and Monitoring Plan

Species	NWT General Status Ranking[(a)]	*Species at Risk (NWT) Act*[(b)]	COSEWIC Assessment[(c)]	Federal *Species at Risk Act*[(d)]	Potential Mine Impacts	Components of the WMMP
Barren-ground caribou	At risk	Threatened	Threatened	Under consideration	• May be affected by habitat loss • May be sensitive to disturbance and human activity • Risk of harm or mortality	• habitat loss • surveillance monitoring • zone of Influence monitoring
Grizzly bear (western population)	Sensitive	No status	Special Concern	Special Concern	• May be attracted to developments if food is available • Sensitive to disturbance particularly when accompanied by young or during denning • Long generation time means one individual may be affected by disturbance seasonally over multiple years, resulting in potential regional population effects	• habitat loss • surveillance monitoring
Wolverine	Sensitive	No status	Special Concern	Special Concern	• May be attracted to developments if food or shelter are available	• habitat loss • surveillance monitoring
Horned grebe (western population)	Sensitive	No status	Special Concern	Special Concern	• Waterbirds that use mine-altered waters may be harmed • Loss of shoreline habitat for breeding • Staging habitat in Kennady Lake may be affected	• habitat loss • surveillance monitoring • PRISM
Peregrine falcon (*anatum-tundrius* complex)	Sensitive	No status	Not at risk	Not at risk	• Peregrine falcons have been known to nest on mine infrastructure and in open pits, where they may be at risk of harm or may cause delays to operations	• habitat loss • surveillance monitoring • monitoring nest occupancy and productivity in the regional study area
Rusty blackbird	Sensitive	No status	Special Concern	Special Concern	• May nest on Mine infrastructure • Experiencing population declines as a result of changing environmental conditions on breeding and overwintering habitats	• habitat loss • surveillance monitoring • PRISM

Table 2-1 Species of Concern for the Mine, Potential Effects, and Related Monitoring Components in the Wildlife Management and Monitoring Plan

Species	NWT General Status Ranking[(a)]	*Species at Risk (NWT) Act*[(b)]	COSEWIC Assessment[(c)]	Federal *Species at Risk Act*[(d)]	Potential Mine Impacts	Components of the WMMP
Short-eared owl	At risk	No Status	Threatened	Special Concern	• May be affected by habitat loss • Sensitive to noise and disturbance and human activity during nesting	• habitat loss • surveillance monitoring • PRISM
Bank swallow	At risk	No Status	Threatened	Threatened	• May nest on sand/ gravel mounds or aggregate quarries associated with the Mine • May be affected by habitat loss	• areas with suitable habitat will be contoured to have slopes <70 degrees for stability • surveillance monitoring
Barn swallow[(e)]	Sensitive	No Status	Special Concern	Threatened	• Barn swallows demonstrate high nest site fidelity and dependence on human-made structures • May nest on Mine infrastructure	• habitat loss • surveillance monitoring • PRISM
Harris's sparrow	Sensitive	No Status	Special Concern	Special Concern	• May be sensitive to noise and disturbance from human activities • May be affected by loss of breeding habitat	• habitat loss • surveillance monitoring • PRISM
Red-necked phalarope	Sensitive	No Status	Special Concern	Special Concern	• Waterbirds that use mine-altered water may be harmed • May be affected by loss of breeding habitat	• habitat loss • surveillance monitoring • PRISM
Lesser yellowlegs	Sensitive	No Status	Threatened	Under consideration	• Waterbirds that use mine-altered water may be harmed • May be affected by loss of breeding habitat	• habitat loss • surveillance monitoring • PRISM

a) Working Group on General Status of NWT Species (2025). Ranking levels, from highest to lowest conservation concern, is: at risk, may be at risk, sensitive, secure, undetermined.
b) NWT SARC (2025).
c) Government of Canada (2025).
d) *Species at Risk Act* (2002).
e) Species not directly listed in the current version of the WMMP.
COSEWIC = Committee on the Status of Endangered Wildlife in Canada; WMMP = Wildlife Management and Monitoring Plan; PRISM = Arctic Program for Regional and International Shorebird Monitoring.

3 MONITORING AND RESULTS

3.1 Local and Regional Study Areas

The wildlife RSA is defined by a rectangle with an area of 5,600 km^2 (75 km by 75 km), centered on the Mine site (Map 3-1). The wildlife Local Study Area (LSA; approximately 200 km^2) was selected to assess the immediate direct and indirect effects of the Mine on individual animals and habitat. The wildlife RSA was used to assess Mine-specific and cumulative effects on upland migratory birds and raptor populations. The RSA was also selected to capture the maximum extent of effects beyond the LSA, which can influence groups of individuals from populations with large seasonal and annual ranges (e.g., caribou, grizzly bear, and wolverine).

3.2 Direct Habitat Loss

3.2.1 Mine Development Area

Wildlife habitat loss will occur from the construction of the Mine and from the flooding of areas resulting from dewatering of Kennady Lake and associated water diversions. Monitoring how much area is altered by the Mine is required to confirm that the permitted Mine development area has not been exceeded under Land Use Permit (MV2021D009) and surface leases.

Methods

The Mine development area will be delineated through aerial photographs, satellite imagery, or ground surveys, and calculated using GIS software. The actual area of the Mine footprint will be compared to the permitted area, and monitored over the life of the Mine at key phases of development (e.g., end of construction and periodic points in operations [De Beers 2022]).

Results

The Mine currently has a land footprint of 704.1 hectares (ha), and water (deep and shallow water) footprint of 669.2 ha, for a total footprint of 1,373.3 ha (Table 3-1). This is currently 96% of the total 1,429.0 ha predicted Project footprint in the approved 2020 Updated Project Description as part of the Water Licence Amendment (De Beers 2020).

The largest amount of disturbance, by area, has been to deep water, which is the dominant Ecological Land Class in the LSA (De Beers 2010). The footprint calculations in 2024 included all of Areas 1-7 of Kennady Lake, which have been disturbed through de-watering or storage of water in the water management pond.

Map 3-1 Wildlife Management and Monitoring Plan Study Areas

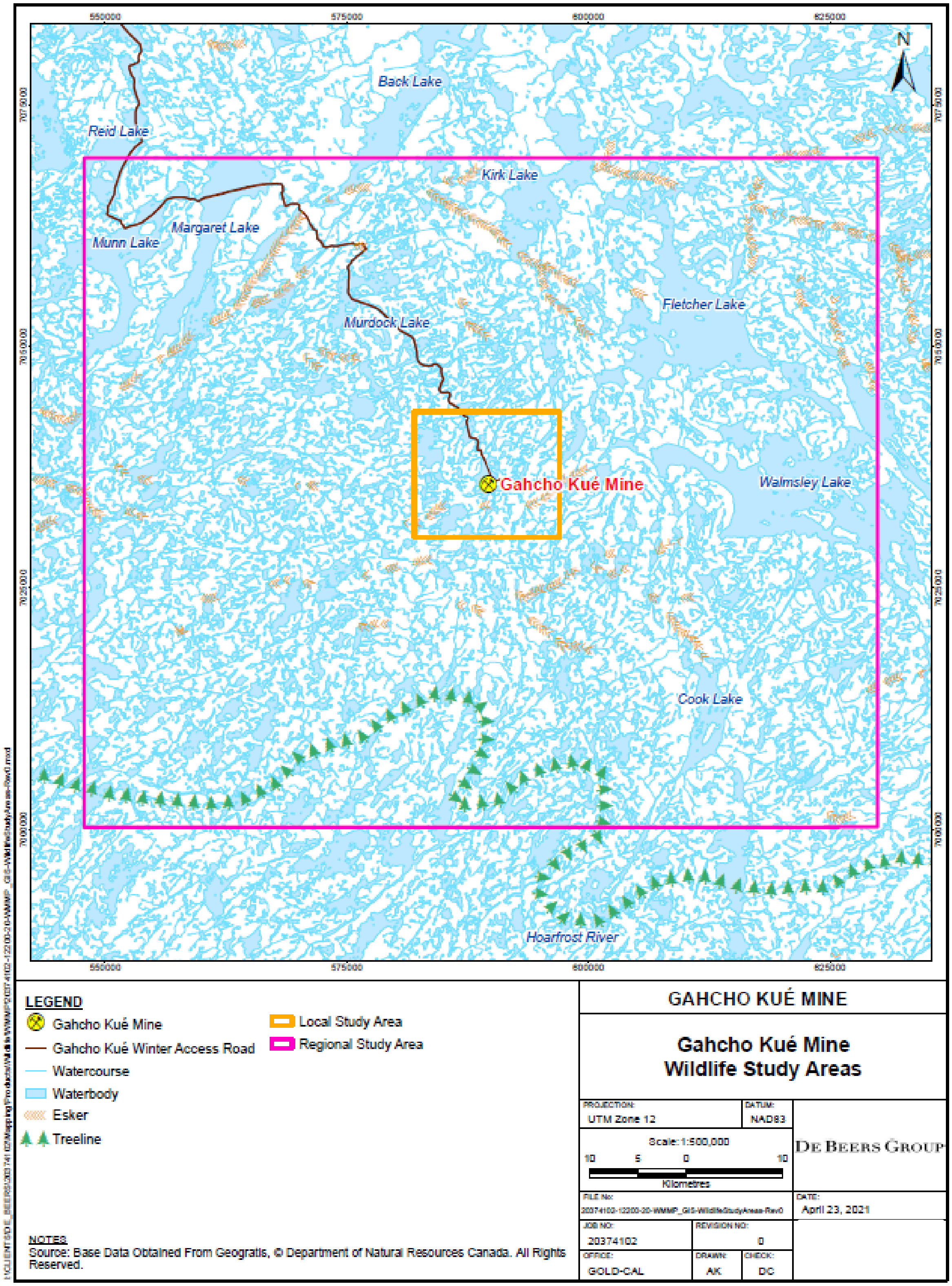


Table 3-1 Expected and Actual Loss of Habitat Types Associated with the Mine Footprint to the end of 2024

Ecological Land Class	Expected Distrubance (ha)[(a)]	Actual Disturbance (ha)[(b)]	Difference between Actual and Expected Disturbance (ha)
Bedrock Association	10.0	8.7	1.3
Birch Seep	43.0	39.5	3.5
Boulder Association	8.0	6.9	1.1
Deep Water	494.0	493.4	0.6
Heath Bedrock	68.0	55.5	12.5
Heath Boulder	33.0	29.6	3.4
Heath Tundra	113.0	105.9	7.1
Peat Bog	134.0	127.9	6.1
Sedge Wetland	134.0	127.6	6.4
Shallow Water	176.0	175.7	0.3
Spruce Forest	51.0	48.3	2.7
Tall Shrub	44.0	41.8	2.2
Tussock Hummock	111.0	102.3	8.7
Esker Complex	0.0	0.0	0.0
Unclassified	10.0	10.1	-0.1
Total	**1,429.0**	**1,373.3**	**55.8**

a) Based on the 2020 Updated Project Description for the Gahcho Kué Project (De Beers 2020).

b) Delineated through ground surveys and calculated using GIS software.

ha = hectare.

3.3 Indirect Habitat Loss

3.3.1 Noise

Noise is believed to cause sensory disturbance to some wildlife species, and may result in avoidance or reduction of time spent in otherwise suitable habitat. Although noise was not anticipated to be a primary driver of indirect habitat loss for any of the wildlife valued components at the Mine, it is still a form of potential disturbance that should be minimized. Activities at the Mine that will generate noise include aircraft, vehicles, generators, blasting and the general presence of people.

Baseline noise levels were established by monitoring ambient noise at the Mine site as part of the EIS. A continuous, 24-hour assessment of baseline noise was completed at selected sites in June 2010. Using known sound emissions from anticipated Mine equipment and infrastructure, a model was developed that predicted the maximum distances Mine noise would attenuate to background levels.

The objectives of the noise monitoring are to confirm noise level predictions from the EIS (De Beers 2010) and to use measured data to inform the effectiveness of noise management practices at site. Monitoring of noise was completed in Year 1 (2017), Year 5 (2021), and Year 8 (2024) of Mine operations.

Methods

According to Alberta Energy Regulator (AER) Directive 038 (AER 2007), the relevant parameter for characterizing cumulative noise levels is the energy equivalent sound level (L_{eq}), expressed in A-weighted decibels (dBA). Noise levels are scaled to A-weighting to reflect the frequency sensitivity of the human auditory system. L_{eq} is a single value that represents the average noise level over a given period of time. AER Directive 038 indicates that noise levels should be time-averaged over a daytime period ($L_{eq,day}$) defined as 7 am to 10 pm, and a nighttime period ($L_{eq,night}$) defined as 10 pm to 7 am. Note that the EIS and the Year 1 noise monitoring program adjusted the AER Directive 038 definition of daytime and nighttime for consistency with Health Canada guidance (Health Canada 2005); in the EIS, Year 1, Year 5, and Year 8 noise monitoring program, daytime is defined as 7 am to 11 pm and nighttime is defined as 11 pm to 7 am.

During the Year 8 noise monitoring program, $L_{eq,\ day}$ and $L_{eq,\ night}$ cumulative noise levels were measured at two locations in and around the Mine during mid-June (Table 3-2). These locations used in the Year 8 monitoring program were selected for consistency with the assessment completed for the EIS (De Beers 2010) and the Years 1 and 5 noise monitoring programs (Golder 2017).

Table 3-2 Year 8 Noise Monitoring Locations

Year 8 Noise Monitoring Location	Description	Universal Transverse Mercator Coordinates [Zone 12]	
		Easting [m]	Northing [m]
RC	Unoccupied location on proposed East Arm National Park boundary	594,248	7,034,625
RD	Unoccupied location 1.5 km from the Mine boundary	591,106	7,033,986

a) RD is located approximately 1.2 km southwest of the Mine airstrip. Because noise levels attenuate with distance, collecting data at a location less than 1.5 km from the Mine boundary is a conservative approach that likely overestimates potential noise effects from Mine operations.

Time-weighted noise averages were measured using daytime and nighttime energy equivalent sound levels over a 24-hour sampling period as per AER Directive 038, both within the Mine footprint and at a designated location 1.5 km from the Mine (location with highest predicted noise level). This schedule may be adjusted to align with other regional monitoring efforts or to accommodate changes in mining activities.

The Year 8 noise monitoring program was conducted in general accordance with methods described in AER Directive 038. Following the conclusion of the noise monitoring program, data were processed to obtain representative estimates of $L_{eq,\ day}$ and $L_{eq,\ night}$ noise levels for each monitoring location. The data was filtered to eliminate contaminated, abnormal, or invalid noise sources such as technician activity during deployment. All other noise sources (e.g., mine equipment, helicopters and other aircraft, insects, birds, and other wildlife) were considered valid and representative of normal conditions at the monitoring locations.

Noise monitoring was conducted in 2024 (Year 8) by WSP Canada Inc. (WSP) over five days from July 29 to August 2, 2024 (Appendix B). Noise levels measured during the Year 8 monitoring program are compared to benchmark noise levels as well as EIS-predicted noise levels for Year 8, and average baseline noise levels. Tables 3-3 though 3-5 presents a summary of the 2024 Noise Monitoring Program. Further detail on the 2024 (Year 8) Noise Monitoring Program is included as Appendix B.

Table 3-3 Comparison of Year 8 to Benchmark Values

Monitoring Location	Period	Average Measured Noise [dBA]	Noise Benchmark [dBA]	Comment
RC	Daytime [$L_{eq, day}$]	43.1	50	Measured noise level is less than the benchmark value.
	Nighttime [$L_{eq, night}$]	40.2	40	Measured noise level is equal to the benchmark value.
RD	Daytime [$L_{eq, day}$]	44.1	50	Measured noise level is less than the benchmark value
	Nighttime [$L_{eq, night}$]	42.0	40	Measured noise level is greater than the benchmark value.

Table 3-4 Comparison of Year 8 to Environmental Impact Statement Predictions

Monitoring Location	Period	Average Measured Noise [dBA]	Noise Benchmark [dBA]	Comment
RC	Daytime [$L_{eq, day}$]	43.1	37	Measured noise level is greater than the EIS prediction.
	Nighttime [$L_{eq, night}$]	40.2	37	Measured noise level is greater than the EIS prediction.
RD	Daytime [$L_{eq, day}$]	44.1	42	Measured noise level is greater than the EIS prediction.
	Nighttime [$L_{eq, night}$]	42.0	42	Measured noise level is equal than the EIS prediction.

EIS = Environmental Impact Statement.

Table 3-5 Comparison of Year 8 to Baseline Levels

Monitoring Location	Period	Average Measured Noise [dBA]	Noise Benchmark [dBA]	Comment
RC	Daytime [$L_{eq, day}$]	43.1	45.1	Measured noise level is less than the average baseline level.
	Nighttime [$L_{eq, night}$]	40.2	40.7	Measured noise level is less than the average baseline level.
RD	Daytime [$L_{eq, day}$]	44.1	45.1	Measured noise level is less than the average baseline level.
	Nighttime [$L_{eq, night}$]	42.0	40.7	Measured noise level is greater than the average baseline level.

Daytime noise levels measured at RC and RD during the Year 8 monitoring program were less than the applicable benchmark value. Similarly, the nighttime noise level measured at RC was equal to the applicable benchmark value. In contrast, the nighttime noise level measured at RD was greater than the applicable benchmark value. It should be noted that the benchmark values do not represent regulatory limits or compliance thresholds, since the NT does not regulate environmental noise levels. It should also be noted that natural/background noise levels in the area routinely exceed benchmark values during the nighttime period (even without the influence of Mine activities).

All noise levels measured during the Year 8 monitoring program were within the range of baseline variability. As such, data collected during the Year 8 monitoring program validated and confirmed the conclusions of the EIS with respect to noise effects, and the Year 8 monitoring program demonstrated that noise management at the Mine is effective.

3.3.2 Dust

The Mine will create dust through various sources including blasting and crushing rock, road construction, and traffic. Through engagement with communities and government, concerns have been expressed about the effects of dust on the environment and wildlife health, particularly caribou.

De Beers is committed to minimizing the amount of dust; however, dust cannot be completely eliminated and is predicted to settle in the area within and near the core Mine site. Fugitive dust will be reduced through the application of water in the area surrounding the Mine. Monitoring is conducted to measure the extent of fugitive dust deposition from emissions.

Methods

As described in the Vegetation and Soil Monitoring Program (VSMP) Version 3 (De Beers 2014), dustfall collectors were deployed in August 2013 and monitoring has continued through 2024.

Dustfall was measured approximately every 25 to 60 days throughout the growing season (May to October). In addition, dustfall was collected over the approximately 250-day Winter period (2015 to 2024). Dust deposition is measured at nine sampling stations, at distances of 0 m, 50 m, 150 m, 500 m, 1 km, 5 km, 10 km, 15 km, and 20 km from the Mine. Dust deposition results from 2013 to 2014 were used as baseline data for comparing dustfall values collected during construction and operation. Dust deposition data will be used to determine if changes in plant communities and soil chemistry are related to dust from the Mine, and as a potential mechanism of the zone of influence on caribou (Golder 2019).

To examine the spatial and temporal patterns of dust deposition, geometric mean fixed dustfall deposition rates were examined both graphically and statistically. For 2024 data, spatial patterns of the dust deposition results were examined for the entire study area and within sampling areas. Temporal patterns were examined by comparing the geometric mean fixed dustfall deposition rate among sampling seasons across years: 2013 to 2014 as baseline years, 2015 and 2016 to represent mine construction, and 2017 to 2024 for Mine operations. To examine the spatial patterns of dust deposition rates with increasing distance from the Mine, regression analysis was conducted using R (R Core Team 2020). Bayesian linear mixed-effects regression (Chung et al. 2013) was performed with fixed dust deposition rates (mg/100 cm^2/30 d) and distance from the Mine (km). Fixed dustfall values greater than 130.02 mg/100 cm^2/30 d were considered anomalous outliers ($n = 10$) and omitted from analysis, based on the calculated statistical distribution defined by the mean and three standard deviation units.

Results

Dustfall is reported annually as part of the VSMP Annual Report (De Beers 2024). The results provided herein represent a summary of key findings from that report. Dustfall collection jars were deployed and collected six times at all sampling areas (five sampling areas at the Northeast transect and nine sampling areas at the

Southwest transect) over the course of the 2023/2024 monitoring year. Collections occurred over six periods beginning:

- 22 September 2023 to 23 April 2024 (Winter);
- 23 April 2024 to 31 May 2024 (Spring);
- 31 May 2024 to 5 July 2024 (Spring);
- 5 July 2024 to 5 August 2024 (Summer);
- 5 August 2024 to 28 August 2024 (Summer); and
- 28 August 2024 to 22 September 2024 (Fall).

A total of 114 samples (including duplicates) were collected and submitted for dustfall analysis. A non-detect in the summer at the NEDF02 duplicate sample was removed from the results, as it was likely the result of sampling error given the deposition rate measured at the collocated sample.

In 2024, 61 of 95 (64.2%) measured values of fixed dustfall deposition during Spring, Summer, and Fall were below the detection limit of 3.0 mg/100 cm^2/30 d (includes duplicate samples). In 2023, 44 of 78 (56.4%) measured values of fixed dustfall deposition during Spring, Summer, and Fall were below the detection limit of 3.0 mg/100 cm^2/30 d (includes duplicate samples). In 2022, 35 of 78 (44.9%) measured values of fixed dustfall deposition during Spring, Summer, and Fall were below the detection limit of 3.0 mg/100 cm^2/30 d (includes duplicate samples). In 2021, 45 of 65 (69.2%) measured values of fixed dustfall deposition during Spring, Summer, and Fall were below the detection limit of 3.0 mg/100 cm^2/30 d (includes duplicate samples). In 2020, 16 of 52 (30.8%) measured values of fixed dustfall deposition during Spring, Summer, and Fall were below the detection limit of 3.0 mg/100 cm^2/30 d (includes duplicate samples). In 2019, 29 of 50 (58.0%) measured values of fixed dustfall deposition during Spring, Summer, and Fall were below the detection limit. In general, dustfall deposition increased from baseline through construction (2015 to 2016) and into the initial phase of operation (2017 to 2018).

Fixed dustfall deposition values measured in 2024 at the Northeast transect for the Air Quality and Emissions Monitoring and Management Plan (AQEMMP; De Beers 2015b) included 19 of 36 values below the detection limit (Table 3-6). Mean fixed dustfall deposition rates for sampling locations during baseline, construction, and operational sampling periods are shown in Table 3-7.

Table 3-6 Fixed Dustfall Deposition Rates at the Northeast Transect, 2024

Month	Fixed Dustfall [mg/100 cm^2/30 d][(b)]				
	NEDF01	NEDF02[(a)]	NEDF03	NEDF04	NEDF05
Overwinter[(c)]	5.1	6.3	<3.0	3	<3.0
May	6.6	<3.0	5.1	<3.0	<3.0
June	11.4	25.2	5.1	9	<3.0
July	29.1	135.6	567	4.2	<3.0
August	7.8	3	<3.6	<3.6	<3.6
September	<3.3	<3.3	<3.3	<3.3	<3.3
Annual[(d)]	**7.83**	**17.85**	**50.43**	**3.68**	**3.08**

a) Duplicate samples were taken at this station. The average value is presented.

b) Calculated on a 30-day basis.

c) Overwinter sampled from September 22, 2023 to April 23, 2024

d) Values below detection limit were assumed to be the detection limit for annual averages.

mg/100 cm^2/30 d = milligrams per 100 square centimetre per 30 days; < = less than, with the value after it representing the detection limit.

Table 3-7 Mean Fixed Dustfall Deposition Rates (mg/100 cm2/30 d) for Southwest Transect Sampling Locations during Baseline (2013-14), Construction (2015-2016) and Operational (2016-2024) Sampling Periods

Sampling Period		Sampling Area									
		Approx Sampling Period (days)	0 km	0.05 km	0.15 km	0.5 km	1 km	5 km	10 km	15 km	20 km
Spring	2013[a]	-	-	-	-	-	-	-	-	-	-
	2014[b]	32	25.5	29.6	26.1	24.4	-	19.3	20.5	21.4	35.4
	2015[c]	44	24.9	18.1	24.0	29.6	23.7	26.6	20.2	19.9	19.2
	2016[d]	36	45.2	25.1	25.4	26.4	44.2	27.2	30.1	26.7	32.8
	2017	35	29.8	34.1	67.8	60.0	37.6	28.4	28.6	28.7	30.8
	2018[f]	28	30.4	47.0	52.8	50.2	75.6	52.3	42.9	73.6	37.1
	2019[g]	-	-	-	-	-	-	-	-	-	-
	2020[h]	-	-	-	-	-	-	-	-	-	-
	2021[i]	58	38.4	30.6	28.2	<3.0	4.5	3.3	<3.0	<3.0	<3.0
	2022[j]	67	15.3	37.1	55.7	6.9	<3	84.5	20.2	60.0	<3
	2023[k]	62	68.6	134.2	138.3	35.1	100.7	<3	13.4	4.4	17.1
	2024[l]	73	7.1	24.4	18.1	<3	12.9	<3	3.1	<3	<3
Summer	2013[a]	-	-	-	-	-	-	-	-	-	-
	2014[b]	-	-	-	-	-	-	-	-	-	-
	2015[c]	35	23.9	25.3	22.7	25.6	25.4	19.4	18.8	24.7	26.3
	2016[d]	28	27.1	25.0	17.7	35.7	44.7	37.1	34.6	<5.0	23.7
	2017[e]	26	-	-	-	-	-	-	-	-	-
	2018[f]	34	61.3	145.0	54.7	24.7	49.7	20.9	33.6	28.2	32.4
	2019[g]	40	12.9	26.1	12.3	<3.0	24.9	70.5	<3.0	<3.0	<3.0
	2020[h]	32	15.6	21.6	11.1	21.0	12.6	5.4	<3.0	8.1	12.0
	2021[i]	38	3.3	14.4	8.7	<3.0	7.2	3.9	<3.0	<3.0	<3.0
	2022[j]	32	10.2	22.7	30.9	<3	<3	55.5	107.6	72.3	<3
	2023[k]	34	5.4	7.2	9.0	3.6	3.6	<3	14.0	10.5	<3
	2024[l]	31	8.4	62.0	298.7	7.5	4.2	7.8	<3	<3	<3
Early Fall	2013[a]	44	10.3	13.0	22.2	11.6	17.8	13.4	14.6	15.9	12.9
	2014[b]	-	-	-	-	-	-	-	-	-	-
	2015[c]	-	-	-	-	-	-	-	-	-	-
	2016[d]	40	33.5	27.2	29.4	32.7	21.8	17.6	45.9	41.4	20.9
	2017	31	23.5	37.0	33.3	35.0	22.8	27.5	26.4	28.8	25.6
	2018[f]	37	13.3	12.7	26.3	19.0	43.4	19.1	24.6	13.6	19.8
	2019[g]	37	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
	2020[h]	24	55.8	9.6	8.1	7.5	9.6	7.2	4.5	<3.0	4.5
	2021[i]	29	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
	2022[j]	28	<3	<3	3.2	<3	<3	<3	3.5	<3	<3
	2023[k]	29	<3	<3	<3	<3	<3	<3	<3	<3	<3
	2024[l]	23	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6
Late Fall	2013[a]	-	-	-	-	-	-	-	-	-	-
	2014[b]	42	<5.0	4.8	<5.0	6.6	6.0	-	<5.0	9.0	11.4
	2015[c]	35	19.9	23.6	38.4	17.4	28.7	24.1	23.6	25.3	21.3
	2016[d]	30	23.4	15.4	24.7	<5.0	24.5	38.15	29.8	31.1	29.5
	2017	28	25.3	40.1	26.0	21.3	35.5	28.6	34.0	32.3	33.1
	2018[f]	21	<3.0	5.7	<3.0	5.4	<3.0	<3.0	<3.0	<3.0	<3.0
	2019[g]	21	<3.0	5.7	<3.0	5.4	<3.0	<3.0	<3.0	<3.0	<3.0
	2020[h]	32	3.6	4.2	7.8	<3.0	3.3	<3.0	<3.0	<3.0	<3.0
	2021[i]	21	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
	2022[j]	23	<3.6	<3.6	<3.6	<3.6	<3.6	4.5	<3.6	<3.6	<3.6
	2023[k]	19	<4.8	<4.8	<4.8	<4.8	<4.8	<4.8	<4.8	<4.8	<4.8
	2024[l]	25	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3
Winter	2013-14[a]	241	25.5	5.3	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	2014-15[b]	256	18.9	29.5	43.6	22.3	25.6	-	-	21.4	23.5
	2015-16[c]	241	11.2	15.9	13.7	7.9	6.1	<5.0	<5.0	<5.0	-
	2016-17[d]	234	<5.0	10.0	-	8.0	-	<5.0	-	<5.0	<5.0
	2017-18[f]	247	6.7	12.2	-	14.5	5.8	5.0	5.6	5.9	<5.0
	2018-19[g]	252	29.1	19.8	19.2	10.5	8.7	6.9	5.1	4.5	4.5
	2019-20[h]	260	6.0	21.6	9.0	5.1	6.9	<3.0	<3.0	<3.0	<3.0
	2020-21[i]	234	<3.0	3.9	4.8	3.0	<3.0	<3.0	<3.0	<3.0	<3.0
	2022[j]	214	4.5	6.0	3.5	<3	<3	<3	<3	<3	<3
	2023[k]	222	4.8	9.0	5.0	<3	<3	<3	<3	<3	<3
	2024[l]	214	<3	3.5	2.7	<3	<3	<3	<3	<3	<3

Note: Lowest Detection Limit = 5 mg /100 cm^2/30d.
a) Transect not established until August 2013 (Golder 2014); 2013 sampling periods were August to September (Early Fall), October 2013 to May 2014 (Winter 2013-14).
b) 2014 sampling periods: May-June (Spring), August to October (Late Fall) and October to May 2015 (Winter).
c) 2015 sampling periods: June (Spring), July (Summer), August to October (Late Fall) and October 2015 to May 2015 (Winter).
d) 2016 sampling periods: June (Spring), July (Summer), August (Early Fall), September (Late Fall) and October 2016 to May 2017 (Winter).
e) Summer 2017 results are anomalous, and included outlier values due to sample contamination and are thus not included.
f) 2018 sampling periods: June-July (Spring), July-August (Summer), August-September (Early Fall), September (Late Fall) and September 2017 to June 2018 (Winter).
g) 2019 sampling periods: June-July (Spring), July-August (Summer), August-September (Early Fall), and October 2018 to June 2019 (Winter).
h) 2020 sampling periods: June-July (Spring), July-August (Summer), August-September (Early Fall), and September 2019 to June 2020 (Winter).
i) 2021 sampling periods: April-June (Spring), June-July (Summer), August (Early Fall), August-September (Late Fall), and September 2020 to April 2021 (Winter).
j) 2022 sampling periods: April-June (Spring), June-July (Summer), August (Early Fall), August-September (Late Fall), and September 2021 to April 2022 (Winter).
k) 2023 sampling periods: May-June (Spring), June-July (Summer), July-August (Early Fall), August-September (Late Fall), and September 2022 to May 2023 (Winter).
l) 2024 sampling periods: April-June (Spring), June-July (Summer), July-August (Early Fall), August-September (Late Fall), and September 2023 to May 2024 (Winter)
- = no data; mg /100 cm^2/30 d = milligrams per hundred square centimetres per thirty days.

3.3.3 Wildlife Sightings Log

The wildlife sightings log provides staff working at the Mine an effective means to record and report wildlife observations to the Mine Environment Department. While the information is not collected systematically and likely contains repeated observations of the same animals, it provides an indication of the presence of wildlife and the potential for wildlife incidents or problem wildlife. It also increases staff involvement with the environment programs and fosters awareness of wildlife issues.

Methods

Wildlife sightings logs were maintained at various locations around the Mine site to record observations of wildlife and wildlife sign. Staff were encouraged to add observations to the log, including observations of unusual species and potential problem wildlife. Reporting of sightings of medium to large wildlife (i.e., fox-size and larger) by staff and contractors is mandatory. Observations of species that pose a potential risk to human safety are reported to Environment staff immediately in addition to being documented in the wildlife sightings log.

Results

There were a total of 297 independent wildlife observations in 2024. The number of observations represents the number of independent and incidental observations of wildlife, and is not an indication of the number of individuals of a species observed. The number of people present at the Mine during 2024 is reported in Section 3.10.

Caribou was the most commonly observed species in 2024, with 48 observations. Red fox was also a commonly observed species during 2024, with 43 observations recorded. Other frequent species observed were the muskox and Arctic hare (34 and 31 observations respectively). In 2024, 13 wolf observations were recorded, with the first sighting occurring January 11 and last recorded sighting on December 16. A full summary of observations recorded on Wildlife Sightings Logs for 2013 to 2024 can be found in Table 3-8.

Table 3-8 Wildlife Sightings Log Summary of Observations, 2013 to 2024

Species	Type	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
American pipit	Bird	-	-	-	-	-	-	-	-	-	-	2	-
American robin	Bird	-	-	1	-	2	-	-	1	-	-	-	-
Arctic fox	Mammal												5
Arctic ground squirrel (sik sik)	Mammal	-	4	11	4	23	3	3	2	8	15	16	7
Arctic hare	Mammal	3	32	45	9	29	5	22	26	37	60	34	31
Arctic lemming	Mammal	-	-	-	-	-	-	-	-	-	-	1	-
Bald eagle	Bird	-	-	1	4	1	2	11	5	7	3	3	4
Barn swallow	Bird	-	-	-	-	-	-	-	-	-	1	-	-
Bank swallow	Bird	-	-	-	-	-	-	-	-	-	-	2	-
Beaver	Mammal	-	-	-	-	1	-	1	-	-	1	-	-
Cackling goose	Bird	-	-	-	-	-	-	-	-	3	-	-	1
Canada goose	Bird	-	1	2	-	2	-	1	3	5	1	1	2
Caribou	Mammal	17	37	45	-	2	61	16	6	14	54	23	48
Cliff swallow	Bird	-	-	-	-	-	-	-	-	-	-	1	-
Common loon	Bird	-	-	-	-	-	-	-	-	-	2	1	1
Common merganser	Bird	-	-	-	-	-	-	-	-	2	-	-	-
Common redpoll	Bird	-	-	-	-	-	-	-	-	1	-	-	-
Common raven	Bird	-	10	16	13	15	11	27	15	44	11	7	8
Coyote	Mammal	-	-	-	-	-	-	-	-	-	3	-	-
Duck spp.	Bird	-	-	-	-	-	-	-	-	2	4	3	1
Eagle spp.	Bird	-	-	-	-	-	-	-	-	-	-	1	1
Falcon spp.	Bird	-	-	-	-	-	-	-	-	-	3	1	3
Fox spp.	Mammal	5	33	155	85	104	91	48	15	33	-	13	22
Gadwall	Bird	-	-	-	-	-	-	-	-	1	-	-	-
Golden eagle	Bird	-	-	-	-	-	-	-	-	4	2	2	-
Goose spp.	Bird	-	-	4	6	3	-	7	1	15	3	1	1
Greater white-fronted goose	Bird	-	1	5	1	-	-	-	3	5	1	2	1
Grey wolf	Mammal	7	27	22	2	4	4	40	2	-	-	-	1

Table 3-8 Wildlife Sightings Log Summary of Observations, 2013 to 2024

Species	Type	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Grizzly bear	Mammal	-	-	3	3	2	4	11	4	1	5	-	1
Grouse	Bird	-	-	-	-	-	-	-	-	1	-	-	-
Gull spp.	Bird	-	1	3	-	2	-	1	-	2	2	2	3
Gyrfalcon	Bird	-	-	1	1	-	-	-	-	1	1	1	8
Hare spp.	Mammal	-	-	-	-	-	5	14	1	12	-	4	8
Harris' sparrow	Bird	-	-	-	-	-	-	-	-	-	-	1	-
Hawk spp.	Bird	-	-	-	-	-	-	-	-	-	2	1	1
Jaeger spp.	Bird	-	-	1	-	-	-	-	1	-	-	-	-
Lapland longspur	Bird	-	-	-	-	-	-	-	-	-	-	1	1
Lesser scaup	Bird	-	-	-	-	-	-	-	-	-	-	1	-
Loon spp.	Bird	-	-	2	-	2	-	1	-	-	-	-	-
Mallard	Bird	-	-	-	-	-	-	-	-	-	1	-	-
Mink	Mammal	1	-	-	-	-	-	-	-	-	-	-	-
Moose	Mammal	-	-	5	-	4	1	5	2	2	5	1	14
Mouse spp.	Mammal	-	-	3	2	2	7	2	1	2	1	5	-
Muskox	Mammal	1	4	14	10	14	20	24	15	30	34	16	34
Muskrat	Mammal	-	-	-	2	5	-	1	-	-	1	-	-
Northern harrier	Bird	-	-	-	-	-	-	-	-	1	1	1	1
Northern pintail	Bird	-	-	-	1	-	-	-	1	2	1	5	1
Owl spp.	Bird	-	-	2	4	-	-	-	-	-	-	1	-
Pelican spp.	Bird	-	-	-	-	-	-	-	-	1	-	-	-
Peregrine falcon	Bird	-	1	12	1	-	2	1	-	4	8	11	-
Pine siskin	Bird	-	-	-	-	1	-	-	-	-	-	-	-
Plover spp.	Bird	-	-	-	-	-	-	-	-	1	1	-	-
Porcupine	Mammal	-	-	-	-	-	1	-	-	-	-	-	-
Ptarmigan spp.	Bird	3	16	10	10	4	9	4	6	15	15	14	14
Red fox	Mammal	-	-	-	-	-	-	-	-	127	36	25	43
Rock ptarmigan	Bird	-	-	-	-	-	-	-	-	7	-	1	1

Table 3-8 Wildlife Sightings Log Summary of Observations, 2013 to 2024

Species	Type	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Ross's goose	Bird	-	1	-	-	-	-	-	-	-	-	-	-
Rough-legged hawk	Bird	-	2	-	-	-	-	1	1	5	2	4	1
Sandhill crane	Bird	-	-	-	1	1	-	-	1	-	-	-	1
Scoter spp.	Bird	-	-	1	-	-	-	-	-	-	-	-	1
Semipalmated plover	Bird	-	-	-	-	-	-	-	-	-	-	-	1
Shot-tailed shearwater	Bird	-	-	-	-	-	-	-	-	-	-	-	1
Short-eared owl	Bird	-	1	1	-	1	-	-	-	-	-	1	-
Snow bunting	Bird	-	-	-	-	-	-	-	1	2	4	4	3
Snow goose	Bird	-	-	1	-	-	-	-	2	4	1	1	4
Snowy owl	Bird	-	-	-	-	1	1	1	2	4	-	-	1
Sparrow spp.	Bird	-	-	1	-	-	-	-	-	-	-	1	-
Teal duck	Bird	-	-	-	-	-	-	-	-	2	-	-	-
Tree swallow	Bird	-	-	-	-	-	-	-	-	-	-	2	-
Tundra swan	Bird	-	1	1	-	-	-	1	-	-	1	-	-
Unidentified duck	Bird	-	-	2	1	1	-	2	-	-	-	-	1
Unidentified raptor	Bird	-	-	2	1	3	4	-	-	-	-	-	-
Unidentified shorebird	Bird	-	-	-	-	-	-	-	-	3	-	-	-
Unidentified songbird	Bird	-	-	2	1	1	2	-	-	3	-	-	2
White-crowned sparrow	Bird	-	-	-	-	-	-	-	-	-	-	1	-
Willow ptarmigan	Bird	-	-	-	-	-	-	-	-	1	-	6	-
Wolf spp.	Mammal	-	-	-	-	-	-	-	-	6	5	6	12
Wolverine	Mammal	-	-	-	-	8	27	43	4	-	3	5	2
Yellow warbler	Bird	-	-	-	-	-	-	-	-	1	-	-	-

Note: The number of observations represents the number of independent observations for each species, and is not an indication of the number of individuals present.
- = no observations.

3.3.4 Site Surveillance

Wildlife are expected to be present near the Mine throughout construction, operation, and closure. Site surveillance monitoring, which is a regular scheduled program that occurs once per week, provides information of wildlife activity at the Mine, and direct feedback to Mine operations regarding the effectiveness of waste management and wildlife mitigation practices. Examples of wildlife activities that are documented through site surveillance monitoring include presence of wildlife in areas where food may be available, use of buildings for shelter or nesting, and use of water management ponds by waterfowl.

Through systematically monitoring for the presence of wildlife within and around the Mine site, Environment staff remain appraised of current and emerging issues, and are able to implement management actions to address these issues as required. To use a common example, site surveillance monitoring may detect that wildlife has gained access to a building on site or is taking shelter beneath it. The typical mitigation is to block the access through improved skirting, and follow-up with surveillance monitoring to confirm whether the mitigation was successful, or if further action is required.

Effective waste management practices and staff education are key to decreasing the availability of wildlife attractants at mine sites. Environmental design features, mitigation, and waste management are implemented at the Mine to limit the attraction of wildlife, and the associated increased risks of wildlife interactions and mortality. The effectiveness of the waste stream management system, as it pertains to wildlife attractants, is monitored through regular waste bin inspections, as per the Waste Management Plan (De Beers 2015c), and site waste audits.

Methods

Systematic site surveys of the Mine were conducted weekly to record all wildlife observations, recent wildlife sign (e.g., tracks, scat), and misdirected waste. Surveys were completed on foot and by truck. Staff recorded the area surveyed, with the nature and location of all observations. Surveillance monitoring included regular visits to areas of the Mine where there is risk of wildlife attractants (e.g., waste management areas), risk of wildlife using the Mine for shelter, denning or nesting, and where there were people working outdoors.

De Beers actively monitors for bird nesting activity around the Mine site, and in areas scheduled for clearing or disturbance each year (Section 3.6.1). Bird deterrents are deployed in areas scheduled for clearing during the breeding season to avoid and minimize the disturbance of any active nests of migratory birds, consistent with the *Migratory Birds Convention Act*. Bird deterrents are also deployed in and around pits each Spring. Monitoring is conducted to detect raptors, and actively deter them prior to nest initiation on Mine infrastructure.

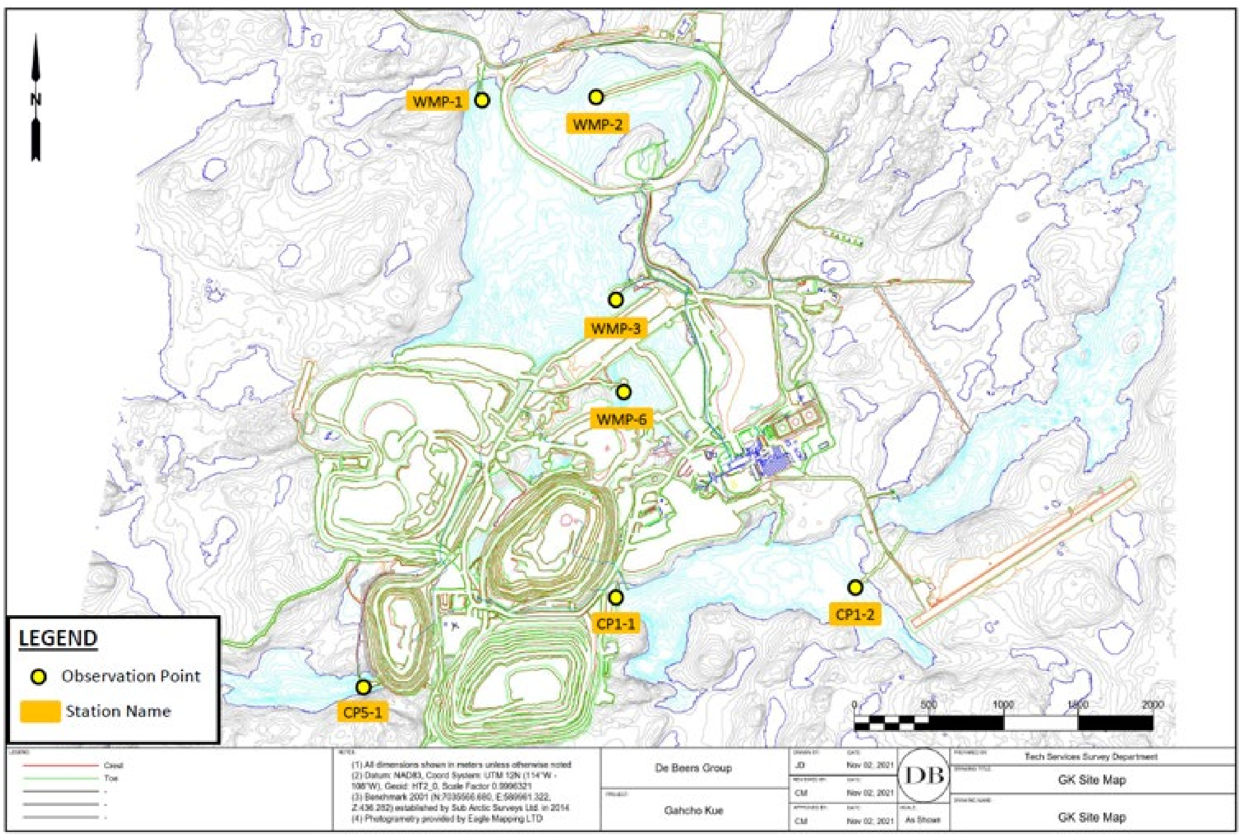
In 2017, De Beers initiated systematic surveys of the water management pond and other water collection ponds on site to monitor for the presence and use of these water bodies by water birds. Collecting observations of water bird use of the site provides a better understanding of which species are present at different times of the year at and near the Mine. This program continued in 2024.

To monitor the use of site water bodies by birds, seven stations were selected as fixed observation points from which the 2024 surveys were conducted. Two of these stations are located at the water management pond, two stations monitoring collection Pond 1 (CP1-1 and CP1-2), one station monitoring the Collection Pond 6 (WMP-6), one station monitoring Collection Pond 5 (CP5-1), and one station monitoring FPK Area 2 (WMP-2). Previous stations that had been in place during the 2021 season have been removed, as these collection ponds have been removed by mining activity and no longer exist (WMP-7). The location of each of these survey stations is provided in Map 3-2 and the UTM coordinates for each station are provided in Table 3-9. At each station, the observer conducts a 180° sweep using binoculars, focusing on both open-water and shoreline habitats. Surveying at each station generally takes 10 to 15 minutes to complete. The observer records information including species type, activity (including evidence of nesting behavior), and number of individuals.

Table 3-9 Locations of Collection Pond Stations, 2024

Station Coordinates	Easting	Northing
WMP-1	0588811	7038360
WMP-2	0589694	7038355
WMP-3	0589814	7037102
WMP-6	0590451	7036293
CP1-1	0589803	7035085
CP1-2	0589735	7035163
CP5-1	0588133	7034571

Map 3-2 Collection Pond Survey Locations, 2024



Results

In 2024, a total of 52 weekly site surveillance surveys were completed. Wildlife or signs of wildlife (e.g., tracks) was observed during 52 surveys (100%). Arctic hare were the most commonly observed species in 2024, with 78 individuals and 87 observations. Common raven observations were frequent with 57 observations and 82 individuals observed during weekly surveys. Other commonly observed species were red fox and Arctic ground squirrel, ptarmigan species, and caribou. A full summary of wildlife observations from weekly wildlife surveys can be found in Table 3-10.

Table 3-10 Wildlife and Wildlife Signs Observed during Site Surveillance Surveys, 2024

Species	Number of Surveys with Wildlife Observations	Total Number of Individuals Observed	Number of Surveys with Wildlife Sign
American pipit	2	4	-
American robin	4	6	-
American tree sparrow	1	3	-
American widgeon	1	2	-
Arctic ground squirrel	19	20	1
Arctic hare	78	87	34
Bald eagle	1	1	-
Bank swallow	5	48	-
Barn swallow	1	7	-
Black scoter	1	5	-
Cackling goose	6	843	-
Canada goose	1	11	-
Caribou	31	420	6
Common gull	1	12	-
Common loon	1	2	-
Mallard	1	6	-
Common raven	57	82	3
Duck spp.	3	34	-
Falcon spp.	1	1	-
Fox spp.	10	10	10
Goose spp.	3	120	-
Greater white-fronted goose	8	1,043	-
Green-winged teal	1	2	-
Gull spp.	1	1	-
Gyrfalcon	5	6	-
Hare spp.	5	7	2
Harris's sparrow	1	15	-
Jaeger spp.	1	1	-
Lesser Scaup	3	14	-
Long-tailed duck	1	9	-

Table 3-10 Wildlife and Wildlife Signs Observed during Site Surveillance Surveys, 2024

Species	Number of Surveys with Wildlife Observations	Total Number of Individuals Observed	Number of Surveys with Wildlife Sign
Moose	1	1	-
Muskox	9	27	-
Northern harrier	1	2	-
Northern pintail	4	367	-
Peregrine falcon	5	6	-
Ptarmigan spp.	22	247	6
Red fox	45	45	35
Rock ptarmigan	3	17	-
Rough-legged hawk	5	8	-
Sandhill crane	1	4	-
Sandpiper spp.	1	1	-
Savannah sparrow	2	21	-
Seagull spp.	6	6	-
Short-tailed shearwater	1	1	-
Snow bunting	9	117	-
Snow goose	8	943	-
Songbird spp.	7	15	-
Sparrow spp.	2	2	-
Surf scoter	2	4	-
Swallow spp.	2	9	-
Unidentified small bird	1	1	-
Waterfowl spp.	2	2	-
White-crowned sparrow	1	1	-
Willow ptarmigan	1	1	-
Wolf	4	7	4

Collection Pond Surveys were conducted on a bi-weekly frequency from May 14 to October 18, 2024. During the 12 separate survey events, a total of 99 bird observations were made, consisting of 913 individuals. A summary of these results is provided in Table 3-11. Observers confirmed 22 different species were identified, with the remaining being placed into 9 broader species identification groups (e.g., Gull spp.). A summary of the results is provided in Table 3-12.

Table 3-11 Bird Observations during Collection Pond Surveys, 2024

Station	Number of Bird Groups Observed	Number of Individuals Observed	Average Number of Individuals per Station per Survey
CP1-1	13	42	3
CP1-2	19	108	6
CP5-1	16	458	29
WMP-1	15	39	3
WMP-2	5	19	4
WMP-3	12	87	7
WMP-6	19	160	8

Table 3-12 Bird Species Observed during Collection Pond Surveys, 2024

Species	Number of Individuals Observed	Number of survey events where species was observed
American pipit	3	2
Arctic tern	1	1
Bald eagle	2	2
Bank swallow	32	9
Barn swallow	8	1
Cackling goose	55	2
California gull	2	1
Canada goose	54	3
Common loon	1	1
Common merganser	15	2
Common raven	12	6
Duck spp.	288	11
Goose spp.	56	1
Greater-white fronted goose	22	4
Green winged teal	9	2
Gull spp.	13	9
Long-tailed duck	12	3
Mallard	14	3
Merganser spp.	3	1
Northern harrier	3	3
Northern pintail	243	5
Red breasted merganser	7	1
Savannah sparrow	3	3
Scaup spp.	5	1
Scoter spp.	1	1
Semipalmated plover	3	2
Songbird spp.	23	4
Sparrow spp.	8	8
Surf scoter	10	3
Swallow spp.	1	1
Tundra Swan	2	1
Unknown Species	1	1
White crowned sparrow	1	1
Total	**913**	**99**

3.3.5 Public Use of the Winter Access Road

De Beers operates a Winter access road from MacKay Lake to the Gahcho Kué Mine site from early February to late March each year (Map 1-1). De Beers conducts surveillance of the Winter access road to document public use and provide safety and support to truck traffic. Public use of the road is typically dominated by hunting parties.

Methods

Each day the Winter access road is open, security personnel drive from the Mine to MacKay Lake, and record wildlife observations and hunting/recreational activity. Observations of public use of the road are documented on a Winter Access Road User Survey Form (De Beers 2022).

Results

In 2024, the Winter access road was operational from February 14 to April 2 (i.e., 47 days). There were 2,073 loads on the Winter access road to supply the Mine with fuel, ammonium nitrate and general freight and equipment. During the daily security patrols, wildlife and wildlife sign observed included of wolf, wolverine, fox, ptarmigan, and caribou. Large numbers of caribou harvest sites were reported on the Winter access road by security personnel on multiple occasions to GNWT-ECC and wildlife incidents were reported.

3.3.6 Wildlife Incidents

A wildlife incident is defined in the WMMP as:

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

Following the principles of adaptive management, monitoring of wildlife incidents is undertaken to identify all incident types and to prevent future incidents or escalation of problems.

Methods

Wildlife incidents throughout the year are reported, investigated, and have immediate follow-up actions by Environment staff. If wildlife are deterred to reduce the risk of a wildlife-human incident, then an effort is made by Environment staff to start with the least intrusive method available, with all deterrent actions recorded in the wildlife deterrent log. All wildlife mortalities are reported immediately to ECCC and/or GNWT-ECC. Documentation of wildlife incidents include photographs, names of people involved, the nature of the incident, and supporting information such as the time, date, location, and the follow-up actions that occurred.

Results

In 2024, seven wildlife mortality incidents were reported:

1) January 26, 2024: A grey wolf (*Canis lupus*) repeatedly entered active work areas despite multiple deterrent attempts and was seeking shelter and warmth, showing signs of extreme lethargy and starvation. Due to the risk it posed to worksite staff, in consultation with ECC, IBA community partners and site management, the decision was made to humanely destroy the animal. On January 26, the wolf was destroyed humanely, showing no signs of distress, and was later transported to the ECC North Slave Laboratory for necropsy. These results are still outstanding.

2) October 04, 2024: A juvenile Long-tailed duck (*Clangula hyemalis*) was found deceased on the Reclaim Jetty. Upon closer inspection, the duck appeared to be in excellent physical condition with no visible signs of injury, or predation. A thorough assessment of the surrounding area revealed no potential hazards or cause of death. The remains were incinerated as directed by GNWT-ECC.

3) October 27, 2024: The Environment team was notified of a deceased Arctic hare (*Lepus arcticus*) on the road between the 5034 Pit south ramp and the Hearne Pit turnoff. Examination indicated it was likely struck by a vehicle or equipment. The sighting was reported by a De Beers Mine Operations employee during routine duties. GNWT-ECC directed the incineration of the remains. A review of site traffic procedures emphasising wildlife remaining right-of-way, and ensuring proper situation awareness, were conducted with the Mine Operations team.

4) October 27, 2024: A deceased Arctic hare (*Lepus arcticus*) was reported to the Environment team at the intersection near the Hearne refueling area. Evidence suggested it had been struck multiple times by vehicles or equipment. The sighting was reported by a De Beers Mine Operations employee during routine duties. GNWT-ECC directed the incineration of the remains. A review of site traffic procedures emphasising wildlife remaining right-of-way, and ensuring proper situation awareness, were conducted with the Mine Operations team.

5) November 21, 2024: A De Beers Mine Operations employee reported a bird unable to fly at the bottom of Tuzo Pit. Environment staff found it in poor condition, suffering from extreme hypothermia, and relocated it to the edge of the Mine site, but it remained unable to fly, eventually succumbing to cold weather injury. As identified by site staff, WSP biologists and the Canadian Wildlife Service (CWS), the bird was a Short-tailed shearwater (*Ardenna tenuirostris*), an unusual species for this time of year and location. The intact bird was shipped to the CWS lab in Ottawa for further analysis.

6) November 21, 2024: Environment staff were notified of a deceased bird in the 5034 Pit. Upon arrival, the bird had already been killed and partially consumed by common ravens. As identified by site staff, WSP biologists and the CWS, the bird was Short-tailed shearwater (*Ardenna tenuirostris*), an unusual species for this time of year and location. GNWT-ECC directed the incineration of the remains.

7) December 15, 2024: The Environment department was notified of three common ravens fighting between two mine buildings. Upon arrival, staff found one common raven (*Corvus corax*) deceased with no apparent signs of trauma or cause of death. No attractants were identified in the area, and staff will continue to be engaged at toolboxes to encourage wildlife reporting and mitigate potential risks to wildlife.

3.4 Caribou

The Bathurst caribou herd is known historically to move through the RSA during the northern migration to the calving grounds near Bathurst Inlet, and to the wintering grounds at or south of the treeline during the post-calving migration (De Beers 2010). Bathurst caribou may also occupy the RSA in Winter. Beverly/Ahiak caribou are also known to occupy the RSA during the Winter months.

Objectives of caribou monitoring for the Mine are:

- to determine if caribou behaviour changes with distance from the Mine;
- to determine the zone of influence extent and whether it changes in relation to Mine activity; and,
- to determine if caribou abundance and distribution changes in the study area over time.

The monitoring objectives are met through:

- participation in the GNWT-ECC led Zone of Influence Technical Task Group;
- aerial reconnaissance surveys of the Winter access road;
- snow berm measurements along the Winter access road; and,
- caribou behaviour monitoring.

3.4.1 Aerial Surveys

De Beers has contributed to the GNWT-ECC monitoring programs supporting the Barren-ground Caribou Management Strategy (GNWT-ECC 2011). De Beers also participates in the GNWT-ECC led Zone of Influence Technical Task Group for development of a standardized set of guidelines to monitor for a zone of influence for caribou. De Beers has committed to completing aerial reconnaissance surveys to determine if caribou are present near the Winter access road. The information collected during this survey is used to inform haul truck drivers of the presence and location of any caribou groups near the road, and is used as a trigger for caribou behaviour monitoring (Section 3.4.2).

Methods

In 2024, an aerial reconnaissance survey was completed on January 24, 2024 along the Gahcho Kué Winter access road via Aviat Husky A-1B aircraft at an altitude of approximately 167 m and speeds of 80 to 100 km/h. The aircraft flew east along the north side of the Winter access road to Mackay Lake. The number of wildlife and wildlife sign observations were recorded by Mine Environment contractor staff. An aerial survey is completed each year prior to the Winter access road opening to provide information to the haul truck drivers of the presence and location of caribou near the road, and determine whether caribou behavioural monitoring is triggered. The monitoring trigger is 20 caribou groups or 100 total caribou.

Results

During the reconnaissance, a total of 40 individual caribou were observed in 3 separate groups. Based on the aerial reconnaissance survey, the Winter access road caribou behavioural monitoring (Section 3.4.2) was triggered for the 2024 season.

3.4.2 Behaviour Monitoring

The objective of determining if caribou behaviour changes with distance from the Mine for behaviour monitoring is based on recommendations from the Diamond Mine Wildlife Monitoring Workshop (Marshall 2009; Handley 2010). As noted for monitoring changes in caribou distribution, monitoring caribou behaviour around the Mine could contribute to future environmental assessments and the assessment and management of cumulative effects by government under different development scenarios. Caribou behavioural monitoring from the Winter access road is conducted through the WMMP (De Beers 2022).

Large numbers of observations are required to detect differences in caribou behaviour, which is strongly affected by environmental conditions, such as wind, temperature, and insect (in summer) and predator abundance (BHPB 2004; Witter et al. 2012). For example, a power analysis based on Ekati and Diavik monitoring results indicated that a minimum of 55 caribou groups are required in each distance strata, assuming power of 0.8 and a type I error rate of 0.1 (Golder 2015). Behaviour monitoring of caribou groups in the RSA may be discontinued in favour of using collared caribou data, which was discussed at the February 2021 Diamond Mine Wildlife Monitoring Meetings (GNWT-ECC 2021). De Beers intends to engage Indigenous communities before making this decision.

The Winter access road is located within the range of the Bathurst caribou herd, and De Beers has committed to implementing a behaviour monitoring program along the Winter access road if sufficient caribou are present. Behaviour monitoring will be triggered when either 100 caribou or 20 caribou groups are observed along the length of the Winter access road during either the aerial reconnaissance survey (Section 3.4.1) or during public use monitoring (Section 3.4.3). Caribou in proximity to the Winter access road is a cause for concern for both the safety of the animals and the drivers. It is also an opportunity to better understand the interactions between caribou and Winter roads in the NT through behavioural monitoring. Monitoring is anticipated to continue from construction through closure of the Mine.

Methods

Behavioural monitoring methods are consistent with those implemented at other NT mines. The behaviour monitoring will be conducted by a crew of two observers stationed along the Winter access road or other Mine roads in a truck. Both focal surveys of individuals and scan surveys of caribou groups will be undertaken. Focal surveys provide information on activity budgets (i.e., the amount of time an animal is engaged in different behaviours), the temporal sequence of behaviours relative to stressors or other stimuli, and the length of time it takes the animal to return to a non-stressed state following a stressor event. Scan samples of a group of animals are more useful for quantifying the frequencies of dominant behaviours in a group over a period of time (ERM Rescan 2014).

For focal surveys, an individual is selected from a group for observation. Behaviour and time of behaviour changes are recorded. Focal surveys will be undertaken on both cows and bulls, for a minimum of 20 minutes. For scan surveys, observers will make instantaneous behaviour observations of caribou groups at 8 minute intervals for at least 40 minutes (a minimum of four observations per group).

For both scan and focal surveys, the response of caribou to stressors, such as vehicle or aircraft traffic, will also be recorded. Behavioural observations will be repeated at multiple locations along the road where caribou are present. In addition to behaviour, observers will record the number, group composition, location of each group and total group size. Observers will also record caribou tracks seen and/or caribou tracks observed, and advise as to any additional factors that seem to stress caribou or alter their behaviour negatively (e.g., vehicle speed and type, and wolves).

Results

Caribou behavioural monitoring was performed by WSP in conjunction with De Beers Environment and Ni Hadi Xa staff from February 20 to March 31, 2024. The crews completed a total of 91 group scans and 90 focal (individual) scan surveys. In 6 group scans and 8 focal surveys, visibility conditions decreased the ability to see the caribou and influenced the number and duration of surveys.

During caribou group scans, the field crew recorded the number of individuals in the group displaying each type of behaviour (feeding, bedded, standing, alert, walking, trotting, or running) at one moment in time at 8-minute intervals. A minimum of four, and a maximum of eight observations are required per group (i.e., 32 minutes and 64 minutes). Crews recorded the group size (i.e., number of individuals), group demographic composition (i.e., sex, age, class, group composition), and location of each group in relation to the Winter access road. The goal of this task was to observe and record data on as many groups as possible over the course of the field program.

During focal scans, the field crew monitored a single individual from a group of caribou continuously for a minimum of 20 minutes to measure how long the caribou was exhibiting each behaviour type/reaction to stressor. The behaviour type and time of the behaviour changes were recorded for the focal individual.

The results of the group and focal scans are listed in Appendix A including; stressors, behaviours and characteristics.

3.4.3 Snow Berm Management

Snow berms associated with the Winter access road may act as a partial barrier to caribou movement by deflecting caribou from crossing roads. For example, caribou have been shown to deflect from a road when snow berms are 1.6 m or greater in height (ERM Rescan 2011). Determining the aspects of the Winter access road that influence caribou movements (e.g., snow berm heights) provide information specific to the operation of the Mine and potentially to features of the Winter access road that may be mitigated, such as lowering of snow berm heights.

The objective of this component of the monitoring program is to determine heights of snow berms along the Winter access road.

In 2015, De Beers made the commitment to implement additional mitigation to reduce snow berm heights if any measurements were observed over 1.6 m. This mitigation was implemented from 2016 onwards.

Methods

Snow berm measurements along the Winter access road were recorded during three separate surveys:

- Survey 1 – February 19, 2024
- Survey 2 – March 6 to 7, 2024
- Survey 3 – March 26 to March 27, 2024

Snow berm height and slope were measured every 2 km along the Winter access road, at both lake and portage locations, to determine factors affecting the permeability of the Winter road to caribou (i.e., whether snow berm heights exceed deflection thresholds for caribou). These data were also used to inform the road maintenance crew of any snow berm heights in excess of 1.6 m.

Results

The total length of the Winter Access Road that crosses frozen lakes is 100 km (83%), and 24 km across land portages (17%). The percent of snow berm measurements along the Winter access road was 80% at lakes and 20% at portages. Thus, the measurements correspond to availability of snow berm conditions potentially encountered by caribou. In 2024, the average snow berm heights for lake section surveys of the Winter access road were 1.00 m, 0.96 m, and 0.1.00 m, during survey 1, 2 and 3, respectively, with a maximum berm height recorded of 1.80 m during Survey 3. The average snow berm slopes for lakes were 30°, 25°, and 30°, with a maximum recorded slope of 80° during Survey 3. On portage sections, average heights were 0.12 m, 0.75 m, and 0.33 m, with a maximum height of 1.71 m during Survey 3. Average snow berm slopes recorded on portages were 3°, 27°, and 15°, with a maximum slope of 56° recorded during Survey 2. A summary of survey data is located in Table 3-13.

Table 3-13 Snow Berm Monitoring Results for the Winter Access Road, 2024

Measurements		Survey 1 (n = 120)		Survey 2 (n = 120)		Survey 3 (n = 120)	
		Lake	Portage	Lake	Portage	Lake	Portage
Height (m)	average	1.00	0.12	0.96	0.75	1.00	0.33
	min	0.00	0.00	0.00	0.00	0.00	0.00
	max	1.60	1.54	1.42	1.71	1.80	1.15
Slope (°)	average	30.14	3.05	25.39	27.09	31.47	14.86
	min	0.00	0.00	0.00	0.00	0.00	0.00
	max	68.00	34.00	56.00	56.00	80.00	40.00

n = number of measurements.

Results from the snow berm monitoring program indicate that 98.91% of the snow berms measured along the Winter access road were at or below 1.6 m during the operational season (Table 3-14). Four measurements of 1.6 m or greater were made at 1.71 (Survey 2), 1.70 (Survey 3), and 1.80 (Survey 3). When Snow berms were observed to be over 1.6 m during the snow berm measurement surveys, De Beers notified the Winter access road maintenance crew so that they could be decreased. Subsequently, wildlife monitoring cameras were set-up in proximity to locations that exceeded snow berm height surveys. Wildlife monitoring cameras did not capture any abnormal behavior at the four locations where snow berm height was exceeded.

Table 3-14 Proportion of Snow Berm Height Measurements for the Winter Access Road, 2024

Height (m)	Survey 1	Survey 2	Survey 3	Average
≤1.6	99.18%	99.18%	98.36%	98.91%
>1.6	0.82%	0.82%	1.64%	1.09%

≤ = less than or equal to; > = greater than.

3.5 Arctic Program for Regional and International Shorebird Monitoring Surveys

De Beers is contributing to ECCC's Program for Regional and International Shorebird Monitoring (PRISM) surveys. These surveys are designed to document population numbers of Arctic shorebirds and contribute to regional knowledge in an effort to set population targets and assist with management and conservation of shorebird species (EC 2012).

Methods

Monitoring methods adhered to standard techniques for PRISM surveys (CWS 2008). De Beers first partnered with ECCC to conduct ground-based rapid assessment surveys of 12 ha plots in 2015. PRISM surveys were conducted in 2017, 2019, 2022, and 2024. The next survey is anticipated to be conducted in 2026.

Results

In 2024, 14 PRISM plots were surveyed and a total of 40 bird species were identified (Tables 3-15 and 3-16). The PRISM survey was conducted from June 17 to 20, 2024. The most frequently observed species was American tree sparrow (*Spizella arborea*), Harris's sparrow (*Zonotrichia querula*), and savannah sparrow (*Passerculus sandwichensis*) were the most frequently observed species, recorded at 13, 13, and 14 PRISM survey plots, respectively (Table 3-15). Three species of shorebird were observed in 2024; least sandpiper (*Calidris minutilla*), red-necked phalarope (*Phalatopus lobatus*), and lesser yellowlegs (*Tringa flavipes*). Canada jay (*Perisoreus canadensis*) was observed at one plot near the treeline. This is the first observation of both lesser yellowlegs and Canada jay in PRISM surveys conducted at Gahcho Kué between 2015 to 2024.

Incidental observations of birds outside of the plots were also recorded. Notable observations include Arctic tern (*Catharus guttatus*), cackling goose *(Branta hutchinsii),* cliff swallow (*Petrochelidon pyrrhonota*), peregrine falcon (*Falco peregrinus*), and ring-billed gull (*Larus delawarensis*). None of these species have been recorded during previous PRISM surveys (Table 3-16). Black scoter (*Melanitta americana*) were observed as incidentals during the 2024 survey well outside their normal breeding range; however, this species was observed during previous surveys in 2017 and 2022.

Six confirmed and three probable nests were observed during the 2024 surveys, including two confirmed least sandpiper nests. Nests were also observed for three sparrow species and long-tailed duck (*Clangula hyemalis*).

Ten plots surveyed in 2024 have been surveyed at least once previously during field visits in 2015, 2017, or 2022. Four new plots were surveyed in 2024. Habitat and sub-habitat types encountered in 2024 were similar to those encountered during the previous surveys. The habitat surveyed was comprised of 43% dry upland habitat, 37% wet lowland habitat, and 20% permanent water. The dominant ground vegetation types included dwarf shrub/heath and moss/lichen in upland areas; graminoids (grasses and sedges), moss/lichen, and high shrub/tree in lowland areas. Lakes made up 72% of the permanent water observed on the surveyed plots.

Table 3-15 Species Observed during the 2024 PRISM Survey

Common Species Name	Scientific Name	Number of Plot where Species was Observed
American robin	*Turdus migratorius*	1
American pipit	*Anthus rubescens*	3
American tree sparrow	*Spizella arborea*	13
Blackpoll warbler	*Setophaga striata*	3
Canada jay	*Perisoreus canadensis*	1
Common redpoll	*Acanthis flammea*	2
Grey-cheeked thrush	*Catharus minimus*	3
Greater scaup	*Aythya marila*	1
Harris' sparrow	*Zonotrichia querula*	13

Table 3-15 Species Observed during the 2024 PRISM Survey

Common Species Name	Scientific Name	Number of Plot where Species was Observed
Herring gull	*Larus argentatus*	1
Horned lark	*Eremophilia alpestris*	2
Lapland longspur	*Calcarius lapponicus*	6
Least sandpiper	*Calidris minutilla*	3
Lesser yellowlegs	*Tringa flavipes*	1
Long-tailed duck	*Clangula hyemalis*	2
Northern pintail	*Anas acuta*	2
Red-breasted merganser	*Mergus serrator*	1
Red-necked phalarope	*Phalatopus lobatus*	1
Ruby-crowned kinglet	*Corthylio calendula*	1
Rusty blackbird	*Euphagus carolinus*	1
Savannah sparrow	*Passerculus sandwichensis*	14
Semipalmated sandpiper	*Calidris pusilla*	2
Smith's longspur	*Calcarius pictus*	6
White-crowned sparrow	*Zonotrichia leucophrys*	10
Willow ptarmigan	*Lagopus lagopus*	3
Yellow warbler	*Setophaga petechia*	8
Unidentified avian species	-	1
Unidentified redpoll species	*Acanthis sp.*	3
Unidentified shorebird species	-	1
Unidentified sparrow species	-	1

- = not applicable.

Table 3-16 Incidental Species Observed during the 2024 PRISM Survey

Common Species Name	Scientific Name
Arctic tern	*Catharus guttatus*
Black scoter	*Melanitta americana*
Bald eagle	*Haliaeetus leucocephalus*
Cackling goose	*Branta hutchinsii*
Canada goose	*Branta canadensis*
Common raven	*Corvus corax*
Cliff swallow	*Petrochelidon pyrrhonota*
Green-winged teal	*Anas crecca*
Northern harrier	*Circus hudsonius*
Northern waterthrush	*Parkesia noveboracensis*
Parasitic jaeger	*Stercorarius parasiticus*
Peregrine falcon	*Falco peregrinus*
Ring-billed gull	*Larus delawarensis*
Yellow-rumped warbler	*Setophaga coronata*

3.6 Raptors

Raptor species (i.e., birds of prey) observed nesting within the RSA include peregrine falcon (likely *anatum-tundrius complex*), gyrfalcon, rough-legged hawk (*Buteo lagopus*), and short-eared owl. The short-eared owl is currently listed as special concern by COSEWIC. Both the peregrine falcon and short-eared owl have a general status rank of sensitive in the NWT (NWT SARC 2023). Peregrine falcon was assessed as Not At Risk by the Northwest Territories Species at Risk Committee in May 2022 (NWT SARC 2022). Short-eared owl has not been assessed by the Northwest Territories Species at Risk Committee. Analysis of 13 years of nest site use and productivity monitoring data in the Ekati and Diavik mines study area found no relationship with proximity to mines (Coulton et al. 2013). The nearest active raptor nest site identified in the RSA is 18 km from the Mine site. Considering the distance of the Mine to the nearest known raptor nest, the Mine is not anticipated to affect local raptor populations.

There are two programs for raptors conducted by the Mine. The first is the Regional Raptor Nest Monitoring Program, which is conducted within the RSA and contributed by De Beers to the GNWT-ECC. The second is monitoring and deterrence of raptors from nesting in the pits. Both are conducted as part of the WMMP (De Beers 2022).

3.6.1 Regional Raptor Nest Monitoring Program

The objective of the raptor nest monitoring program is to contribute nest survey data to the GNWT-ECC for inclusion in regional databases (De Beers 2022).

Methods

De Beers conducted regional raptor nest data through collaborative aerial surveys at both the Gahcho Kué and Snap Lake mines. The timing and methods of these surveys are developed in partnership with the GNWT-ECC and other operators in the region.

Visits to known nest sites are conducted by helicopter, using fly-by methods to identify occupying species, and to count eggs and young. Surveys are not carried out in the rain, and visits are kept as short as possible to limit disturbances to the birds. Nests are considered occupied if at least one adult bird was observed. Eggs are counted if visible. Nests are recorded as successful if at least one chick is observed in the nest. The number of chicks are also recorded. Although the monitoring is focused on raptor species, observations of other species (e.g., ravens) are recorded during the surveys and included in the summary statistics.

Results

Regional raptor nest monitoring was initially completed in 2015. The monitoring in the RSA was not conducted in 2020 due to the COVID-19 restrictions. The next regional survey will occur in 2025.

3.6.2 Pit-nest and Raptor Monitoring and Deterrence Program

As described in the WMMP (De Beers 2022), raptor interactions and mortalities at the Mine are also monitored through the wildlife sightings log, site surveillance, and wildlife incidents (Sections 3.3.3, 3.3.4 and 3.3.6), as well as incidents of raptor nesting activity on Mine infrastructure (De Beers 2022). Raptors that are observed in dangerous areas of the Mine, such as open pit areas, are actively deterred from nesting. Deterrent methods include bear bangers, propane noise cannons, air horns and predatory effigies. The objective of this aspect of the program is to deter raptors from nesting on critical Mine infrastructure or pit walls.

Methods

De Beers actively deters raptors from nesting in the open pits through the use of visual and auditory deterrents and routine monitoring.

The 2024 Bird Deterrent and Surveillance Program began on April 25, 2024. Visual monitoring for the presence of migratory bird species was initiated across 5034, Tuzo, and Hearne open pits, including their surrounding areas and active construction zones. These monitoring efforts, aimed at detecting potential nesting activity, were conducted by the Bird Monitor and Environmental staff during the day shift using binoculars and spotting scopes to ensure comprehensive coverage.

Proactive deployment of propane cannons commenced on April 29, 2024, targeting areas where nesting activity could interfere with operational activities. The airstrip was equipped with six strategically placed propane cannons and two inflatables along its perimeter to deter waterfowl from the area. In the Coursed Processed Kimberlite (CPK) area, four propane cannons were positioned along the west and southwest walls to discourage bank swallows (*Riparia riparia*) from nesting.

Throughout the nesting season, kites were deployed continuously as visual deterrents. These kites were positioned above each wall of the open pits to create an effective deterrent presence. As the season progressed, additional kites were strategically placed by securing the poles in rock piles near areas with potential nesting interest. Kites were also positioned in locations outside the open pit areas to further mitigate the risk of nesting.

The placement of deterrents was regularly adjusted to accommodate mining and construction activities, as well as to respond to extreme weather events. By the end of the season, a total of ten kites were deployed around the pit area, with an additional four deployed in the CPK area.

A full-time Bird Monitor was hired to manage deterrent operations, conduct daily surveillance, and monitor oversee the monitoring of nesting sites as needed. The Mine Environmental Department assumed responsibility for the adjustment, maintenance, and replacement of deterrents throughout the bird season. Bird sightings were recorded daily to ensure comprehensive tracking of activity.

Historical data from previous years indicated that the primary species of concern for nesting included the peregrine falcon (*Falco peregrinus*), rough-legged hawk (*Buteo lagopus*), bank swallow (*Riparia riparia*), cliff swallow (*Petrochelidon pyrrhonota*), American robin (*Turdus migratorius*), common raven (*Corvus corax*), barn swallow (*Hirundo rustica*), and various shorebird and waterfowl species.

On July 9, 2024, the frequency of daily bird observations and deterrent maintenance was reduced as the risk of new nesting activity had significantly decreased. At this stage, the program shifted its focus from active deterrent deployment to continued monitoring of established nesting sites. All deterrents were fully demobilized by July 27, 2024

Results

Between May 2, 2024 and July 16, 2024, a total of 427 bird observations were documented, encompassing 3,238 individual birds across 41 different species. in or around the 5034, Hearne, and Tuzo pits (Table 3-17). Of the birds observed in or near the pits, the most common was the bank swallow with 102 observations. The most commonly observed with the highest number of individuals counted was snow goose (686 individuals counted over 11 occasions). There were 174 nests documented during the nesting season. Of the 174, approximately 159 nests were bank swallow burrows dispersed in six different colonies within the CPK area.

During the 2024 nesting season, American robins (*Turdus migratorius*) constructed four nests at various locations across the Mine site. The first active nest was observed on June 7, 2024, at the Emulsion plant, beneath an Orica Mobile Mix Unit (LV-101). Upon discovery, the area was delineated with barriers and monitored regularly to ensure minimal disturbance. The second active nest was observed on June 19, 2024, on the stairs at the end of Dorm A3. By June 22, 2024. As with the first nest, the area was delineated and monitored regularly. The third active nest was discovered on June 20, 2024, beneath the airport office shack at the warehouse supply chain laydown. This site was also delineated with barriers and monitored regularly. The fourth active nest was observed on June 23, 2024, in the SMS East Laydown. This nest was occupied by hatchlings and two adult robins. Similar protective measures were implemented, with the area delineated and monitored regularly.

Common ravens (*Corvus corax*) constructed two nests at the Mine site. The first active nest was observed on April 11, 2024, at the Quonset prill truck offload tent near the Ammonium Nitrate (AN) barn. Following its discovery, the area was delineated with barriers to prevent disturbance and monitored regularly. The second active nest was observed on May 3, 2024, on a bench within the Tuzo pit. Due to limited accessibility, the area could not be delineated. However, the mining department was promptly informed, and operational activities in the vicinity of the nest were suspended for the duration of the nesting period.

A savannah sparrow (*Passerculus sandwichensis*) established a nest at the Mine site during the 2024 nesting season. The active nest was observed on June 21, 2024, at the foot entrance at the back end of Hearne Pit. Upon discovery, the area was delineated with barriers to minimize disturbance and monitored regularly.

Cliff swallows (*Petrochelidon pyrrhonota*) constructed several nests at the Mine site during the 2024 nesting season. The active nests were observed on May 23, 2024, at the Quonset prill truck loading tent near the AN barn, despite the installation of spike deterrents prior to the nesting season, as implemented in previous years. Upon discovery, the area was delineated to prevent disturbance, and workers were notified of the nest's presence. Work schedules were adjusted to minimize potential impacts on the nesting cliff swallows. The AN barn was monitored regularly to ensure the nests remained undisturbed.

Peregrine falcons (*Falco peregrinus*) established a nest at the Mine site during the 2024 nesting season. The active nest was observed on July 19, 2024, within the Hearne Pit, approximately three benches down from the top along the east wall. A pair of peregrine falcons was observed flying within the pit, while three hatchlings were confirmed to be within the nest. Following the confirmation of the nest and hatchlings, the location was reported to Mine Operations staff and the Environmental Supervisor. Nesting signs were installed at the Hearne lookout and along the F1 road, where openings along the berm were identified, to establish a buffer zone and minimize potential disturbances to the nest.

Bank swallows (*Riparia riparia*) represented the majority of nests recorded during the 2024 nesting season, with a total of 170 burrows spread across six colonies. Five of these colonies (A,B,C,D and F) were located within the CPK area, while the sixth colony (E) was located within the West Mine Rock Pile (WMRP). The colonies within the CPK were discovered on June 8, 2024, and the WMRP colony was observed on June 12, 2024.

Upon discovery, Mine Operations staff were immediately notified to cease dumping within the nesting colony areas, and 30-meter setbacks were implemented using physical barriers. Senior management was also informed of the nesting activity to ensure appropriate mitigation measures were enacted. To further minimize potential impacts, the Mine Operations team adjusted operational plans within the CPK area in consultation with the

Environment Team. The mitigation measures in place were reviewed by ECCC and provided feedback on potential improvements.

Daily monitoring was conducted throughout the nesting season to ensure compliance with the delineation and setback protocol. To confirm the burrows were no longer occupied, 30-minute observation periods were carried out daily between August 16 to 27, 2024. No further bird activity was reported from any of the six colonies during this period, and all delineators and setbacks were removed on August 28, 2024.

Table 3-17 Recorded Observations of Individual Species Count and Total Number of Observations, 2024

Species	Number of Observations	Total Number Observed
Bank swallow	102	437
Common raven	74	133
Sparrow spp.	45	72
American robin	41	56
Cliff swallow	20	119
Peregrine falcon	13	18
Snow goose	11	686
Cackling goose	10	631
Goose spp.	14	420
Northern harrier	8	9
Willow ptarmigan	8	66
Savannah sparrow	7	8
Gull spp.	6	7
Tree swallow	6	6
Duck spp.	5	13
Northern pintail	5	138
Semipalmated plover	5	57
Swallow spp.	5	5
Rock ptarmigan	4	113
Rough-legged hawk	4	40
Falcon spp.	5	5
Greater white-fronted goose	3	4
Bald eagle	3	160
Greater scaup	2	2
Harris' sparrow	2	4
Plover spp.	2	2
White-crowned sparrow	2	2
Arctic tern	2	2
Eagle spp.	1	1
Gyrfalcon	1	1
Lapland longspur	1	1
Lesser scaup	1	1
Loon spp.	1	5

Table 3-17 Recorded Observations of Individual Species Count and Total Number of Observations, 2024

Species	Number of Observations	Total Number Observed
Parasitic jaeger	1	3
Pectoral sandpiper	1	1
Ptarmigan spp.	1	6
Short-billed gull	1	1
Surf scoter	1	1
Hawk spp.	1	2
Unidentified spp.	2	4

Note: the number of individuals is biased high as the same individuals may be observed during surveys.

3.7 Upland Breeding Birds

In 2015, a Migratory Bird Nest Mitigation Plan was developed and submitted to and approved by ECCC (De Beers 2015d). The objective of the nest management program is to avoid destruction of active upland migratory bird nests in areas scheduled for flooding or disturbance by mining. This plan described mitigation actions to limit harm to migratory birds and the disturbance or destruction of nests and eggs and to comply with the *Migratory Birds Convention Act*. Each Fall De Beers pro-actively clears standing vegetation in areas anticipated to flood the subsequent Spring, therefore reducing the attractiveness of these areas to tree and shrub nesters. Each Spring, prior to the 50% snow melt when nesting activity is typically initiated, De Beers deploys bird deterrents to those same areas targeting ground nesting birds. Additionally, during the nesting season, De Beers re-visits these areas to confirm functionality of the deterrents and observe bird activity.

Upland birds include shorebirds, ptarmigan, and songbirds (excluding raven). The rusty blackbird, bank swallow, barn swallow, Harris's sparrow, lesser yellowlegs, horned grebe and the red-necked phalarope are birds of concern that may occur in the RSA. They are also listed by COSEWIC as either threatened or special concern (COSEWIC 2023). From 1998 to 2004, rapid assessment upland bird surveys were completed to provide a comprehensive species list in the RSA. In 2004 and 2005, permanent sample plots were established in the RSA to estimate the variation in upland breeding bird density and richness in the RSA and LSA, and to assess the importance of habitats in the LSA for upland bird nesting. Impacts to upland breeding birds are anticipated to be localized at the Mine site and not to influence regional populations (De Beers 2010). The objective of monitoring for upland birds is to detect changes in regional bird populations over time. This objective is achieved through participation in ECCC PRISM surveys (Section 3.5). De Beers contributes PRISM monitoring during the operating life of the Mine to fill existing information gaps in ECCC's N7 Bird Conservation Region (Section 3.5).

3.7.1 Nest Management Program

Development and operation of the Mine has the potential to inadvertently disturb upland breeding birds and their nests through land clearing activities to develop site infrastructure and the raising of Lakes D2 and D3 (Lakes D2/D3) and E1. For the latter, during the operation of the Mine, terrestrial habitat around Lakes D2/D3 and E1 will be flooded through the establishment of diversion dykes in the D and E lakes watersheds (Table 3-18). Water levels in these lakes have increased following freshet each year since the diversion dykes were constructed in 2015. They were predicted to continue to rise until reaching full supply level in Years 2 and 3 for Lake E1, and Year 4 for Lakes D2/D3, after which water levels will stabilize until the dykes are removed at closure (Table 3-18). The actual extent of flooding in 2024 at Lakes D2/D3 and E1 is reported in Table 3-18. As the water levels will rise most rapidly during freshet, the period of flooding will overlap with the migratory bird nesting season, which tends to occur annually from mid-May to mid-August.

Table 3-18 Predicted Timing and Extent of Predicted and Actual Flooding at Lakes D2/D3, and E1

Timing of Flooding	Incremental Extent of Flooding							
	Lake D2/D3				Lake E1			
	Predicted		Actual		Predicted		Actual	
	Elevation (masl)	Area (ha)	Elevation (masl)	Area (ha)	Elevation (masl)	Area (ha)	Elevation (masl)	Area (ha)
2015	424.2	0	424.2	0	425.2	0.0	425.2	0.0
Year 1 (June – October 2016)	425.7	19.7	426.1	34.2	426.0	5.1	425.8	4.5
Year 2 (June - October 2017)	426.3	18	426.6	10.2	426.0	1.1	425.9	0.5
Year 3 (June - October 2018)	426.8	9.8	426.7	3.1	426.0	0.0	425.9	0.0
Year 4 (June - October 2019)	427.0	4.6	427.0	4.6	426.0	0.0	425.9	0.2
Year 5 (June – October 2020)	427.0	0.0	427.0	2.4	426.0	0.0	426.1	1.1
Year 6 (June – October 2021)	427.0	0.0	426.9	0.0	426.0	0.0	426.1	0.2
Year 7 (May – October 2022)	427.0	0.0	426.9	0.0	426.0	0.0	425.8	0.0
Year 8 (May – October 2023)	427.0	0.0	426.7	0.0	426.0	0.0	425.8	0.0
Year 9 (May – October 2024)	427.0	0.0	426.6	0.0	426.0	0.0	426.1	0.0
Total	-	**52.1**	-	**54.5**	-	**6.2**	-	**6.5**

Note: Lake D2/D3 and E1 reached their spillover elevation in June 2019 and 2018, respectively. Following the spillover, changes to the lake water elevations were due to natural fluctuations.

- = not applicable; masl = metres above sea level.

Methods

The hydrometric station at Lake D2/D3 was established in 2015 and continuous monitoring of water surface elevations (WSE) have been ongoing annually since 2015. The hydrometric station on Lake E1 was established in 2016 and water level measurements and continuous monitoring of WSE have been conducted annually since 2018. Flooding (WSE) is monitored to verify predictions of water elevations. If water levels are on the rise, a vegetation clearing program will be put in place as mitigation.

Results

There was no vegetation clearing program conducted in 2024. The actual peak elevation in 2024 for Lake D2/D3 was similar to that estimated by the EIS with associated flooding being slightly higher than predicted in total. The peak WSE and actual area for Lake E1 was also similar to the predicted values from the EIS. The timing and extent of flooding predicted in the EIS is compared to actual observations as shown in Table 3-18 for both lakes.

3.8 Small Mammals

The periodic population cycles of small mammals can have strong influences on other species in the Arctic ecosystem such as clutch and litter size of raptors and foxes, respectively. The nearest small mammal monitoring location to the Mine is at the Daring Lake research facility (approximately 200 km northwest of the Mine), operated by the GNWT-ECC. In 2015, De Beers began annual monitoring of small mammals, including lemmings and voles, to provide an additional regional monitoring site to the GNWT-ECC.

The methods for the small mammal survey follow those outlined by Carrière (1999) and Outcrop Communications (2005). The small mammal program in 2024was conducted from August 10 to 14 over five nights, with 100 traps set over five consecutive nights. The same two transects established in 2015 northeast of Area 2 of Kennady Lake were used again in 2024. This habitat is considered representative of tundra features typical to the Taiga Shield High Subarctic Ecoregion. Both transects measured 250 m in length and are parallel to each other, roughly 100 m apart. Historically, a mixture of oats and peanut butter were utilized as bait for all museum traps. The 2024 survey also utilized a mixture of oats and peanut butter on both transects with bait regularly replaced as needed.,

Results

Catch results are summarized in Table 3-19. A total of 19 small mammals were captured over the five consecutive trap nights. Specimens were identified using the NWT Small Mammal Identification Guide (GNWT-ECC 2005). Transect 1 #1 traps yielded 8 small mammals and Transect 1 #2 traps yielded 3 small mammals. Transect 2 #1 traps yielded 2 small mammals and Transect 2 #2 traps yielded 6 small mammals. It was noted that as the week progressed, strong winds and heavy rain likely affected the capture rates. Both Transect 1 and 2 recorded two incidental captures of song birds. The samples were shipped out to GNWT-ECC laboratories in Yellowknife during the fourth quarter of 2024.

Table 3-19 Small Mammal Monitoring Program Catch Summary, 2024

Date	Transect No.	Site No.	Trap No.	Species
10-Aug-24	1	2	1	Red backed vole
10-Aug-24	2	2	2	Red backed vole
10-Aug-24	2	9	2	Red backed vole
11-Aug-24	1	8	1	Collared lemming
11-Aug-24	1	13	1	Savannah sparrow
11-Aug-24	2	20	2	Collared lemming
11-Aug-24	2	2	2	Red backed vole
12-Aug-24	1	1	1	Red backed vole
12-Aug-24	1	2	1	Red backed vole
12-Aug-24	1	14	2	Meadow vole
12-Aug-24	2	20	1	Heather vole
12-Aug-24	2	2	2	Red backed vole
13-Aug-24	1	1	1	Red backed vole
13-Aug-24	1	13	2	Savannah sparrow
13-Aug-24	1	14	1	Savannah sparrow
13-Aug-24	1	24	1	Red backed vole
14-Aug-24	1	2	2	Red backed vole
14-Aug-24	2	4	1	Red backed vole
14-Aug-24	2	2	2	White-crowned sparrow

3.9 Environmental Indicators

To provide estimates of the annual changes in local environmental conditions surrounding the Mine, De Beers committed to monitoring basic environmental indicators or covariates (De Beers 2014).

Methods

The indicators recorded by Environment staff included the following:

- snow melt (date of 50% snow cover and 10% snow cover);
- lake thaw (date of 50% ice cover and 10% ice cover on selected lakes);
- lake freeze (date of first ice across selected lakes);
- first snow (date of first snowfall that does not melt); and,
- migratory bird arrival (date of first and second observation of common and easily identified migratory birds, including raptor, waterfowl and upland bird species).

Results

The environmental indicators that were recorded in 2024 are summarized in Table 3-20.

Table 3-20 Gahcho Kué Environmental Indicators, 2024

Environmental Indicator	Date
Snow melt	May 18, 2024 (10% snow cover)
	May 9, 2024 (50% snow cover)
Area 8 thaw	June 14, 2024 (10% ice cover)
	June 7, 2024 (50% ice cover)
Lake freeze	October 20, 2023 (100% ice cover on Area 8 Lake)
First snow	October 18, 2024 (Date of first snow that did not melt)
Migratory bird arrival	May 6, 2024 (Sighting of snow bunting) May 7, 2024 (Sighting of northern pintail)

3.10 Mine Activity

Sensory disturbances, such as noise, smells, dust, or the presence of people resulting from mining activity may alter the behaviour or distribution of wildlife in habitats adjacent to development (Bayne et al. 2008; Boulanger et al. 2012). De Beers committed to record covariates contributing to overall Mine activity to help explain possible changes in wildlife behaviour and distribution (De Beers 2022).

Methods

The indicators recorded monthly by the Mine include the following:

- occupancy (number of site staff);
- fuel consumption;
- mine rock moved;
- ore processed; and
- domestic water consumption.

Results

In 2024, average monthly occupancy ranged from 372 in August to 423 in March (Table 3-21). The total fuel consumption for 2024 was 52,557,310 L of diesel. The total amount of mine rock mined was 33,388,000 tonnes. The total amount of ore processed was 3,629,000 tonnes. The total amount of water consumed for domestic use was 34,439,000 L, which does not include the additional water drawn from the water management pond for site operation activities such as dust suppression within the Controlled Area (11,034,000 L).

Table 3-21 Gahcho Kué Camp Occupancy, 2024

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Occupancy	394	419	423	392	388	396	373	372	389	403	394	373

4 WILDLIFE MITIGATION AND MONITORING PLAN AUDIT

Mitigation measures are described in the WMMP and stem from current practices at existing mines or are derived from suggestions during the environmental assessment process. In order to evaluate mitigation measures an audit is implemented annually. The results of the audit should include site mitigation measures that are regularly implemented by Mine staff and results from any additional special studies undertaken to further understand effectiveness of mitigation actions intended to reduce residual effects.

Section 5.2 of the WMMP states that the mitigation proposed in the WMMP should be evaluated to confirm that mitigations work as intended and new mitigation identified through adaptive management should be documented. The mitigation policies and actions evaluate:

- if all mitigation has been implemented;
- which mitigation was observed or demonstrated to be successful or effective;
- if new mitigation has been implemented in response to new issues; and
- if some mitigation is redundant.

Methods

For the audit, WSP was contracted to work with Mine Environmental staff to review mitigations provided in the WMMP. Mine Environmental staff were asked the following questions:

1) Was the mitigation implemented in during the year?
2) Was the mitigation observed or demonstrated to be effective?
3) Was the mitigation redundant in application with any other mitigation?
4) Are there any special studies required to support determining effectiveness of the mitigation?

GNWT-ECC indicated in the conditional approval letter for the WMMP that the effectiveness of snow berm reduction on the Winter access road (113 km) could not be evaluated with the current mitigation management measures outlined in Version 1.1. In response, WSP conducted an evaluation of the Mine's snow berm management and compared the management to caribou observations that occurred in years where behaviour monitoring was triggered. WSP analyzed the snow berm data and caribou behaviour data locations as part of the mitigation audit deliverable to examine how frequently and where snow berm management has been required.

Results

The audit (Appendix C) was conducted in 2024 based upon 2023 mitigations with a summary of results outlined below.

The WMMP identifies a total of 72 mitigations (De Beers 2022). Two additional mitigations were added after the WMMP was approved, following recommendations from Environment and Climate Change Canada to put measures in place to deter nesting and avoid disturbance and damage and distribution of nesting barn swallows from mining activity (ECCC 2022). As a result, a total of 74 mitigations were audited in 2023. Of these, 71 mitigations (96%) which were implemented in 2023; 66 out of the 71 mitigations implemented (93%) were observed by Mine site staff to be effective and 5 were found to be not effective. A summary of mitigations is listed in Table 4-1.

Snow berm monitoring from 2014 to 2023 identified infrequent instances (<3% of all recorded measurements) that equal or exceed the threshold height of 1.6 m. In years where caribou monitoring was triggered and data were available (2014, 2018, 2022, 2023), four or fewer locations per year had snow berm measurements greater than 1.6 m, which appears to be a threshold height for deflecting caribou from roads (ERM Rescan 2011). Observations of caribou from behaviour monitoring detected caribou occurrences on both sides of the winter access road before and after snow berm reduction. This suggests it is unlikely that the snow berms established from ploughing the winter access road are hindering movement for caribou. Although snow berms exceeding 1.6 m are uncommon, it could not be verified whether caribou are using locations where snow berms have been reduced.

Table 4-1 Summary of Mitigations Implemented in 2023

Mitigation Implemented?	Count of Mitigations	Proportion (%) of Total Implemented Effective	Mitigation not Implemented	Rationale for no Implementation
Yes	71	66 (93%)	Speed limits were not reduced when caribou or large wildlife were within 200 m of roads.	Wildlife continue to have the right-of-way and no large wildlife injuries or mortalities occurred during 2023.
Not Applicable	2	-	Backfill Mined out Pits.	Mined out pits have not been backfilled because it is not applicable at this phase of development of open pits.
			All interactions involving injury to caribou will be reported to GNWT.	No caribou injuries occurred in 2023 and thus did not have to be reported to GNWT.

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6 ACRONYMS AND ABBREVIATIONS

AER	Alberta Energy Regulator
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPK	Coarse Processed Kimberlite
De Beers	De Beers Canada Inc.
DKFN	Deninu Kué First Nations
EC	Environment Canada
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
GIS	Geographical Information System
GNWT	Government of the Northwest Territories
GNWT-ECC	Department of Environment and Climate Change, Government of the Northwest Territories
Golder	Golder Associates Ltd.
LKDFN	Łutsel K'e Dene First Nation
LSA	Local Study Area
Mine	Gahcho Kué Mine
MVLWB	Mackenzie Valley Land and Water Board
NSMA	North Slave Métis Alliance
NWT	Northwest Territories
NWT SAR	Northwest Territories Species at Risk
NWT SARC	Northwest Territories Species at Risk Committee
NWTMN	Northwest Territories Métis Nation
PK	Processed Kimberlite
PRISM	Arctic Program for Regional and International Shorebird Monitoring
RSA	Regional Study Area
SAR	Species at Risk
sp.	species
spp.	multiple species
TG	Tłı̨chǫ Government
TK	Traditional Knowledge
VSMP	Vegetation and Soil Monitoring Program
WEMP	Wildlife Effects Monitoring Program
WMMP	Wildlife Management and Monitoring Plan
WMRP	West Mine Rock Pile
WSE	water surface elevation
WSP	WSP Canada Inc.
WWHPP	Wildlife and Wildlife Habitat Protection Plan
YKDFN	Yellowknives Dene First Nation

7 UNITS OF MEASURE

≤	less than or equal to
≥	greater than of equal to
%	percent
±	plus or minus
>	greater than
°	degree
°C	degrees Celsius
h	hour
ha	hectare
km	kilometre
km/h	kilometres per hour
km^2	square kilometre
L	litre
m	metre
masl	metres above sea level
m^3	cubic metre
$mg/100\ cm^2/30\ d$	milligrams per hundred square centimetres per thirty days

8 GLOSSARY

Abundance	The number of individuals
Density	The number of individuals per unit area
Distribution	The pattern of dispersion of an entity within its range
Habitat use	The way and animal uses (or *consumes*, in a generic sense) a collection of physical and biological entities in a habitat
Population	Classically, a collection of interbreeding individuals
Transect	A method of sampling along a path or fixed line
Upland	Ground elevated above the lowlands along rivers or between hills; highland or elevated land; high and hilly country

APPENDIX A 5 Year Comprehensive Analysis of Wildlife Monitoring Data Collected from 2014 to 2024

5 year Comprehensive Analysis of Wildlife Monitoring Data Collected from 2014 to 2024

Gahcho Kué Mine

De Beers Canada Inc.

2025-03-26

CA0048439.7029/DCN-004

Distribution List

electronic copy - De Beers

electronic copy - WSP

Table of Contents

1.0 INTRODUCTION 1
2.0 DIRECT HABITAT LOSS 7
3.0 INDIRECT HABITAT LOSS 7
4.0 CARIBOU BEHAVIOUR ANALYSIS 9
4.1 Methods 9
4.2 Results 12
4.2.1 Caribou Group Scan Surveys 13
4.2.2 Focal Behaviour Surveys 18
4.3 Summary 23
5.0 TRENDS IN WILDLIFE OBSERVATIONS, INCIDENTS, AND DETERRENT PROGRAMS 23
6.0 SNOW BERM MANAGEMENT AND MONITORING 30
6.1 Methods 30
6.2 Results 31
6.3 Summary 31
7.0 TRENDS IN PUBLIC USE, ENVIRONMENTAL INDICATORS AND MINE ACTIVITY 32
7.1 Methods 32
7.2 Results 33
7.3 Summary 37
8.0 CONCLUSIONS 38
9.0 CLOSURE 39
10.0 REFERENCES 40

TABLES

Table 1: Schedule of Wildlife and Wildlife Habitat Monitoring under Relevant Management Plans 4

Table 2: Direct Habitat Loss Associated with the Mine Footprint from 2017 to 2024 7

Table 3: Description of Explanatory Variables used to Create Candidate Models for Group Behaviour Frequency Analysis 11

Table 4: Description of Explanatory Variables included in Candidate Model sets for Each Category of Interest 11

Table 5: Number of Group Scan Surveys, First and Last Survey Date, and Number of Survey Days per Year, 2014 to 2024..12

Table 6: Group Behaviour Monitoring Results for Caribou along the Winter Access Road, 2014 - 2024 13

Table 7: Results from AIC Analysis on Candidate Model Groups...13

Table 8: Coefficients for the Model Estimating Compositional Group Behaviour Based on Wind Speeds (km/hr)..14

Table 9: Coefficients for the Model Estimating Compositional Group Behaviour Based on Group Size 15

Table 10: Coefficients for the Model Estimating Compositional Group Behaviour Based on the Number of Stressors 16

Table 11: Focal Behaviour Survey Results for Caribou along the Winter Access Road, 2018 to 2024 19

Table 12: Caribou Response to Stressors during Focal Behaviour Survey along the Winter Access Road, 2018 to 2024 22

Table 13: Observations of All Species and Species at Risk Reported in Wildlife Sightings Log, 2014 to 2024....25

Table 14: Wildlife Mortalities reported at the Mine, 2014 to 2024 27

Table 15: Avian Monitoring and Deterrence Program, 2016 to 2024..29

Table 16: Small Mammal Monitoring Program Summary, 2015 to 2024 30

Table 17: Winter Road Surveys - Snow Berm Heights, 2014 to 2024 31

Table 18: Public Use of Winter Access Road, 2014 to 2024...34

Table 19: Environmental Conditions Measured at the Mine, 2014 to 2024 35

Table 20: Mine Activity Indicators Measured at the Mine, 2015 to 2024...36

Table 21: Correlation Matrix for Mine Activity Parameters Measured at the Mine, 2015 to 2024..........................37

FIGURES

Figure 1: Location of Gahcho Kué Mine 3

Figure 2: Predicted Proportions from the Model Estimating Compositional Behaviour based on Wind Speeds. Shaded bands are bootstrapped 95% confidence intervals. 15

Figure 3: Predicted Proportions from the Model Estimating Compositional Group Behaviour based on Group Size. Shaded bands are bootstrapped 95% confidence intervals. 16

Figure 4: Predicted Proportions from the Model Estimating Compositional Group Behaviour based on the Number of Stressors Present. Shaded bands are bootstrapped 95% confidence intervals. 17

APPENDICES

APPENDIX A
Power Analysis and Summary of Collared Caribou Technical Memorandum

APPENDIX B
Focal Behaviour Survey Results for Caribou

APPENDIX C
Caribou Response to Stressors during Focal Behaviour Survey

APPENDIX D
Wildlife Sightings Log

1.0 INTRODUCTION

De Beers Canada Inc. (De Beers) operates the Gahcho Kué Mine (Mine), located at Kennady Lake about 280 kilometres (km) northeast of Yellowknife, Northwest Territories (NT). Kennady Lake is north of the East Arm of Great Slave Lake and the community of Lutsel K'e by approximately 140 km (Figure 1). Construction of the Mine began in winter 2014/2015, following the issuance of the Type A Water Licence (MV2005L2-0015) and Type A Land Use Permit (MV2005C032) for mining and milling by the Mackenzie Valley Land and Water Board (MVLWB) in late 2014. Mine activities and infrastructure include dewatering of Kennady Lake, open pit mining of three kimberlite pipes, construction and operation of Coarse and Fine Processed Kimberlite Facilities, Mine Rock Piles, accommodation and maintenance facilities, solar farm, all-season airstrip, site roads and annual winter access road.

Wildlife monitoring commitments for the Mine were developed during environmental review of the proposed Mine in consultation with regulators and Indigenous communities. De Beers prepared a Wildlife Effects Monitoring Plan (WEMP; De Beers 2014a), which describes wildlife mitigation and monitoring of direct effects within the Mine footprint, and a Wildlife and Wildlife Habitat Protection Plan (WWHPP; De Beers 2014b), which describes monitoring of indirect effects that occur beyond the Mine footprint. In 2019, the Government of Northwest Territories (GNWT) revised the wildlife management plan guidelines for mine operators for the development of a single Wildlife Management and Monitoring Plan (WMMP) to meet the requirements of the *NWT Wildlife Act* (GNWT-ENR 2019). The Mine's Tier 3 WMMP Version 1.2 (De Beers 2022a) was approved in September 2022 (GNWT-ENR 2022). Relevant to the approved WWHPP and WMMP, De Beers committed to undertaking a comprehensive analysis of mitigation and monitoring activities every five years to investigate trends in Mine-related effects to wildlife, using all the relevant data available. In addition to programs designed for monitoring effects to wildlife from the Mine, monitoring of environmental indicators is completed to characterize natural changes or to contribute to regional monitoring initiatives.

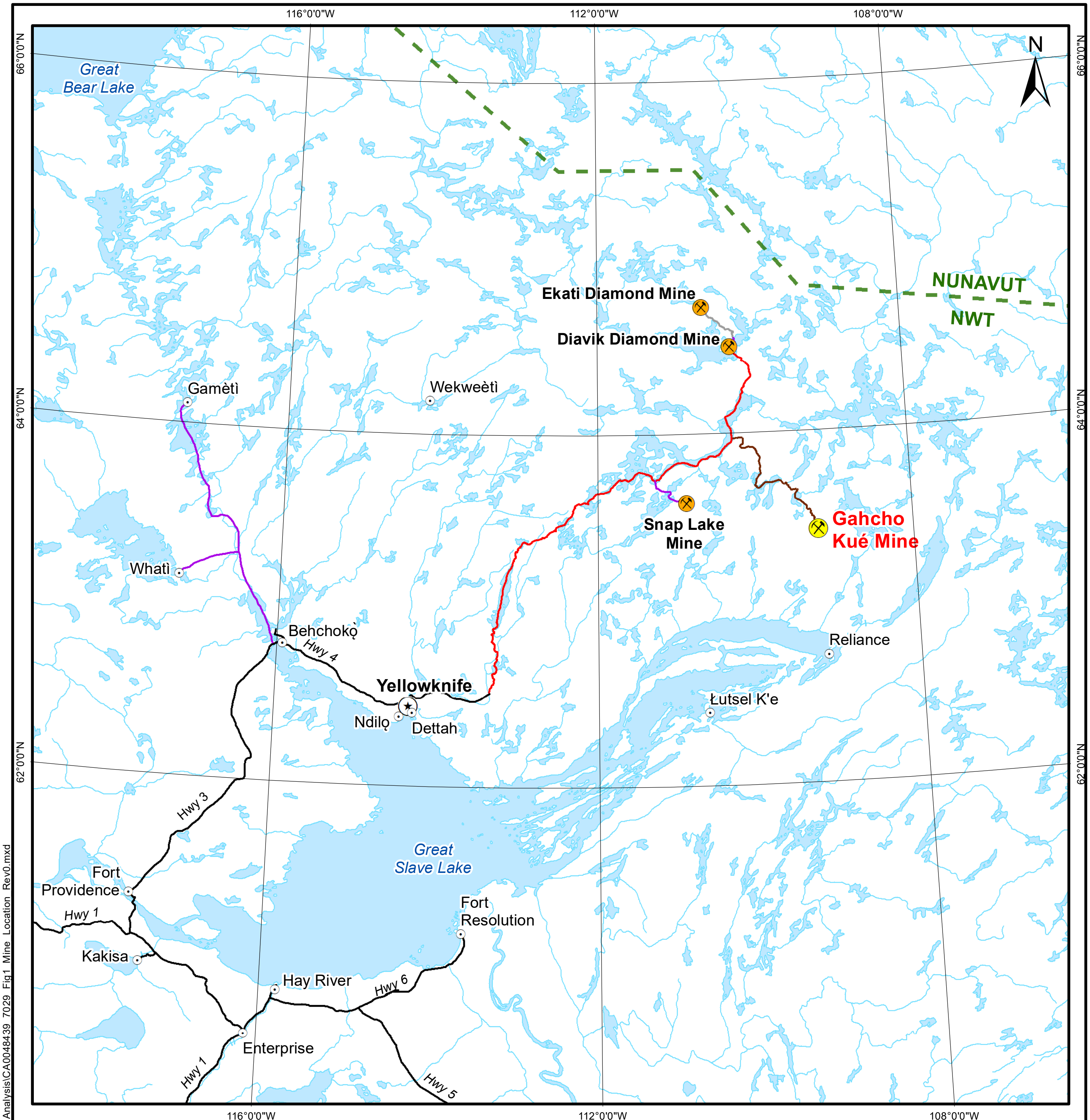
This report is the second comprehensive analysis of multi-year wildlife monitoring data, and includes data collected from 2014 to 2024. The monitoring analyzed within this report are related to annual commitments from the Mine's WMMP (Table 1). A power analysis was completed (Appendix A), which determined that there was insufficient data to generate a reliable estimate of zone of influence for barren-ground caribou (*Rangifer tarandus groenlandicus*); as such, this commitment from the WMMP cannot be completed as initially planned. Other monitoring commitments from the WWHPP and WEMP (e.g., for grizzly bear [*Ursus arctos*], wolverine [*Gulo gulo*]) were discontinued in the WMMP but remained priorities for protection and mitigations (De Beers 2022a).

Based on the relevance and availability of multi-year monitoring data, the following components have been evaluated in this comprehensive analysis:

- direct habitat loss from the Mine footprint
- caribou behaviour monitoring on the winter access road, including all years of collected monitoring data: 2014, 2018, 2019, 2020, 2022, 2023, and 2024
- trends in wildlife observations, incidents, and deterrent programs
- snow berm data
- Mine activity indicators
- public use of the winter access road

- environmental indicators

The objective of the comprehensive analysis is to evaluate patterns in multi-year monitoring data for Mine-related changes relative to natural factors. The intended use of comprehensive analysis results is to inform the adaptive management process on the effectiveness of mitigation in place at the Mine.



LEGEND

- Gahcho Kué Mine
- Existing Mine
- Territorial Capital
- Populated Place
- Highway
- Access Road
- Existing Winter Road
- Gahcho Kué Winter Access Road
- Tibbitt to Contwoyto Winter Road
- Watercourse
- Waterbody
- Territorial/Provincial Boundary

NOTES
Source: Base Data Obtained From Geogratis, © Department of Natural Resources Canada.

GAHCHO KUÉ MINE

Location of the Gahcho Kué Mine

PROJECTION: Canadian Lambert Conf. Conic	DATUM: NAD83	DE BEERS GROUP
Scale: 1:3,500,000 — 30 15 0 30 Kilometres		
FILE No: Fig1_Mine_Location_RevA		DATE: March 24, 2025
JOB NO: CA0048439.7029	REVISION NO: 0	Figure 1
OFFICE: WSP-CAL	DRAWN: PMT	CHECK: MB

I:\CLIENTS\DE BEERS\CA0048439 7029\Mapping\01 GK Comprehensive Analysis\CA0048439 7029 Fig1 Mine Location Rev0.mxd

Table 1: Schedule of Wildlife and Wildlife Habitat Monitoring under Relevant Management Plans

Component, Measure, or Indicator	Corresponding Monitoring Plans or Programs	Monitoring Schedule	Relevant to Wildlife Comprehensive Analysis
Mine Development Area and Direct Habitat Loss	WMMP	Mine development area updates will be provided at the end of construction and updated every year.	Yes, cumulative area development reported annually and summarized in comprehensive analysis completed every 5 years.
Indirect Habitat Loss - Noise	WMMP Noise Monitoring Program	Noise monitoring is anticipated to take place on a multi-year schedule at the Mine during operation in Years 1 (2017; Golder 2017), 5 (2021; WSP Golder 2022), and 8 (2024; WSP 2025).	Assessed and reported in detail as part of Noise Monitoring Program following implementation. Trends and implications to indirect habitat loss are summarized in comprehensive analysis completed every 5 years.
Indirect Habitat Loss - Dust	WMMP Vegetation and Soils Monitoring Program	Dustfall collectors are monitored at the Mine annually and are measured every 30 days during the growing season (May to October).	Assessed and reported in detail as part of Vegetation and Soils Monitoring Program following implementation. Trends and implications to indirect habitat loss are summarized in comprehensive analysis completed every 5 years.
Wildlife Sightings	WMMP	Wildlife sightings are monitored continually and reported annually.	Yes, cumulative sightings reported annually and trends over time summarized in comprehensive analysis completed every 5 years.
Site Surveillance	WMMP	Monitoring is completed weekly and reported annually.	Yes, results reported annually and trends over time summarized in comprehensive analysis completed every 5 years.
Public Use of the Winter Access Road	WMMP	Monitoring is conducted daily when the winter access road is operational (usually February to March).	Yes, cumulative sightings reported annually and trends over time summarized in comprehensive analysis completed every 5 years.
Wildlife Incidents	WMMP	Wildlife incident monitoring, including mortalities, has been ongoing and will continue to be undertaken as required. Wildlife incidents are reported immediately to ENR, in addition to being reported annually.	Yes, cumulative incidents and mortalities reported annually and trends over time summarized in comprehensive analysis completed every 5 years.

Table 1: Schedule of Wildlife and Wildlife Habitat Monitoring under Relevant Management Plans

Component, Measure, or Indicator	Corresponding Monitoring Plans or Programs	Monitoring Schedule	Relevant to Wildlife Comprehensive Analysis
Caribou	WMMP	Aerial reconnaissance surveys are completed annually prior to the winter access road opening. The purpose of these surveys is to determine if caribou are present near the winter access road in numbers that would trigger caribou behaviour monitoring. Caribou interactions and mortalities at the Mine are monitored through the wildlife sightings log, site surveillance, wildlife interactions and behaviour monitoring. Winter access road behaviour monitoring was first completed in 2014 and occurred annually when triggers for group size are met. Caribou behaviour monitoring along the winter access road was triggered in 2014, 2018, 2019, 2020, 2022, 2023, and 2024.	No, aerial reconnaissance surveys are used to determine whether winter access road monitoring is triggered. Behavioural monitoring is summarized in annual reports and comprehensive analysis completed every 5 years. Yes, interactions and mortalities are reported annually and trends over time summarized in comprehensive analysis completed every 5 years. Yes, caribou behaviour monitoring data is summarized in annual reports and comprehensive analysis completed every 5 years.
Raptors	WMMP	Raptor interactions and mortalities at the Mine are monitored through the wildlife sightings log, site surveillance, and wildlife incidents, as well as incidents of raptor nesting activity on Mine infrastructure. Raptor nest survey results in the regional study area are contributed to ENR for their regional nest monitoring database. Regional monitoring is anticipated to continue every five years.	Yes, wildlife interactions and mortalities are reported annually and trends over time are summarized in comprehensive analysis completed every 5 years. No, regional nest monitoring surveys are submitted to and analyzed by the GNWT.
Upland Birds	WMMP Migratory Bird Nest Management Plan	Upland bird interactions and mortalities at the Mine are monitored through the wildlife sightings log, site surveillance, and wildlife incidents. De Beers will deploy bird deterrent devices, as per the Migratory Bird Nest Management Plan, to mitigate the risk of birds nesting in the remaining low-lying vegetation or on the ground during the spring in areas anticipated to flood. Arctic Program for Regional and International Shorebird Monitoring Surveys (PRISM) surveys were completed in 2015, 2017, 2022 and 2024. The next round of surveys is scheduled for 2026.	Yes, wildlife interactions and mortalities are reported annually and trends over time are summarized in comprehensive analysis completed every 5 years. No, mitigations are reported on annually in a mitigation audit. No, PRISM surveys are submitted to ECCC's regional database and analyzed by ECCC.

Table 1: Schedule of Wildlife and Wildlife Habitat Monitoring under Relevant Management Plans

Component, Measure, or Indicator	Corresponding Monitoring Plans or Programs	Monitoring Schedule	Relevant to Wildlife Comprehensive Analysis
Small Mammals	WMMP	Monitoring and reporting of small mammal abundance will be completed annually. All small mammal samples collected are provided to ENR for identification and analysis.	Yes, small mammal monitoring is submitted to the GNWT's database and trends over time are summarized in comprehensive analysis completed every 5 years.
Environmental Indicators	WMMP	Annual monitoring of weather-related variables began in 2015 and has continued. Reporting is annual.	Yes, environmental indicators are reported annually and trends over time are summarized in comprehensive analysis completed every 5 years.
Measures of Mine Activity	WMMP	Annual monitoring of staff numbers, fuel consumption, volume of Mine rock removed and ore processed, and domestic water consumption began in 2015 and has continued. Values are reported annually.	Yes, Mine activity is reported annually and trends over time are summarized in comprehensive analysis completed every 5 years.

ECCC = Environment and Climate Change Canada; ENR = Environment of Natural Resources; GNWT = Government of Northwest Territories; PRISM = Program for Regional and International Shorebird Monitoring; WMMP = Wildlife Management and Monitoring Plan.

2.0 DIRECT HABITAT LOSS

Wildlife habitat loss occurs from the construction of the Mine and from flooding of areas resulting from dewatering of Kennady Lake and associated water diversions. The Project footprint was predicted in the Environmental Impact Statement (EIS) to be 1,235.4 ha (De Beers 2010), while the Land Use Permit MV2005C0032 approved a footprint size of 1,247.8 ha (De Beers 2013). Various amendments to the Land Use Permit between 2013 and 2017 led to an approved footprint of 1,265 ha in 2017 (De Beers 2018). An Updated Project Description as part of Water Licence and Land Use Permit amendment in 2018 approved an increase of the footprint to 1,292.5 ha. A subsequent update to the Project Description included a total predicted footprint of 1,429.0 ha (De Beers 2020); this was approved as part of the issuance of the renewed Land Use Permit MV2021D009 in 2021.

Each year following the end of the construction phase, the Mine development area is delineated through aerial photographs, satellite imagery or ground surveys and calculated using GIS software. The area has been presented in annual reports beginning in 2017 to confirm the permitted area was not exceeded and is summarized in Table 2.

Table 2: Direct Habitat Loss Associated with the Mine Footprint from 2017 to 2024

Year[a]	Land Footprint (ha)	Water Footprint (ha)	Total Footprint (ha)	Percentage of Permitted Footprint
2017	522.6	666.9	1,189.5	94.0%[b]
2018	496.5	639.8	1,136.2	87.9%[c]
2019	539.5	639.8	1,179.3	91.2%[c]
2020	572.2	639.9	1,212.1	93.8%[c]
2021	671.0	668.8	1,339.8	93.8%[d]
2022	697.3	669.2	1,366.4	95.6%[d]
2023	704.1	669.2	1,373.3	96.1%[d]
2024	704.1	669.2	1,373.3	96.1%[d]

a) Annual report references: De Beers 2018, 2019, 2020, 2021, 2022b, 2023, 2024, 2025a.

b) Based on the approved Project footprint of 1,265 ha in amended Land Use Permit MV2005C0032.

c) Based on the approved Updated Project footprint of 1,292.5 ha in amended Land Use Permit MV2005C0032

d) Based on the approved 2021 Updated Project Description footprint of 1,429.0 ha in Land Use Permit MV2021D009.

3.0 INDIRECT HABITAT LOSS

Noise and dust are two sources of Mine-related sensory disturbance that may indirectly affect how wildlife perceive undisturbed habitat adjacent to the Mine. Both dust and noise have been hypothesized to influence avoidance of habitat near mining developments (Boulanger et al. 2012; Plante et al. 2018). Both noise and dust are monitored by the Mine.

Noise

Noise from anthropogenic disturbance has been predicted to cause sensory disturbance to wildlife, resulting in avoidance or reduction of time spent in otherwise suitable habitat. Activities at the Mine that generate noise include aircraft, vehicles, generators, blasting, and the presence of people. The Mine's WMMP includes requirements to monitor noise that are consistent with previous requirements in the WWHPP and WEMP; this includes conducting noise monitoring in Year 1 (2017; Golder 2017), Year 5 (2021; WSP Golder 2022), and Year

8 (2024; WSP 2025) of Mine operations to confirm noise level predictions from the EIS and inform noise management practices on site (De Beers 2022a).

The GNWT does not have environmental noise regulations; as such, the EIS and subsequent monitoring programs used guidance and benchmarks established in other jurisdictions (De Beers 2010; WSP 2025). Noise receptors were located approximately 1.5 km from the Mine boundary and 1.2 km from the Mine airstrip. Both daytime and nighttime noise levels were measured from those same receptor locations in Years 1, 5 and 8.

Daytime noise levels collected in all three monitoring years were less than the applicable benchmark values. Nightime noise levels at one of the receptors (RD; 1.5 km from Mine boundary) in Year 5 and Year 8 measured greater than the benchmark. Daytime and nighttime noise levels were all within the range of baseline variability presented in the EIS under low levels of natural noise, such as wind (WSP 2025). These results indicate that noise from Mine activities are unlikely to result in wildlife avoiding areas beyond 1.5 km from the Mine when natural noise levels are low, more than they may have at baseline.

Dust

Fugitive dust emissions have potential to affect plant health, alter plant species composition, structure and biomass, and affect soil chemistry. As a result, dust can degrade wildlife habitat quality and forage availability. Activities at the Mine that generate dust include blasting and crushing rock, road construction, and traffic. Fugitive dust is reduced through application of water in the area surrounding the Mine.

The Mine's Land Use Permit and Type A Water Licence (and subsequent amendments) include requirements to deploy dustfall collectors at the Mine annually and measure the dustfall every 25 to 60 days during the growing season (May to October) to assess the spatial and temporal patterns of dust deposition. Since 2013, dustfall has been collected at nine sampling stations spaced on a transect in a west-southwest direction away from the Mine, at distances of 0 m, 50 m, 150 m, 500 m, 1 km, 5 km, 10 km, 15 km and 20 km from the Mine. Dust deposition in 2013 and 2014 was used as baseline data to compare with dust collected during the construction and operation phases of the Mine. A second transect of sampling stations was established to the northeast of the Mine in 2016 for monitoring associated with the Air Quality and Emissions Monitoring and Management Plan. At each sampling plot, plant community species richness and abundance, dustfall deposition and associated metals, soil pH and electrical conductivity, soil moisture and soil temperature are measured (De Beers 2025b). These results are reported annually in the Mine's Vegetation and Soils Monitoring Plan annual reports and the Air Quality annual reports.

Analysis of dust deposition between baseline (2013 to 2014), construction (2015 to 2016) and operations (2016 to 2024) phases of the Mine have demonstrated a decrease in dustfall deposition outside the Mine's footprint over time (De Beers 2025b). The average rates of dustfall since 2019 are below baseline values, suggesting that dust suppression mitigation measures (e.g., applying a suitable amount of water for dust suppression that correlates to the amount of rock mined; Section 7) are likely effective at reducing fugitive dust. In addition, blasting has been occurring at greater depths within the developed pits which likely reduces dust deposition, and higher waste rock piles located downwind may be partially blocking dust emissions.

Changes to plant species richness and abundance across sampling areas and years appear to be related to local site conditions and other natural factors, rather than the Mine. Analysis of data collected between 2013 to 2024 indicated no effect on vegetation from dustfall since 2013, while soil characteristics were mostly within baseline values (De Beers 2025b). The reduction of fugitive dust during the operations phase of the Mine is beneficial for the quality of wildlife habitat and forage adjacent to the Mine.

4.0 CARIBOU BEHAVIOUR ANALYSIS

De Beers operates a winter access road from MacKay Lake to supply the Mine from early February to late March each year (Figure 1). The winter access road is located within the winter range of the Bathurst caribou herd and likely the Beverly/Ahiak caribou herd, and De Beers has committed to implementing a behaviour monitoring program along the winter access road if sufficient caribou are present (i.e., when 20 or more groups of caribou, or 100 individuals, are observed along the length of the winter access road during either the aerial reconnaissance survey or during public use monitoring; Section 4.4 of De Beers 2022a). Caribou in proximity to the winter access road is a cause for concern for both the safety of the animals and the drivers, and monitoring is a means of alerting drivers and avoiding vehicle-caribou collisions. It is also an opportunity to better understand the interactions between the caribou and winter roads in the NT. Caribou behaviour monitoring along the winter access road was triggered in 2014, 2018, 2019, 2020, 2022, 2023, and 2024. In each year, both group scans and focal (individual) behavioural surveys were conducted.

Focal surveys provide information on activity budgets (i.e., the amount of time an animal is engaged in different behaviours), the temporal sequence of behaviours relative to stressors or other stimuli, and the length of time it takes the animal to return to a non-stressed state following a stressor event. Scan samples of a group of animals are more useful for quantifying the frequencies of dominant behaviours in a group over a period of time (ERM Rescan 2014). Both the focal surveys of individuals and scan surveys of caribou groups were undertaken as part of monitoring during all surveyed years. This report summarizes the data collected during all surveyed years to date (2014, 2018, 2019, 2020, 2022, 2023, and 2024).

4.1 Methods

Caribou behaviour monitoring was conducted by a crew of two observers stationed along the winter access road or other Mine roads in a truck. Behavioural monitoring methods were consistent with those implemented at other NT mines (BHPB 2004; DDMI 2013) and followed methods described by Murphy and Curatolo (1987). When Mine staff were alerted to the presence of caribou along the winter access road, a team of two observers would be deployed by truck to conduct behavioural assessments of any groups of caribou that were visible from the winter access road. Behavioural observations were repeated at multiple locations along the winter access road where caribou were present.

Scans were undertaken on groups with the aid of binoculars, with a group of caribou consisting of one or more individuals. During scan surveys, observers made instantaneous behaviour observations of caribou groups. A scan was completed every eight minutes for each caribou group monitoring session. A minimum of three scans (i.e., span of 24 minutes) or a maximum of eight scans (i.e., span of 64 minutes) were performed per caribou group encountered. Group scans that were less than 24 minutes in length were removed from the data. In addition to noting caribou behaviour, observers recorded the group size (i.e., number of individuals), group demographic composition (i.e., sex, age class, group composition), and location of each group in relation to the winter road. Environmental conditions were also recorded at the start of each monitoring session including air temperature, wind direction, wind speed and cloud cover.

Focal surveys monitor a single individual from a group of caribou. Behaviour and time of behaviour changes were recorded for that focal individual. Focal surveys were undertaken on both cows and bulls, for a minimum of 20 minutes.

The following behaviour types were recorded for scan and focal observations:

- bedded
- standing
- feeding (groups were classified as feeding when they were observed eating, foraging, or searching for food)
- alert (raising their heads and looking towards a stimulus)
- walking
- trotting
- running

For each caribou group in a scan sample the average frequency of behaviours was calculated as:

$$(\sum s_i / b_i)/\mathrm{N}$$

where s_i is the number of animals in the i^{th} scanning observation exhibiting behaviour type 's'; b_i is the total number of individuals scanned during the i^{th} scanning observation; and N is the number of scans. The mean proportion of time spent in alert/moving behaviour for a group was calculated as the sum of the average proportion of alert, walking, trotting, and running behaviours.

Measuring Response to Stressors

During scan surveys, the response of caribou to stressors, such as vehicle or aircraft traffic, was recorded. Observers recorded the time of the stressor event and visually estimated the distance (metres [m]) from the stressor to the caribou group.

The response of each individual in a group to the stressor was recorded and classified into one of the following five response categories:

- 0 - no reaction, no change in caribou behaviour
- 1 - mild reaction, caribou looked towards stressor
- 2 - moderate reaction, caribou walked away from stressor
- 3 - severe reaction, caribou trotted away from stressor
- 4 - extreme reaction, caribou ran away from stressor

An overall caribou group response to the stressor was assigned to each stressor event. In a situation where individuals within a group demonstrated varying levels of reaction to a stressor (e.g., a semi-truck elicits no reaction in some individuals but a moderate reaction in others), the highest response level was conservatively assigned as the overall group response score for the stressor. The majority of stressors observed were associated with humans (e.g., vehicle traffic). In five instances, natural stressors (i.e., animal or predators) were recorded. In three cases, an unknown stressor was recorded because the stressor was not visible.

Analysis

The average frequency of behaviours recorded during the group scan surveys was analyzed using Dirichlet regression models. A Dirichlet regression is a flexible analysis used to understand the relationship between proportions and predictors. It allows for multiple proportional dependent variables that sum to 1 (i.e., compositional data; Hijazi and Jernigan 2009). For example, Dirichlet regressions have been used to assess how seabirds split their time between their colony, sitting on water, diving, and flying (Regular et al. 2014). Using a Dirichlet regression, the analysis presented in this section will assess how proportions of caribou behaviours in a group (bedded, standing, feeding, active behaviours) change in relation to the weather, stressors, and group dynamics.

For this assessment, a series of candidate models were created by combining explanatory variables of interest (Table 3). There were four proportional response variables for each model. These response variables were the average proportion of individuals in a group demonstrating bedding, standing, feeding, and active behaviours. Each caribou group observed represented the unit of replication.

Table 3: Description of Explanatory Variables used to Create Candidate Models for Group Behaviour Frequency Analysis

Explanatory Variable Name	Variable Type	Description
wind speed	categorical	Wind speed in km/hr recorded during group scan surveys
air temperature	discrete integer	Air temperature recorded during group scan surveys
group composition	categorical	Variable with three levels indicating if the caribou group under surveillance was composed of adults only (adults), contained adults and yearlings (nursery), or was unknown (unknown). Adult was used as the reference category.
group size	discrete integer	The average group size of the observed animals. Referred to as group size rather than mean group size.
stressor type	categorical	Most common type of stressor observed during monitoring sessions. Presented as one of six stressor types: None, Animal, Pickup Truck, Semi-truck, Aircraft, Unknown. None was used as the reference category.
number of stressors	discrete integer	The total number of stressors (e.g., semitrucks) observed during monitoring for each group

Candidate models were created to understand the effect of weather conditions (i.e., air temperature, wind speed), stressors (number of stressors recorded, type of stressors), and group dynamics (group composition, group size; Table 4). The candidate model set also included a null model (i.e., a model with only the y-intercept included as an explanatory variable). The null model provides a benchmark of relative explanatory value of other models based on improved fit over a null model.

Table 4: Description of Explanatory Variables included in Candidate Model sets for Each Category of Interest

Candidate Model Name	Explanatory Variables Included in Candidate Model
Weather models	
Null	y-intercept only
Wind	wind speed
Temp	air temperature
Combined	wind speed and air temperature
Group dynamics models	
Null	y-intercept only

Table 4: Description of Explanatory Variables included in Candidate Model sets for Each Category of Interest

Candidate Model Name	Explanatory Variables Included in Candidate Model
Demographics	group composition
Size	group size
Combined	group composition and group size
Stressor models	
Null	y-intercept only
Number	number of stressors during observation
Type	type of stressor present
Combined	number of stressors and type of stressor

An information-theoretic approach was used to evaluate the candidate set of models (Burnham and Anderson 2004). Akaike's Information Criterion (AIC) prioritizes model parsimony and balances explanatory value with the number of variables included when determining the model of best fit (i.e., the top model) in a competing set of candidate models. Each candidate model is assigned an AIC value and the model receiving the lowest AIC value is considered the top model in the suite of candidates. All other models were compared to the top model and ranked through a delta AIC value (ΔAIC). Any candidate model receiving a ΔAIC value less than 2.0 was considered among the top models for describing variation in the behaviour frequency. When the null model (intercept only model) was the top model by AIC, other models were still assessed for significant effects. For the group dynamics models, 53 groups with unknown group composition were removed. For the stressor models, the three events with an unknown stressor type were removed. All analyses were performed in R version 4.3.2 (R Core Team 2024).

4.2 Results

Caribou behaviour monitoring occurred during February and March across years (Table 5). Considering all years, the earliest date surveyed was February 6 and the latest date surveyed was March 31. The average number of survey days per year was 22. Weather conditions recorded during monitoring sessions were variable. The air temperatures recorded during behavioural assessments ranged from -4°C to -41°C with an average air temperature of -25°C. Wind conditions ranged from no wind to strong winds (42 km/hr) with an average wind speed of 12 km/hr. The average number of stressor events recorded during group scan surveys was three stressors per survey session. The most common type of stressor was semi-trucks, which occurred as the dominant stressor type for 73% of the monitoring sessions with at least one stressor recorded.

Table 5: Number of Group Scan Surveys, First and Last Survey Date, and Number of Survey Days per Year, 2014 to 2024

Year	Number of Group Scan Surveys	Total Analyzed Group Scan Surveys[(a)]	Earliest Survey Date	Last Survey Date	Number of Survey Days
2014	59	59	2014-02-15	2014-03-08	20
2018	11	11	2018-03-03	2018-03-08	6
2019	33	19	2019-02-15	2019-03-25	16
2020	7	7	2020-02-19	2020-03-12	7
2022	197	173	2022-02-06	2022-03-24	40
2023	188	159	2023-02-10	2023-03-27	36
2024	107	97	2024-02-22	2024-03-31	32

a) Surveys shorter than 24 minutes were not included in the analyses.

4.2.1 Caribou Group Scan Surveys

The number of caribou groups assessed for behaviour across years ranged from seven in 2020 to 173 in 2022 (Table 6). Mean group size ranged from one individual to 3,050 individuals. The average mean group size was 60 individuals across all years and 63 individuals from 2019 to 2024 (Table 6). More than half the observed groups contained at least one yearling (58%), while close to a third of the groups were strictly adults (32%). Nursery groups were significantly larger than adult-only groups with an average of 81 individuals and 16 individuals, respectively ($\beta = 92.9$, $z = 3.56$, $P < 0.001$).

Caribou spent the majority of their time bedded (mean percentage of group bedded = 33.5 ± 1.5%) or foraging (mean percentage of group foraging = 37.3 ± 1.4%) during group scan surveys. The mean percentage of groups that were either standing or alert/moving was comparatively low (Table 6).

Table 6: Group Behaviour Monitoring Results for Caribou along the Winter Access Road, 2014 - 2024

Monitoring Year	Number of Groups Assessed (a)	Mean Group Size (± SE)	Mean Percentage (%) of Caribou Group Demonstrating Behaviours			
			Bedded (± SE)	Foraging (± SE)	Standing (± SE)	Alert/Moving (± SE)
2014	59	39 ± 6	50.8 ± 5.3	32.8 ± 4.5	5.0 ± 1.7	11.4 ± 3.4
2018	11	25 ± 7	47.4 ± 11.1	45.6 ± 10.2	2.4 ± 0.9	4.5 ± 2.5
2019	19	132 ± 22	20.9 ± 5.1	45.8 ± 5.2	8.6 ± 2.1	24.3 ± 4.6
2020	7	144 ± 51	43.7 ± 5.3	42.7 ± 4.1	8.4 ± 2.2	5.2 ± 1.3
2022	173	119 ± 32	29.3 ± 2.4	41.8 ± 2.3	8.3 ± 0.8	20.6 ± 1.8
2023	159	15 ± 1	35.4 ± 3	30 ± 2.7	5.9 ± 0.7	28.8 ± 2.6
2024	97	24 ± 2	31.6 ± 3.6	39.1 ± 3.3	6.9 ± 1	22.3 ± 2.8
All Monitoring Years	**525**	**60 ± 10**	**33.5 ± 1.5**	**37.3 ± 1.4**	**6.8 ± 0.4**	**22.4 ± 1.2**

a) In 2014 an additional four groups were assessed but excluded from analysis because of insufficient sampling time.

Note: Mean proportion values may not add to 1.0 due to rounding used for presentation.

SE = standard error.

Results of Dirichlet Regression Models

Results for the model comparisons by AIC are shown below (Table 7).

Table 7: Results from AIC Analysis on Candidate Model Groups

Candidate Model Name	Explanatory Variables Included in Candidate Model	AIC	ΔAIC	Status
Weather models				
Null	y-intercept only	-4772.51	0.00	Top Model
Wind	wind speed	-4642.73	129.78	
Temp	air temperature	-4628.07	144.43	
Combined	wind speed and air temperature	-4541.69	230.82	
Group dynamics models				
Null	y-intercept only	-4449.59	13.25	
Demographics	group composition	-4445.82	17.02	
Size	group size	-4462.84	0.00	Top Model
Combined	group composition and group size	-4459.29	3.55	

Table 7: Results from AIC Analysis on Candidate Model Groups

Candidate Model Name	Explanatory Variables Included in Candidate Model	AIC	ΔAIC	Status
Stressor models				
Null	y-intercept only	-4768.14	0.00	Top Model
Type	type of stressor present	-4752.18	15.96	
Number	number of stressors during observation	-4764.35	3.79	
Combined	number of stressors and type of stressor	-4742.91	25.23	

Note: The response variables for all models were the proportions of caribou bedding, standing, feeding, and active in groups.

The models of interest are described in detail below. As the coefficients for Dirichlet regression models are difficult to interpret, it has been suggested that the best way to interpret a model is to plot its predictions (Douma and Weedon 2019). These plots are provided in each section. In these figures, predicted values may look similar but may have different patterns of statistical significance. This can be due to differences in unexplained variance in the outcome variables (i.e., the behaviours).

Weather

Of the tested weather models, the intercept only model was identified as the top model for describing group behavioural compositions during scan surveys (Table 7). The second best model (wind speed only) had a statistically significant effect of wind speed on active behaviour (P = 0.013). This effect was such that increased wind speed resulted in a higher proportion of active caribou (Figure 2). There was no significant effect of wind speed on the proportion of the group bedded (P = 0.681), feeding (P = 0.076) or standing (0.164). Model coefficients can be found in Table 8.

Table 8: Coefficients for the Model Estimating Compositional Group Behaviour Based on Wind Speeds (km/hr)

Behaviour	Estimate	95 % Confidence Interval	*P*-value
Bedded	-0.002	-0.014, 0.009	0.681
Standing	0.008	-0.003, 0.019	0.164
Feeding	0.01	-0.001, 0.022	0.076
Active	0.014	0.003, 0.025	0.013

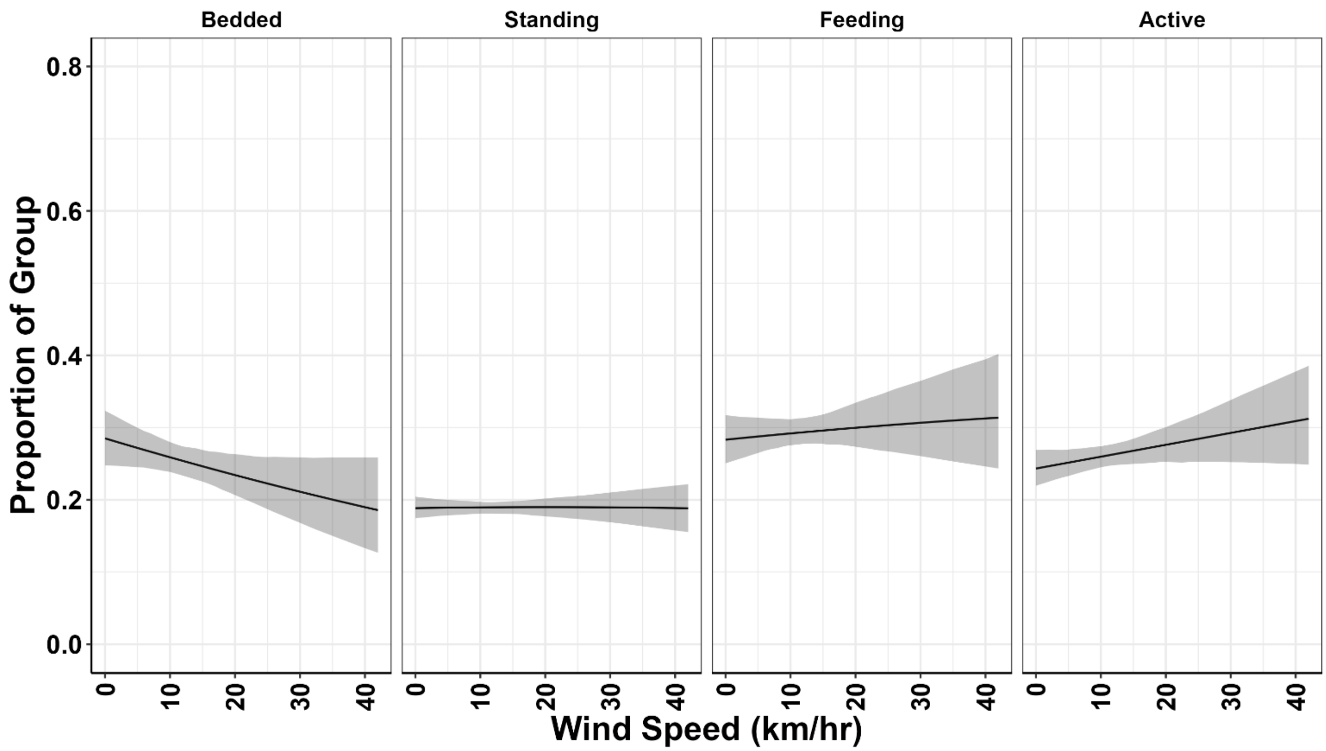


Figure 2: Predicted Proportions from the Model Estimating Compositional Behaviour based on Wind Speeds. Shaded bands are bootstrapped 95% confidence intervals.

Group Dynamics

For the group dynamics models, the group size model was the best fit to the data (Table 7). Across all behaviours, there was a significant effect of group size. An increase in group size tended to increase the proportion of individuals bedding and feeding. In contrast, as group size increased, the proportion of individuals standing and being active decreased (Figure 3). Significant effects remained the same when the largest groups were removed (group size values with z-scores > 5 standard deviations). Model coefficients can be found in Table 9.

Table 9: Coefficients for the Model Estimating Compositional Group Behaviour Based on Group Size

Behaviour	Estimate	95 % Confidence Interval	*P*-value
Bedded	0.292	0.225, 0.359	<0.001
Standing	0.175	0.099, 0.252	<0.001
Feeding	0.247	0.171, 0.323	<0.001
Active	0.185	0.111, 0.258	<0.001

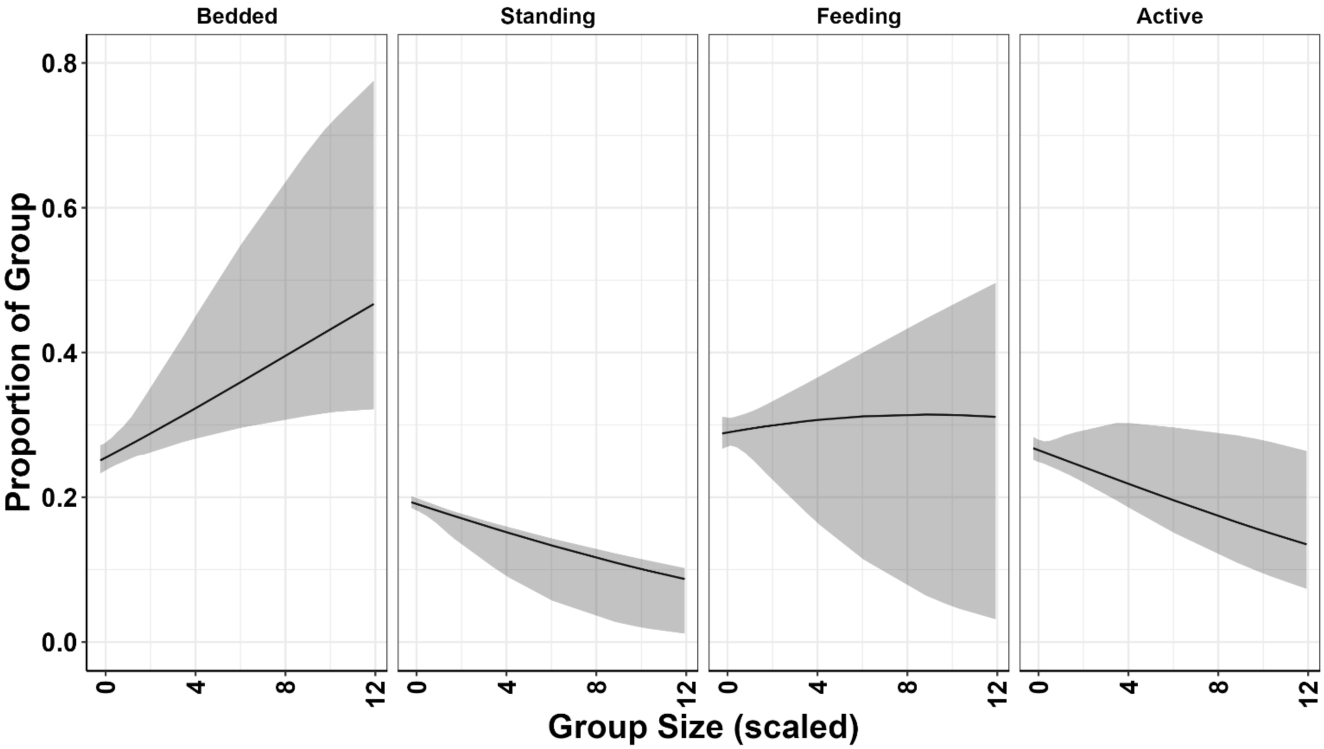


Figure 3: Predicted Proportions from the Model Estimating Compositional Group Behaviour based on Group Size. Shaded bands are bootstrapped 95% confidence intervals.

Stressors

For the tested stressor models, the intercept only model was identified as the top model for describing group behavioural compositions during scan surveys (Table 7). The second best model (number of stressors only) had a statistically significant effect of the number of stressors on the proportion of active caribou in a group ($P = 0.048$). This effect was such that an increase in the number of stressors resulted in a higher proportion of active caribou (Figure 4). There were no other significant effects in this model (all *P*'s > .33), or in any other explored stressor model. Model coefficients are found in Table 10.

Table 10: Coefficients for the Model Estimating Compositional Group Behaviour Based on the Number of Stressors

Behaviour	Estimate	95 % Confidence Interval	*P*-value
Bedded	-0.007	-0.036, 0.023	0.661
Standing	0.008	-0.021, 0.038	0.578
Feeding	-0.015	-0.046, 0.016	0.337
Active	0.03	0.000, 0.059	0.048

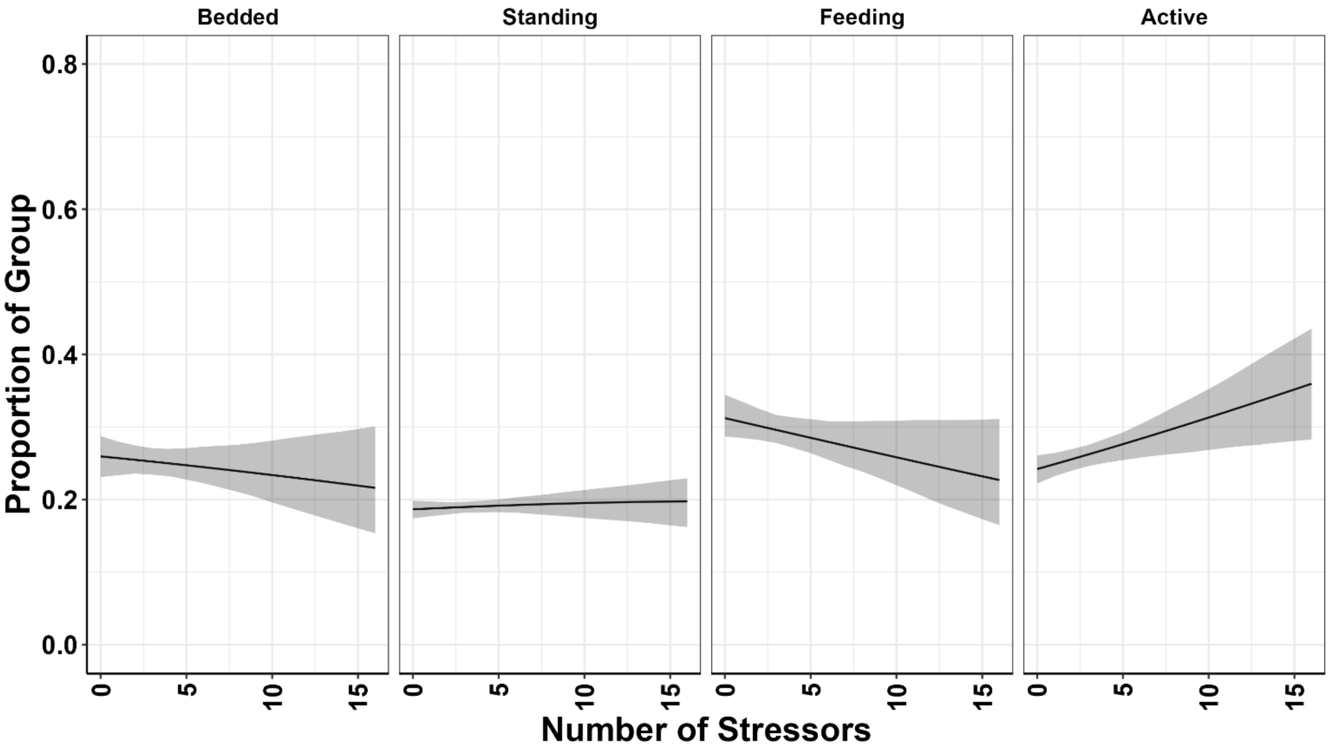


Figure 4: Predicted Proportions from the Model Estimating Compositional Group Behaviour based on the Number of Stressors Present. Shaded bands are bootstrapped 95% confidence intervals.

Summary of Group Scan Results

During group scans, caribou behaviours were categorized as bedding, standing, foraging, or alert/moving (including walking, trotting, or running). Although these are all unique behaviours, they are correlated to a certain degree (e.g., a caribou cannot be bedded and standing at the same time). We modeled these behaviours together so that the relationship between them could be assessed.

Wind speed may influence caribou behaviour. There was some evidence that caribou were more active as wind speed increased. This increase in activity may result in decreased bedding behaviour (Figure 2). Increased wind speed tends to decrease the ability of animals to detect each other (Cherry and Barton 2017). This could reduce the ability of caribou to detect other caribou as well as potential predators (Cherry and Barton 2017). Decreased perceptual capabilities due to wind speeds may result in caribou moving to maximize their ability to monitor their environment visually. However, these results should be treated with caution as the intercept only model was a better fit to the data than the wind speed model.

Group size appeared to have the strongest effect on caribou behaviour. As group size increased, the number of active and standing caribou decreased, while the number of bedded and feeding caribou increased. This may represent reduced vigilance by individuals in large groups, which is a common phenomenon in aggregating animals (Lima 1995). Large groups provide safety; this may reduce the need for individual vigilance (Lehtonen and Jaatinen 2016).

Stressors had little influence on caribou behaviour. However, the second best stressor model contained one significant effect with the amount of active behaviour increasing with the number of stressors. This may represent increased vigilance among individuals and result in reduced feeding behaviour (Figure 4). Increased vigilance as a response to disturbance is a common response (Dyck and Baydack 2003; Scheijen et al. 2021), and can persist even when stress levels (measured by the stress hormone cortisol) decrease (Scheijen et al. 2021) Overall, the general lack of notable behavioural responses to stressors may indicate habituation (Uchida et al. 2019).

4.2.2 Focal Behaviour Surveys

One individual adult from each of the caribou groups monitored from 2018, 2019, 2020, 2022, 2023 and 2024 was selected for focal behaviour surveys. Focal behaviour surveys were not conducted in 2014 or 2021. The 2019 and 2020 focal behaviour survey data was excluded from this analysis because a different study design was used, which resulted in no stressor or bedding behaviour data being collected and shorter survey times (Smith 2022). The average survey durations were less than 20 minutes for both 2019 and 2020 (Smith 2022). All surveys that were less than 20 minutes were excluded from the analysis as this was often due to the individual walking out of the observer’s sight. Surveys were also excluded from the analysis if they were missing behaviour or time data.

A total of 490 focal behaviour surveys were conducted in 2018 and 2022 to 2024, 378 of which met the minimum requirements, and 112 that did not and were excluded from the 2022 to 2024 data (Table 11). The duration of the focal survey sessions ranged from 20 to 83 minutes with a total of 191 hours and 16 minutes of observation time completed across the 378 individuals monitored (Appendix B). The average size of the caribou group that the focal individuals were a part of was 20 individuals (Appendix B; Table 11). The focal individuals spent the most amount of their time, on average, either bedded (36.8%) or foraging (36.3%); they spent less time alert or moving (19.5%) or standing (7.4%) (Table 11).

Table 11: Focal Behaviour Survey Results for Caribou along the Winter Access Road, 2018 to 2024

Year[a]	Average Group Size ± 1SE	Average Duration of Monitoring (minutes) ± 1SE	Average Number of Stressor Events ± 1SE	Average Distance from Stressor (m) ± 1SE	Average Percentage (%) of Time Spent in Each Behaviour ± 1SE				Number of Surveys Included[b]	Number of Surveys Excluded
					Bedded	Foraging	Standing	Alert/Moving		
2018	27 ± 7	30 ± 5.6	1.3 ± 0.6	273.2 ± 75.0	57.3 ± 12.8	37.6 ± 11.7	1.5 ± 1.1	3.6 ± 1.9	11	0
2019[c]	-	-	-	-	-	-	-	-	-	-
2020[c]	-	-	-	-	-	-	-	-	-	-
2021[d]	-	-	-	-	-	-	-	-	-	-
2022	21 ± 1	28 ± 0.5	1.8 ± 0.1	437.4 ± 28.6	24.8 ± 3.0	44.3 ± 3.0	9.2 ± 1.0	21.7 ± 2.1	153	33
2023	15 ± 1	33 ± 0.9	2.2 ± 0.1	669.0 ± 30.2	45.5 ± 3.8	29.0 ± 3.3	6.0 ± 0.9	19.6 ± 2.6	139	52
2024	25 ± 3	30 ± 1.2	2.5 ± 0.2	570.9 ± 39.9	42.3 ± 5.0	33.4 ± 4.4	7.4 ± 1.3	17.0 ± 2.9	75	27
Total	**20 ± 0.9**	**30 ± 0.5**	**2.1 ± 0.1**	**552.2 ± 18.8**	**36.8 ± 2.2**	**36.3 ± 2.0**	**7.4 ± 0.6**	**19.5 ± 1.4**	**378**	**112**

a) Appendix B has complete details pertaining to all caribou monitored.

b) Number of surveys that met the requirements (duration ≥ 20 minutes and the survey had all the time and behaviour data recorded).

c) Focal surveys from 2019 and 2020 were excluded because different survey methods were used (Smith 2022). Results were not comparable to other survey years and thus were excluded from comprehensive analysis of focal survey data.

d) The Winter Road Caribou Behavioural Monitoring Program was not triggered during 2021.

SE = standard error; - = no data.

Caribou Response to Stressors

Focal behaviour surveys were not conducted in 2014. During the group scan surveys, observers rated the behaviour of all members of the group under surveillance and used the highest (i.e., most conservative) behaviour score to classify the group's reaction to the stressor. Because of the difference in data records, the 2014 data could not be compared with the other data to observe changes in response to stressor over time. Although the 2014 data were collected following different methods and were not analyzed, it is worth noting two incidents of natural stressors that were observed during group scan surveys on March 4, 2014 (one wolf) and March 7, 2014 (two wolves). In both incidents, the group size of caribou was over 100 individuals, and the highest response was classified as "extreme (i.e., at least one individual ran away from the stressor). One other incident where caribou demonstrated an "extreme" response in 2014 was from a human stressor (haul truck) and two "extreme" responses were from unknown stressors.

In 2018, 5 of the 11 survey sessions had at least one stressor recorded; 1 session had as many as 7 stressor events recorded (Appendix B). On average, the stressors occurred 313.0 m from the focal individuals (Table 12). There were no instances where caribou had an extreme response (ran away) to a stressor. Caribou encountered a grader during one survey session, and the individual responded by trotting away from the road until they were out of view sight from the observers. The majority of encounters with semi-trucks (76%) and pick-up trucks (64%) resulted in no reaction or change to behaviour by caribou being surveyed (Appendix C). Caribou had severe reactions (trotted away) from encounters with semi-trucks and pick-up trucks 7% and 9% of the time, respectively (Appendix C). Responses lasted an average of 11 seconds before returning to non-disturbed behaviour (Table 12). In 2018 the focal surveys occurred within a short time frame (six days), so it was not possible to assess whether responses changed and caribou increased their tolerance (i.e., decreased their vigilance to stressors) through the winter season.

The 2019 and 2020 focal behaviour surveys were excluded from this analysis because a different study design was used, which resulted in no stressor or bedding behaviour data being collected and shorter survey times (average survey duration was less than 20 minutes; Smith 2022).

In 2022, 124 of the 153 survey sessions had at least 1 stressor recorded; 2 sessions had 9 stressor events recorded (Appendix B). On average, the stressors occurred 261.1 m from the focal individuals (Table 12). There were no instances where caribou had an extreme response (ran away) to a stressor. The majority of encounters with a bus (100% of the time), forklift (100% of the time), loader (100% of the time), rock truck (100% of the time), snowmobile (100% of the time), grader (81.8% of the time), pick-up truck (66% of the time), haul truck (51.8% of the time), animal (50% of the time), and snow plow (42.9% of the time) resulted in no reaction or change to behaviour by caribou surveyed (Appendix C). Caribou had severe reactions from encounters with animals (25% of the time), unknowns (25% of the time), snowplows (14.3% of the time), haul trucks (13.2% of the time), and pick-up trucks (6.2% of the time) (Appendix C). Responses lasted an average of 3 minutes before returning to non-disturbed behaviour; response duration was longer towards animal and unknown stressors than vehicles (Table 12).

In 2023, 121 of the 139 survey sessions had at least 1 stressor recorded; 1 session had 8 stressor events recorded (Appendix B). On average, the stressors occurred 797.6 m from the focal individuals (Table 12). There were no instances where caribou had an extreme response (ran away) to a stressor. The majority of encounters with a helicopter (100% of the time), rock truck (100% of the time), sand truck (100% of the time), snow plow (100% of the time), pick-up truck (65.9% of the time), and grader (55.6% of the time) resulted in no reaction or change to behaviour by caribou surveyed (Appendix C). The majority of encounters with a delivery truck (100% of the time), gravel truck (100% of the time), unknown (100% of the time), semi-truck (66.7% of the time), and haul truck (48.4% of the time) resulted in a mild reaction (looked towards the stressor) (Appendix C). Caribou had severe reactions from encounters with animals (100% of the time), haul trucks (1.9% of the time) and pick-up trucks (0.8% of the time) (Appendix C). Responses lasted an average of 56 seconds before returning to non-disturbed behaviour (Table 12).

At least 1 stressor was recorded in 68 of the 75 survey sessions in 2024; 1 session had 9 stressor events recorded (Appendix B). On average, the stressors occurred 520.9 m from the focal individuals (Table 12). There were no instances where caribou had an extreme response (ran away) to a stressor. The majority of encounters with a snow plow (100% of the time), snowmobile (100% of the time), water truck (100% of the time), convoy (80% of the time), grader (80% of the time), haul truck (79.2% of the time), and pick-up truck (75% of the time) resulted in no reaction or change to behaviour by caribou surveyed (Appendix C). Caribou had mild reactions (looked toward the stressor) with helicopters 100% of the time (Appendix C). Caribou had moderate reactions (walked away) with unknown stressors 100% of the time (Appendix C). Caribou had severe reactions from encounters with pick-up trucks (1.5% of the time), and haul trucks (0.6% of the time) (Appendix C). Responses lasted an average of 2 minutes and 2 seconds before returning to non-disturbed behaviour, but this was skewed by one unknown stressor response that lasted ten minutes; if this one stressor event is removed, the average stressor response duration is 43 seconds (Table 12).

At least one stressor was recorded in 84% of survey sessions in 2018, 2022, 2023 and 2024 (Appendix B). On average, the stressors occurred 473 m from the focal individuals (Table 12). There were no instances where caribou had an extreme response (ran away) to a stressor. The most frequently observed individual behavioural response to a stressor was no reaction or change (64%), followed by mild (looked towards the stressor, 25%), severe (trotted away, 6%) and moderate (waked away, 5%) (Table 12). Responses lasted an average of 1 minute and 32 seconds before returning to non-disturbed behaviour (Table 12). There were no instances observed where caribou had an extreme response (ran away) to a stressor.

Since 2022, the average duration of caribou responses to stressors have been declining annually (from three minutes in 2022, to 56 seconds in 2023, and to 43 seconds in 2024 [when the one unknown stressor was removed]) (Table 12). Stressor responses were generally shorter the further away the stressor was from the individual (Appendix C).

Table 12: Caribou Response to Stressors during Focal Behaviour Survey along the Winter Access Road, 2018 to 2024

				Percentage (%) of Individual Behavioural Responses to Stressor						
Year	Number of Stressor Types[(a)]	Number of Stressors Recorded During Survey	Average Distance from Stressor (m)	0 - No reaction or change	1 - Mild, looked towards stressor	2 - Moderate, walked away	3 - Severe, trotted away	1, 2, 3 (All three responses observed)	Unknown	Average Duration of Response (minutes: seconds)
2018	3	67	313.0	73.0	15.0	3.0	9.0	0.0	0.0	00:11
2019[(b)]	-	-	-	-	-	-	-	-	-	-
2020[(b)]	-	-	-	-	-	-	-	-	-	-
2021[(c)]	-	-	-	-	-	-	-	-	-	-
2022	11	444	261.1	56.1	22.1	10.1	11.3	0.2	0.2	03:00
2023	12	412	797.6	49.8	43.2	4.6	1.9	0.0	0.5	00:56
2024	9	252	520.9	77.8	19.8	1.6	0.8	0.0	0.0	02:02[(d)]
Total Average	**9**	**294**	**473**	**64**	**25**	**5**	**6**	**0**	**0**	**01:32**

a) Appendix C has complete details pertaining to each type of stressor.

b) Focal surveys from 2019 and 2020 were excluded because different survey methods were used (Smith 2022). Results were not comparable to other survey years and thus were excluded from comprehensive analysis of focal survey data.

c) The Winter Road Caribou Behavioural Monitoring Program was not triggered during 2021.

d) This was skewed by one unknown stressor response that lasted ten minutes. If this event is removed, the average stressor response duration was 43 seconds.

4.3 Summary

Twenty or more groups of caribou were observed along the length of the winter access road between MacKay Lake and the Mine site in 2014, 2018, 2019, 2020, 2022, 2023 and 2024, triggering De Beers' behavioural monitoring program. Group scans were conducted in 2014, 2018, 2019, 2020, 2022, 2023 and 2024 and focal behavioural surveys were conducted in 2018, 2019, 2020, 2022, 2023 and 2024 (2019 and 2020 surveys were excluded from the focal behaviour survey analysis). These two types of surveys provide information about group dynamics and potential effects on energy and protein reserves as a result of behavioural responses to anthropogenic stressors.

Caribou behaviour appears to be influenced in part by the natural environment and anthropogenic stressors. Caribou were alert/moving in strong winds and when there was a stressor present on the road, while animals bedded down in light winds. Overall, the general lack of notable behavioural responses to stressors may indicate habituation (Uchida et al. 2019). Group size appeared to have the strongest effect on caribou behaviour; as group size increased, the number of active and standing caribou decreased, while the number of bedded and feeding caribou increased. This may represent reduced vigilance by individuals in large groups, which is a common phenomenon in aggregating animals (Lima 1995). Large groups provide safety; this may reduce the need for individual vigilance (Lehtonen and Jaatinen 2016).

The majority of encounters with stressors resulted in no reaction or change in behaviour, indicating caribou were not particularly sensitive to anthropogenic disturbances on the winter access road. There was no extreme flight response to anthropogenic stressors; and caribou were only observed trotting away ("severe" response) from a stressor in 6% of the observations. Since 2022, the average duration of caribou responses to stressors have been declining annually, thus supporting the likelihood of caribou habituation to anthropogenic stressors.

5.0 TRENDS IN WILDLIFE OBSERVATIONS, INCIDENTS, AND DETERRENT PROGRAMS

De Beers' Environment Department tracks and annually reports wildlife sightings and incidents at the Mine and evaluates the efficacy of deterrent mitigation programs at open pits. The confidence in these data and species identification is moderate because of the large number of individuals with varied levels of knowledge of wildlife identification reporting the information; therefore, no statistical analysis was conducted. The following are summaries from 2014 to 2024 (De Beers 2015a, 2016, 2017, 2018, 2019, 2020, 2021, 2022b, 2023, 2024, 2025a).

Wildlife Sightings Log

Wildlife sightings logs are maintained at various locations around the Mine site, and staff are encouraged to add observations to the log, including observations of unusual species and potential problem wildlife. However, it is likely this log does not include all sightings (Appendix D). Table 13 summarizes observations of species at risk as well as the overall number of observations reported by Mine staff. The number of observations is not an indication of the number of individuals present, but rather the number of independent observations. Relevant to the number of independent observations is the number of staff on site in any given year or season (Section 7.2); for example, there were more people on site during the construction phase of the Mine (monthly average of 516 people in 2015), which increased the opportunities to observe and report sightings (n = 402 observations in 2015).

Additional species of concern that are not included in Table 13 (e.g., bank swallow [*Riparia riparia]*, common nighthawk [*Chordeiles minor]*, horned grebe [*Podiceps auritus]*, lesser yellowlegs [*Tringa flavipes]*, olive-sided flycatcher [*Contopus cooperi]*, red-necked phalarope [*Phalaropus lobatus]*, rusty blackbird [*Euphagus carolinus]*) may have been observed and categorized as an unidentified species if the Mine staff recording the observation was not experienced with bird identification. In general, annual patterns of wildlife observations by Mine staff were variable and included minimal records of species at risk.

Table 13: Observations of All Species and Species at Risk Reported in Wildlife Sightings Log, 2014 to 2024

Species	Species at Risk (NWT) Act[a]	COSEWIC[b]	SARA[c]	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
all species	Not Applicable			177	402	164	238	260	302	184	428	303	241	296
barn swallow (*Hirundo rustica*)	No status	Special Concern	Schedule 1 – Threatened	0	0	0	0	0	0	0	0	1	2	0
barren-ground caribou (*Rangifer tarandus tarandus*)	Threatened	Threatened	Not on Schedule 1 (under consideration for addition)	37	45	0	2	61	16	6	17	55	23	48
grizzly bear (*Ursus arctos*)	No status	Special Concern	Schedule 1 - Special Concern	0	3	3	2	4	11	4	1	5	0	1
Harris's sparrow (*Zonotrichia querula)*	No status	Special Concern	Schedule 1 – Special Concern	0	0	0	0	0	0	0	0	0	1	0
short-eared owl (*Asio flammeus*)	No status	Threatened	Schedule 1 – Special Concern	0	0	0	0	0	0	0	0	0	1	0
wolverine (*Gulo gulo*)	No status	Special Concern	Schedule 1 – Special Concern	5	27	2	8	27	43	4	0	3	5	2

Note: The number of observations is not an indication of the number of individuals present, but rather the number of independent observations. Observations were recorded by staff on site.

a) GNWT 2023.

b) COSEWIC = Committee on the Status of Endangered Wildlife in Canada. Government of Canada 2024.

c) SARA = Federal Species at Risk Act. Government of Canada 2024.

Wildlife Incident and Mortalities

Wildlife incidents are monitored to inform adaptive management and prevent future incidents. De Beers staff report any human-wildlife interaction that may present a risk to either humans or animals, wildlife-caused damages to property, events when wildlife deterrent actions are used, and any wildlife injury or mortality.

There have been 46 mortalities of 18 species reported since 2014 (Table 14), 2 of which were barren-ground caribou, a species at risk. The two barren-ground caribou collided with a pick-up truck parked on the winter access road in 2014. An additional mortality of a young bull caribou mortality was reported in the 2022 Annual Wildlife Report, however, it is believed that the animal died of severe sepsis from *Pasteurella multocida* (De Beers 2023), and is not included in the total number of mortalities as the necropsy deemed the mortality to be from natural causes, not a Mine-related interaction.

There have been several Mine-related mortalities of species that are not at risk. In 2014, ten loons drowned after being caught in gill nets during fish-out activities. In 2015, one long-tailed duck (*Clangula hyemalis*) was found dead in a net following fish-out activities. More recently, there have been incidents of wildlife mortalities on roadways after interactions with vehicles and heavy equipment, including one Arctic hare (*Lepus arcticus*) in 2022, one red fox (*Vulpes vulpes*) in 2023 and two Arctic hares (*Lepus arcticus*) in 2024. One red fox was also found dead in the confined space area underneath the main camp in 2023 (Table 14).

There were two mortalities that appeared to be from non-Mine related interactions. This includes a muskox (*Ovibos moschatus*) calf presumed to be abandoned by the herd, who was found deceased below dewatering pipes near the Area 3 shore access road in 2019, and one long-tailed duck found deceased on the reclaim jetty in 2024, with no obvious cause of death.

As a result of these incidents and mortalities, additional monitoring and mitigation programs were initiated (De Beers 2015a). Mitigation for caribou on the winter access road included reduced speed limits when entering and exiting portages, announcing wildlife sightings along the road over the radio to warn other drivers, and turning off high beam lights if stopped on the road at night. Mitigation for birds during dewatering activities included avoiding high-use loon habitat (gill-net exclusion zones), increasing visibility of underwater gill nets by attaching streamers to nets, installing visual deterrents adjacent to gill nets, reducing boat speed within 500 m of a loon sighting, and avoid boating or placing gill nets within 100 m of a loon sighting (De Beers 2015a). Mitigation for preventing wildlife entrapment included regular inspections of all access points to the area underneath the camp and stressing to the crew the importance of ensuring they are closed (De Beers 2024). Mitigation for reducing wildlife mortalities on roadways included reviewing wildlife Right-of-Way policy, which applies to all site roads and is included in driver and winter road training, to reinforce awareness and compliance among field crews (De Beers 2023, 2024). These mitigation measures appear effective at limiting wildlife mortalities, as evidenced by no further caribou mortalities on the winter access road since 2014 and no further reports of wildlife entrapment mortalities (Table 14). When examining the number of annual mortalities compared to Mine activity, using average annual camp occupancy as a proxy (Section 7.2), mortalities and camp occupancy were not correlated ($r = 0.48$, $P = 0.16$). This lack of significant positive correlation further supports that mitigation measures on site have been effective to minimize wildlife mortalities. Further examination of species known to scavenge such as grizzly bears, wolverine, foxes, and common raven (*Corvus corax*) show that despite frequent observation in the vicinity, Mine-related mortalities are low (i.e., Arctic fox, red fox, common raven; Table 14) or non-existent (i.e., grizzly bear and wolverine).

De Beers also implemented additional mitigation measures starting in 2022 to deter upland breeding birds from nesting, specifically to deter bank swallows from nesting at the Course Processed Kimberlite rock pile. Mitigations included reducing the slope to less than 70 degrees along the entire cutbank per Environment and Climate Change Canada (ECCC) guidance, thus making the habitat less desirable; creating alternative, more desirable habitat, in inactive areas, and the installation of deterrents to reduce nest establishment. Additional mitigations were also implemented to reduce cliff swallow (*Petrochelidon pyrrhonota*) nesting in the Ammonium Nitrate (AN) transfer barns, which included the installation of deterrents such as non-propane noise deterrents, flagging, plastic raptor silhouettes and plastic bird spikes along inner peaks of structure (WSP 2024).

De Beers has taken an adaptive management approach and engages with subject matter experts and Indigenous monitors when new situations arise. For example, several caribou were observed on the ice of the Fine Processed Kimberlite Containment (FPKC) facility in 2022. Possible mitigations were discussed with Ni Hadi Xa (NHX) Traditional Knowledge Monitors and the Regulatory and Permitting Department to determine the best method to avoid the caribou from getting stuck in the FPKC facility.

Table 14: Wildlife Mortalities reported at the Mine, 2014 to 2024

Species	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Arctic fox (*Vulpes lagopus*)	0	0	0	0	1	0	0	0	0	0	0	1
Arctic hare (*Lepus arcticus*)	0	2	0	2	0	0	0	0	1	0	2	7
barren-ground caribou[(a)] (*Rangifer tarandus tarandus*)	2	0	0	0	0	0	0	0	0	0	0	2
common loon (*Gavia immer*)	1	0	0	0	1	0	0	0	0	0	0	2
common raven (*Corvus corax*)	0	0	2	0	0	0	0	0	0	0	1	3
grey wolf (*Canis lupus*)	0	0	0	0	1	0	0	0	0	0	1	2
ground squirrel (*Urocitellus parryii*)	1	0	0	1	0	0	0	0	0	0	0	2
gull species	0	1	0	0	0	0	0	0	0	0	0	1
long-tailed duck (*Clangula hyemalis*)	0	1	0	0	0	0	0	0	0	0	1	2
mouse species	0	0	0	0	1	0	0	0	0	0	0	1
muskox (*Ovibos moschatus*)	0	0	0	0	0	1	0	0	0	0	0	1
ptarmigan species	1	1	2	1	0	0	0	0	0	1	0	6
red fox (*Vulpes vulpes*)	0	0	0	0	0	0	0	0	0	2	0	2
red-throated loon (*Gavia stellata*)	6	1	0	0	0	0	0	0	0	0	0	7
short-tailed shearwater (*Ardenna tenuirostris*)	0	0	0	0	0	0	0	0	0	0	2	2
songbird species	0	1	0	1	0	0	0	0	0	0	0	2
tree swallow (*Tachycineta bicolor*)	0	0	0	0	0	0	0	0	0	1	0	1
yellow-billed loon (*Gavia adamsii*)	3	0	0	0	0	0	0	0	0	0	0	3
Total	**14**	**7**	**4**	**5**	**3**	**1**	**0**	**0**	**1**	**4**	**7**	**46**

a) Species at Risk (GNWT 2023, Government of Canada 2024).

Avian Monitoring and Deterrence Program

De Beers actively deters raptors and other migratory birds from nesting in the open-pits through the use of visual and auditory deterrents and routine monitoring (Migratory Bird Nest Mitigation Plan, De Beers 2015b). Visual surveys are conducted around the open pits using binoculars, and sightings are documented on field sheets. The species of primary concern around the pit are cliff-nesting birds, including peregrine falcon (*Falco peregrinus*), gyrfalcon (*Falco rusticolus*), rough-legged hawk (*Buteo lagopus*), and common raven.

In 2016 and 2017, deterrents were also deployed at areas where vegetation clearing was anticipated to occur to avoid destruction of nests, including Lakes D2/D3, E1, Dyke 1, and Area 3 (Table 15). In 2018, no vegetation clearing was required, and deterrents were only deployed at two open pits (5034 and Hearne; Table 15). From 2019 to 2024, deterrents were set in the vicinity of the pits at the start of the monitoring season. As the season progressed, deterrent deployment was actively adapted to match bird activity. In all years, deterrents were deployed just prior to and during the migratory bird nesting season, as defined by ECCC (ECCC 2018).

Deterrents used at the open-pits and in various locations around the Mine include propane cannons, electronic noise makers, scarecrows, and raptor kite decoys. Environment staff also periodically used bear bangers to deter raptors from the pit area. In 2021, and 2022, a peregrine falcon nest site was observed at the 5034 pit. In 2024, a peregrine falcon nest was observed at the Hearne pit (Table 15). In 2022, three bank swallow colonies were identified in the vicinity of the CPK dump. Upon identification of the colonies, ECCC was consulted and an action plan initiated to minimize disturbance. Bank swallow colonies were again identified at the CPK dump site in 2023 (four colonies) and 2024 (six colonies). Across all years, bank swallows have produced the majority of nests found at deterrent locations (83%), followed by cliff swallows (*Petrochelidon pyrrhonota*) 13%, and American robins (*Turdus migratorius*) 2%.

The number of individual birds observed at the open-pits has varied considerably across years (Table 15). In almost all years the majority were incidental observations of goose species that were passing over the sites, including Canada goose (*Branta canadensis*), greater white-fronted goose (*Anser albifrons*), snow goose (*Anser caerulescens*), and unidentified goose species. In recent years, with the establishment of the bank swallow colonies, the number of bank swallow observed has increased markedly from no individuals in 2021 to the second most common species (after goose) from 2022 to 2024. Between 2019 and 2024, there were 534 individual raptors (169 bald eagle (*Haliaeetus leucocephalus*), 27 northern harrier (C*ircus hudsonius*), 234 peregrine falcon, 79 rough-legged hawk, 4 golden eagle (*Aquila chrysaetos*), 2 gyrfalcon, and 19 bird of prey that were not identified to species) observed at the open-pits. Excluding peregrine falcons, which were consistently present across years, more than 71% of these observations occurred in 2024.

Changes in nesting and bird observations across years are likely multi-causal. Staffing differences may result in changes in the numbers of birds spotted and identified while changes in the slope of pits and dumps and differences in human use patterns across sites could make nesting more likely in certain areas. In addition, population level changes in abundance or occupancy may increase the number of birds generally, and species differences in habituation to human activity could increase the presence of some species over time (Sutton et al. 2021). Despite differences in nesting and bird observations across years, the majority of nesting has been successfully deterred. Additionally, when nests have been established, monitoring and mitigation plans have been initiated to minimize disturbance.

Table 15: Avian Monitoring and Deterrence Program, 2016 to 2024

Monitoring Metric	2016	2017	2018	2019	2020	2021	2022	2023	2024
Locations of deterrents	5034 Pit, Lakes D2/D3, E1, Dyke 1, Area 3	5034 Pit, Lakes D2/D3, E1, Area 2, AN Building pad	5034 Pit, Hearne Pit	5034 Pit, Hearne Pit, Dyke A1, Dyke B, Area 4	5034 Pit, Hearne Pit, Dyke B, West Mine rock pile	5034 Pit, Hearne Pit, Dyke B, West Mine rock pile	5034 Pit, Tuzo Pit, Hearne Pit, CPK area	5034 Pit, Tuzo Pit, Hearne Pit, CPK area	5034 Pit, Tuzo Pit, Hearne Pit, CPK area
Number of raptor nests at locations with deterrents	0	0	0	0	0	1	1	0	1
Number of other species' nests at locations with deterrents	3[(a)]	0	0	0	0	0	108[(b)]	119[(b)]	184[(b)]
Number of individuals observed	8,307	1,246	9,836	11,443	212	1,788	1,479	1,816	3,242
Number of species	44	75	25	Identified to species: 17, identified to genus or family: 6, unknown or identified to broad category: 1	Identified to species: 10, identified to genus or family: 2, unknown or identified to broad category: 2	Identified to species: 17, identified to genus or family: 9, unknown or identified to broad category: 2	Identified to species: 34, identified to genus or family: 8, unknown or identified to broad category: 1	Identified to species: 22, identified to genus or family: 7, unknown or identified to broad category: 1	Identified to species: 29, identified to genus or family: 11, unknown or identified to broad category: 1
Number of occurrences	2,952	58[(c)]	175	331	43	154	430	214	427

a) One nest each of greater white-fronted goose, lapland longspur (*Calcarius lapponicus*), and northern pintail (*Anas acuta*).

b) Majority are bank swallow colony nests.

c) Occurrences only reported for the pit deterrence monitoring.

Small Mammal Monitoring Program

The periodic population cycles of small mammals can have strong influences on other species in Arctic ecosystems, so De Beers began annual monitoring of small mammals in 2015. The small mammal program is not designed to evaluate mitigation but is a contribution to regional monitoring database (De Beers 2014a). Trapping methods follow other similar programs and animal care protocols (see De Beers 2019 for methods). Two transects were established in 2015 and surveys were repeated in 2016 to 2024. All species collected from the traps were provided to the GNWT-ECC in Yellowknife to be identified and archived.

Northern red-backed vole (*Myodes rutilus*) has been the most abundant species collected in the program, followed by southern red-backed vole (*Myodes gapperi*) (Table 16). In four of the ten years that small mammal monitoring was conducted, there was inadvertent bycatch of birds (Table 16). This included three birds (one savannah sparrow [*Passerculus sandwichensis*] and two unidentified sparrows) in 2018, one unidentified species of bird in 2019, one lapland longspur [*Calcarius lapponicus*] in 2022, and four birds (three savannah sparrow and one white crowned sparrow [*Zonotrichia leucophrys*]) in 2024 (Table 16).

Table 16: Small Mammal Monitoring Program Summary, 2015 to 2024

Species	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
collared lemming (*Dicrostonyx groenlandicus)*	0	0	0	0	1	0	1	0	0	2	**4**
eastern heather vole (*Phenacomys ungava)*	2	0	0	0	0	0	0	0	0	1	**3**
lemming species	0	0	0	0	0	0	0	1	0	0	**1**
meadow vole (*Microtus pennsylvanicus)*	0	0	0	0	0	0	0	3	0	1	**4**
northern red-backed vole (*Clethrionomys rutilus)*	1	15	12	4	8	4	0	0	5	11	**60**
shrew species	0	0	0	0	0	0	0	0	2	0	**2**
southern red-backed vole (*Clethrionomys gapperi)*	1	0	0	0	0	0	12	1	0	0	**14**
unidentified	0	0	0	0	0	0	1	1	3	0	**5**
vole species	0	0	0	0	0	0	2	3	8	0	**13**
inadvertent bycatch	0	0	0	3	1	0	0	1	0	4	**9**
Total	**4**	**15**	**12**	**7**	**10**	**4**	**16**	**10**	**18**	**19**	**115**

6.0 SNOW BERM MANAGEMENT AND MONITORING

Caribou movement is potentially impacted by snow berm height along the winter access road and may result in deflecting caribou from crossing roads (Rescan 2011). As such, De Beers began annual monitoring of snow berm height along the winter access road in 2014. In 2015 De Beers committed to implementing additional mitigation to reduce snow berm heights to less than or equal to 1.6 m based on results from Ekati Mine (Rescan 2011); this mitigation has been implemented since 2016.

6.1 Methods

Three snow berm surveys were conducted annually along the winter access road between February and March of 2014 to 2024, with three exceptions: in 2014 only one survey was completed, in 2020 only two surveys were competed due to staffing issues related to COVID-19 and in 2022 only two surveys were completed. Snow berm height and slope were measured every 2 km (on the left and right side of the road) along the winter access road, including both lake and portage locations; in 2017 round 3, the field crew unintentionally measured distance in miles instead of kilometers. The road maintenance crew was informed of any snow berm heights that exceeded

1.6 m and heavy mobile equipment was used to reduce the height of the snow berms to less than or equal to 1.6 m.

6.2 Results

From 2014 to 2024 there was a total of 84 (2.5%) snow berms areas that required mitigation from the road maintenance crew, as they exceeded 1.6 m in height (Table 17). The number of snow berm areas requiring reduction of height has generally been low since the beginning of the winter road annual monitoring program (Table 17), with the highest number of snow berms requiring mitigation being in 2015 (59), while 9 of 11 years required 4 or fewer.

Table 17: Winter Road Surveys - Snow Berm Heights, 2014 to 2024

Year	# of Surveys	n for Round 1	n > 1.60 m	n for Round 2	n > 1.60 m	n for Round 3	n > 1.60 m	Total n	Total n > 1.60 m	% of Total	Total n ≤ 1.60 m	% of Total
2014	1	120	4	-	-	-	-	120	4	3.3	116	96.7
2015	3	118	2	122	20	122	37	362	59	16.3	303	83.7
2016	3	116	0	118	1	116	0	350	1	0.3	349	99.7
2017	3	116	0	116	5	72	6	304	11	3.6	293	96.4
2018	3	118	0	118	0	118	0	354	0	0.0	354	100.0
2019	3	118	0	118	2	118	0	354	2	0.6	352	99.4
2020	2	120	0	118	0	-	-	238	0	0.0	238	100.0
2021	3	122	0	122	0	122	0	366	0	0.0	366	100.0
2022	2	118	1	118	0	-	-	236	1	0.4	235	99.6
2023	3	120	2	120	1	120	0	360	3	0.8	357	99.2
2024	3	122	0	122	1	122	2	366	3	0.8	363	99.2
Total	**29**	**1308**	**9**	**1,192**	**30**	**910**	**45**	**3,410**	**84**	**2.5**	**3,326**	**97.5**

n = number of measurements (total n differs as some years did not have all 3 rounds completed, some rounds were shorter than others and some had more then 2 km between measurements).

- = no survey completed.

In 2023, remote cameras captured five barren-ground caribou crossing the winter road twice on March 18 near Lake 12 (in the vicinity of km 28 and km 30 marker points). Although these remote cameras were not directly at the snow berm survey marker (De Beers 2024), the locations where caribou were captured on camera crossing the road were similar to the conditions at the recontoured snow berm, indicating that the mitigation at the recontoured snow berms was expected to be effective.

6.3 Summary

De Beers began annual monitoring of snow berms along the winter access road in 2014 to identify snow berm heights greater than 1.6 m that may deflect caribou from crossing roads. To mitigate this potential negative effect on caribou, all snow berms monitored and observed to be greater than 1.6 m were reported to the road maintenance crew and were heights reduced.

From 2014 to 2024 snow berms that required mitigation from the road maintenance crew are infrequent (2.5% of surveyed locations). The winter access road continues to be constructed in a way that minimizes potential to deflect caribou.

7.0 TRENDS IN PUBLIC USE, ENVIRONMENTAL INDICATORS AND MINE ACTIVITY

De Beers conducts surveillance of the winter access road to document public use and provide safety and support to truck traffic. Public use of the road is typically dominated by hunting groups. In addition, De Beers committed to monitoring basic environmental indicators to provide estimates of the annual natural changes in local environmental conditions surrounding the Mine (De Beers 2014b).

Sensory disturbances, such as noise, smells, dust, or the presence of people resulting from mining activity may alter the behaviour or distribution of wildlife in habitats adjacent to development (Bayne et al. 2008; Boulanger et al. 2012). De Beers committed to recording indices related to Mine activity as correlates to increase understanding of possible changes in wildlife behaviour and distribution (De Beers 2014b).

7.1 Methods

Public Use of Winter Access Road

Each day the winter access road is open, De Beers' security personnel drive from the Mine to MacKay Lake, and recorded wildlife observations and hunting/recreational activity. Observations of public use of the road were documented on a Winter Access Road User Survey Form (De Beers 2014b).

Environmental Indicators

The environmental indicators monitored annually by the Mine since construction include:

- snow melt (date of 50% snow cover and 10% snow cover)
- lake thaw (date of 50% ice cover and 10% ice cover on selected lakes)
- lake freeze (date of first ice across selected lakes)
- first snow (date of first snowfall that does not melt)
- migratory bird arrival (date of first and second observation of common and easily identified migratory birds, including raptors, waterfowl and upland bird species)

Mine Activity

The activity indicators recorded monthly by the Mine since construction included the following:

- camp occupancy (number of site staff staying in camp)
- fuel consumption
- Mine rock moved
- ore processed
- domestic water consumption

Analysis

Winter access road use data and environmental indicator data from 2014 to 2018, and Mine activity indicators from 2015 to 2018, were compiled from annual reports (De Beers 2015a, 2016, 2017, 2018, 2019, 2020, 2021, 2022b, 2023, 2024, 2025a) and summarized qualitatively and quantitatively to assess trends over time. Correlation analysis for the Mine indicator data was performed to determine the associations between parameters and assess whether all parameters should continue to be collected. Analysis was completed in R (R Core Team 2024).

7.2 Results

Public Use of Winter Access Road

Data recorded by security personnel monitoring public use of the road varied by year (Table 18). The average number of days that the winter access road was operational on an annual basis between 2014 and 2024 was 56 days. In 2017 and 2018, the road was available for haul traffic 85% of the time, and an average of 521 freight loads, 264 Ammonium Nitrate loads, and 23 heavy haul loads were transported to the Mine over these two years. In 2019 to 2024, there was an average of 1,839 loads to supply the Mine with fuel, ammonium nitrate and general freight and equipment each year. Hunting parties were recorded using the winter access road during surveys in 2014 to 2024, with the exception of 2016.

Table 18: Public Use of Winter Access Road, 2014 to 2024

Indicator	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Average
Number of days road was operational	88	58	43	51	59	53	53	52	56	52	47	56
Percentage (%) of time road was operational that it was available for haul traffic	-	-	-	85	85	-	-	-	-	-	-	85
Number of occasions that hunting parties were observed	11	19	0	multiple occasions	multiple occasions	multiple occasions	multiple occasions	multiple occasions	multiple occasions	multiple occasions[(a)]	multiple occasions[(a)]	-
Number of loads to supply the Mine with fuel, ammonium nitrate and general freight and equipment	-	-	-	-	-	1,735	1,704	1,915	1,890	1,719	2,073	1,839

a) Large kill sites were reported to GNWT-ECC on multiple occasions.

- = no data.

Environmental Indicators

The date of snow melt varied by year, with the earliest melt to 50% and 10% snow cover occurring in 2023 (April 20 and April 28, respectively), and the latest occurring in 2021 and 2022 (June 1 and June 12, respectively) (Table 19). A similar trend was observed for ice thawing on Kennady Lake, with the earliest thaw occurring in and the latest dates of thaw in 2021 and 2022 (Table 19). Since 2015, the year with the most days without snow cover was 2024, from April 28 to October 21 (176 days without snow cover).

The arrival of migratory birds (i.e., Canada geese, northern pintail, snow bunting) at Kennady Lake and at Lake N11 outlet both occurred within a 29-day period, from 2015 to 2023 (there were no data collected in 2014) (Table 19).

Table 19: Environmental Conditions Measured at the Mine, 2014 to 2024

Indicator	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Average
Snow melt (50% snow cover)	08-May	12-May	05-May	10-May	22-May	16-May	19-May	01-Jun	01-Jun	20-Apr	09-May	14-May
Snow melt (10% snow cover)	24-May	17-May	16-May	18-May	02-Jun	26-May	11-Jun	12-Jun	12-Jun	28-Apr	18-May	24-May
Kennady Lake thaw (50% ice cover)	-[(a)]	06-Jun	02-Jun	05-Jun	12-Jun	22-May	02-Jun	21-Jun	21-Jun	28-Apr	07-Jun	04-Jun
Kennady Lake thaw (10% ice cover)	25-Jun	12-Jun	09-Jun	10-Jun	18-Jun	24-May	30-Jun	26-Jun	26-Jun	04-May	14-Jun	11-Jun
Kennady Lake Freeze (100% ice cover)	15-Oct	15-Oct	10-Oct	20-Oct	10-Oct	16-Nov	16-Oct	02-Nov	22-Oct	24-Oct	20-Oct	21-Oct
First Snow (that did not melt)	-	04-Oct	14-Sep	03-Oct	11-Sep	07-Oct	06-Oct	11-Oct	12-Oct	21-Oct	18-Oct	04-Oct
Migratory bird arrival: Canada geese arrival at Kennady Lake	-	07-May	30-Apr	-	10-May	-	06-May[(c)]	05-May[(c)]	14-May[(c)]	15-Apr[(d)]	03-May[(f)]	03-May
Migratory bird arrival: Canada geese at Lake N11 outlet	-	15-May	30-Apr	28-Apr[(b)]	16-May	27-May	06-May	-	-	03-May[(e)]	04-May[(f)]	08-May

a) Lake ice thaw was measured only once in 2014 and was documented when there was full open water present on Kennady Lake.
b) Only noted Canada geese arrival, not location.
c) Unidentified geese.
d) Only noted snow bunting arrival, not location.
e) Only noted northern pintail arrival, not location.
f) Only noted migratory bird arrival, not species or location.
- = no data.

Mine Activity

Camp occupancy was higher in 2015 when construction was occurring compared to in 2016 to 2024 when the Mine was solely in operations phase (Table 20). Fuel consumption has generally increased annually, except in 2020, 2021 and 2022, and was highest in 2024 (Table 20). The amount of rock mined was highest in 2019, followed by 2023 (Table 20). A greater amount of ore was mined than processed in 2017 (235,313 tonnes more); a year later, the reverse occurred and a greater amount of ore was processed than mined (286,177 tonnes more) (Table 20). The amount of ore processed was highest in 2024, but has remained fairly consistent since 2017 (Table 20). Domestic water consumption was highest in 2024 (Table 20). Water used for dust suppression was highest in 2023, followed by 2019, 2022 and 2021 (Table 20).

Table 20: Mine Activity Indicators Measured at the Mine, 2015 to 2024

Metric	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Average
Average Monthly Occupancy (averaged across calendar year)	516	388	310	375	364	402	328	355	387	393	382
Fuel Consumption (L)[(a)]	12,445,380	25,077,922	38,146,994	45,182,038	49,338,054	48,765,880[(c)]	48,100,003[(c)]	47,346,991[(c)]	49,494,656[(c)]	53,008,687[(b)]	41,690,661
Rock Mined (tonnes)	1,698,183[(d)]	23,105,360[(e)]	29,523,794	29,523,794	43,201,525	35,870,768	34,598,563	33,947,188	37,147,350	33,388,000	34,650,123 [(f)]
Ore Mined (tonnes)	-	-	3,512,542	2,908,183	-	-	-	-	-	5,378,500	3,933,075
Ore Processed (tonnes)	-	515,349[(g)]	3,277,229	3,194,360	3,509,901	3,247,681	3,082,687	3,102,219	3,249,963	3,629,000	3,237,720[(f)]
Domestic Water Consumption (L)	24,908,000	25,323,000	26,428,000	31,480,000	28,862,000	27,998,000	24,868,000	27,417,000	32,607,000	34,439,000	28,433,000
Water Used for Dust Suppression (L)	8,345,000	4,143,000	2,616,000	2,486,000	15,348,000	8,950,000	14,788,000	14,822,000	15,737,000	11,034,000	9,826,900

a) Calculated as the sum of jet fuel, gasoline, and diesel consumed.
b) Calculated as the sum of jet fuel and diesel, no gasoline data provided.
c) Calculated as the sum of diesel, no jet fuel or gasoline data provided.
d) Cubic metres (m^3) of waste rock moved.
e) Cubic metres (m^3) of Mine rock moved.
f) Calculated as the average between 2017 and 2024 when measurements were in tonnes.
g) Ore processed measurement was started in July 2016 and was originally measured in cubic metres (m^3) instead of tonnes.
- = no data

Mine activity indicators were assessed for potential correlations using the Pearson correlation coefficient. Values greater than or equal to |0.60| were considered correlated. Relationships were considered significant based on an α-level of 0.05 (i.e., *P*-value <0.05). The correlation analysis could not be performed for the ore mined tonnage due to limited data (sample size of two; Table 20). Data from 2015 and 2016 for rock mined and ore processed were excluded from the correlation analysis due to differences in the way the metrics were measured (m^3 versus tonnes) compared to more recent years (2017 to 2024).

Average camp occupancy per year and fuel consumption were negatively correlated, and the correlation was significant (r = -0.63, *P* = 0.05; Table 21). Fuel consumption and domestic water consumption were positively correlated, though the relationship was not significant (r = 0.62, *P* = 0.07; Table 21). Similarly, processed ore and water consumption were positively correlated, but the relationship was not significant (r = 0.61, *P* = 0.11; Table 21). There was a positive correlation between rock mined and water use for dust suppression, and the relationship was significant (r = 0.76, *P* = 0.03; Table 21).

Table 21: Correlation Matrix for Mine Activity Parameters Measured at the Mine, 2015 to 2024

Mine Activity Parameter [a]	Average Camp Occupancy	Fuel Consumption	Rock Mined	Ore Processed	Domestic Water Consumption	Water for Dust Suppression
Average Camp Occupancy		**-0.63**	0.30	0.38	-0.05	-0.05
Fuel Consumption			0.56	0.41	0.62	0.47
Rock Mined				0.34	0.02	**0.76**
Ore Processed					0.61	0.04
Domestic Water Consumption						0.17
Water for Dust Suppression						

Note: Values greater than or equal to |0.60| are considered correlated. **Bolded** values indicate a statistically significant correlation between the parameters at an α-level of 0.05 (i.e., *P*-value <0.05).

7.3 Summary

Noise, dust, and increased human presence may alter wildlife habitat use and distribution in areas surrounding the Mine. These indirect effects of the Mine on wildlife populations have been monitored by De Beers since 2014 by documenting public use of the winter access road and by recording local environmental conditions and annual Mine activity indicators.

During pre-construction in 2014, the winter access road was in operation for 88 days (Table 18). The ground still had 10% snow cover on May 24 that year, and Kennady Lake was recorded with 10% ice cover on June 25 (Table 19). During Mine construction in 2015, the winter access road was operational for 58 days (Table 18) and there was over 500 people in the camp (Table 20). As the Mine entered the Operations phase in 2016, the number of people on site decreased (average of 367 from 2016 to 2024); this would have reduced the likelihood of wildlife incidents and possibly decreased avoidance of the Mine by wildlife. Between 2016 and 2023, the winter access road was operational for as few as 43 days and up to 59 days, annually (Table 18). The date of snow melt varied by year, with the earliest 10% snow cover occurring in 2023 on April 28, and the latest occurring in 2021 and 2022 on June 12 (Table 19). A similar trend was observed for ice thawing on Kennady Lake, with 2023 showing thaw earliest, on May 4, and 2021 and 2022 showing thaw the latest, on June 26 (Table 19).

There was a negative correlation between average camp occupancy per year and fuel consumption and a positive relationship between mined rock and water used for dust suppression, both of which were statistically significant (Table 21). There was a positive relationship between fuel consumption and domestic water consumption and a positive relationship between processed ore and domestic water consumption, though these relationships were not statistically significant (Table 21). Other metric comparisons did not show strong correlations, and no other tested relationships were significant. The correlation analysis was based on 10 years of monitoring, except in cases of missing data for a metric for a given year. For example, data from 2015 and 2016 for rock mined and ore processed were excluded due to differences in how metrics were recorded. Mine activity indices will continue to be monitored and re-evaluated in the future as more information becomes available.

8.0 CONCLUSIONS

De Beers has implemented mitigation and monitoring since 2014, as per management plans (e.g., WWHPP, WEMP, and WMMP), and have used adaptive management principles to revise mitigation in response to incidents and monitoring results. This comprehensive analysis, completed every five years, examined data collected from 2014 through 2024 (De Beers 2015a, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025a). Six species at risk have been identified on site through the wildlife sightings log, including barn swallow, barren-ground caribou, grizzly bear, Harris's sparrow, short-eared owl and wolverine. Mitigation implemented by De Beers to avoid and minimize incidents with wildlife appear to be effective. Mortality events in 2014 (two caribou on the winter access road and ten loons on Kennady Lake) led to a revision in mitigation and monitoring programs, with input from the Department of Environment and Natural Resources and Indigenous communities, and have been effective at limiting mortalities since implementation. Mortality events relating to interactions with wildlife and vehicles/heavy equipment in 2022 (one Arctic hare), 2023 (one red fox) and 2024 (two Arctic hares) led to the review of the wildlife Right-of-Way policy with staff on site to reinforce awareness and compliance. When examining the number of annual mortalities compared to Mine activity, using average annual camp occupancy as a proxy, mortalities and camp occupancy were not found to be correlated, which provides further support that mitigation measures on site have been effective to minimize wildlife mortalities.

Following the incident in 2014 where two caribou died after colliding with a parked vehicle on the winter access road, De Beers implemented a behaviour monitoring program to better understand the effects of winter access road on caribou behaviour and movement. Monitoring was triggered in 2014, 2018, 2019, 2020, 2022, 2023 and 2024 when there was greater than 20 groups on the road observed during reconnaissance surveys. Caribou behaviour appeared to be affected as much from the natural environment as from anthropogenic stressors, as they displayed similar behaviour in response to strong winds and from stressors on the road. The majority of encounters with stressors resulted in no reaction or change in behaviour, indicating caribou were habituated/not particularly sensitive to anthropogenic disturbances on the winter access road. Group size appeared to have the strongest effect on caribou behaviour; as group size increased, the number of active and standing caribou decreased, while the number of bedded and feeding caribou increased. This phenomenon is common in aggregating animals (Lima 1995), as large groups provide safety and may reduce the need for individual vigilance (Lehtonen and Jaatinen 2016). There was no extreme flight response to anthropogenic stressors observed during monitoring sessions. The presence of stressors resulted in caribou changing their behaviour for an average of 1 minute and 32 seconds. Since 2022, the average duration of caribou responses to stressors have been declining annually, thus supporting the likelihood of caribou habituation to stressors.

Deterrents aimed at reducing raptor and migratory birds nesting near open-pits and in areas where vegetation is scheduled to be cleared have been effective at minimizing interactions with birds during sensitive periods. There have been three raptor nests observed where deterrents were deployed from 2016 through 2024: one peregrine falcon nest at the 5034 pit (in 2021 and 2022) and one peregrine falcon nest at the Hearne pit (in 2024). Deterrent actions have shown to be effective for raptors and other nesting birds, while deterrents for bank and cliff swallows have been less effective. De Beers will continue to discuss mitigation strategies with ECCC in attempt to increase success for these species.

De Beers began annual monitoring of snow berms along the winter access road in 2014, as snow berm heights greater than 1.6 m may deflect caribou from crossing roads. To mitigate this potential negative effect on caribou, all snow berms that were greater than 1.6 m were reported to the road maintenance crew to be lowered. From 2014 to 2024 there was a total of 84 (2.5%) snow berms that required mitigation from the road maintenance crew. Since 2018 the snow berms requiring mitigation has been less than 1% of the total snow berms measured per year (ranging from 0 to 3 snow berms per year). The winter access road continues to be constructed and managed that minimizes potential physical barrier effects to caribou.

Trends in Mine activity were as expected, with the highest human occupancy during construction in 2015. Fuel consumption was highest in 2024 and has seen an annual increase, except for in 2021 and 2022, and is assumed to reflect the increased number of equipment and vehicles during operation. Water used for dust suppression was highest in 2023, and has seen large increases in 2019, 2021, 2022 and 2023. There was a negative relationship between average camp occupancy per year and fuel consumption and a positive relationship between rock mined and water use for dust suppression, both of which were statistically significant. Indices of mining activity and their associations with one another will be re-examined as part of the next comprehensive analysis. The next 5-year comprehensive wildlife analysis will be completed in 2030.

9.0 CLOSURE

We trust the above meets your needs. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Sincerely,

WSP Canada Inc.

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APPENDIX A

Power Analysis and Summary of Collared Caribou Technical Memorandum

TECHNICAL MEMORANDUM

DATE 27 February 2025 **Project No.** CA0023460.8480/DCN-049-Rev0

TO Mason Elwood and Kurtis Trefry
De Beers Canada Inc.

CC John Faithful and Charity Beres (WSP)

FROM Morgan Skinner, Dan Coulton **EMAIL daniel.coulton@wsp.com**

POWER ANALYSIS AND SUMMARY OF COLLARED CARIBOU INTERACTIONS IN SUPPORT OF GAHCHO KUÉ MINE'S WILDLIFE MANAGEMENT AND MONITORING PLAN

Plain Language Summary

The Gahcho Kué Mine (Mine) Wildlife Management and Monitoring Plan (WMMP) commits to generating annual estimates of the Mine's potential influence on collared caribou movement behaviour. Currently, it is not known how much data would be necessary to support such an analysis and generate reliable accurate estimates. A statistical analysis called a power analysis was performed to identify the number of collared caribou that would be necessary to generate such estimates. This was done by simulating caribou movements around the Mine site with different numbers of individuals (i.e., sample sizes) and alternate numbers of telemetry locations (individual resolution). In all simulated data, caribou movement behaviour was assumed to be affected by the Mine up to a distance of 15 km. These data were then analyzed to determine how many caribou would be necessary to reliably and accurately detect this assumed Mine effect. The values used for the simulated data and analyses were selected from a previous analysis on the influence of diamond mines on caribou behaviour and included larger assumed effect sizes (i.e., Mine effects).

The number of collared caribou necessary to reliably detect a Mine effect, as determined by the power analysis, were compared to the number of collared caribou that actually interacted with the Mine. In the available data, the number of collared caribou that interacted with the Mine ranged from 0 and 29 across years. The power analysis found that in many simulated scenarios, even 100 individuals would be insufficient to reliably detect a Mine effect on habitat use. Additionally, given the number of collared caribou available, an analysis to detect the extent of a proposed Mine effect (i.e., a segmented regression) would likely provide inaccurate estimates. In summary, given the small number of collared caribou that interacted with the Mine during the study period, an analysis is unlikely to reliably and accurately detect a Mine effect on behaviour, even if data were combined across years. De Beers Canada Inc. trusts that the valuable information provided herein is an acceptable alternative to their commitment under the WMMP.

1.0 INTRODUCTION AND OBJECTIVES

De Beers Canada Inc. (De Beers) operates the Mine, located at Kennady Lake about 280 kilometres (km) northeast of Yellowknife, Northwest Territories (NT). Kennady Lake is north of the East Arm of Great Slave Lake and the community of Lutsel K'e by approximately 140 km. Construction of the Mine began in winter 2014/2015, following the issuance of the Type A Water Licence (MV2005L2-0015) and Type A Land Use Permit (MV2021D0009) for mining and milling by the Mackenzie Valley Land and Water Board (MVLWB) in late 2014. Wildlife monitoring commitments for the Mine on and beyond the footprint were developed in consultation with regulators and Indigenous communities. These were initially described in a Wildlife and Wildlife Habitat Protection Plan (WWHPP; De Beers 2014a) and a Wildlife Effects Monitoring Program (WEMP; De Beers 2014b). A Caribou Protection Plan was incorporated into the WWHPP to mitigate and monitor impacts to barren-ground caribou (*Rangifer tarandus groenlandicus*) which occupy or travel through the area of the Mine during the year.

Following the publication of new wildlife management guidelines developed by the Government of Northwest Territories, Department of Environment and Natural Resources (GNWT-ENR 2019), De Beers developed a Tier 3 WMMP (De Beers 2022). The Mine's WMMP commits to generating annual estimates from a caribou zone of influence (ZOI) analysis of collared caribou and indicates and that the Mine will use the Zone of Influence Technical Task Group (ZOITTG) guidelines to complete the analysis (ZOITTG 2021). The current guidelines mostly endorse the approach of Boulanger et al. (2021), which WSP has already determined is not possible to replicate because of insufficient description of methods and incomplete analysis code. Further, the Government of the Northwest Territories, Department of Environment and Climate Change (GNWT-ECC), who funded the Boulanger et al. (2021) research and developed the ZOITTG guidelines, indicated to WSP that they will not help to obtain the complete statistical coding from the authors. As such, an alternative ZOI approach is required, and it is necessary for De Beers to provide an analysis plan to the GNWT-ECC for a 30-day review as stated in the Mine's WMMP.

Based on experience with other NT WMMPs, two analyses were completed to evaluate whether a ZOI analysis could be supported:

1) A summary of the number of collared caribou and the number of telemetry fixes from Bathurst and Ahiak/Beverly herds that overlap with the Regional Study Area.

2) A power analysis, which will identify the minimum number of collared caribou required to generate annual ZOI estimates under a set of statistical assumptions.

Historically, there have been few collared caribou that interact with the Mine and combined with the results of the power analysis, the interaction summary may provide evidence that there are insufficient collared caribou data to generate ZOI estimates for some or all years.

The objective of this technical memorandum is to report on the methods and results of the power analysis and collared caribou interaction summary and provide recommendation of next steps necessary for De Beers to comply with the WMMP commitments.

2.0 METHODS

2.1 Collared Caribou Interaction

Collared caribou data from the Bathurst and Ahiak/Beverly herds up to April 2024 were requested from the Government of the Northwest Territories (GNWT) by WSP on 23 August 2024. Data from 2016 to 2024 were provided for analysis. Data were filtered to retain GPS fixes with high position accuracy (Abernathy 2024). Data were further filtered to remove locations within 14 days from the first recorded fix (to reduce effects of capture and collaring; e.g., Dechen Quinn et al. 2012; Wilson et al. 2016); cases where two subsequent fixes were within two minutes or less (to reduce positioning uncertainty); collars with stationary relocations (i.e., the collar fell off); fixations in which the speed between any two points was unrealistic (greater than 80 km/hr; Prichard et al., 2013). The clean data set included 1,327,570 fixes of 359 individual collars and 867 collar-years ranging from 7 April 2016 to

31 August 2024. Following Boulanger et al. (2021), the data were further filtered to only include individuals that came within 1 km of the Mine footprint. The footprint included the winter access road, during its open dates from January to March, within the regional study area (De Beers 2022). The combined Mine and winter access road footprint is hereafter referred to as the Mine. No caribou came within 1 km of the Mine before 2018. The filtered data set included 139,395 fixes of 59 individual collars and 74 individual collar-years ranging from 1 January 2018 to 21 August 2024. Further information is provided in Section 3.

2.2 Zone of Influence Power Analysis

A power analysis was used to determine the sample size of caribou that would be required to detect a Mine effect on behaviour (i.e., the ZOI) 80% of the time. For a power analysis, it is necessary to choose the significance level at which the null hypothesis is rejected (i.e., alpha value); estimate the variability in the outcome variable (i.e., the standard deviation); and estimate the strength of the effect of the predictor variables on the outcome variable (i.e., covariate effect sizes). With these input parameters, the sample size in which a significant effect can be detected 80% of the time can be estimated. The specific parameters used for this power analysis can be found in Section 3.2.2.

The parameters estimated for a power analysis should be the population parameters rather than study-specific parameters (Zhang et al. 2019). Common practice is to use existing literature and/or expert knowledge (Perugini et al. 2018). When estimating from published studies, it is important to consider that published effect sizes are biased upwards (Perugini et al. 2018). This is due to the selective reporting of statistically significant results, which tend to overestimate true effects (Jennions and Møller 2002; Van Aert et al. 2019). To inform the power analysis reported here, the results of Boulanger et al. (2021) were used when possible; for example, Table 4 was used to inform the tested ZOI slopes, and Table A4 (Supplementary materials) was used to inform the habitat covariate effect sizes. Boulanger et al. (2021) used a conditional logistic regression to model the effect of distance on baseline resource selection. To replicate such a ZOI analysis, a study requires sufficient individuals, with enough GPS fixes, to detect the effect of distance on baseline habitat selection (Leban et al. 2001; Plante et al. 2018). In other words, the analysis must have sufficient data to detect how habitat selection changes with distance from the Mine.

The power analysis reported herein was done using simulations (e.g., Black et al. 2022). Simulations were incorporated to allow for the additional complexity of a distance variable. Data were simulated 1,000 times for use with a conditional logistic regression analyzing habitat selection as a function of distance (Boulanger et al. 2021; Plante et al. 2018). Habitat selection was the outcome variable, which was predicted by three habitat covariates, a ‘distance from Mine’ variable separated into 5 km bins, and an interaction between each habitat covariate and the distance variable. The maximum distance bin was the reference level for all models.

Simulations were done with a defined zone of influence of 15 km, which is consistent with Boulanger et al. (2012). The maximum distance from the Mine was set to 50 km. Each simulation contained all three habitat covariates. One covariate had a strong effect size (Odds ratio [OR] = 1.73). The other two had more average effect sizes (OR = 0.89, OR = 1.18). Across simulations, the strength of the Mine effect on habitat selection was varied within the ZOI; this is slope of the ZOI and is directly related to the ZOI effect size (particularly when the ZOI distance is constant at 15 km; see Boulanger et al. 2021). Hereafter, ZOI slope will be used instead of ZOI effect size to help differentiate these values from the covariate effect sizes. ZOI slope values of 0.06, 0.12, 0.24, 0.48, 0.96, 1.7 were used in simulations. The number of GPS fixes per individual (30, 60, 120) was varied across simulations. For each ZOI slope and GPS fix simulation, sample sizes (i.e., number of collared caribou) between 10 and 100 (in increments of 10) were tested.

Broadly, the data simulation process can be described as follows: For each GPS fix for each caribou, ten possible locations were generated at different distances from the Mine. In line with resource selection function methods, the goal was to assign one of these data points as the "chosen" GPS coordinate while the remaining coordinates would be designated as "random/available" (Boyce 2006). Each of the ten random locations began with an equal probability of selection. This baseline probability was then modified by:

1) The combined effects of the three generated habitat covariates

2) Whether or not the generated distance was within the ZOI

3) Random variance (e.g., random intercept for Caribou ID)

4) A spatial autocorrelation term that biased choices to locations nearer to the prior choice

After these adjustments were made, a GPS fix was then designated as "chosen" based on the adjusted probabilities. This cluster of ten points (one chosen and nine random) was designated a strata and the process was repeated.

Following data simulation, a conditional logistic regression model was used to test for significant effects. The percentage of significant results for each sample size, at different ZOI effect sizes, and using different GPS fixation numbers per individual were recorded. The models contained a cluster term for caribou ID to match the simulated data. In addition to the conditional logistic regression, a segmented regression was run on a binomial generalized linear model (GLM) to detect the simulated breakpoint (15 km). By simulating data under a variety of conditions, this power analysis allows for an understanding of the relationship between sample size, effect size, and the ability to detect the presence of a ZOI effect. All analyses were run in R version 4.3.2 (R Core Team 2024).

3.0 RESULTS

3.1 Collared Caribou Interaction

Table 1 shows the total number of available individuals in the full dataset and in the filtered dataset. Table 2 provides the number of collared caribou that come within 1 km of the Mine under different inclusion criteria (based on the number of GPS fixes). The year with the most interactions was 2023 with 29 collared caribou with at least 30 GPS fixes.

Table 1: Annual Numbers of Collars and Position Fixes for the Full and Filtered Datasets

Year	Total Number of Collared Caribou	Total Number of Fixes	Total Number of Collared Caribou With at Least 1 Fix Within 1 km	Fixes Within 50 km	Proportion of Fixes Within 50 km
2016	13	19,594	0	0	0.00
2017	57	84,969	0	0	0.00
2018	78	128,747	5	3,269	0.03
2019	98	148,732	4	2,372	0.02
2020	102	146,483	1	737	0.01
2021	119	210,019	2	1,352	0.01
2022	123	228,869	9	16,062	0.07
2023	170	233,490	29	13,768	0.06
2024	107	126,667	24	17,350	0.14

Note: Distances refer to the distance from the Mine in km.

Table 2: Annual Numbers of Collars that come within 1 km of the Mine

Year	Total Number of Collared Caribou With at Least 1 Fix Within 1 km	Total Number of Collared Caribou With at Least 30 Fixes Within 1 km	Total Number of Collared Caribou With at Least 60 Fixes Within 1 km	Total Number of Collared Caribou With at Least 120 Fixes Within 1 km
2016	0	0	0	0
2017	0	0	0	0
2018	5	5	5	5
2019	4	4	4	4
2020	1	1	1	1
2021	2	2	2	2
2022	9	9	9	9
2023	29	29	26	22
2024	24	23	22	20

Note: Columns show the available sample size based on a minimum number of GPS fixes for inclusion.

3.2 Power Analysis

3.2.1 Simulated Data

As a conservatism for successful simulation of the Mine effect (i.e., the ZOI), test data were simulated with strong effects sizes (OR for covariate 1 = 0.6, OR for covariate 2 = 1.7, OR for covariate 3 = 1.9, ZOI slope = 1.7), and a large sample size (Number of collared caribou = 100, GPS fixes per individual = 30). Figure 1 shows the results of a conditional logistic regression run on these simulated data.

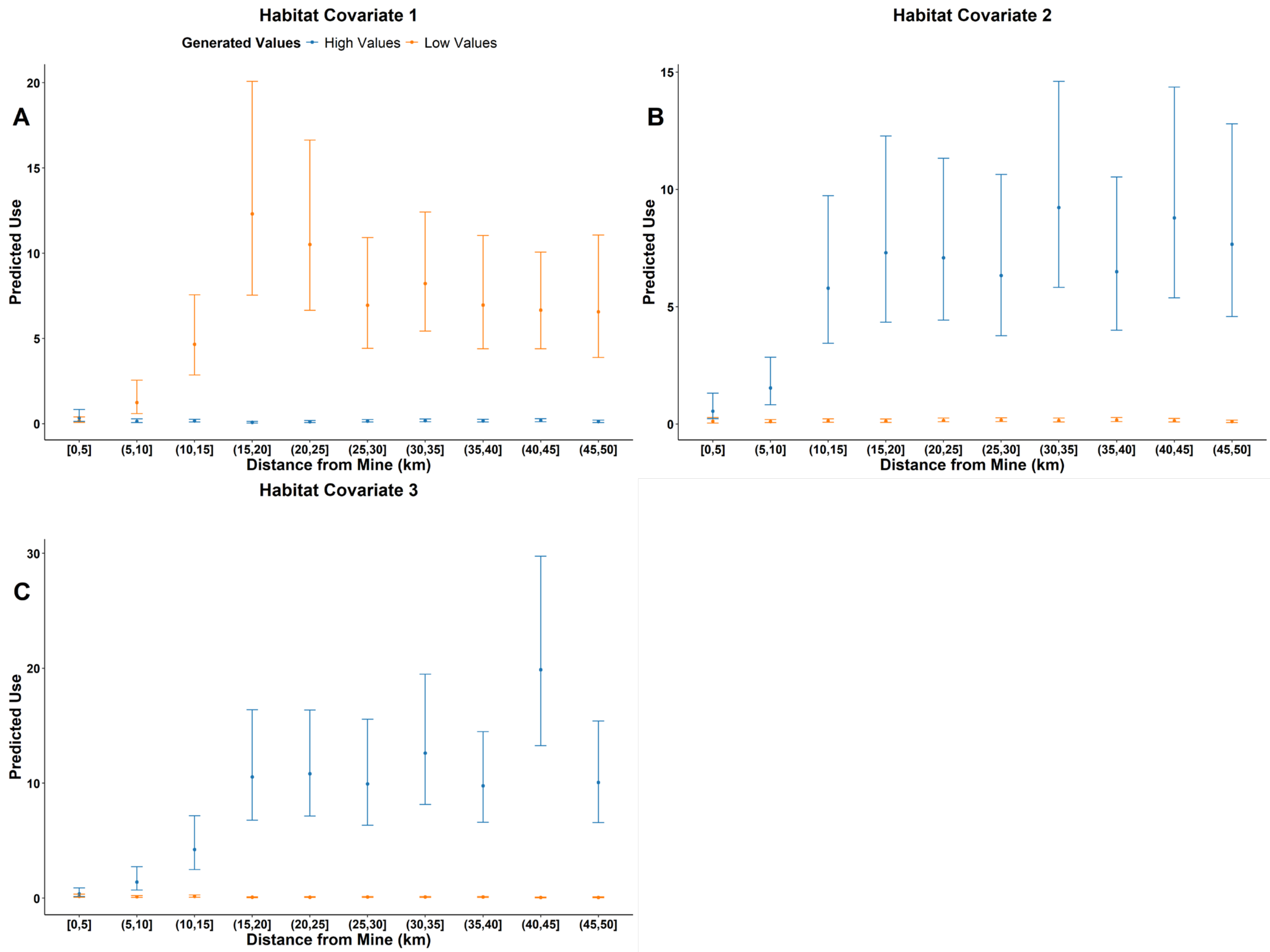

Figure 1: Results from a Conditional Logistic Regression on a Single Simulation for Three Habitat Covariates

Notes: The ZOI distance is set to 15 km. This means that habitat selection in the [0,5], (5,10], and (10,15] km bins is moderated by distance to the Mine. Covariate 1 has an odds ratio below 1, whereas covariates 2 and 3 have odds ratios above 1.

Results suggested that simulations were successful at generating a ZOI that changed with distance from the Mine out to 15 km (Figure 1). For all covariates, selection for habitat increased until the simulated breakpoint of 15 km. After the breakpoint, habitat selection became relatively stable in the presence of simulated error variability (Figure 1). This occurred in the appropriate direction for covariates with odds ratios both greater (Figure 1B and 1C) and less than 1 (Figure 1A). In other words, simulated data capture the appropriate effects of the covariates and the change of these effects with distance to the Mine.

3.2.2 Power determination

Once it was determined that the ZOI effect could successfully be generated in the data, the power analysis simulations were run using the assumed parameters in Table 3. As noted in Section 2.2, 29 individual collared caribou from the available Bathurst and Akial/Beveraly herds collar data had at least 30 fixes but there were fewer with higher numbers of fixes (Table 2). Simulation results when levels of assumed fixes were greater than 30 (potentially reducing available data) are provided in Attachment A (Figures A1 to A4).

Table 3: Parameters, Assumed Values, and Descriptions for the Variable Components of the Simulated Power Analyses

Parameter Type	Assumed Value	Description
Alpha	0.05	The *P*-value for determining statistical significance.
ZOI slopes	0.06, 0.12, 0.24, 0.48, 0.96, 1.70	The effect of the Mine on habitat selection.
Breakpoint/maximum Mine effect distance	15 km	<15 km the ZOI influences habitat selection.
Maximum distance from the Mine	50 km	GPS fixes are simulated up to distances of 50 km.
Covariate effect size	Covariate 1 OR: 0.89, Covariate 2 OR: 1.18, Covariate three OR: 1.73	Odds ratios for the strength of habitat/resource selection. Values > 1 indicate selection for the habitat.
Effect size error variance	Drawn from a normal distribution with mean = 0 and SD = 0.06	Adds error variability to habitat selection.
Individual intercepts for caribou ID	Drawn from a normal distribution with mean = 0 and SD = 0.002	Adds individual variability to habitat selection.
Number of collars (N)	10, 20, 30, 40, 50, 60, 70, 80, 90, 100	Number of individuals simulated.
Number of GPS fixes per individual	30, 60, 120	The number of GPS fixes for each individual. Ten available choices/fixes are simulated for each GPS fix.
Autocorrelation coefficient	0.04	A parameter that biases simulated movement toward the previous GPS fix location.

ZOI = zone of influence; OR = Odds ratio; SD = standard deviation; *P*-value = probability value.

The power analysis demonstrated that a strong main effect of habitat selection (i.e., covariate effect size) was necessary to reliably detect an interaction (Figure 2; Attachment A, Figures A1 and A2). Without strong habitat selection, a power of 0.8 could not be achieved with the simulated number of individuals (Figure 2; Attachment A, Figures A1 and A2; habitat covariate [HC] 1 and HC 2). When habitat selection was strong, it was possible to achieve power for most ZOI effect sizes at the closest distance to the mine. Notably, when the ZOI effect size was very strong, it was slightly more difficult to detect an interaction. This is because the covariate effect is overshadowed (i.e., all choices are governed by the Mine effect and not by habitat). Nevertheless, in most cases a larger ZOI effect size increased power.

The breakpoints extracted from the segmented regression emphasized the importance of both the ZOI slope and sample size to accurately detect a ZOI. For small ZOI slopes, accurate ZOI detection did not occur (Figure 3; Attachment A, Figures A3 and A4). Breakpoint detection became more accurate at slopes above 0.48, if the sample size was above 30 individuals. Further simulations found that a breakpoint is detected even when the ZOI slope was removed (Table 4).

Table 4: Breakpoint Detections for a Segmented Regression run on Simulated Data in which no ZOI was Present

Number of Collared Caribou	Mean Detected Breakpoint	Range of Detected Breakpoints
70	23.08	2.5 - 47.49
80	22.36	2.5 - 47.47
90	22.84	2.5 - 47.49
100	23.12	2.5 - 47.48

Note: 60 GPS fixes per individual were simulated.

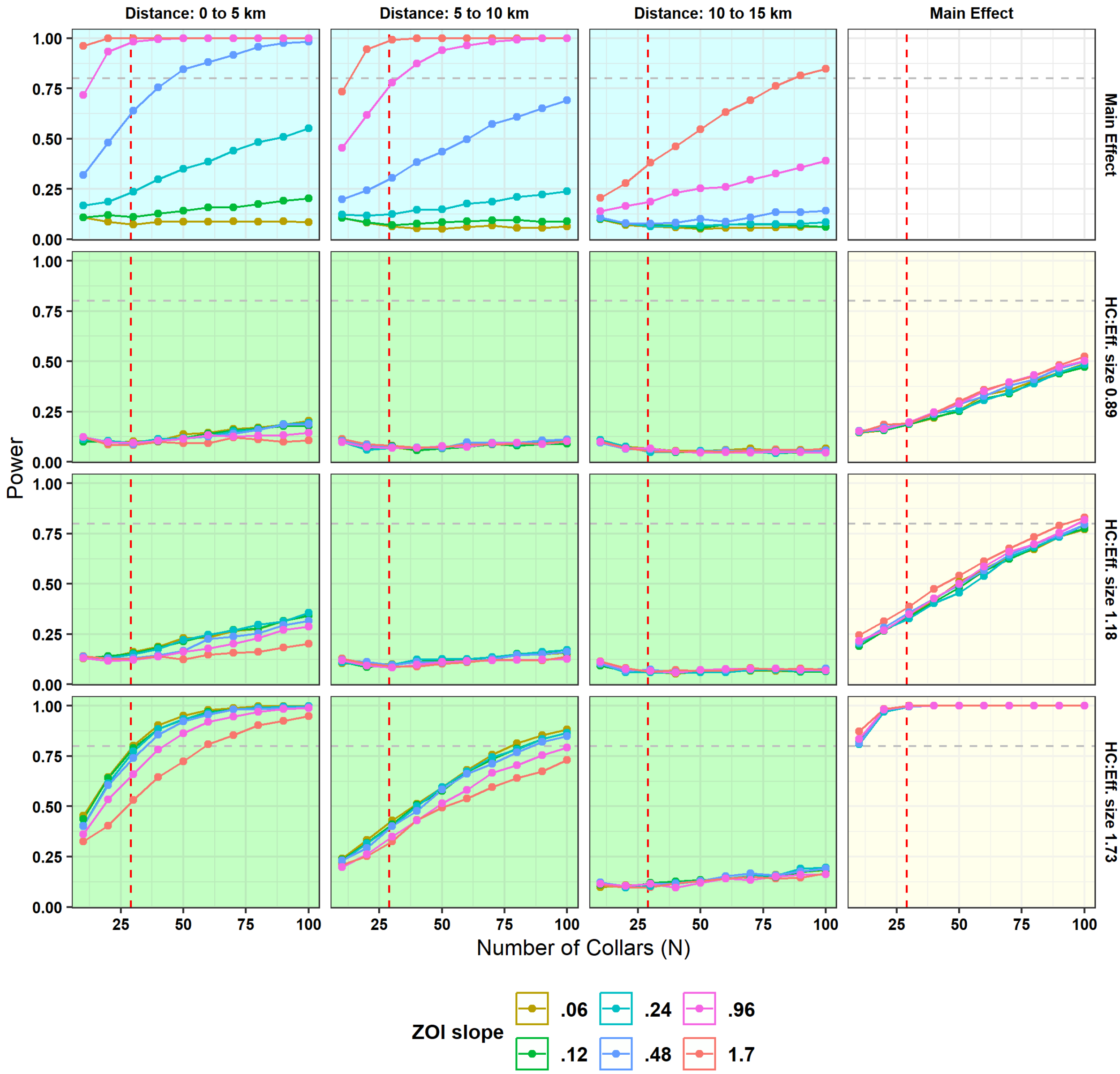

Figure 2: Visualization of the Power Analysis for 30 GPS Fixes per Individual

Notes: Power (y-axis) is the proportion of models that can detect a significant effect with a power of 0.80 referenced (dashed horizontal grey line). The number of collars simulated (x-axis) with the largest sample size available for any year (n = 29 in 2023; red dash line). Columns represent the distance variable in three bins (0 to 5 km from the Mine [left], 5 to 10 km [middle], and 10 to 15 km [right]). Blue shaded panels (top row) show the main effect of distance. Rows represent the habitat covariates. Yellow shaded panels represent the main effect of the covariates alone. The effect size of each covariate is written on the right-side vertical axis. Green shaded facets show the interaction between habitat and distance such that matching the row and column of the main effect gives the corresponding interaction effect.

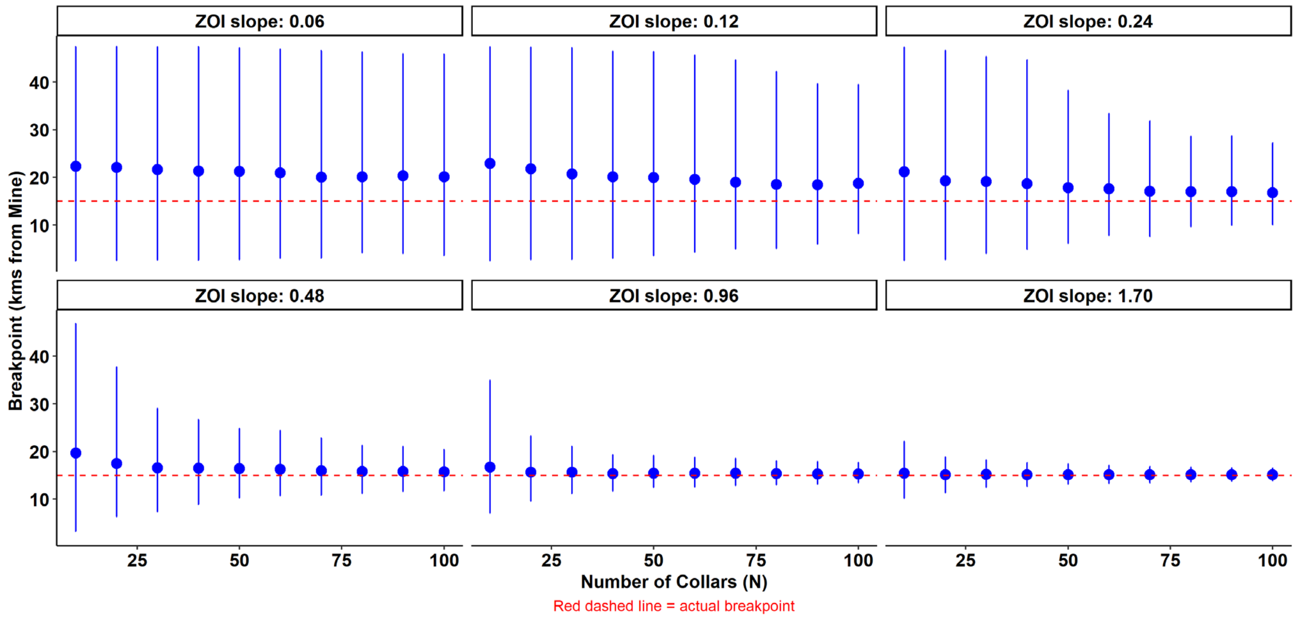

Figure 3: Results from Segmented Regressions run on Simulated Data with a Breakpoint of 15 km and 30 GPS Fixes per Individual

Notes: The number of collared caribou (x-axis) was varied within simulations. Breakpoints (y-axis) were detected using the R package segmented (Muggeo 2003). The horizontal dashed line indicates the 15 km breakpoint assumed in the simulated data. Dots are the average breakpoint across 1,000 simulations. Error bars represent the range of detected breakpoints. Each panel represents a different assumed ZOI slope (panel titles).

4.0 CONCLUSIONS

A simulation-based power analysis was implemented to identify the minimum number of collared caribou required under a set of assumptions to detect annual ZOIs and inform whether there are sufficient available collared caribou data to detect a range of ZOI slopes consistent or larger than Boulanger et al. (2021). As expected, the results of the simulations indicate that as effect sizes of covariates and ZOIs increase, power increases and the number of collared caribou required to achieve 0.80 power, at an alpha value of 0.05 decreases. For example, with an assumed ZOI slope of 0.48, which is larger than the 0.29 slope (and corresponding effect size) reported by Boulanger et al. (2021), about 100 collared individuals would be required with average habitat covariate selection. The largest number of collared caribou interacting within the Mine is 29 individuals with at least 30 telemetry fixes during 2023, which would be insufficient for estimating annual ZOIs. During most years in which data were available, fewer than 10 collared caribou interacted with the Mine footprint. Even if available collared individuals were pooled for an ZOI analysis (Table 2, n = 74), there would not be enough to reliably detect a ZOI slope of 0.48 within a 15 km ZOI.

The results of the power analysis show that strong habitat selection has an important influence on power. In Boulanger et al. (2021), only the habitat covariates forests and water had effect sizes that matched the strongest simulated covariate. Therefore, in order to properly assess habitat usage as a function of these covariates, it is important that forests and water to be equally dispersed both inside and outside the zone of influence. If this is not the case, then habitat availability is confounded with ZOI influence. Outside forests and water, the median odds ratios reported by Boulanger et al. (2021) were 0.88 and 1.16 for odds ratios that were greater or less than 1.0 (see supplementary materials in Boulanger et al. 2021). These odds ratios are closer to the simulated habitat covariates 1 (OR = 0.89) and 2 (OR = 1.18). The simulations suggest that power cannot be achieved with these odds ratios with the available numbers of collared caribou.

Simulations suggest that the ZOI slope can also influence power. The analysis reported herein used ZOI slopes ranging from 0.06 to 1.7. The significant slopes reported by Boulanger et al. (2021) ranged from 0.06 to 0.29 with a median value of 0.22. These values and their effect sizes are similar to the assumed 0.24 slope in this analysis. Examination of these results suggests that, given the available sample sizes, power to detect a distance or interaction effects cannot be achieved without also having strong habitat selection (habitat covariate 3; see above). Assuming a relatively strong ZOI slope of 0.24, detecting a breakpoint with a segmented analysis may be more plausible than detecting an interaction between distance and habitat use. However, at this slope, the range of values estimated can still deviate from the actual breakpoint by approximately 5 to 10 km in either direction (Figures A3 and A4). Importantly, an underpowered analysis using a segmented regression will likely detect a breakpoint irrespective of its accuracy.

It is important to note that this power analysis simulated an equal number of GPS fixes per individual from 30 up to 120. In actual data, the distribution of GPS fixes is highly skewed. This emphasizes the challenges in comparing simulated to actual data, which is more variable across individuals. Finally, where possible, the published results of Boulanger et al. (2021) were used to inform parameters and interpretations. It is important to recognize that published effect sizes tend to be biased upwards (Perugini et al. 2018), so that any interpretations based on Boulanger et al. (2021) may overestimate power. These factors should be considered when interpreting the reported results.

5.0 RECOMMENDED NEXT STEPS

The results of the power analysis and caribou collar summary do not support that an annual or pooled ZOI analysis would likely achieve a power of 0.80 given the available number of collared caribou and average habitat selection. That said, the number of collared caribou interacting with the Mine footprint has been increasing. Across years, 2023 and 2024 both had more interactions than the previous 7 years combined. If this trend continues it may be possible to achieve power with either of the two methods explored. However, given the tendency for segmented regressions to return breakpoints irrespective of accuracy, it is important for an analysis to have a sufficiently large sample size, a method to assess significance of a ZOI breakpoint and a strategy to account for factors influencing movement that may be unrelated to Mine operation (e.g., habitat distributions, spatial autocorrelation). Under these conditions, ZOI estimates could be accurate.

In summary, if a ZOI analysis is to be performed, irrespective of method, it should be undertaken when there are sufficient data to reliably and accurately estimate any potential ZOI that can be linked to changes in mining activity. Currently, given average effect sizes for the ZOI and habitat selection, simulations show that accurate detection of a ZOI is unlikely. This ZOI power analysis, which uses the modelling methods of Boulanger et al. (2021), should prove invaluable for future ZOI analyses and conservation generally. Considering a traditional ZOI analysis would likely be unreliable, DeBeers trusts that the valuable information provided herein and that fills a knowledge gap, is an acceptable alternative to their commitment under their Wildlife Management and Monitoring Plan.

6.0 CLOSURE

We trust the above meets your needs. If you have any questions or concerns, please do no hesitate to contact the undersigned.

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ATTACHMENT A

Supporting Figures for Zone of Influence Power Analysis

The following figures reflect visualizations of power analyses results when the number of simulated telemetry fixes per individual at levels of 60 and 120.

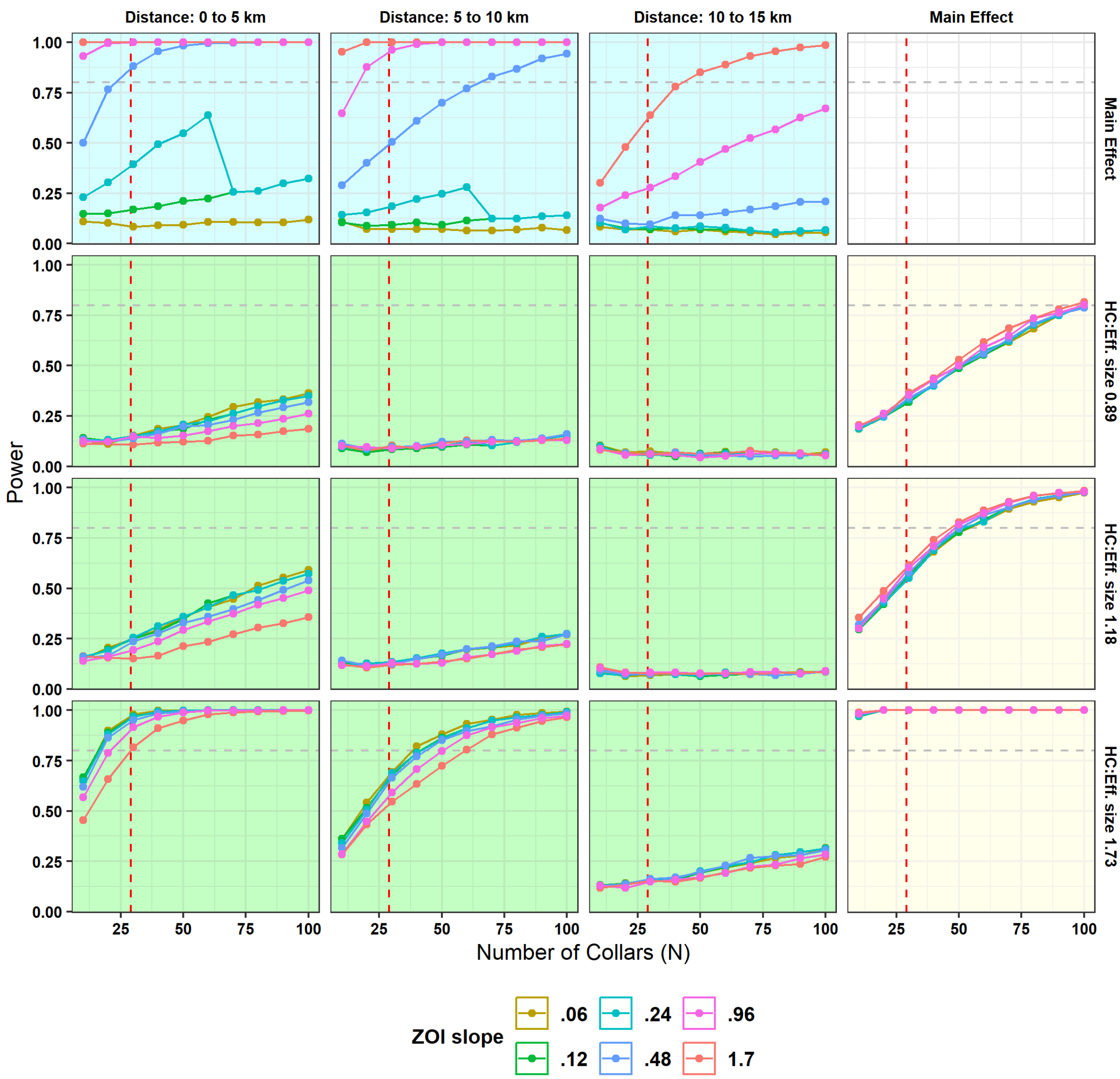

Figure A1: Visualization of the Power Analysis for 60 GPS Fixes per Individual

Notes: Power (y-axis) is the proportion of models that can detect a significant effect with a power of 0.80 referenced (dashed horizontal grey line). The number of collars simulated (x-axis) with the largest sample size available for any year (n = 29 in 2023; red dash line). Columns represent the distance variable in three bins (0 to 5 kms from the Mine [left], 5 to 10 kms [middle], and 10 to 15 kms [right]). Blue shaded panels (top row) show the main effect of distance. Rows represent the habitat covariates. Yellow shaded panels represent the main effect of the covariates alone. The effect size of each covariate is written on the right-side vertical axis. Green shaded facets show the interaction between habitat and distance such that matching the row and column of the main effect gives the corresponding interaction effect.

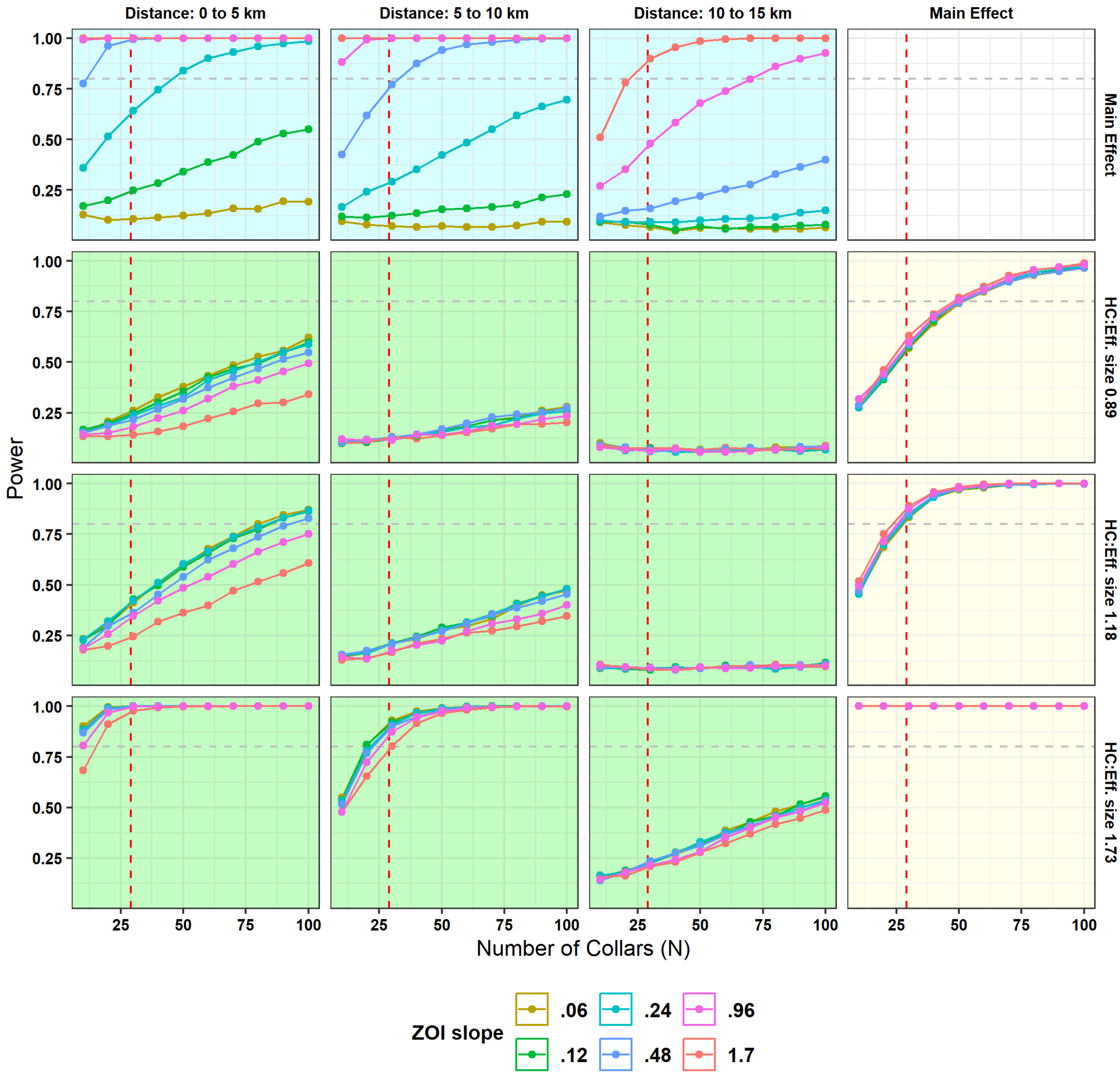

Figure A2: Visualization of the Power Analysis for 120 GPS Fixes per Individual

Notes: Power (y-axis) is the proportion of models that can detect a significant effect with a power of 0.80 referenced (dashed horizontal grey line). The number of collars simulated (x-axis) with the largest sample size available for any year (n = 29 in 2023; red dash line). Columns represent the distance variable in three bins (0 to 5 kms from the Mine [left], 5 to 10 kms [middle], and 10 to 15 kms [right]). Blue shaded panels (top row) show the main effect of distance. Rows represent the habitat covariates. Yellow shaded panels represent the main effect of the covariates alone. The effect size of each covariate is written on the right-side vertical axis. Green shaded facets show the interaction between habitat and distance such that matching the row and column of the main effect gives the corresponding interaction effect.

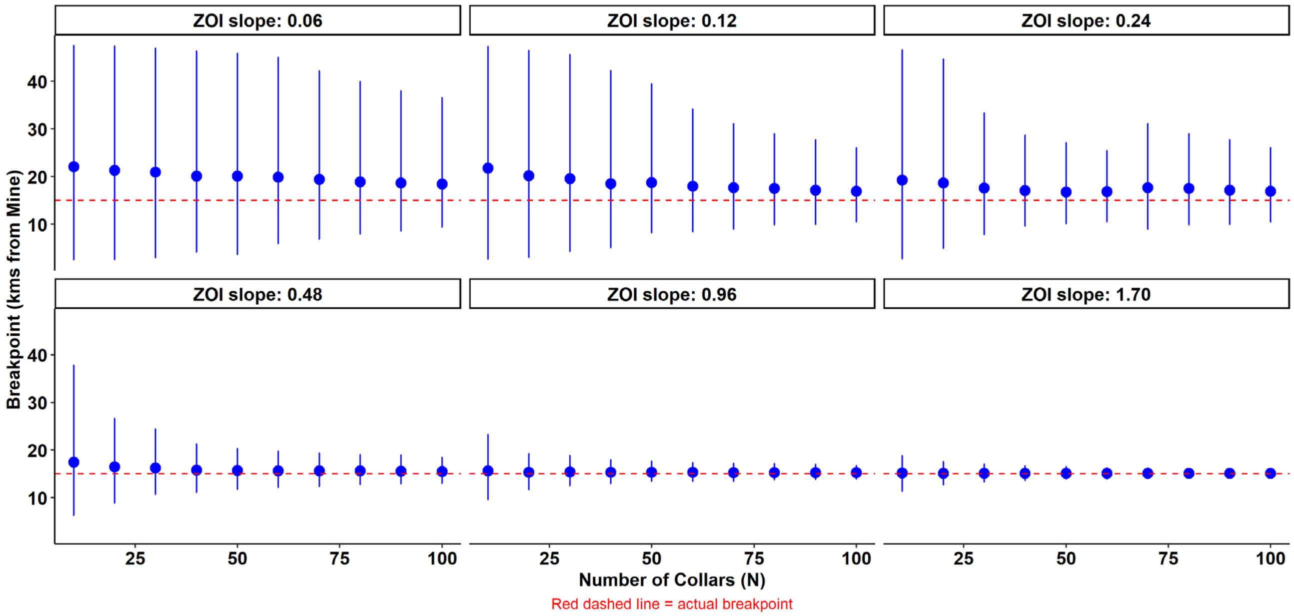

Figure A3: Results from Segmented Regressions run on Simulated Data with a Breakpoint of 15 kms and 60 GPS Fixes per Individual

Notes: The number of collared caribou (x-axis) was varied within simulations. Breakpoints (y-axis) were detected using the R package segmented (Muggeo 2003). The horizontal dashed line indicates the 15 km breakpoint assumed in the simulated data. Dots are the average breakpoint across 1,000 simulations. Error bars represent the range of detected breakpoints. Each panel represents a different assumed ZOI slope (panel titles).

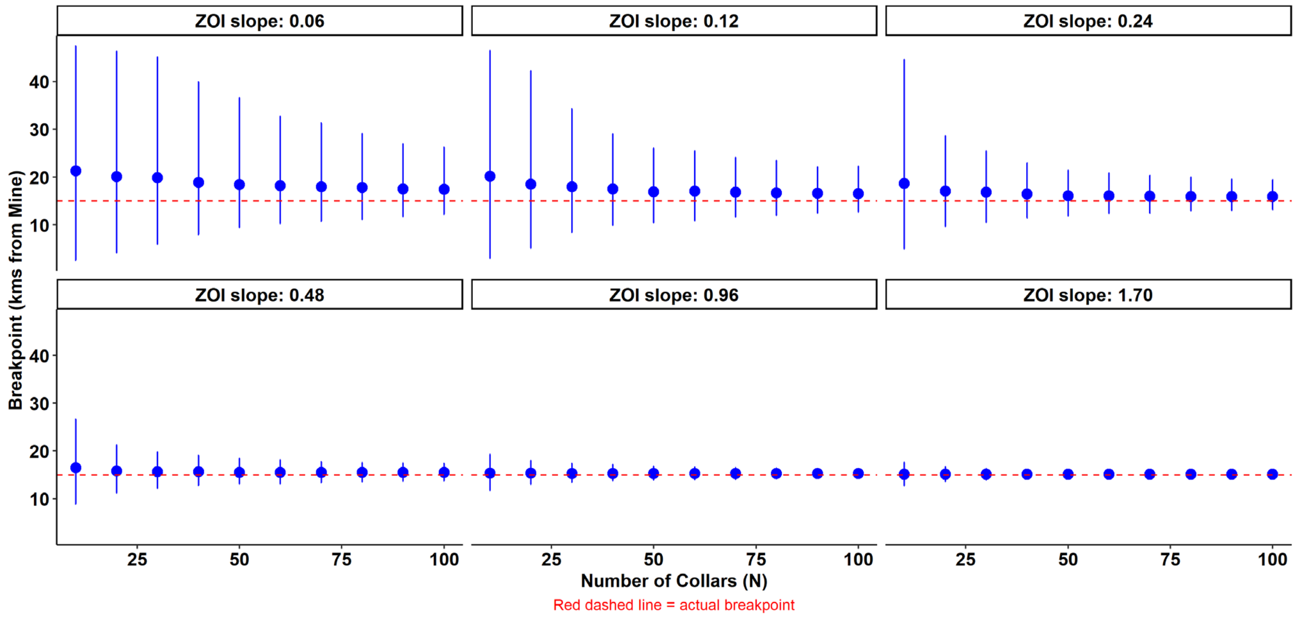

Figure A4: Results from Segmented Regressions run on Simulated Data with a Breakpoint of 15 kms and 120 GPS Fixes per Individual.

Notes: The number of collared caribou (x-axis) was varied within simulations. Breakpoints (y-axis) were detected using the R package segmented (Muggeo 2003). The horizontal dashed line indicates the 15 km breakpoint assumed in the simulated data. Dots are the average breakpoint across 1,000 simulations. Error bars represent the range of detected breakpoints. Each panel represents a different assumed ZOI slope (panel titles).

APPENDIX B

Focal Behaviour Survey Results for Caribou

Table B-1: Focal Behaviour Survey Results for Caribou along the Winter Access Road, 2014 to 2024

Year	Caribou Group Monitored	Group Size	Duration of Monitoring (hours:minutes: seconds)	Number of Stressor Events	Average Distance from Stressor (m)	Percentage (%) of Time Spent in Each Behaviour			
						Bedded	Foraging	Standing	Alert/Moving
2018	A1	6	0:25:00	0	N/A	100.0	0.0	0.0	0.0
2018	A2	6	0:25:00	0	N/A	84.0	16.0	0.0	0.0
2018	A3	35	1:23:00	3	500	39.8	56.6	0.0	3.6
2018	A4	37	0:36:00	2	400	5.6	83.3	11.1	0.0
2018	A5	15	0:31:00	7	175	61.3	22.6	0.0	16.1
2018	A6	56	0:30:00	0	N/A	100.0	0.0	0.0	0.0
2018	A7	13	0:20:00	1	100	0.0	85.0	0.0	15.0
2018	A8	78	0:20:00	0	N/A	40.0	50.0	5.0	5.0
2018	A9	11	0:20:00	0	N/A	100.0	0.0	0.0	0.0
2018	A10	38	0:20:00	1	200	100.0	0.0	0.0	0.0
2018	A11	6	0:20:00	0	N/A	0.0	100.0	0.0	0.0
2018	**Average ± 1SE**	**27 ± 7**	**0:30:00 ± 5.6**	**1.3 ± 0.6**	**273.2 ± 75.0**	**57.3 ± 12.8**	**37.6 ± 11.7**	**1.5 ± 1.1**	**3.6 ± 1.9**
2019[(a)]	-	-	-	-	-	-	-	-	-
2019[(a)]	**Average ± 1SE**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
2020[(a)]	-	-	-	-	-	-	-	-	-
2020[(a)]	**Average ± 1SE**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
2021[(b)]	-	-	-	-	-	-	-	-	-
2021[(b)]	**Average ± 1SE**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
2022	Focal 1-1	10	0:21:00	1	150	0.0	77.4	11.9	10.7
2022	Focal 2-1[(b)]	11	0:22:00	0	N/A	0.0	95.2	0.2	4.5
2022	Focal 2-2	12	0:27:00	3	230	66.7	0.0	25.3	8.0
2022	Focal 2-3	10	0:34:00	2	370	0.0	77.7	11.9	10.4
2022	Focal 2-4	7	0:24:00	1	60	2.1	0.0	66.7	31.2
2022	Focal 2-6	2	0:20:00	1	50	0.0	0.0	22.5	77.5
2022	Focal 3-1	17	0:23:33	2	1,000	0.0	52.9	4.0	43.0
2022	Focal 3-3	55	0:22:00	2	475	36.4	0.0	0.0	63.6
2022	Focal 3-6[(b)]	25	0:22:00	3	500	0.0	87.9	0.0	12.1
2022	Focal 3-7	10	0:24:00	6	180	0.0	99.3	0.0	0.7
2022	Focal 4-1	22	0:21:00	1	800	0.0	97.6	0.0	2.4
2022	Focal 4-2	6	0:24:39	1	275	0.0	76.8	8.2	14.9
2022	Focal 4-4	36	0:22:29	1	50	0.0	92.0	0.9	7.1
2022	Focal 5-1[(b)]	8	0:21:00	2	800	0.0	74.6	21.4	4.0
2022	Focal 5-2	72	0:26:00	3	800	92.3	0.0	7.7	0.0
2022	Focal 6-1	24	0:23:00	1	1,000	0.0	17.4	21.7	60.9
2022	Focal 6-2	16	0:23:00	1	900	0.0	0.0	0.0	100.0
2022	Focal 6-3	5	0:37:00	4	425	0.0	0.0	4.5	95.5
2022	Focal 7-2	37	0:25:50	1	1,000	0.0	72.9	7.9	19.2
2022	Focal 7-3	52	0:22:00	1	1,400	0.0	95.7	1.9	2.4
2022	Focal 7-4	20	0:24:00	2	800	0.0	0.0	13.9	86.1
2022	Focal 7-5	3	0:40:00	3	600	0.0	57.5	7.9	34.6
2022	Focal 8-1	13	0:39:00	8	221	0.0	65.4	2.8	31.8
2022	Focal 8-2	36	0:49:30	3	700	0.0	80.5	14.6	4.9
2022	Focal 9-1	25	0:21:00	4	700	0.0	70.2	4.8	25.0
2022	Focal 9-2	7	0:32:30	9	40	100.0	0.0	0.0	0.0
2022	Focal 9-4	9	0:22:45	0	N/A	0.0	87.9	3.3	8.8
2022	Focal 9-5	4	0:27:00	0	N/A	100.0	0.0	0.0	0.0
2022	Focal 9-6	19	0:29:00	1	200	0.0	46.3	48.9	4.9
2022	Focal 10-1	18	0:22:00	1	350	0.0	47.7	43.9	8.3
2022	Focal 10-2	10	0:36:30	3	500	0.0	76.9	6.8	16.3
2022	Focal 10-3	24	0:32:00	1	600	100.0	0.0	0.0	0.0
2022	Focal 10-5	9	0:22:00	1	1,000	0.0	0.0	37.9	62.1
2022	Focal 11-2	23	0:30:35	1	800	0.0	92.4	0.3	7.4
2022	Focal 11-3	22	0:32:00	3	600	0.0	93.7	0.0	6.3
2022	Focal 11-4	2	0:25:00	2	400	0.0	98.3	1.7	0.0
2022	Focal 11-5	12	0:32:00	0	N/A	90.9	1.3	7.8	0.0
2022	Focal 12-1	7	0:32:00	3	57	18.7	69.3	3.6	8.3
2022	Focal 12-2	4	0:32:45	2	300	0.0	72.8	4.8	22.4
2022	Focal 12-3	5	0:31:00	1	280	0.0	89.8	0.0	10.2
2022	Focal 12-4	27	0:23:00	3	150	85.9	0.0	0.0	14.1
2022	Focal 12-5	13	0:22:00	1	1,200	100.0	0.0	0.0	0.0
2022	Focal 13-1	8	0:38:00	4	1,200	0.0	99.3	0.0	0.7
2022	Focal 13-2	9	0:32:00	4	136	100.0	0.0	0.0	0.0
2022	Focal 13-3	76	0:29:00	3	367	0.0	0.0	4.0	96.0
2022	Focal 13-4	16	0:32:00	3	1,000	18.0	42.2	15.6	24.2
2022	Focal 13-5	12	0:28:00	1	50	0.0	48.2	27.7	24.1
2022	Focal 14-1	17	0:32:00	1	200	68.8	25.5	0.0	5.7
2022	Focal 14-2	11	0:32:00	1	550	0.0	100.0	0.0	0.0
2022	Focal 14-3	7	0:21:00	1	150	0.0	36.1	2.4	61.5
2022	Focal 14-4	10	0:28:00	1	500	0.0	98.2	0.9	0.9
2022	Focal 15-1	11	0:32:00	2	325	0.0	93.0	1.8	5.2
2022	Focal 15-2	8	0:33:00	5	200	15.2	41.9	32.6	10.4
2022	Focal 15-3	16	0:29:00	2	1,700	83.9	1.7	10.9	3.4
2022	Focal 15-4	8	0:32:00	1	1,300	0.0	100.0	0.0	0.0
2022	Focal 15-5	13	0:27:00	1	700	0.0	94.4	0.0	5.6
2022	Focal 16-3	11	0:31:00	2	400	0.0	98.1	0.0	1.9
2022	Focal 16-4	21	0:40:00	3	1,000	62.5	34.0	0.0	3.5
2022	Focal-24-1	18	0:24:45	2	150	0.0	71.7	0.8	27.5
2022	Focal-24-4	Unknown	0:32:13	2	550	99.2	0.0	0.0	0.8
2022	Focal-25-1	4	0:23:25	0	N/A	0.0	67.3	16.7	15.9
2022	Focal-25-2	16	0:30:36	1	Unknown	0.0	77.2	3.1	19.7

Table B-1: Focal Behaviour Survey Results for Caribou along the Winter Access Road, 2014 to 2024

Year	Caribou Group Monitored	Group Size	Duration of Monitoring (hours:minutes: seconds)	Number of Stressor Events	Average Distance from Stressor (m)	Percentage (%) of Time Spent in Each Behaviour			
						Bedded	Foraging	Standing	Alert/Moving
2022	Focal-25-3	65	0:32:15	2	450	97.8	0.0	0.4	1.8
2022	Focal-25-4	1	0:33:12	1	775	1.8	53.3	7.8	37.1
2022	Focal-25-5	50	0:29:06	0	N/A	13.9	68.7	9.7	7.7
2022	Focal-26-1	36	0:35:02	4	50	0.0	66.0	23.1	10.9
2022	Focal-26-2	Unknown	0:37:46	2	550	95.9	0.0	3.2	0.9
2022	Focal-26-3	17	0:24:42	1	800	51.8	2.7	18.8	26.7
2022	Focal-26-4	34	0:32:19	1	50	94.4	0.0	0.0	5.6
2022	Focal-26-5	91	0:30:30	1	850	0.0	42.6	45.5	11.9
2022	Focal-26-6	21	0:21:02	3	100	0.0	48.4	31.1	20.4
2022	Focal-27-1	Unknown	0:21:26	5	98	0.0	0.0	25.6	74.4
2022	Focal-27-2	26	0:32:24	3	600	0.0	69.5	12.4	18.1
2022	Focal-27-3	36	0:28:14	0	N/A	0.0	57.1	1.1	41.8
2022	Focal-27-4	Unknown	0:21:23	3	500	86.8	0.0	0.0	13.2
2022	Focal-27-5	16	0:24:16	4	300	74.7	18.6	0.0	6.7
2022	Focal-27-7	Unknown	0:21:46	0	N/A	39.7	35.2	0.0	25.0
2022	Focal-28-1	32	0:25:11	9	24	0.0	70.7	4.6	24.8
2022	Focal-28-2	49	0:25:13	0	N/A	0.0	86.6	0.9	12.5
2022	Focal-28-3	27	0:30:42	2	25	0.0	57.3	0.0	42.7
2022	Focal-28-5	Unknown	0:28:47	4	500	100.0	0.0	0.0	0.0
2022	Focal-28-6	13	0:21:20	0	N/A	55.6	28.6	1.7	14.1
2022	Focal-28-7	2	0:26:01	1	150	0.0	92.8	1.6	5.6
2022	Focal-28-8	42	0:22:55	0	N/A	12.7	47.9	2.0	37.5
2022	Focal-1-1	35	0:33:03	3	62	0.0	35.9	6.4	57.8
2022	Focal-1-2	Unknown	0:20:46	1	600	26.6	52.6	9.6	11.2
2022	Focal-1-3	26	0:26:16	0	N/A	0.0	92.3	6.7	1.0
2022	Focal-1-4	Unknown	0:21:09	0	N/A	90.2	0.0	0.3	9.5
2022	Focal-1-6	Unknown	0:26:04	3	100	0.0	91.0	0.0	9.0
2022	Focal-2-1	49	0:26:46	1	20	0.0	55.5	8.3	36.2
2022	Focal-2-2	47	0:22:25	1	75	0.0	73.1	6.3	20.6
2022	Focal-2-3	10	0:22:49	0	N/A	0.0	67.3	27.8	5.0
2022	Focal-2-6	46	0:21:49	0	N/A	9.9	38.7	23.8	27.6
2022	Focal-2-7	Unknown	0:21:56	2	100	28.3	24.4	10.5	36.9
2022	Focal-2-8	Unknown	0:26:34	1	25	59.2	0.0	0.0	40.8
2022	Focal-2-9	Unknown	0:24:56	1	Unknown	0.0	40.2	11.0	48.8
2022	Focal-3-2	68	0:24:48	0	N/A	0.0	58.8	34.7	6.5
2022	Focal-3-3	49	0:25:00	2	75	0.0	70.7	8.3	21.0
2022	Focal-3-4	Unknown	0:22:13	0	N/A	0.0	51.2	8.9	40.0
2022	Focal-3-5	41	0:24:54	1	Unknown	0.0	0.0	0.0	100.0
2022	Focal-3-8	Unknown	0:21:39	0	N/A	0.0	0.0	20.5	79.5
2022	Focal-3-9	Unknown	0:23:22	1	50	0.0	68.8	13.4	17.8
2022	Focal-3-11	Unknown	0:34:31	0	N/A	0.0	43.8	35.2	21.1
2022	Focal-7-1	2	0:25:00	0	N/A	64.0	0.0	0.0	36.0
2022	Focal-08-01	87	0:56:00	1	100	82.1	0.0	5.4	12.5
2022	Focal-08-02	27	0:33:00	0	N/A	30.3	63.6	0.0	6.1
2022	Focal-09-02	13	0:45:00	3	Unknown	66.7	20.0	2.2	11.1
2022	Focal-09-03	12	0:26:00	0	N/A	0.0	19.2	7.7	73.1
2022	Focal-09-05	32	0:34:00	2	100	0.0	91.2	0.0	8.8
2022	Focal-10-01	18	0:30:00	2	200	0.0	83.3	3.3	13.3
2022	Focal-10-02	33	0:20:00	1	900	25.0	75.0	0.0	0.0
2022	Focal-10-03	26	0:32:00	0	N/A	75.0	3.1	0.0	21.9
2022	Focal-10-04	34	0:25:00	3	10	0.0	76.0	0.0	24.0
2022	Focal-11-01	4	0:33:30	0	N/A	0.0	99.0	0.0	1.0
2022	Focal-11-02	12	0:29:50	3	9	29.9	0.0	0.0	70.1
2022	Focal-11-03	27	0:43:55	3	150	95.8	0.0	0.0	4.2
2022	Focal-12-01	11	0:23:34	0	N/A	0.0	66.7	0.0	33.3
2022	Focal-12-02	1	0:28:30	3	500	43.7	0.0	0.0	56.3
2022	Focal-12-05	14	0:33:00	0	N/A	90.2	0.0	9.8	0.0
2022	Focal-13-03	17	0:25:17	1	350	0.0	0.0	0.0	100.0
2022	Focal-13-04	11	0:30:15	2	Unknown	0.0	65.2	0.0	34.8
2022	Focal-14-01	24	0:28:00	2	950	0.0	79.9	10.8	9.3
2022	Focal-14-02	16	0:28:10	1	250	0.0	93.5	0.0	6.5
2022	Focal-14-03	12	0:25:10	4	856	0.0	0.0	10.0	90.0
2022	Focal-14-04	13	0:30:40	2	200	16.8	74.3	4.3	4.5
2022	Focal-14-06	21	0:25:40	3	167	0.0	0.0	47.4	52.6
2022	Focal-16-1	36	0:30:10	3	400	20.7	68.5	3.0	7.7
2022	Focal-16-2	11	0:28:00	2	100	100.0	0.0	0.0	0.0
2022	Focal-16-3	13	0:25:30	3	167	72.9	0.0	13.4	13.7
2022	Focal-16-4	9	0:23:05	2	300	53.1	10.1	11.2	25.6
2022	Focal-17-1	11	0:30:00	0	N/A	0.0	40.8	23.1	36.1
2022	Focal-17-3	10	0:26:00	4	200	0.0	29.5	59.6	10.9
2022	Focal-17-4	36	0:24:00	3	300	41.7	4.2	17.4	36.8
2022	Focal-18-1	5	0:32:00	1	200	0.0	95.8	0.8	3.4
2022	Focal-18-2	26	0:32:00	1	500	100.0	0.0	0.0	0.0
2022	Focal-18-3	14	0:20:00	1	400	0.0	65.0	24.6	10.4
2022	Focal-18-4	15	0:32:00	2	700	100.0	0.0	0.0	0.0
2022	Focal-18-6	16	0:26:00	4	775	32.4	55.8	0.0	11.9
2022	Focal-18-7	10	0:20:00	1	800	0.0	28.8	30.4	40.8
2022	Focal-19-1	20	0:25:15	2	500	0.0	66.7	18.2	15.2
2022	Focal-19-3	9	0:32:00	3	600	84.4	0.0	15.6	0.0
2022	Focal-21-1	8	0:32:00	2	500	100.0	0.0	0.0	0.0

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Year	Caribou Group Monitored	Group Size	Duration of Monitoring (hours:minutes: seconds)	Number of Stressor Events	Average Distance from Stressor (m)	Percentage (%) of Time Spent in Each Behaviour			
						Bedded	Foraging	Standing	Alert/Moving
2022	Focal-21-2	19	0:20:00	1	600	77.5	0.0	22.5	0.0
2022	Focal-21-3	8	0:20:00	1	400	0.0	0.0	2.5	97.5
2022	Focal-21-4	13	0:29:00	3	800	0.0	78.4	19.3	2.3
2022	Focal-21-5	12	0:32:00	3	800	100.0	0.0	0.0	0.0
2022	Focal-22-1	15	0:32:00	0	N/A	0.0	88.8	7.0	4.2
2022	Focal-22-2	6	0:28:00	2	200	0.6	80.1	8.9	10.4
2022	Focal-22-3	23	0:26:00	4	200	0.0	54.8	24.0	21.2
2022	Focal-23-1	54	0:32:00	1	200	88.3	0.0	8.6	3.1
2022	Focal-23-2	29	0:29:00	4	150	0.0	90.5	7.8	1.7
2022	Focal-24-1	9	0:20:00	0	N/A	16.7	0.0	37.9	45.4
2022	Focal-24-2	26	0:27:00	2	150	0.0	96.9	0.9	2.2
2022	**Average ± 1SE**	**21 ± 1**	**0:27:55 ± 0:00:29**	**1.8 ± 0.1**	**437.4 ± 28.6**	**24.8 ± 3.0**	**44.3 ± 3.0**	**9.2 ± 1.0**	**21.7 ± 2.1**
2023	Focal 0-1	70	0:31:00	5	160	0.0	100.0	0.0	0.0
2023	Focal 0-5	24	0:26:19	2	90	5.1	0.0	2.2	92.7
2023	Focal 1-3	6	0:26:25	1	850	73.9	0.0	0.0	26.1
2023	Focal 2-1	23	0:20:23	0	N/A	0.0	26.7	0.0	73.3
2023	Focal 5-1	4	0:47:00	5	178	78.7	0.0	2.1	19.1
2023	Focal 5-2	4	0:38:00	2	170	0.0	0.0	18.4	81.6
2023	Focal 5-3	3	0:33:59	0	N/A	97.2	0.0	2.8	0.0
2023	Focal 8-1	3	1:10:01	7	800	98.3	0.0	0.0	1.7
2023	Focal 9-1	10	0:31:02	4	1,000	0.0	12.6	0.3	87.1
2023	Focal 9-2	22	0:56:27	6	1,000	4.5	72.1	1.5	22.0
2023	Focal 9-3	11	0:38:26	2	900	0.0	10.9	14.4	74.7
2023	Focal 11-1	30	0:28:45	4	200	0.0	0.0	0.0	100.0
2023	Focal 14-1	5	0:22:00	2	1,500	21.2	0.0	6.7	72.0
2023	Focal 15-1	3	0:41:00	8	918.75	0.0	31.2	11.3	57.5
2023	Focal 15-2	30	0:25:00	1	1,200	0.0	4.0	57.3	38.7
2023	Focal 16-1B	5	0:24:00	2	350	0.0	33.6	7.1	59.3
2023	Focal 17-1	6	0:20:15	2	425	0.0	76.1	14.7	9.2
2023	Focal 17-2	15	0:45:00	4	775	27.0	0.0	13.0	59.9
2023	Focal 18-1	31	0:36:00	2	200	0.0	98.2	0.7	1.1
2023	Focal 18-2	100	0:20:00	1	900	0.0	0.0	14.4	85.6
2023	Focal 22-1	11	0:37:43	2	75	0.0	0.0	3.6	96.4
2023	Focal 22-3	31	0:36:30	6	78.33	0.0	0.0	21.6	78.4
2023	Focal 22-5	16	0:38:00	5	560	0.0	0.0	0.0	100.0
2023	Focal 22-6	25	0:47:00	4	1,200	14.9	0.0	23.9	61.2
2023	Focal 23-1B	15	0:23:00	2	400	0.0	96.4	2.0	1.6
2023	Focal 23-1	10	0:48:14	6	400	91.4	6.9	1.4	0.3
2023	Focal 25-2	22	0:35:00	4	600	0.0	78.8	0.5	20.7
2023	Focal 25-1	70	0:31:00	5	600	71.0	0.0	9.7	19.4
2023	Focal 26-2	10	0:58:33	3	400	93.4	0.0	3.4	3.2
2023	Focal 26-3	10	0:37:27	4	1,000	98.0	0.0	2.0	0.0
2023	Focal 26-4	20	0:25:40	0	N/A	0.0	57.1	8.7	34.2
2023	Focal 27-1	15	0:44:10	3	350	100.0	0.0	0.0	0.0
2023	Focal 27-2	15	0:23:15	3	317	76.0	0.0	4.2	19.9
2023	Focal 27-3	15	0:40:10	2	450	100.0	0.0	0.0	0.0
2023	Focal 27-4	19	0:36:07	2	450	57.6	41.9	0.5	0.0
2023	Focal 27-6	12	0:20:40	2	950	96.0	0.0	1.8	2.2
2023	Focal 28-1	15	0:29:19	1	1,200	76.1	3.2	1.8	19.0
2023	Focal 28-2	11	0:29:50	1	300	100.0	0.0	0.0	0.0
2023	Focal 28-4	9	0:23:09	3	950	69.5	0.0	4.1	26.4
2023	Focal 28-6	20	0:30:39	2	1,000	100.0	0.0	0.0	0.0
2023	Focal 29-1	9	0:52:46	6	300	100.0	0.0	0.0	0.0
2023	Focal 29-2	11	0:31:50	2	1,025	79.6	0.0	0.6	19.8
2023	Focal 29-3	24	0:32:24	2	950	0.0	100.0	0.0	0.0
2023	Focal 29-4	25	0:33:37	4	950	0.0	99.4	0.0	0.6
2023	Focal 29-5	15	0:20:19	1	450	92.5	0.0	4.4	3.1
2023	Focal 30-1	15	0:29:45	1	500	0.0	100.0	0.0	0.0
2023	Focal 30-2	3	0:37:13	3	1,050	87.1	0.0	1.5	11.4
2023	Focal 30-3	6	0:21:03	4	1,100	70.3	0.0	6.8	22.9
2023	Focal 30-4	10	0:21:27	2	625	49.3	0.0	20.0	30.7
2023	Focal 30-5	10	0:22:56	1	700	0.0	0.0	10.6	89.4
2023	Focal 31-1	15	0:36:21	4	500	64.7	28.0	6.5	0.8
2023	Focal 31-2	17	0:21:17	3	900	0.0	0.0	22.8	77.2
2023	Focal 31-3	20	0:23:11	1	1,100	0.0	0.0	2.9	97.1
2023	Focal 31-6	12	0:27:15	3	500	100.0	0.0	0.0	0.0
2023	Focal 31-7	12	0:24:32	1	700	100.0	0.0	0.0	0.0
2023	Focal 32-1	14	0:39:08	2	300	0.0	92.5	3.1	4.3
2023	Focal 32-3	17	0:21:30	4	1,000	0.0	96.0	0.9	3.1
2023	Focal 32-4	10	0:39:16	3	1,000	100.0	0.0	0.0	0.0
2023	Focal 33-1	16	0:32:42	2	800	0.0	97.3	2.7	0.0
2023	Focal 33-2	10	0:29:01	0	N/A	61.5	38.5	0.0	0.0
2023	Focal 33-3B	10	0:26:00	1	300	0.0	95.2	2.4	2.4
2023	Focal 33-4	10	0:32:20	1	400	4.9	74.1	9.6	11.4
2023	Focal 33-5	10	0:31:34	1	700	0.0	0.0	9.7	90.3
2023	Focal 33-6	15	0:27:48	0	N/A	0.0	0.0	1.9	98.1
2023	Focal 33-8	14	0:27:39	1	1,100	71.0	0.0	13.3	15.7
2023	Focal 34-1	10	0:35:57	2	1,200	51.6	10.7	33.6	4.2
2023	Focal 34-2	9	0:30:11	2	900	76.5	1.1	1.9	20.4
2023	Focal 34-4	18	0:47:13	2	700	27.9	56.3	5.5	10.3

Table B-1: Focal Behaviour Survey Results for Caribou along the Winter Access Road, 2014 to 2024

Year	Caribou Group Monitored	Group Size	Duration of Monitoring (hours:minutes: seconds)	Number of Stressor Events	Average Distance from Stressor (m)	Percentage (%) of Time Spent in Each Behaviour			
						Bedded	Foraging	Standing	Alert/Moving
2023	Focal 34-5	10	0:57:30	6	503.33	100.0	0.0	0.0	0.0
2023	Focal 34-6	3	0:33:30	2	1,300	100.0	0.0	0.0	0.0
2023	Focal 34-7	15	0:36:23	4	1,100	0.0	92.5	2.9	4.6
2023	Focal 34-8	10	0:34:58	0	N/A	36.9	33.1	0.5	29.4
2023	Focal 35-1	15	0:30:36	3	650	100.0	0.0	0.0	0.0
2023	Focal 35-2	12	0:46:26	3	600	100.0	0.0	0.0	0.0
2023	Focal 35-3	9	0:49:34	5	500	78.5	0.0	15.6	5.9
2023	Focal 35-4	10	0:57:23	4	542.5	98.2	0.0	1.8	0.0
2023	Focal 35-5	12	0:43:09	0	N/A	88.2	0.0	1.9	10.0
2023	Focal 35-6	4	0:43:52	1	850	99.1	0.0	0.9	0.0
2023	Focal 35-7	14	0:39:29	2	400	0.0	60.1	7.1	32.8
2023	Focal 36-1	5	0:29:16	0	N/A	0.0	80.2	9.9	9.9
2023	Focal 36-2	16	0:41:59	0	N/A	0.0	88.4	5.0	6.5
2023	Focal 36-3	12	0:34:03	1	470	4.9	67.8	16.4	10.8
2023	Focal 36-4	6	0:54:40	2	430	89.7	0.5	5.3	4.5
2023	Focal 36-6	10	0:46:14	2	650	100.0	0.0	0.0	0.0
2023	Focal 36-7	9	0:39:45	4	1,300	100.0	0.0	0.0	0.0
2023	Focal 36-8	12	0:35:17	1	500	0.0	86.5	1.9	11.6
2023	Focal 37-1	15	0:51:16	3	600	100.0	0.0	0.0	0.0
2023	Focal 37-2	11	0:59:48	5	560	0.0	71.8	6.1	22.1
2023	Focal 37-3B	14	0:30:37	2	950	94.1	0.0	0.0	5.9
2023	Focal 37-4	10	0:33:05	1	1,650	100.0	0.0	0.0	0.0
2023	Focal 37-5	8	0:39:19	1	1,500	100.0	0.0	0.0	0.0
2023	Focal 37-6	5	0:37:47	3	400	0.0	0.0	6.9	93.1
2023	Focal 37-7	18	0:42:26	6	720	0.0	94.3	0.0	5.7
2023	Focal 37-8	10	0:31:56	1	600	100.0	0.0	0.0	0.0
2023	Focal 38-1	11	0:45:57	3	750	0.0	92.6	0.8	6.6
2023	Focal 38-2	10	0:59:09	3	500	99.1	0.0	0.6	0.3
2023	Focal 38-3	15	0:40:02	3	377	85.1	0.0	6.9	8.0
2023	Focal 38-4	6	0:50:57	1	750	98.6	0.0	0.0	1.4
2023	Focal 38-5	8	0:48:33	5	520	68.4	19.7	1.5	10.3
2023	Focal 38-6	13	0:34:52	2	1,100	100.0	0.0	0.0	0.0
2023	Focal 38-8	9	0:34:13	2	1,400	100.0	0.0	0.0	0.0
2023	Focal 38-9	16	0:23:45	0	N/A	0.0	91.9	0.0	8.1
2023	Focal 39-1	11	0:37:39	1	450	0.0	80.8	4.9	14.3
2023	Focal 39-2	14	0:46:43	1	380	0.7	73.2	18.6	7.4
2023	Focal 39-3	37	0:23:43	0	N/A	100.0	0.0	0.0	0.0
2023	Focal 39-4	20	0:34:10	2	925	90.4	0.0	6.5	3.0
2023	Focal 39-5	3	0:24:04	1	350	0.0	33.8	2.2	64.0
2023	Focal 40-1	18	0:25:20	3	100	0.0	96.7	0.0	3.3
2023	Focal 40-2	10	0:25:00	2	500	0.0	92.0	3.0	5.0
2023	Focal 40-4	10	0:28:00	2	200	78.6	20.5	0.0	0.9
2023	Focal 40-6	9	0:21:40	2	100	62.1	0.0	37.9	0.0
2023	Focal 40-7	13	0:24:00	0	N/A	100.0	0.0	0.0	0.0
2023	Focal 40-8	10	0:29:00	3	850	100.0	0.0	0.0	0.0
2023	Focal 41-2	12	0:26:00	1	100	0.0	94.2	5.8	0.0
2023	Focal 41-5	20	0:24:00	2	700	100.0	0.0	0.0	0.0
2023	Focal 41-6	22	0:22:00	0	N/A	0.0	82.7	3.7	13.6
2023	Focal 41-7	9	0:20:00	1	700	100.0	0.0	0.0	0.0
2023	Focal 42-1	8	0:24:22	2	650	0.0	88.4	4.2	7.3
2023	Focal 42-2	9	0:21:59	1	940	0.0	93.6	3.9	2.6
2023	Focal 42-3	7	0:20:51	0	N/A	94.4	0.0	5.6	0.0
2023	Focal 42-4	8	0:20:27	3	460	0.0	82.6	11.9	5.5
2023	Focal 42-6	14	0:24:29	1	800	0.0	19.2	57.9	22.9
2023	Focal 42-7	6	0:20:38	0	N/A	0.0	90.3	6.1	3.6
2023	Focal 42-8	9	0:22:10	0	N/A	0.0	68.5	12.0	19.5
2023	Focal 43-1	11	0:26:36	2	600	0.0	97.8	0.8	1.4
2023	Focal 43-3	7	0:21:34	4	1,050	0.0	0.0	31.9	68.1
2023	Focal 43-4	14	0:32:42	4	Unknown	100.0	0.0	0.0	0.0
2023	Focal 43-5	8	0:27:53	1	Unknown	100.0	0.0	0.0	0.0
2023	Focal 43-6	8	0:34:04	0	N/A	0.0	98.9	0.6	0.5
2023	Focal 43-8	8	0:23:04	1	Unknown	0.0	62.9	29.9	7.2
2023	Focal 44-1	13	0:28:00	1	250	63.4	29.5	7.1	0.0
2023	Focal 44-2	21	0:21:00	3	200	0.0	100.0	0.0	0.0
2023	Focal 44-3	24	0:22:30	2	815	39.8	0.0	60.2	0.0
2023	Focal 44-5	27	0:21:50	1	300	66.1	0.0	3.2	30.7
2023	Focal 44-6	22	0:25:50	1	200	100.0	0.0	0.0	0.0
2023	Focal 45-1	7	0:24:00	0	N/A	100.0	0.0	0.0	0.0
2023	Focal 45-2	52	0:23:00	1	1,200	100.0	0.0	0.0	0.0
2023	Focal 45-3	21	0:30:24	1	1,000	0.0	100.0	0.0	0.0
2023	Focal 45-4	45	0:32:50	1	300	0.0	3.7	3.6	92.7
2023	**Average ± 1SE**	**15 ± 1**	**0:33:11 ± 0:00:54**	**2.2 ± 0.1**	**669.0 ± 30.2**	**45.5 ± 3.8**	**29.0 ± 3.3**	**6.0 ± 0.9**	**19.6 ± 2.6**
2024	Focal 2-3	18	0:26:00	5	150	88.5	0.0	7.7	3.8
2024	Focal 2-2	16	1:03:00	4	623.33	61.9	0.0	3.5	34.6
2024	Focal 2-4	5	0:29:00	1	900	0.0	81.0	1.7	17.2
2024	Focal 6-1	5	1:14:00	9	300	16.2	71.5	7.5	4.7
2024	Focal 7-3	10	0:32:00	2	100	100.0	0.0	0.0	0.0
2024	Focal 7-1	9	0:34:30	4	750	31.9	1.4	26.1	40.6
2024	Focal 8-1	23	0:21:00	0	N/A	0.0	4.8	42.1	53.2
2024	Focal 8-2	21	0:25:40	2	400	86.4	0.0	7.8	5.8

Table B-1: Focal Behaviour Survey Results for Caribou along the Winter Access Road, 2014 to 2024

Year	Caribou Group Monitored	Group Size	Duration of Monitoring (hours:minutes: seconds)	Number of Stressor Events	Average Distance from Stressor (m)	Percentage (%) of Time Spent in Each Behaviour			
						Bedded	Foraging	Standing	Alert/Moving
2024	Focal 9-2	38	0:20:00	2	120	0.0	0.0	0.6	99.4
2024	Focal 13-1	8	1:20:20	2	Unknown	0.0	0.5	1.9	97.6
2024	Focal 14-1	1	0:27:41	1	800	0.0	2.2	27.8	70.0
2024	Focal 14-3	10	0:23:33	2	250	1.4	5.3	5.4	87.9
2024	Focal 18-2	7	0:21:37	1	20	0.0	59.0	11.7	29.3
2024	Focal 19-2	7	0:20:44	0	N/A	0.0	12.9	16.0	71.1
2024	Focal 22-1	3	0:41:00	2	495	0.0	99.7	0.2	0.1
2024	Focal 23-1	74	0:25:32	3	800	0.0	90.5	4.8	4.7
2024	Focal 23-2	Unknown	0:20:32	3	1,000	14.0	0.0	42.5	43.6
2024	Focal 23-3	4	0:31:10	5	800	89.6	0.0	7.4	2.9
2024	Focal 24-1	7	0:32:00	1	500	100.0	0.0	0.0	0.0
2024	Focal 24-2	6	0:31:20	4	700	0.0	93.6	5.7	0.7
2024	Focal 24-3	19	0:27:51	3	1,400	0.0	89.9	2.2	8.0
2024	Focal 25-1	22	0:29:13	2	900	0.0	83.9	2.5	13.6
2024	Focal 25-2	7	0:33:39	3	300	97.1	0.0	2.9	0.0
2024	Focal 25-3	91	0:26:45	3	500	0.0	59.4	16.1	24.4
2024	Focal 26-1	4	0:32:40	3	300	75.0	21.9	3.1	0.0
2024	Focal 27-1	67	0:32:45	5	250	0.0	89.1	3.3	7.6
2024	Focal 28-1	56	0:30:50	5	200	0.0	93.7	1.2	5.1
2024	Focal 28-2	4	0:33:16	2	300	100.0	0.0	0.0	0.0
2024	Focal 28-4	13	0:37:48	4	450	0.0	77.3	8.9	13.8
2024	Focal 29-2	13	0:35:29	2	600	84.7	0.0	5.2	10.1
2024	Focal 29-3	8	0:30:00	2	500	76.1	17.3	3.1	3.5
2024	Focal 29-4	38	0:32:00	3	700	99.4	0.0	0.6	0.0
2024	Focal 29-5	90	0:25:00	3	1,500	0.0	87.9	4.9	7.3
2024	Focal 29-6	62	0:21:00	1	600	0.0	0.0	17.5	82.5
2024	Focal 29-7	53	0:27:10	3	800	0.0	97.0	1.2	1.8
2024	Focal 30-1	15	0:21:00	0	N/A	0.0	76.2	0.0	23.8
2024	Focal 30-3	1	0:23:00	2	370	0.0	73.9	6.5	19.6
2024	Focal 30-4	35	0:32:00	3	130	97.4	0.0	2.6	0.0
2024	Focal 30-5	32	0:22:00	4	300	0.0	88.6	3.8	7.6
2024	Focal 30-6	98	0:31:30	1	200	0.0	94.9	4.0	1.1
2024	Focal 31-5	28	0:42:00	3	1,000	100.0	0.0	0.0	0.0
2024	Focal 31-6	8	0:21:18	2	350	18.0	20.3	44.0	17.7
2024	Focal 32-2	34	0:28:00	4	1,000	0.0	100.0	0.0	0.0
2024	Focal 32-3	32	0:20:00	2	1,150	81.7	18.3	0.0	0.0
2024	Focal 32-4	21	0:33:00	1	500	100.0	0.0	0.0	0.0
2024	Focal 32-5	37	0:28:00	1	550	92.9	0.0	0.0	7.1
2024	Focal 32-6	18	0:30:00	0	N/A	100.0	0.0	0.0	0.0
2024	Focal 32-7	44	0:25:00	0	N/A	0.0	48.0	15.9	36.1
2024	Focal 33-2	31	0:32:39	4	250	21.6	59.6	4.6	14.2
2024	Focal 33-3	50	0:20:00	1	600	100.0	0.0	0.0	0.0
2024	Focal 33-4	6	0:29:30	5	200	26.3	54.2	6.3	13.2
2024	Focal 33-5	32	0:31:00	7	550	91.1	0.0	1.6	7.3
2024	Focal 34-1	12	0:20:12	0	N/A	0.0	30.7	30.8	38.5
2024	Focal 34-3	10	0:26:00	3	300	0.0	46.8	0.0	53.2
2024	Focal 34-4	34	0:20:26	1	600	0.0	90.9	3.3	5.9
2024	Focal 34-5	11	0:35:00	3	333.33	84.9	0.0	7.3	7.8
2024	Focal 34-7	44	0:29:10	1	800	0.0	11.4	9.5	79.1
2024	Focal 35-1	51	0:31:00	1	500	48.1	42.2	6.5	3.2
2024	Focal 35-3	21	0:24:00	2	350	0.0	95.8	1.7	2.4
2024	Focal 35-5	12	0:31:00	3	1,000	100.0	0.0	0.0	0.0
2024	Focal 35-6	23	0:24:00	2	1,500	0.0	95.5	0.0	4.5
2024	Focal 36-1	18	0:20:00	1	300	5.8	55.4	30.6	8.2
2024	Focal 36-2	26	0:32:00	0	N/A	84.4	0.0	6.5	9.1
2024	Focal 36-3	21	0:31:35	2	500	67.3	6.9	6.6	19.3
2024	Focal 37-1	49	0:31:00	3	1,300	98.4	1.1	0.5	0.0
2024	Focal 37-2	40	0:26:00	2	600	73.1	26.9	0.0	0.0
2024	Focal 37-3	24	0:23:00	2	250	100.0	0.0	0.0	0.0
2024	Focal 38-1	9	0:32:00	2	1,000	100.0	0.0	0.0	0.0
2024	Focal 38-2	47	0:32:00	2	430	100.0	0.0	0.0	0.0
2024	Focal 38-3	9	0:32:00	2	450	49.0	42.7	1.0	7.3
2024	Focal 39-1	9	0:32:00	3	500	68.2	15.6	7.9	8.3
2024	Focal 39-2	21	0:32:00	1	1,000	100.0	0.0	0.0	0.0
2024	Focal 39-3	18	0:31:00	2	400	45.5	0.0	45.2	9.4
2024	Focal 39-4	18	0:29:50	6	775	0.0	67.6	9.2	23.2
2024	Focal 40-2	12	0:31:30	3	200	95.2	0.0	3.2	1.6
2024	**Average ± 1SE**	**25 ± 3**	**0:30:10 ± 0:01:11**	**2.5 ± 0.2**	**570.9 ± 39.9**	**42.3 ± 5.0**	**33.4 ± 4.4**	**7.4 ± 1.3**	**17.0 ± 2.9**

a) Focal surveys from 2019 and 2020 were excluded because different survey methods were used (Smith 2022). Results were not comparable to other survey years and thus were excluded from comprehensive analysis of focal survey data.

b) The Winter Road Caribou Behavioural Monitoring Program was not triggered during 2021 as there were no observations of caribou or other wildlife during the aerial survey.

- = data not available or excluded from analysis; N/A = not applicable; Unknown = value not collected; SE = standard error.

APPENDIX C

Caribou Response to Stressors during Focal Behaviour Survey

Table C-1: Caribou Response to Stressors during Focal Behaviour Survey along the Winter Access Road, 2018 to 2024

Year	Stressor Type	Number of Stressors Recorded During Survey	Average Distance from Stressor (m)	Percentage (%) of Individual Behavioural Responses to Stressor						Average Duration of Response (minutes:seconds)
				0	1	2	3	1, 2, 3	Unknown	
2018	Grader	1	175	0	0	0	100	0	0	N/A
2018	Pickup Truck	11	230	64	27	0	9	0	0	00:12
2018	Semi truck	55	330	76	13	4	7	0	0	00:08
2018	**Total**	**67**	**313**	**73**	**15**	**3**	**9**	0	0	**00:11**
2019[(a)]	-	-	-	-	-	-	-	-	-	-
2019[(a)]	**Total**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
2020[(a)]	-	-	-	-	-	-	-	-	-	-
2020[(a)]	**Total**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
2021[(b)]	-	-	-	-	-	-	-	-	-	-
2021[(b)]	**Total**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
2022	Animal	4	117	50	25	0	25	0	0	06:00
2022	Bus	2	40	100	0	0	0	0	0	N/A
2022	Forklift	1	40	100	0	0	0	0	0	N/A
2022	Grader	11	370	82	18	0	0	0	0	00:30
2022	Haul Truck	311	440	52	22	13	13	0	0	02:33
2022	Loader	1	200	100	0	0	0	0	0	N/A
2022	Pickup Truck	97	356	66	23	4	6	0	1	01:15
2022	Rock Truck	3	113	100	0	0	0	0	0	N/A
2022	Snow Plow	**7**	435	43	43	0	14	0	0	01:33
2022	Snowmobile	3	500	100	0	0	0	0	0	N/A
2022	Unknown	4	Unknown	0	75	0	25	0	0	06:10
2022	**Total**	**444**	**261**	**56**	**22**	**10**	**11**	**0**	**0**	**03:00**
2023	Animal	2	250	0	0	0	100	0	0	00:10
2023	Delivery Truck	1	800	0	100	0	0	0	0	01:30
2023	Grader	9	675	56	44	0	0	0	0	01:27
2023	Gravel Truck	1	90	0	100	0	0	0	0	Unknown
2023	Haul Truck	258	639	43	48	7	2	0	0	01:32
2023	Helicopter	2	1,150	100	0	0	0	0	0	N/A
2023	Pickup Truck	123	664	66	31	2	1	0	1	01:24
2023	Rock Truck	1	1,650	100	0	0	0	0	0	N/A
2023	Sand Truck	1	900	100	0	0	0	0	0	N/A
2023	Semi Truck	12	755	25	67	0	0	0	8	00:21

Table C-1: Caribou Response to Stressors during Focal Behaviour Survey along the Winter Access Road, 2018 to 2024

Year	Stressor Type	Number of Stressors Recorded During Survey	Average Distance from Stressor (m)	Percentage (%) of Individual Behavioural Responses to Stressor						Average Duration of Response (minutes:seconds)
				0	1	2	3	1, 2, 3	Unknown	
2023	Snow Plow	1	1,200	100	0	0	0	0	0	N/A
2023	Unknown	1	Unknown	0	100	0	0	0	0	00:07
2023	**Total**	**412**	**798**	**50**	**43**	**5**	**2**	**0**	**0**	**00:56**
2024	Convoy	5	440	80	20	0	0	0	0	00:04
2024	Grader	5	450	80	20	0	0	0	0	00:18
2024	Haul Truck	168	626	79	20	1	1	0	0	00:43
2024	Helicopter	1	500	0	100	0	0	0	0	02:47
2024	Pickup Truck	68	451	75	21	3	1	0	0	00:24
2024	Snow Plow	2	0	100	0	0	0	0	0	00:00
2024	Snowmobile	1	700	100	0	0	0	0	0	N/A
2024	Unknown	1	Unknown	0	0	100	0	0	0	10:00
2024	Water Truck	1	1,000	100	0	0	0	0	0	N/A
2024	**Total**	**252**	**521**	**78**	**20**	**2**	**1**	**0**	**0**	**02:02**

a) Focal surveys from 2019 and 2020 were excluded because different survey methods were used (Smith 2022). Results were not comparable to other survey years and thus were excluded from comprehensive analysis of focal survey data.

b) The Winter Road Caribou Behavioural Monitoring Program was not triggered during 2021.

N/A = not applicable; Unknown = value not collected.

APPENDIX D

Wildlife Sightings Log

Table D-1: Number of Observations of All Species Reported in the Wildlife Sightings Log, 2014 to 2024

Species	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
All species	177	402	164	238	260	302	184	428	303	241	296
American crow (*Corvus brachyrhynchos*)	-	-	-	-	-	-	-	1	-	-	-
American pipit (Anthus rubescens)	-	-	-	-	-	-	-	-	-	2	-
American robin (*Turdus migratorius*)	-	1	-	2	-	-	1	-	-	-	-
Arctic fox (*Vulpes lagopus*)	-	-	-	-	-	3	3	1	-	-	5
Arctic ground squirrel (*Urocitellus parryii*)	4	11	4	23	3	3	2	8	15	16	7
Arctic hare (*Lepus arcticus*)	32	45	9	29	5	22	26	37	60	34	31
bald eagle (*Haliaeetus leucocephalus*)	-	1	4	1	2	11	5	7	3	3	4
barn swallow (*Hirundo rustica*)	-	-	-	-	-	-	-	-	1	2	-
barren-ground caribou (*Rangifer tarandus tarandus*)	37	45	0	2	61	16	6	17	55	23	48
beaver (*Castor canadensis*)	-	-	-	1	-	1	-	-	1	-	-
cackling goose (*Branta hutchinsii*)	-	-	-	-	-	1	-	3	-	-	1
California gull (*Larus californicus*)	-	-	-	-	-	1	-	-	-	-	-
Canada goose (*Branta canadensis*)	1	2	-	2	-	1	3	5	1	1	2
cliff swallow (*Petrochelidon pyrrhonota*)	-	-	-	-	-	-	-	-	-	1	-
common loon (*Gavia immer*)	-	-	-	-	-	1	2	-	2	1	1
common merganser (*Mergus merganser*)	-	-	-	-	-	1	-	2	-	-	-
common redpoll (*Acanthis flammea*)	-	-	-	-	-	-	-	1	-	-	-
common raven (*Corvus corax*)	10	16	13	15	11	27	15	43	11	7	8
coyote (*Canis latrans*)	-	-	-	-	-	-	-	-	3	-	-
duck species	-	2	1	1	-	1	-	2	4	3	1
eagle species	-	-	-	-	-	6	-	-	-	1	1
falcon species	-	-	-	-	-	3	-	-	3	1	3
fox species	33	155	85	104	91	43	15	34	-	14	22
gadwall (*Mareca strepera*)	-	-	-	-	-	-	-	1	-	-	-
golden eagle (*Aquila chrysaetos*)	-	-	-	-	-	-	2	4	2	2	-
goose species	-	4	6	3	-	7	1	15	3	3	1
greater white-fronted goose (*Anser albifrons*)	1	6	1	-	-	-	3	5	1	2	1
grey wolf (*Canis lupus*)	27	22	2	4	4	40	2	6	6	6	13
grizzly bear (*Ursus arctos*)	-	3	3	2	4	11	4	1	5	-	1
grouse species	-	-	-	-	-	-	-	1	-	-	-
gull species	1	3	-	2	-	-	-	2	2	2	3
gyrfalcon (*Falco rusticolus*)	-	1	1	-	-	-	-	1	1	1	8

Table D-1: Number of Observations of All Species Reported in the Wildlife Sightings Log, 2014 to 2024

Species	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
hare species	-	-	-	-	5	14	1	12	-	4	8
Harris' sparrow (*Zonotrichia querula*)	-	-	-	-	-	-	-	-	-	1	-
hawk species	-	-	-	-	-	-	-	-	2	1	1
jaeger species	-	1	-	-	-	-	-	-	-	-	-
lapland longspur (*Calcarius lapponicus*)	-	-	-	-	-	-	-	-	-	1	1
lesser scaup (*Aythya affinis*)	-	-	-	-	-	-	-	-	-	1	-
loon species	-	2	-	2	-	-	-	-	-	-	-
mallard (*Anas platyrhynchos*)	-	-	-	-	-	-	-	-	1	-	-
moose (*Alces alces*)	-	5	-	4	1	5	2	2	5	1	13
mouse species	-	3	2	2	7	2	1	2	1	5	-
muskox (*Ovibos moschatus*)	4	14	10	14	20	24	15	30	34	16	34
muskrat (*Ondatra zibethicus*)	-	-	2	5	-	1	-	-	1	-	-
northern collared lemming (*Dicrostonyx groenlandicus*)[(a)]	-	-	-	-	-	-	-	-	-	1	-
northern harrier (*Circus hudsonius*)	-	-	-	-	-	-	-	1	1	1	1
northern pintail (*Anas acuta*)	-	-	1	-	-	-	1	2	1	5	1
owl species	-	-	4	-	-	-	-	-	-	1	-
parasitic jaeger (*Stercorarius parasiticus*)	-	-	-	-	-	-	1	-	-	-	-
pelican species	-	-	-	-	-	-	-	1	-	-	-
peregrine falcon (*Falco peregrinus*)	1	12	1	-	2	1	-	4	8	11	-
pine siskin (*Spinus pinus*)	-	-	-	1	-	-	-	-	-	-	-
plover species	-	-	-	-	-	-	-	1	1	-	-
porcupine (*Erethizon dorsata*)	-	-	-	-	1	-	-	-	-	-	-
ptarmigan species	16	10	10	4	9	4	6	15	17	14	14
red fox (*Vulpes vulpes*)	-	-	-	-	-	5	54	127	39	25	43
rock ptarmigan (*Lagopus muta*)	-	-	-	-	-	-	1	7	-	1	1
Ross's goose (*Anser rossii*)	1	-	-	-	-	-	-	-	-	-	-
rough legged hawk (*Buteo lagopus*)	2	-	-	-	-	1	1	5	2	4	1
sandhill crane (*Antigone canadensis*)	-	-	1	1	-	-	1	-	-	-	1
scaup species	-	-	-	-	-	-	-	-	-	-	1
scoter species	-	1	-	-	-	-	-	-	-	-	-
semipalmated plover (*Charadrius semipalmatus*)	-	-	-	-	-	-	-	-	-	-	1
short eared owl (*Asio flammeus*)	-	-	-	-	-	-	-	-	-	1	-
short-tailed shearwater (*Ardenna tenuirostris*)	-	-	-	-	-	-	-	-	-	-	1

Table D-1: Number of Observations of All Species Reported in the Wildlife Sightings Log, 2014 to 2024

Species	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
snow bunting (*Plectrophenax nivalis*)	1	1	-	1	-	-	-	2	4	4	3
snow goose (*Anser caerulescens*)	-	1	-	-	-	-	2	4	1	1	4
snowy owl (*Bubo scandiacus*)	-	2	-	1	1	1	2	4	1	-	1
sparrow species	-	1	-	-	-	-	-	-	-	1	-
teal ducks	-	-	-	-	-	-	-	2	-	-	-
tree swallow (*Tachycineta bicolor*)	-	-	-	-	-	-	-	-	-	2	-
tundra swan (*Cygnus columbianus*)	1	1	-	-	-	1	-	-	1	-	-
unidentified raptor	-	2	1	3	4	-	-	-	-	-	1
unidentified shorebird	-	-	-	-	-	-	-	3	-	-	-
unidentified songbird	-	2	1	1	2	-	-	3	-	-	2
unknown	-	-	-	-	-	1	2	2	1	2	-
white-crowned sparrow (*Zonotrichia leucophrys*)	-	-	-	-	-	-	-	-	-	1	-
willow ptarmigan (*Lagopus lagopus*)	-	-	-	-	-	-	-	1	-	6	-
wolverine (*Gulo gulo*)	5	27	2	8	27	43	4	-	3	5	2
yellow warbler (*Setophaga petechia*)	-	-	-	-	-	-	-	1	-	-	-

Note: The number of observations represents the number of independent observations for each species and is not an indication of the number of individuals present. Observations were recorded by staff on site.

a) northern collared lemming was recorded as arctic lemming, but due to the geographic distribution of the species it is assumed it is actually a northern collared lemming.

- = none reported.

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APPENDIX B Gahcho Kué Mine – 2024 (Year 8) Noise Monitoring Program

TECHNICAL MEMORANDUM

DATE 11 February 2025 **Project No.** CA0023460.8480/DCN-046

TO Kurtis Trefry and Mason Elwood
De Beers Canada Inc.

CC Charity Beres (WSP)

FROM Victor Young and Andrew Faszer **EMAIL victor.young@wsp.com**

GAHCHO KUÉ MINE – 2024 (YEAR 8) NOISE MONITORING PROGRAM

1.0 INTRODUCTION

De Beers Canada Inc. (De Beers) operates the Gahcho Kué Mine (Mine) in the Northwest Territories (NT). In 2010, De Beers prepared an Environmental Impact Statement (EIS) for the Mine, which includes an assessment of noise effects from the Mine (De Beers 2010a,b).

De Beers Wildlife and Wildlife Habitat Protection Plan (WWHPP; De Beers 2014a) and Wildlife Effects Monitoring Program (WEMP; De Beers 2014b) identified mitigation and monitoring efforts required during operation of the Mine (De Beers 2014a,b). The WWHPP and WEMP have been replaced by a consolidated Wildlife Management and Monitoring Plan (WMMP); the WMMP contains consistent requirements and objectives for noise monitoring (De Beers 2022). In the WWHPP, De Beers planned to conduct noise monitoring during Year 1 (2017[1]), Year 5 (2021[2]), and Year 8 (2024) of Mine operations (De Beers 2014a). The objectives of the noise monitoring are to confirm noise level predictions from the EIS and to use measured data to inform the effectiveness of noise management practices at site.

In accordance with the WMMP, De Beers has completed the Year 8 noise monitoring program in 2024, with an emphasis of collecting and evaluating noise monitoring data to inform the effectiveness of the site's noise management in reducing disturbance potential to wildlife. This technical memorandum presents the results of the 2024 noise monitoring program.

2.0 REGULATORY GUIDELINES

The NT does not have environmental noise regulations or limits. In the absence of NT-specific guidance, the EIS, Year 1 noise monitoring program, Year 5 noise monitoring program, and Year 8 noise monitoring program (Project-specific documentation) made use of guidance from other jurisdictions. In particular, when assessing noise effects at offsite receptor locations, the Project-specific documentation followed guidance provided by the Alberta Energy Regulator (AER) in *Directive 038: Noise Control* (AER 2007). It should be noted that an updated version of AER

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[1] The Year 1 noise monitoring was completed in June 2017. The results of the Year 1 noise monitoring program are summarized in the technical memorandum *De Beers Gahcho Kué Mine – 2017 Noise Monitoring Program* (Golder 2017).

[2] The Year 5 noise monitoring was completed in June 2021. The results of the Year 5 noise monitoring program are summarized in the technical memorandum *Gahcho Kué Mine – 2021 Noise Monitoring Program* (WSP Golder 2022).

Directive 038 was issued in 2024 (AER 2024); however, the methods for collecting and processing noise monitoring data are effectively identical in the 2007 and 2024 versions of the document.

AER Directive 038 indicates that cumulative noise levels should be maintained below a permissible sound level (PSL) limit. The appropriate PSL limit for a given location is set based on time of day, population density, and proximity to transportation infrastructure. In remote areas where there are no occupied dwellings, AER Directive 038 states that the PSL limit should be applied at the most impacted unoccupied location 1.5 km from the facility boundary.

According to AER Directive 038, the relevant parameter for characterizing cumulative noise levels is the energy equivalent sound level (L_{eq}), expressed in A-weighted decibels (dBA). L_{eq} is a single value that represents the average noise level over a given period of time. AER Directive 038 indicates that noise levels should be time-averaged over a daytime period ($L_{eq,day}$) defined as 7 am to 10 pm, and a nighttime period ($L_{eq,night}$) defined as 10 pm to 7 am. Note the Project-specific documentation adjusted the definition of daytime and nighttime for consistency with Health Canada guidance in-place at the time EIS was prepared (Health Canada 2005). In the Project-specific documentation, daytime is defined as 7 am to 11 pm and nighttime is defined as 11 pm to 7 am.

Based on guidance from AER Directive 038, the EIS established noise benchmarks for offsite receptors that are consistent with PSL limits. The daytime benchmark value for offsite receptors was set at 50 dBA ($L_{eq\ day}$) and the nighttime benchmark value for offsite receptors was set at 40 dBA ($L_{eq,\ night}$). These same benchmarks were applied in the Year 1, Year 5, and Year 8 noise monitoring programs.

Table 1 summarizes the noise benchmarks considered in the EIS (De Beers 2010b) and in the Year 1, Year 5, and Year 8 noise monitoring programs. It should be noted that these benchmarks do not represent regulatory limits or compliance thresholds, since the NT does not regulate environmental noise levels. Instead, the benchmarks from Table 1 were used to evaluate the potential for noise effects from the Mine.

Table 1: Noise Benchmarks for the Environmental Impact Statement and the Year 1, Year 5, and Year 8 Monitoring Programs

Receptor Type	Noise Benchmark[(a)] [dBA]	
	Daytime [$L_{eq,day}$]	Nighttime [$L_{eq,night}$]
Offsite Location	50	40

(a) Benchmark values taken directly from AER Directive 038 (AER 2024).

3.0 RESULTS FROM THE 2010 EIS

The noise assessment prepared for the EIS included baseline noise monitoring at three locations far from anthropogenic development (De Beers 2010a). Baseline data was collected at these locations to establish representative noise levels in the absence of anthropogenic sources (i.e., to characterize natural/background conditions without the influence of Mine activities).

Table 2 presents a summary of baseline noise levels measured as part of the EIS. Because baseline noise levels do not include the influence of anthropogenic sources, the range of values presented in Table 2 reflects natural variability in response to local environmental conditions. For example, background noise levels tend to be higher during periods with elevated wind speed.

It should be noted that both the average and maximum nighttime baseline noise levels measured for the EIS exceed the nighttime benchmark value from Table 1. In other words, baseline monitoring conducted for the EIS suggests that natural/background noise levels in the area routinely exceed the nighttime benchmark value (even without the influence of Mine activities).

Table 2: Baseline Noise Levels from Environmental Impact Statement

Period	Measured Baseline Noise Level[a] [dBA]		
	Minimum	Average	Maximum
Daytime [$L_{eq,day}$]	36.5	45.1	48.3
Nighttime [$L_{eq,night}$]	24.9	40.7	44.9

(a) Baseline noise levels taken from Table 7.II.2-1 of the EIS (De Beers 2010b).

The noise assessment prepared for the EIS included computer modelling to predict noise levels during Year 1, Year 5, and Year 8 of Mine operations (De Beers 2010b). Computer models for the EIS were developed using a widely accepted technical standard (ISO 1996), based on Mine plans, schedules, and equipment lists provided by De Beers. It should be noted that an updated version of the technical standard used for noise modelling was issued in 2024 (ISO 2024); however, the methods for modelling mining equipment and activities are effectively identical in the 1996 and 2024 versions of the document.

In accordance with AER Directive 038, noise levels from Mine operations were predicted at a receptor corresponding to the most impacted location 1.5 km from the Mine boundary; this receptor is located approximately due south of the Mine operations area and was retroactively named "RD" in the Project-specific documentation. Noise levels from Mine operations were also predicted at a receptor located approximately 1.5 km southeast of the Mine airstrip to characterize potential noise effects to the East Arm National Park, which was being proposed for development at the time the EIS was prepared; this receptor location was retroactively named "RC" in the Project-specific documentation. The EIS predicted cumulative noise levels at both receptors (RC and RD) by summing noise levels from Mine operations with an assumed ambient sound level (ASL) from AER Directive 038 (AER 2024). Table 3 presents predicted Mine noise levels and predicted cumulative noise levels from the EIS (De Beers 2010b).

It should be noted that the assumed ASL values used to predict cumulative noise levels in the EIS (see Table 3) are substantially lower than the measured baseline noise levels (see Table 2). In other words, the assumed ASL values likely underestimate actual natural/background noise levels in the area. Using assumed ASL values provides a consistent framework for evaluating potential noise effects based on computer modelling and was thus appropriate for the EIS. However, when evaluating potential noise effects based on field measurements, it is not possible to remove the influence of natural noise sources, and therefore measured noise levels may exceed the predictions presented in Table 3 because of elevated natural/background noise levels.

Table 3 shows that daytime and nighttime cumulative noise levels at RC (an unoccupied location approximately 1.5 km southeast of the Mine airstrip) are predicted to be less than the daytime and nighttime benchmarks from Table 1 for all three years assessed in the EIS. Similarly, daytime cumulative noise levels at RD (the most impacted location 1.5 km from the Mine boundary) are predicted to be less than the daytime benchmark from Table 1 for all three years assessed in the EIS. In contrast, nighttime cumulative noise levels at RD are predicted to be greater than the nighttime benchmark for all three years assessed in the EIS.

Table 3: Cumulative Noise Levels from Environmental Impact Statement

Receptor	Mine Operations Year	Assumed Ambient Sound Level(a) [dBA]		Predicted Mine Noise Level(b) [dBA]		Predicted Cumulative Noise Level(c,d) [dBA]	
		Daytime [$L_{eq,day}$]	Nighttime [$L_{eq,night}$]	Daytime [$L_{eq,day}$]	Nighttime [$L_{eq,night}$]	Daytime [$L_{eq,day}$]	Nighttime [$L_{eq,night}$]
RC – unoccupied location approximately 1.5 km southeast of the Mine airstrip	Year 1 (2017)	35	35	34	33	38	37
	Year 5 (2021)	35	35	35	35	38	38
	Year 8 (2024)	35	35	34	33	37	37
RD – most impacted unoccupied location 1.5 km from the Mine boundary	Year 1 (2017)	35	35	43	42	44	43
	Year 5 (2021)	35	35	44	44	44	44
	Year 8 (2024)	35	35	41	41	42	42

(a) Assumed ASL values taken from AER Directive 038 (AER 2024).
(b) Predicted Mine noise levels taken from Table 7.II.5-2 of the EIS (De Beers 2010b).
(c) Precited cumulative noise levels calculated by summing the assumed ASL values and the predicted Mine noise levels.
(d) Predicted cumulative noise levels taken from Table 7.II.5-3 of the EIS (De Beers 2010b).

4.0 RESULTS FROM YEAR 1 AND YEAR 5 MONITORING PROGRAMS

During the Year 1 and Year 5 monitoring programs, noise levels were measured at locations corresponding to receptors RC and RD from the EIS. As noted in Section 3 of this memorandum, RD is approximately 1.5 km from the Mine boundary at the point where computer modelling for the EIS predicted noise levels would be highest (i.e., the most impacted location 1.5 km from the Mine boundary per AER Directive 038), and RC is approximately 1.5 km southeast of the Mine airstrip. It should be noted that RD is located approximately 1.2 km southwest of the Mine airstrip. Because noise levels attenuate with distance, collecting data at a location less than 1.5 km from the Mine boundary is a conservative approach that likely overestimates potential noise effects from Mine operations. As discussed in more detail in Section 5.1 of this memorandum, the same two locations (RC and RD) were used for the Year 8 noise monitoring program.

Table 4 presents a summary of results from the Year 1 and Year 5 noise monitoring programs (Golder 2017; WSP Golder 2022). For Year 1 and Year 5, daytime noise levels measured at RC and RD were less than the applicable benchmark value from Table 1. Similarly, nighttime noise levels measured at RC were less than the applicable benchmark value for Year 1 and Year 5. In contrast, nighttime noise levels measured at RD were greater than the benchmark value for Year 1 and Year 5. Nevertheless, noise levels measured during the Year 1 and Year 5 monitoring programs were generally within the range of baseline variability presented in Table 2. As such, data collected during the Year 1 and Year 5 monitoring programs validated and confirmed the conclusions of the EIS with respect to noise effects, and the Year 1 and Year 5 monitoring programs demonstrated that noise management at the Mine is effective (Golder 2017; WSP Golder 2022).

Table 4: Noise Levels from Year 1 and Year 5 Monitoring Programs

Monitoring Location	Monitoring Program	Measured Noise Level [dBA]	
		Daytime [$L_{eq,day}$]	Nighttime [$L_{eq,night}$]
RC	Year 1[(a)]	41.5	37.2
	Year 5[(b)]	35.1	33.4
RD	Year 1[(a)]	42.0	45.1
	Year 5[(b)]	38.9	40.4

(a) Year 1 noise levels taken from Table 7 of the Year 1 noise monitoring memorandum (Golder 2017).
(b) Year 5 noise levels taken from Table 3 of the Year 5 noise monitoring memorandum (WSP Golder 2022).

5.0 YEAR 8 (2024) NOISE MONITORING PROGRAM

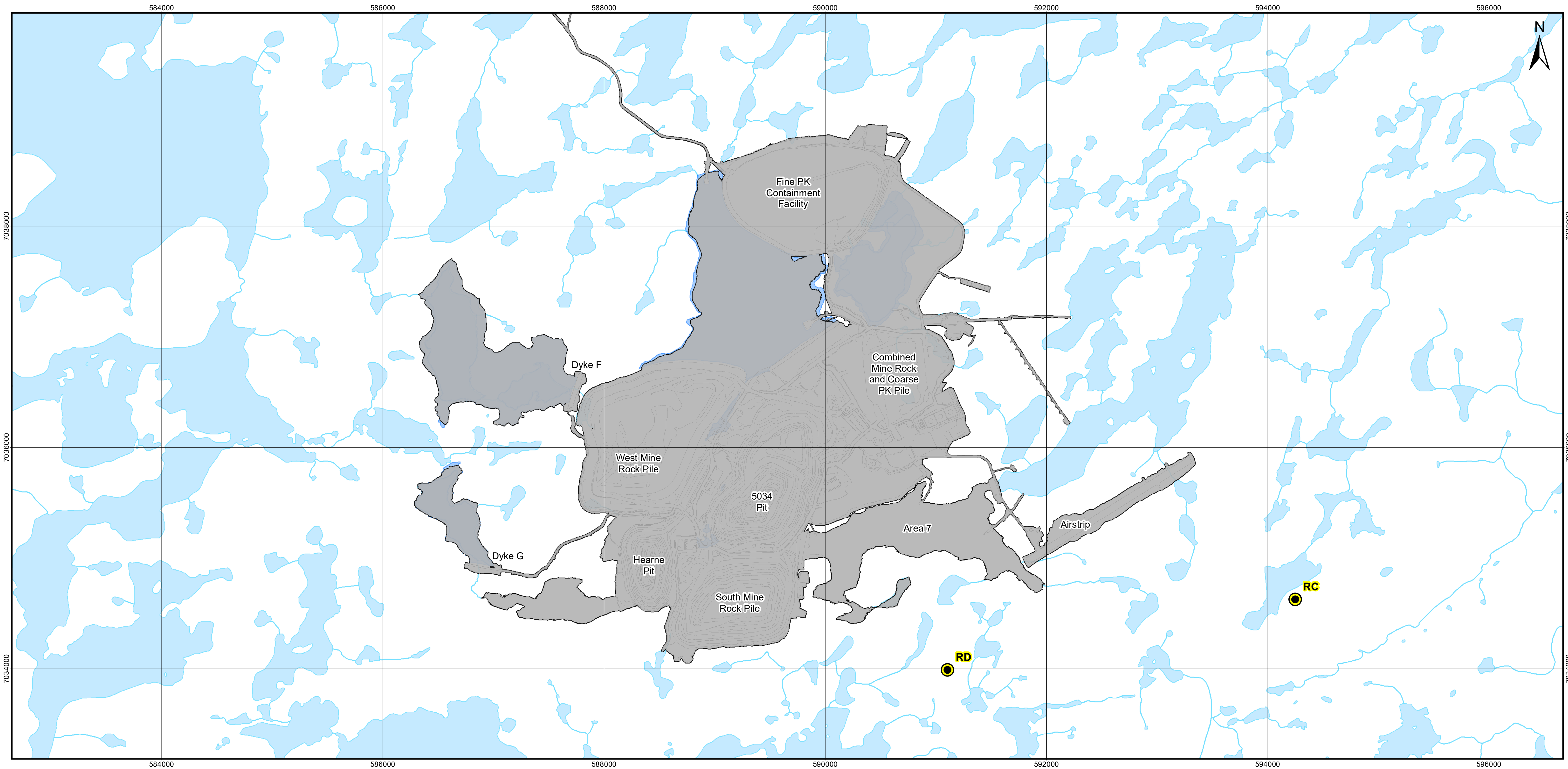
5.1 Locations

The Year 8 noise monitoring program targeted the same two locations as the Year 1 and Year 5 monitoring programs. Table 5 presents coordinates for the two monitoring locations. The two monitoring locations are also shown in Figure 1.

Table 5: Year 8 Noise Monitoring Locations

Monitoring Location	Description	Universal Transverse Mercator Coordinates [Zone 12]	
		Easting [m]	Northing [m]
RC	unoccupied location approximately 1.5 km southeast of the Mine airstrip	594,248	7,034,625
RD	unoccupied location approximately 1.5 km south of Mine operations[(a)]	591,106	7,033,986

a) RD is located approximately 1.2 km southwest of the Mine airstrip. Because noise levels attenuate with distance, collecting data at a location less than 1.5 km from the Mine boundary is a conservative approach that likely overestimates potential noise effects from Mine operations.



LEGEND

Watercourse

Waterbody

Year 8 Noise Monitoring Location

2024 Mine Footprint

NOTES

Base data source: National Topographic Base Data (NTDB) 1:50,000

I:\CLIENTSIDE_BEERS\CA0023460_8480\Mapping\06_NoiseMonitoring\NoiseMonitoring2024-001-GIS-Rev0.mxd

GAHCHO KUÉ MINE

Year 8 Noise Monitoring Locations

PROJECTION: UTM Zone 12	DATUM: NAD83		DE BEERS GROUP
Scale: 1:35,000 (0 0.25 0.5 1 Kilometres)			
FILE No: NoiseMonitoring2024-001-GIS-Rev0			DATE: February 11, 2025
JOB NO: CA0023460.8480	REVISION NO: 0		Figure 1
OFFICE: WSP-CAL	DRAWN: AL	CHECK: VY	

5.2 Methods

The Year 8 noise monitoring program was conducted in general accordance with methods described in AER Directive 038 (AER 2024), as per the WMMP (De Beers 2022). At each monitoring location, a Larson Davis Model 831 Class I integrating sound level meter was used to collect noise measurements. Each meter was configured to log dBA noise levels over one-minute averaging periods ($L_{eq,1min}$). At each monitoring location, the sound level meter's microphone was deployed approximately 1.5 m above ground to match the height at which humans and large animals (such as caribou and muskox) are typically exposed to noise. The sound level meter at each monitoring location was calibrated with a Larson Davis Model CAL250 Class I calibrator unit immediately before the start of the monitoring program. Meter calibration was also verified immediately after the conclusion of the monitoring program.

Noise levels were monitored at both RC and RD from 29 July through 4 August 2024. However, the monitoring equipment deployed at RC was knocked down by a muskox on the afternoon of 30 July 2024. Although the monitoring equipment continued to function after being knocked down, the microphone was laying on the ground and so data logged during this period cannot be considered valid. More than 24 hours of data was logged at RC before the monitoring unit was knocked down, and 24 hours is the minimum monitoring duration considered acceptable in the context of AER Directive 038 (AER 2024).

Because AER Directive 038 sets out meteorological conditions that are acceptable for noise monitoring, wind speed, wind direction, temperature, and precipitation data were logged by the Gahcho Kué on-site meteorological station for the duration of the Year 8 noise monitoring program. According to AER Directive 038, environmental noise monitoring data should be collected in the absence of active precipitation (AER 2024) since the sound of rainfall can influence measured noise levels, resulting in an overestimate of potential effects. Similarly, AER Directive 038 recommends that environmental noise be monitored during periods when local wind speeds are relatively low since elevated wind speeds can increase background/natural noise levels, resulting in an overestimate of potential effects. AER Directive 038 sets different wind speed limits for upwind conditions (i.e., wind blowing from the monitoring location towards the Mine), crosswind conditions (i.e., wind blowing across the line joining the monitoring location and the Mine), and downwind conditions (i.e., wind blowing from the Mine towards the monitoring location). According to AER Directive 038, the applicable wind speed limits are as follows (AER 2024):

- upwind: 5 km/h
- crosswind: 10 km/h
- downwind: 10 km/h

Following the conclusion of the Year 8 noise monitoring program, raw $L_{eq,1min}$ data were processed to obtain representative estimates of $L_{eq,day}$ and $L_{eq,night}$ for each monitoring location. Processing of the raw data was conducted in general accordance with methods described in AER Directive 038 (AER 2024). First, data logged during periods of active precipitation were identified and eliminated. Next, wind conditions during the monitoring program were compared to criteria from AER Directive 038 and data logged under unacceptable conditions were eliminated.

Because of extended rainy periods on 29 July through 1 August 2024, and because of elevated wind speeds throughout the Year 8 monitoring program, filtering the data strictly in accordance with AER Directive 038 resulted in limited valid data. Therefore, it was necessary to relax the default meteorological criteria such that data collected during rainy periods and data collected under downwind conditions with wind speeds ≤17 km/h were considered valid. As noted previously, relaxing the precipitation and downwind criteria is a conservative approach to processing the monitoring data that will tend to overestimate potential noise effects from Mine operations.

After eliminating data based on the relaxed environmental criteria described above, further filtering was applied to eliminate data influenced by abnormal or invalid noise sources that are not generally representative of conditions at the monitoring locations. The only abnormal or invalid noise sources removed from the data were those associated with technician activities during deployment or recovery of the noise monitoring equipment. All other noise sources (e.g., Mine equipment, helicopters and other aircraft, insects, birds, and other wildlife) were considered valid and representative of normal conditions at the monitoring locations.

Representative/valid $L_{eq,1min}$ data samples were used to calculate average $L_{eq,day}$ and $L_{eq,night}$ noise levels for each of the monitoring locations. Potential noise effects from Mine operations were assessed by comparing average $L_{eq,day}$ and $L_{eq,night}$ noise levels to benchmark values from Table 1, baseline noise levels from Table 2, and EIS predictions from Table 3.

5.3 Results

Table 6 summarizes the results of the Year 8 noise monitoring program and Table 7 shows the comparison of average measured noise levels to benchmarks. Table 8 presents average $L_{eq,day}$ and $L_{eq,night}$ noise levels calculated for each monitoring location, along with the number of valid $L_{eq,1min}$ data samples used in each calculation. Per AER Directive 038, only $L_{eq,day}$ and $L_{eq,night}$ noise levels calculated using 180 or more valid data samples can be considered conclusive (AER 2024). Because a muskox knocked over the sound level meter deployed at RC on the afternoon of 30 July 2024, it was necessary to calculate the average $L_{eq,night}$ noise level for this location using fewer than 180 individual $L_{eq,1min}$ data samples. In this case, AER Directive 038 considers the noise monitoring program to be inconclusive. Notwithstanding, it is WSP's professional judgement that this noise level is representative of nighttime conditions at monitoring location RC. Additional detail on the noise levels measured at the individual monitoring locations is presented in Sections 5.3.1 and 5.3.2.

Table 6: Summary of Results from Year 8 Noise Monitoring Program

Monitoring Location	Average Measured Noise Level [dBA]		Number of One-Minute Data Samples Used in Average	
	Daytime [$L_{eq,day}$]	Nighttime [$L_{eq,night}$]	Daytime	Nighttime
RC	43.1	40.2[(a)]	762	60
RD	44.1	42.0	4,093	1,320

(a) This noise level was calculated using fewer than 180 valid one-minute data samples. As such, AER Directive 038 considers this result to be inconclusive (AER 2024). Notwithstanding, it is WSP's professional judgement that this noise level is representative of conditions at the monitoring location.

Potential noise effects from Mine operations were assessed by comparing noise levels measured during the Year 8 monitoring program to:

- benchmark values (Table 7)
- EIS predictions for Year 8 Mine operations (Table 8)
- average baseline noise levels (Table 9)

Table 7: Comparison of Year 8 Measurements to Benchmark Values

Monitoring Location	Period	Average Measured Noise Level[(a)] [dBA]	Noise Benchmark[(b)] [dBA]	Comment
RC	Daytime [$L_{eq,day}$]	43.1	50	measured noise level is less than the benchmark value
	Nighttime [$L_{eq,night}$]	40.2	40	measured noise level is equal to the benchmark value[(c)]
RD	Daytime [$L_{eq,day}$]	44.1	50	measured noise level is less than the benchmark value
	Nighttime [$L_{eq,night}$]	42.0	40	measured noise level is greater than the benchmark value

(a) Measured noise levels taken from Table 6.
(b) Noise benchmarks taken from Table 1.
(c) Assessment using PSL limits from AER Directive 038 is typically performed at whole-number precision (AER 2024). As such, a measured value of 40.2 dBA would be considered equal to a PSL of 40 dBA.

Table 8: Comparison of Year 8 Measurements to Environmental Impact Statement Predictions

Monitoring Location	Period	Average Measured Noise Level[(a)] [dBA]	Predicted Cumulative Noise Level[(b)] [dBA]	Comment
RC	Daytime [$L_{eq,day}$]	43.1	37	measured noise level is greater than EIS prediction
	Nighttime [$L_{eq,night}$]	40.2	37	measured noise level is greater than EIS prediction
RD	Daytime [$L_{eq,day}$]	44.1	42	measured noise level is greater than EIS prediction
	Nighttime [$L_{eq,night}$]	42.0	42	measured noise level is equal to the EIS prediction

(a) Measured noise levels taken from Table 6.
(b) Predicted cumulative noise levels taken from Table 3.

Table 9: Comparison of Year 8 Measurements to Baseline Levels

Monitoring Location	Period	Average Measured Noise Level[a] [dBA]	Average Baseline Noise Level[b] [dBA]	Comment
RC	Daytime [$L_{eq,day}$]	43.1	45.1	measured noise level is less than average baseline level
	Nighttime [$L_{eq,night}$]	40.2	40.7	measured noise level is less than average baseline level
RD	Daytime [$L_{eq,day}$]	44.1	45.1	measured noise level is less than average baseline level
	Nighttime [$L_{eq,night}$]	42.0	40.7	measured noise level is greater than average baseline level[c]

(a) Measured noise levels taken from Table 6.
(b) Average baseline noise levels taken from Table 2.
(c) However, the measured noise level is less than the maximum baseline noise level from Table 2 (i.e., 44.9 dBA).

5.3.1 Monitoring Location RC

Noise monitoring was conducted at RC from 1:11 pm on 29 July 2024, until 1:00 pm on 2 August 2024. However, a muskox knocked down the noise monitor at 2:11 pm on 30 July 2024, so data logged after this time are considered invalid. The dominant noise sources noted during deployment/recovery of the noise monitor at RC were the Mine airstrip, along with insects, birds, and other wildlife. When processing the raw data logged at RC, data excluded from the dataset included samples logged under unacceptable wind conditions (i.e., upwind speeds in excess of 5 km/h, crosswind speeds in excess of 10 km/h, and downwind speeds in excess of 17 km/h) and/or samples unduly influenced by the presence of the field technician during deployment/recovery of the monitoring equipment.

Figure 2 presents a graph of one-minute noise levels measured at RC and highlights the valid data used in the calculation of $L_{eq,day}$ and $L_{eq,night}$ average noise levels and the data omitted because they were logged under unacceptable wind conditions or influenced by the field technician. The eliminated data have been highlighted with red dots.

At RC, it was possible to include 180 or more valid one-minute data samples in the calculation of $L_{eq,day}$ but not in the calculation of $L_{eq,night}$. Consequently, the results of the Year 8 noise monitoring program at RC can be considered conclusive for the daytime period but not for the nighttime period (AER 2024). However, it is WSP's professional judgment that the valid data samples collected during the nighttime period are generally representative of environmental noise levels at RC.

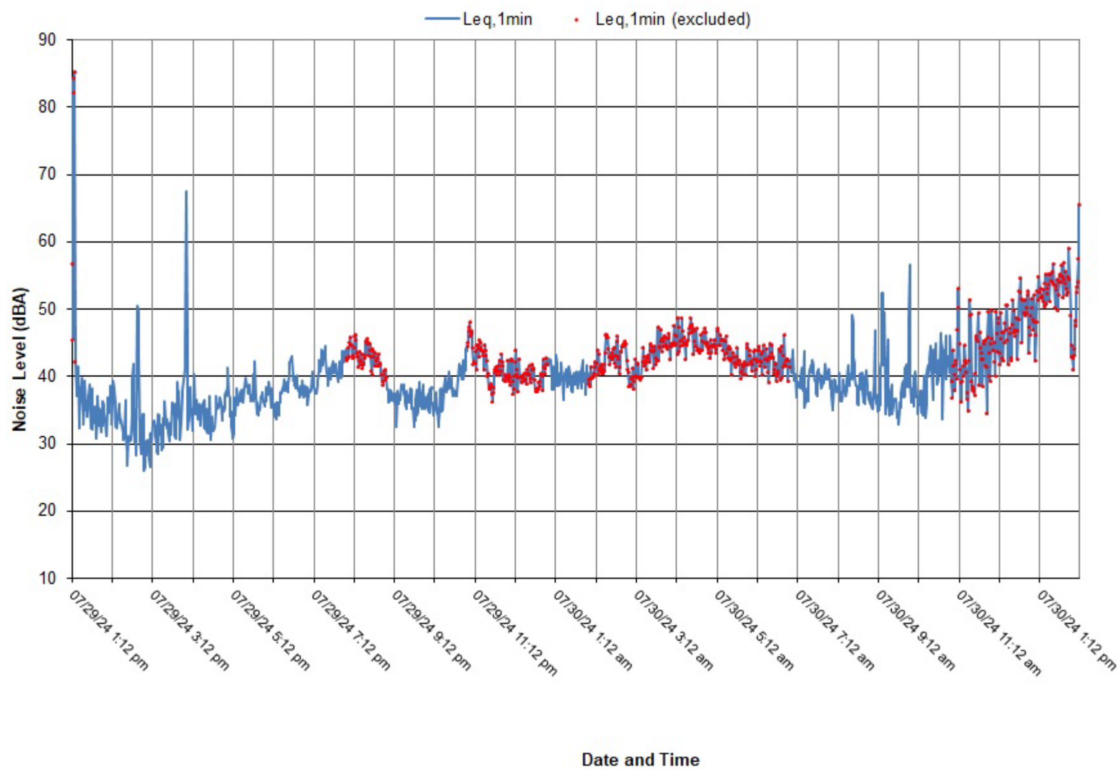


Figure 2: RC - Year 8 Noise Monitoring Data

5.3.2 Monitoring Location RD

Noise monitoring was conducted at RD from 1:25 pm on 29 July 2024, until 5:00 pm on 2 August 2024. The dominant noise sources noted during deployment/recovery of the noise monitor at RD were heavy equipment and associated back-up alarms, along with the Mine airstrip. When processing the raw data logged at RD, data excluded from the dataset included samples logged under unacceptable wind conditions (i.e., upwind speeds in excess of 5 km/h, crosswind speeds in excess of 10 km/h, and downwind speeds in excess of 17 km/h) and/or samples unduly influenced by the presence of the field technician during deployment/recovery of the monitoring equipment.

Figures 3 through 9 present graphs of one-minute noise levels measured at RD and highlight the valid data used in the calculation of $L_{eq,day}$ and $L_{eq,night}$ average noise levels and the data omitted because they were logged under unacceptable wind conditions or influenced by the field technician. The eliminated data have been highlighted with red dots.

At RD, it was possible to include 180 or more valid one-minute data samples in the calculation of both $L_{eq,day}$ and $L_{eq,night}$. Consequently, the results of the Year 8 noise monitoring program at RD can be considered conclusive for both the daytime period and the nighttime period (AER 2024).

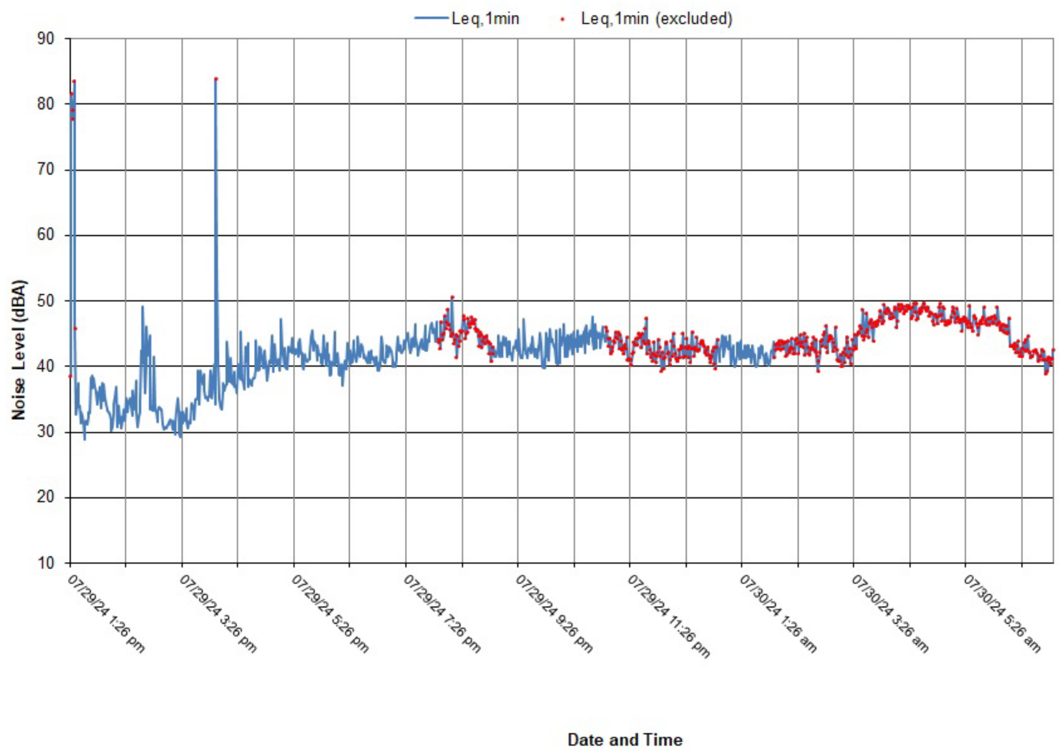


Figure 3: RD - Year 8 Noise Monitoring Data (Day 1)

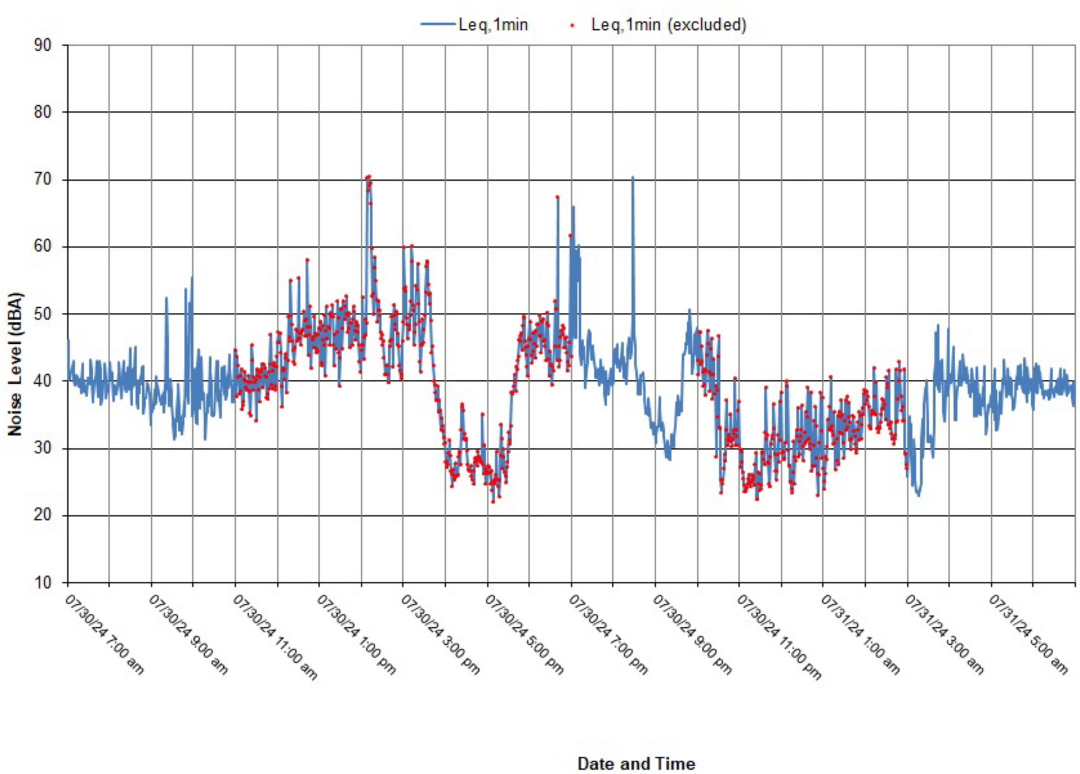


Figure 4: RD - Year 8 Noise Monitoring Data (Day 2)

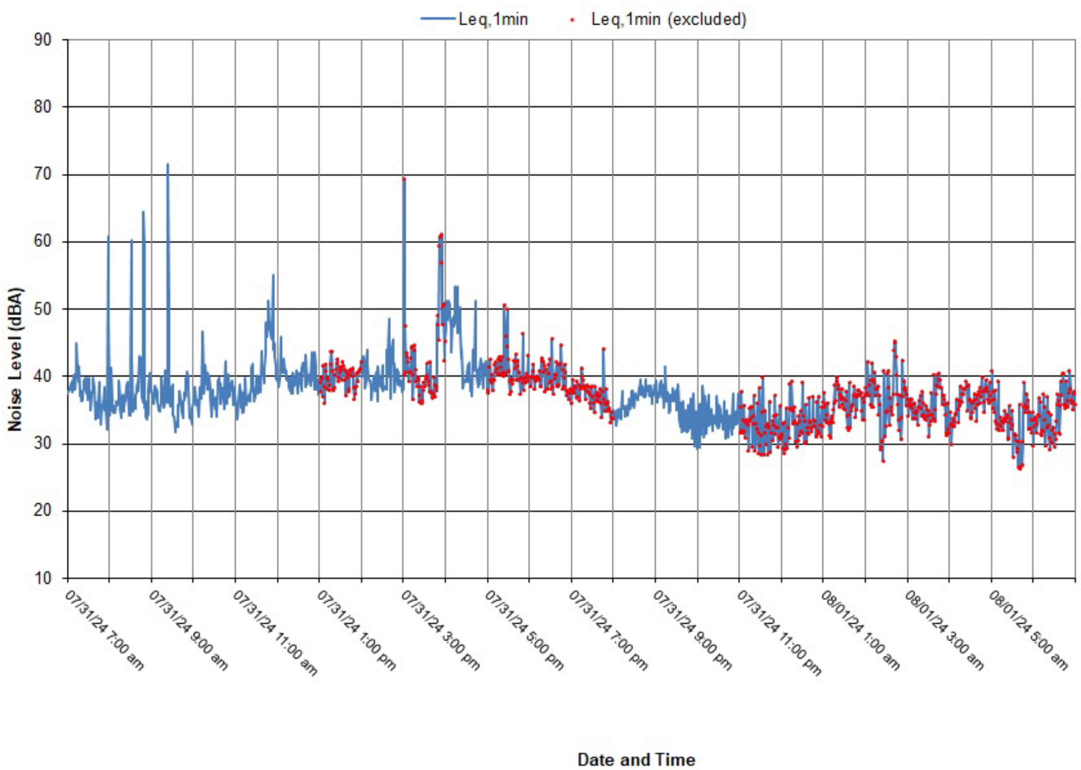


Figure 5: RD - Year 8 Noise Monitoring Data (Day 3)

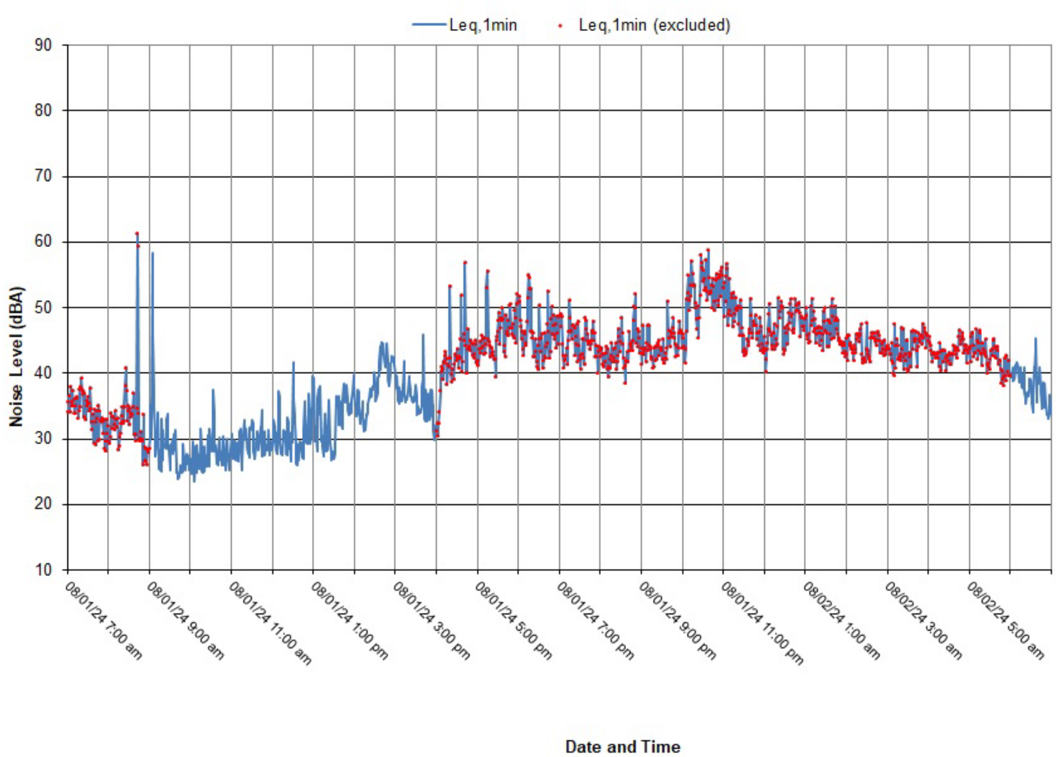


Figure 6: RD - Year 8 Noise Monitoring Data (Day 4)

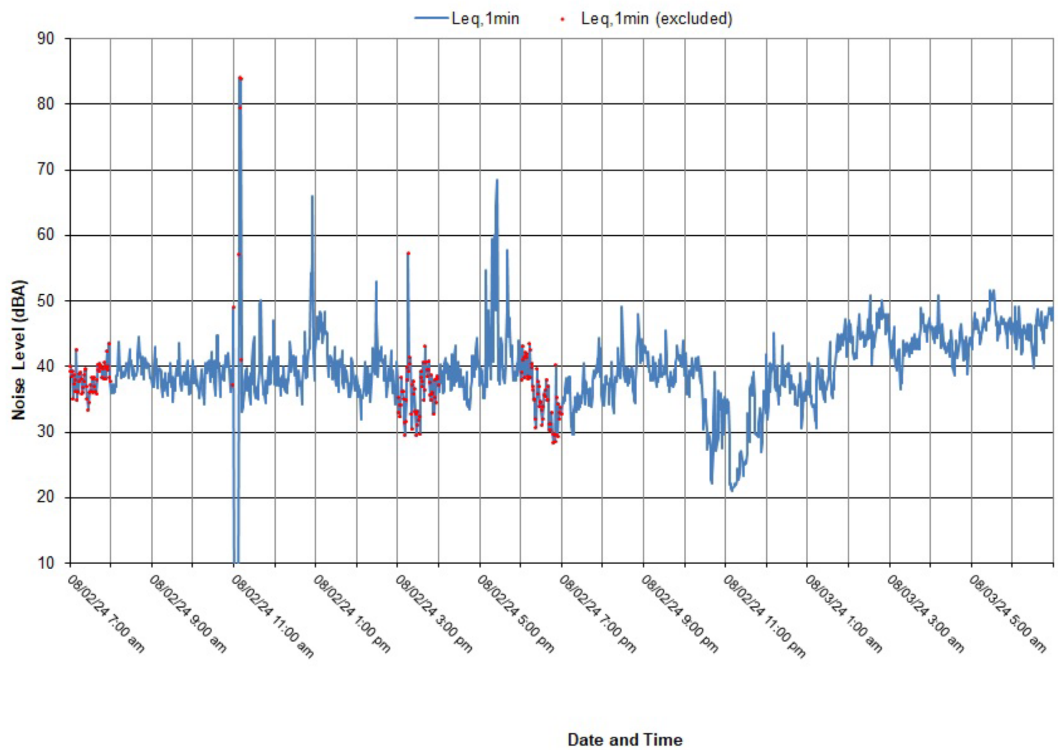


Figure 7: RD - Year 8 Noise Monitoring Data (Day 5)

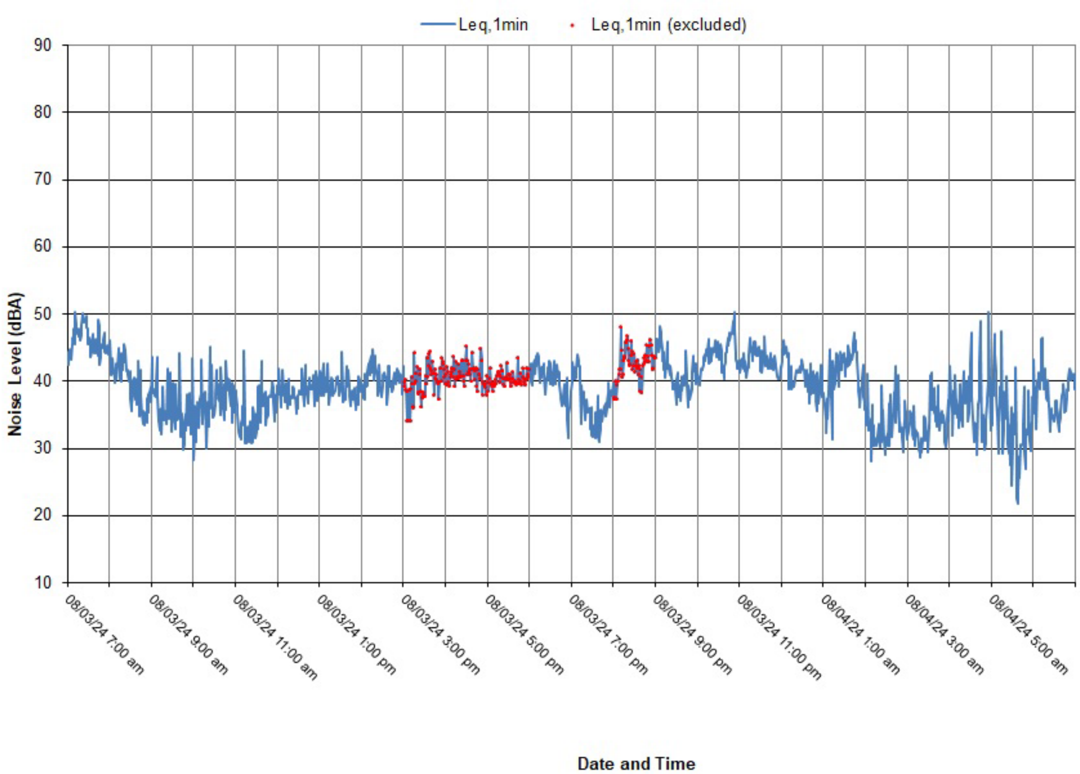


Figure 8: RD - Year 8 Noise Monitoring Data (Day 6)

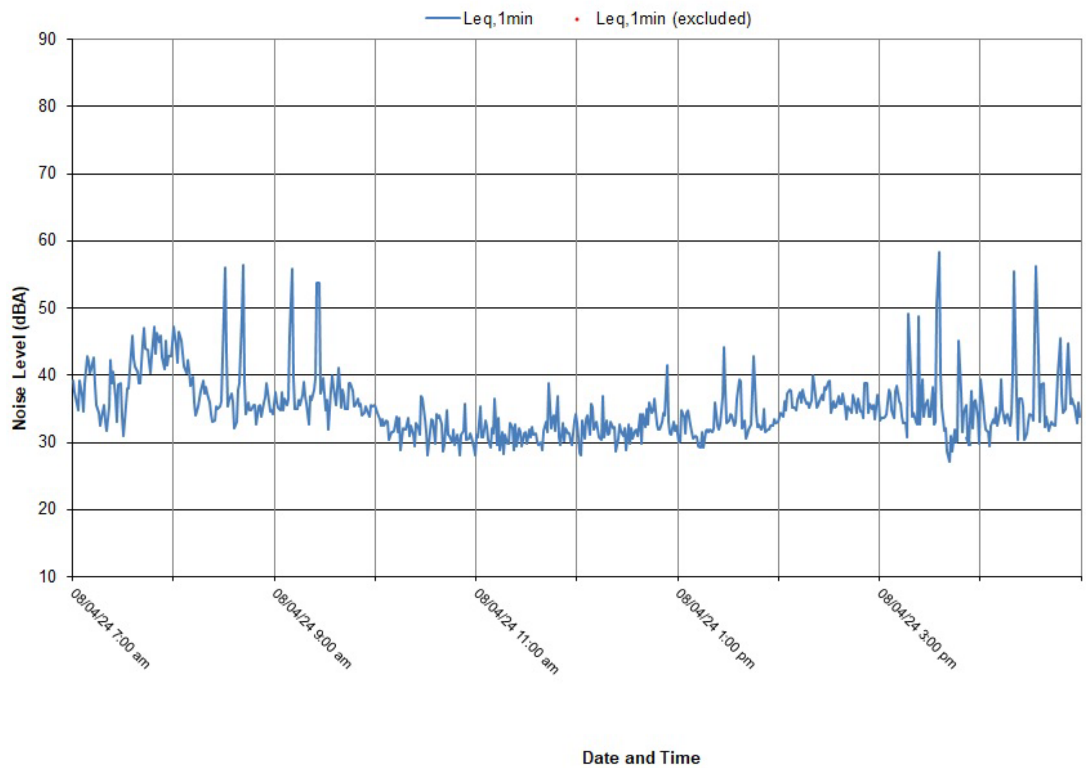


Figure 9: RD - Year 8 Noise Monitoring Data (Day 7)

6.0 SUMMARY

Daytime noise levels measured at RC and RD during the Year 8 monitoring program were less than the applicable benchmark value. Similarly, the nighttime noise level measured at RC was equal to the applicable benchmark value. In contrast, the nighttime noise level measured at RD was greater than the applicable benchmark value. It should be noted that the benchmark values do not represent regulatory limits or compliance thresholds, since the NT does not regulate environmental noise levels. It should also be noted that natural/background noise levels in the area routinely exceed benchmark values during the nighttime period (even without the influence of Mine activities).

Daytime and nighttime noise levels measured at RC during the Year 8 monitoring program were greater than the EIS predictions for Year 8 operations presented in Table 3. Similarly, the daytime noise level measured at RD was greater than the EIS prediction for Year 8 daytime operations. In contrast, the nighttime noise level measured at RD was equal to the EIS prediction for Year 8 nighttime operations. It should be noted that predicted cumulative noise levels presented in the EIS use assumed ASL values to represent natural/background noise levels, and these assumed ASL values likely underestimate actual natural/background noise levels in the area.

All noise levels measured during the Year 8 monitoring program were within the range of baseline variability presented in Table 2. As such, data collected during the Year 8 monitoring program validated and confirmed the conclusions of the EIS with respect to noise effects, and the Year 8 monitoring program demonstrated that noise management at the Mine is effective.

7.0 CLOSURE

We trust the above information meets your present requirements. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

WSP Canada Inc.

ORIGINAL SIGNED

Victor Young, MSc
Acoustic Scientist

ORIGINAL SIGNED

Andrew Faszer, BSc, INCE
Senior Consultant

VY/AF/pls

https://wsponlinecan.sharepoint.com/sites/ca-ca00234608480/shared documents/05. technical/15000_wildlife/40_noise_report/03_final/ca0023460.8480-046-tm-rev0-noise-monitoring_11feb2025.docx

8.0 REFERENCES

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APPENDIX C Gahcho Kué Mine – 2023 Wildlife Mitigation and Monitoring Plan Audit

TECHNICAL MEMORANDUM

DATE 18 November 2024 **Project No.** CA0023460.8480/DCN-048

TO Kurtis Trefry and Mason Elwood
De Beers Canada Inc.

CC Charity Beres

FROM Michelle Bacon and Daniel Coulton **EMAIL michelle.bacon@wsp.com**

GAHCHO KUÉ MINE – 2023 WILDLIFE MITIGATION AND MONITORING PLAN AUDIT

1.0 INTRODUCTION

De Beers Canada Inc. (De Beers) conducts open pit mining, milling, and associated activities at the Gahcho Kué Mine (Mine), located approximately 280 kilometers (km) northeast of Yellowknife, and 80 km southeast of the Snap Lake Mine. At the end of Environmental Impact Review (EIR) for the Mine and at the public hearing in 2014, De Beers prepared a Wildlife Effects Monitoring Plan (WEMP; De Beers 2014a), a Caribou Protection Plan, and a Wildlife and Wildlife Habitat Protection Plan (WWHPP; De Beers 2014b).

In 2019, the Government of Northwest Territories (GNWT) revised the wildlife management plan guidelines for mine operators for the development of a single Wildlife Management and Monitoring Plan (WMMP) to meet the requirements of the *NWT Wildlife Act* (GNWT-ENR 2019). The Mine's Tier 3 WMMP Version 1.2 was submitted to the GNWT in June 2022 (De Beers 2022) and was approved in September 2022 (GNWT-ENR 2022a).

Section 5.2 of the WMMP (De Beers 2022) states that the mitigation proposed in the WMMP should be evaluated to confirm that mitigations work as intended, and new mitigation identified through adaptive management should be documented. De Beers committed to conducting an annual audit specific to the mitigation policies and actions to evaluate:

- if all mitigation has been implemented
- which mitigation was observed or demonstrated to be successful or effective
- if new mitigation has been implemented in response to new issues
- if some mitigation is redundant

The audit will include an evaluation of site mitigation measures that are regularly implemented by Mine staff, and a summary of results from any additional special studies undertaken, if deemed necessary by De Beers, to further understand the effectiveness of mitigation actions intended to reduce residual effects.

2.0 APPROACH TO CONDUCTING THE AUDIT

To complete the audit, Mine staff reviewed mitigations provided in the WMMP and were asked by WSP Canada Inc. (WSP) to answer the following questions:

1) Was the mitigation implemented in 2023?

2) Was the mitigation observed or demonstrated to be effective?

3) Was the mitigation redundant in application with any other mitigation?

4) Are there any special studies required to support determining effectiveness of the mitigation?

The mitigations completed in 2023 were reviewed by Mine site staff and the results are provided in Section 3 and Attachment A.

3.0 2023 AUDIT RESULTS

The WMMP identifies a total of 72 mitigations (De Beers 2022). Two additional mitigations were added after the WMMP was approved, following recommendations from Environment and Climate Change Canada to put measures in place to deter nesting and avoid disturbance and damage and distribution of nesting barn swallows from mining activity (ECCC 2022). As a result, a total of 74 mitigations were audited in 2023. Of these, 71 mitigations (96%) which were implemented in 2023; 66 out of the 71 mitigations implemented (93%) were observed by Mine site staff to be effective and 5 were found to be not effective (Attachment A). The mitigations that were found to be not effective were related to deterring birds from nesting and colony establishment, including a mitigation that was added in 2022 to install visual and noise deterrents at the Ammonium Nitrate Transfer Barn. Despite the extensive mitigation program with a variety of types of deterrents, these mitigations were determined to only be partially effective because some birds (including bank swallows and peregrine falcon) still nested on site regardless of the mitigation factors.

Three mitigations listed in the WMMP were not implemented in 2023. This includes reduced speed limits when caribou and other large wildlife are within 200 m of roads. Mine site staff indicated that although speed limits were not reduced, wildlife were given the right of way. Two other mitigations that were not implemented were considered not applicable in 2023 either because of the phase of mine development or because there were no reportable injuries. A summary of the mitigations implemented in 2023 is included in Table 1 with details provided in Attachment A.

Table 1: Summary of Mitigations Implemented in 2023

Mitigation Implemented?	Count of Mitigations	Number and proportion (%) that were fully effective	Rationale
Yes	71	66 (93%)	▪ These mitigations were implemented in 2023. ▪ Bird deterrents at AN Transfer Barn did not deter nesting cliff swallows. ▪ Bird deterrents at CPKMR Facility did not deter nesting of bank swallows. ▪ Re-sloping CPKMR Facility before the breeding season did not deter nesting by bank swallows. ▪ Bird deterrents deployed around site did not deter nesting raptors.

Table 1: Summary of Mitigations Implemented in 2023

Mitigation Implemented?	Count of Mitigations	Number and proportion (%) that were fully effective	Rationale
No	1	N/A	▪ Speed limits were not reduced when caribou or large wildlife were within 200 m of roads. Wildlife continue to have the right-of-way and no large wildlife injuries or mortalities occurred during 2023.
N/A	2	N/A	▪ Mined out pits have not been backfilled because it is not applicable at this phase of development of open pits. ▪ No caribou injuries occurred in 2023 and thus did not have to be reported to GNWT.

N/A = not applicable; AN = Ammonium Nitrate; CPKMR = Coarse Processed Kimberlite Mine Rock; GNWT = Government of Northwest Territories.

4.0 SNOW BERM MITIGATION EFFECTIVENESS

The GNWT Department of Environment and Natural Resources (ENR; now GNWT-ECC) indicated in the conditional approval letter for the WMMP that the effectiveness of snow berm reduction on the winter access road (113 km) could not be evaluated with the current mitigation management measures outlined in Version 1.1. (GNWT-ENR 2022b). In response, an evaluation of the Mine's snow berm management has been undertaken.

The objective of snow berm management is to reduce potential movement barriers to caribou (*Rangifer tarandus groenlandicus*). In the WMMP Version 1.1 and previously, De Beers committed to maintaining snow berms below a height of 1.6 m (Section 5.1.2.3 of De Beers 2022), as this height was established as a threshold for barrier effects to caribou crossing roads based on monitoring conducted at the Ekati Mine (Rescan 2011). Berm heights are measured at pre-determined locations along the winter access road, approximately every 2 km. Typically three rounds of snow berm height measurements on either side of the winter access road are completed during February to March annually. At each location, the site is classified as lake or portage. Snow berms are reduced if measured height exceeds 1.6 m. Note that snow berm management actions are triggered by measurement of berm height and locations do not require caribou to be present, which is a conservative approach.

Caribou activity at the locations where berms required management (i.e., reduced height) was not recorded prior to or after the reduction in height to confirm whether caribou use these managed sites. However, a mitigation commitment in the WMMP is to conduct caribou behaviour monitoring along the winter access road when 20 groups (a group is defined as one or more animals) or 100 animals are observed during the aerial reconnaissance survey conducted annually in late January by the Mine prior to the opening of the winter access road. As such, the locations of caribou along the winter access road during behaviour monitoring can be compared with locations where the snow berm height from the same year exceeded 1.6 m to determine if caribou were observed on both sides of the winter access road.

The objectives of this analysis were as follows:

- determine the frequency that snow berms exceed the threshold height and need to be reduced
- evaluate if the reduction of snow berms is effective for caribou

4.1 Methods

Snow berm data were collected along the winter access road in February and March from 2014 to 2023. Frequency of snow berm measurements varied by year, between one and three surveys. Snow berm heights were merged into two groups; where any left or right measurement is less than 1.6 m, or greater than 1.6 m. For the purposes of this mitigation audit, a height of 1.6 m (rounded to the 0.1 m level of precision) was considered as less than the threshold.

Between 2014 and 2023, caribou behaviour monitoring was triggered in 2014, 2018, 2019, 2022 and 2023. Data was collected by WSP (formerly Golder Associates Ltd.), Ni Hadi Xa and/or Mine site staff, with the exception of data collected in 2019 which was completed by a graduate student from University of Northern British Columbia. Caribou behaviour monitoring methods are outlined in the Specific Work Instructions included in Appendix A of the WMMP (De Beers 2022). Caribou behaviour data collected in 2023 included the distance (measured with a Halo XR 700 Rangefinder) and bearing of caribou groups relative to the location of the observer. Caribou groups observed were projected from the UTM coordinates of observers and mapped. For those caribou observations in 2023 that did not include distance and bearing, they were mapped at the position where the observer was located during the survey. Caribou behaviour data collected in 2014 and 2018 did not include consistent or any projections of groups locations, respectively, so the observations were mapped at the position where the observer was located along the winter access road during the survey.

4.2 Results

4.2.1 Snow Berm Measurements

Snow berm measurements have been completed annually since 2014 (Table 2). Three surveys of snow berm measurements have been typically completed each year from 2014 to 2023, except in 2014 (one survey; pilot study year), 2020 (one survey), and 2022 (two surveys). A total of 3,054 snow measurements were recorded from 2014 to 2023. Of these measurements, there were 84 (2.8%) recorded instances where either the left or right snow berm measurement exceeded 1.6 m (Table 2). Greater than 95% of snow berm measurements in each year were below 1.6 m, with the exception of 2015 (Table 2). In 2023, 357 of 360 measurements were below 1.6 m (Table 2).

Table 2: Snow Berm Measurements Above and Below Threshold (2014 to 2023)

Year[a]	Number of Snow Berm Measurement Surveys	Total measurements[b]	Less than or equal to 1.6 m (%)[c]	Greater than 1.6 m (%)[c]
2014	1	120	116 (96.7%)	4 (3.3%)
2015	3	362	303 (83.7%)	59 (16.3%)
2016	3	350	349 (99.7%)	1 (0.3%)
2017	3	304	293 (96.4%)	11 (3.6%)
2018	3	354	354 (100%)	0 (0%)
2019	3	354	352 (99.4%)	2 (0.6%)
2020	1	118	115 (97.5%)	3 (2.5%)
2021	3	366	366 (100%)	0 (0%)
2022	2	366	365 (99.7%)	1 (0.3%)
2023	3	360	357 (99.2%)	3 (0.8%)
Total	**25**	**3,054**	**2,970 (97.2%)**	**84 (2.8%)**

a) **Bolded** years indicate caribou monitoring was triggered.
b) Number of total measurements differs among years because some years had less than three rounds of berm measurements.
c) Minor discrepancies between this summary and annual reports are because reporting of snow berm measurements in annual reports were categorized as “less than or equal to 1.6 m” and “greater than or equal to 1.6 m”; as a result, reporting of measurements of 1.6 m may be placed in different categories. WSP recommends in future years that De Beers clarifies the category of snow berm measurements.

4.2.2 Snow Berm Management

In 2023, there were three exceedances of the snow berm height threshold (Table 2). After a snow berm was measured as greater than 1.6 m in height, De Beers staff reported the exceedance to the winter access road maintenance crew. Road maintenance crews used snow cats or groomers to push the berms down and/or recontour them to a lower height.

4.2.3 Caribou Observations and Snow Berm Management

Snow berm measurements and caribou observations did not occur simultaneously, so it is difficult to make direct correlations about the effectiveness of the mitigation. Caribou monitoring was triggered in 2014, 2018, 2019, 2022 and 2023. In years when caribou monitoring was triggered (i.e., when 20 groups or 100 animals were observed during the aerial reconnaissance survey conducted in late January), four or fewer locations had snow berm measurements greater than 1.6 m (Table 2). In years when caribou monitoring was not triggered (i.e., there was not sufficient animals observed near the winter access road during the aerial reconnaissance survey), there was between 0 and 59 locations with snow berm measurements greater than 1.6 m (Table 2).

5.0 DISCUSSION

The Mine implemented 71 out of 74 mitigations in 2023, and the audit results indicate 93% of the mitigations implemented appear effective, according to the observations of Mine staff. Although the Mine is near the northern limit and above the northern limit of the breeding range for bank and cliff swallows, respectively, both species were detected in 2021 and subsequent years. As a result, additional mitigation actions to minimize disturbance to nesting birds from mining activity were implemented starting in 2022. In 2023, installing visual and noise deterrents at the Ammonium Nitrate Transfer Barn was not effective at deterring birds from nesting. Four other mitigation measures intended to deter birds were only partially effective in 2023 because some birds still nested on site. This included re-sloping of the Coarse Processed Kimberlite Mine Rock (CPKMR) Facility per GNWT-ECC guidelines for deterring bank swallow nesting.

Similar to previous years, snow berm monitoring in 2023 identified infrequent instances (<1% of 2023 recorded measurements) where snow berms equaled or exceeded the threshold height of 1.6 m. In years where caribou monitoring was triggered (2014, 2018, 2019, 2022, 2023), four or fewer locations per year had snow berm measurements greater than 1.6 m, which appears to be a threshold height for deflecting caribou from roads (Rescan 2011). Overall, the winter access road continues to be constructed and managed to minimize barrier effects to caribou. Although snow berms exceeding 1.6 m are uncommon, it could not be verified in 2023 whether caribou are using locations where snow berms have been reduced. This is partly related to De Beers' conservative approach to manage snow berms based on height measurements and not necessarily because caribou are present where exceedances occur. To address this, De Beers intends to deploy cameras at snow berm locations where management actions are implemented in 2024.

The WMMP commits to an annual mitigation audit to evaluate mitigations and document new mitigation policies and actions. The next audit for mitigations implemented during 2024, will occur in spring 2025.

6.0 RECOMMENDATIONS

GNWT-ENR (now GNWT-ECC) indicated in the conditional approval letter for the WMMP that berm reduction effectiveness could not be evaluated with the current mitigation management measures outlined in Version 1.1 of the WMMP (De Beers 2021). In 2023, cameras were set up within the area of where the mitigation measures were applied but were not directly at the snow berm survey marker (De Beers 2024). These locations are representative of the conditions of the recontoured snow berm, and caribou were observed on camera crossing the road (Attachment B). WSP recommends that in 2024, De Beers place wildlife cameras at precise locations where snow berms have been reduced to provide a means of observing whether caribou use these specific locations following management. However, it should be noted that failure to detect caribou using these locations may arise because caribou are not present near these areas and/or because reduction locations are uncommon along the winter access road.

7.0 CLOSURE

We trust the above information meets your present requirements. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

WSP Canada Inc.

ORIGINAL SIGNED BY

Michelle Bacon, MSc, RPBio
Lead Wildlife Biologist

ORIGINAL SIGNED BY

Daniel Coulton, PhD, RPBio
Principal Wildlife Biologist

MB/DC/cg

Distribution: Kurtis Trefry, Mason Elwood (De Beers)

Attachments: Attachment A – Mitigation Audit Results
Attachment B – Remote Monitoring Camera Caribou Photo

https://wsponlinecan.sharepoint.com/sites/ca-ca00234608480/shared documents/05. technical/15000_wildlife/30_wildlife_mitigation_audit_report/03_final/ca0023460.8480-048-tm-rev0-wmmp-audit_18nov24.docx

8.0 REFERENCES

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GNWT-ENR. 2022b. Approval of the Wildlife Management and Monitoring Plan for DeBeers Canada Inc.'s Gahcho Kué Mine. Letter to William Liu of De Beers Canada Inc., dated 31 March 2022.

Rescan (Rescan Environmental Services Inc.). 2011. Ekati Diamond Mine: 2010 Wildlife Effects Monitoring Program. Prepared for BHP Billiton Canada Inc. by Rescan Environmental Services Inc. Yellowknife, NT.

ATTACHMENT A

Mitigation Audit Results

Table A1: Review of WMMP Mitigations Implemented in 2023

WMMP Section	Mitigation #	Mitigation	Was it implemented in 2023?	Was it observed or demonstrated to be effective?	Was it redundant in application with any other mitigation?	Any special studies required as follow up?	Comments
3.1 Direct Habitat Loss	1	Confirm mine footprint is kept within authorized area	Yes	Yes	No	No	
	2	Promote natural revegetation and progressive reclamation	Yes	Yes	No	No	Continual reclamation research completed in advance of closure.
	3	Backfill the mined out pits	N/A	N/A	N/A	N/A	Not completed in 2023
	4	Maintain downstream flows within baseline levels	Yes	Yes	No	No	Successful completion of 2023 Downstream Flow Mitigation
3.2 Indirect Habitat Loss	5	Cover and contour pipelines so they will not be a barrier to wildlife movement;	Yes	Yes	No	No	Pipelines on Lake N11 road had wildlife crossings installed
	6	Use dust suppression strategies (following *Guideline for Dust Suppression* , GNWT-ENR 2013b), such as regular road watering during snow free conditions;	Yes	Yes	No	No	Dust suppression ongoing
	7	Enforce speed limits of 50 km/h on haul roads and 30 km/h on other roads to assist in reducing the production of dust;	Yes	Yes	No	No	Speed limits enforced during 2023
	8	Reduced speed limits when caribou and other large wildlife are within 200 m of roads;	No	Yes	No	No	Wildlife are given right of way, however speed limits are not reduced on site or winter road.
	9	Enclose processes that create dust (such as rock crushing), where feasible;	Yes	Yes	No	No	No new dust sources placed that would require enclosures
	10	Maintain a minimum flying altitude of 650 m above ground level (except during takeoff and landing) for cargo and passenger aircraft outside of the Mine site (GNWT-ENR n.d. [Flying Low brochure]; Appendix A, OP-006);	Yes	Yes	No	No	Enforced with operators during 2023
	11	Limit as many equipment noise sources as possible by locating equipment inside buildings;	Yes	Yes	No	No	
	12	Use downward directional low impact lighting to reduce light pollution;	Yes	Yes	No	No	Light plants placed with lights facing downwards when installed
	13	Construct low profile roads that do not act as a barriers to movement for wildlife (relative to surrounding landscape);	N/A	N/A	No	No	No new road construction in 2023
	14	Maintain snow berms along the winter access road at heights of less than 1.6 m to not hinder wildlife movement	Yes	Yes	No	No	Noted berms were reported to contractor and corrected as needed.
	15	Conduct a pre-blasting search for large mammals in the area within 1 km of the blasting site; blasting activities would be suspended until caribou have moved away (Appendix A, OP108);	Yes	Yes	No	No	Pre-blasting sweeps conducted prior to all blasts during 2023
	16	Suspending mining activities in areas where caribou are present at the Mine site;	Yes	Yes	No	No	No Caribou noted in areas of active mining
	17	Prohibit recreational vehicle use by personnel; and	Yes	Yes	No	No	No recreational vehicles on site
	18	Provide environmental sensitivity training for personnel.	Yes	Yes	No	No	Part of site initial introduction training
3.3 Wildlife Protection	19	Prohibit hunting, trapping, harvesting and fishing by employees and contractors at the Mine site;	Yes	Yes	No	No	Part of site policy
	20	All wildlife will have the right-of-way on roads;	Yes	Yes	No	No	Part of site policy & enforced by supervision and induction training.
	21	Establish and enforce speed limits 50 km/h on haul roads and 30 km/h on other roads;	Yes	Yes	No	No	Part of site policy
	22	When vehicles are stopped at night due to wildlife presence, bright headlights will be turned off, low beams or driving lights will remain on;	Yes	Yes	No	No	Part of site policy
	23	Warn drivers with signage and radio when wildlife are moving through an area;	Yes	Yes	No	No	Part of site policy and enforced by environment
	24	Staff and contractors to report all relevant observations of wildlife (particularly caribou, fox, wolverine, and bear) to on-site environment staff;	Yes	Yes	No	No	Site wildlife logs for staff, supported by weekly wildlife surveys completed by environment
	25	Land clearing for all facilities is to be completed outside of the breeding season for migratory birds (May 15 to September 15). If clearing during the breeding season is required, pre-clearing nest sweeps will be conducted;	Yes	Yes	No	No	No construction of new areas completed during the nesting season
	26	Prevent or discourage upland breeding birds and raptors from nesting on Mine infrastructure and man-made structures;	Yes	Yes	No	No	Extensive migratory bird mitigation program put into place. Focus on raptors and bank swallows, but encompasses all migratory species. All observed nests resulted in set backs until successful rearing complete.
	27	Skirt buildings to limit opportunities for animals to find suitable shelter; accommodations buildings, waste management buildings, and heated buildings will have the highest priority for skirting;	Yes	Yes	No	No	Complete and inspected regularly
	28	Conduct a pre-blasting search for large mammals in the area within 1 km of the blasting site (Appendix A, OP108). Blasting will be delayed when large mammals are present within the search area;	Yes	Yes	No	No	Part of site blasting procedure, completed in advance of every blast
	29	Isolate and remove any physical or chemical hazards to wildlife (i.e., spill management);	Yes	Yes	No	No	
	30	Contact GNWT to receive additional direction regarding new wildlife incident issues as they arise	Yes	Yes	No	No	GNWT contacted for all 2023 wildlife mortalities. 3 events reported (July 9, 16 & December 29)
	31	Contact GNWT for approval to destroy problem wildlife (this will only be done as a last resort).	Yes	Yes	No	No	Not required in 2023

Table A1: Review of WMMP Mitigations Implemented in 2023

WMMP Section	Mitigation #	Mitigation	Was it implemented in 2023?	Was it observed or demonstrated to be effective?	Was it redundant in application with any other mitigation?	Any special studies required as follow up?	Comments
3.3.1 Management of Toxic Substances	32	Follow the procedures outlined in the Waste Management Plan (De Beers 2019b);	Yes	Yes	No	No	Complied with the Waste Management Procedures during 2023
	33	Adhere to and regularly update the Emergency Response and Spill Contingency Plan (De Beers 2017a);	Yes	Yes	No	No	Complied with the Waste Management Procedures during 2023
	34	Designate and train a spill response team consisting of on-site personnel;	Yes	Yes	No	No	Annual spill training completed with ERT team and part of annual mock scenario
	35	Provide spill containment supplies at fuel transfer and storage areas;	Yes	Yes	No	No	All fuel handling areas have inspected and stoked spill kits, which are inspected monthly as part of a workplace inspection
	36	Immediately isolate, clean and report any spills;	Yes	Yes	No	No	All spills reported to environment and remediated in 2023
	37	Keep spill response equipment readily available and maintained;	Yes	Yes	No	No	Spill kits inspected across site monthly, as well as a spill response trailer with ERT being regularly inspected and readily available.
	38	Maintain vehicles and equipment;	Yes	Yes	No	No	
	39	Store fuel in double-walled containers or single-walled containers in lined containment areas.	Yes	Yes	No	No	All fueling equipment meets or exceeds ECCC standards
3.3.2 Management of Attractants	40	Education and enforcement of proper waste management practices to all workers and visitors to the site;	Yes	Yes	No	No	Regular outreach ongoing with supervisors and crews during toolboxes and weekly safety meetings.
	41	Implement waste management awareness programs;	Yes	Yes	No	No	As above
	42	Monitor waste and identify and manage sources of misdirected waste;	Yes	Yes	No	No	All non-compliant waste is sorted appropriately by area owners prior to pickup.
	43	Provide training to on-site personnel about wildlife awareness and safety including the dangers of improper food waste disposal and feeding wildlife;	Yes	Yes	No	No	Part of initial induction training, as well as tool box topics and SHE weekly safety meetings
	44	Provide designated indoor areas for lunch and coffee breaks for staff working outdoors;	Yes	Yes	No	No	Provided
	45	Separate food waste and non-food waste through the use of designated garbage cans;	Yes	Yes	No	No	Part of the WMA and waste segregation program
	46	Incinerate food waste and other attractants regularly to reduce holding time and odours;	Yes	Yes	No	No	Incineration is typically on a daily or every other day basis.
	47	Store food waste, fuel waste and other potential animal attractants inside buildings prior to incineration or transportation off-site for disposal;	Yes	Yes	No	No	All food waste stored indoors during 2023
	48	Install steel skirting around waste management facilities (including the compost facility, should it be reactivated) to limit opportunities for animals to access compost storage;	Yes	Yes	No	No	All buildings in the waste management facility are still skirted. The area is also chain like fenced on the exterior.
	49	Burn food waste and non-toxic combustible waste in oil-fired incinerators;	Yes	Yes	No	No	Completed as above
	50	Ship hazardous material off site for recycling or disposal at an appropriate facility;	Yes	Yes	No	No	Completed annual through winter road backhaul
	51	Inspect the landfill and cover it progressively;	Yes	Yes	No	No	Landfill is inspected weekly and covered on a regular basis as discussed with GNWT resource officer (monthly)
	52	Collect, sort, and place waste products that cannot be incinerated or deposited in the landfill in designated areas within the waste management and storage area until they can be shipped off-site;	Yes	Yes	No	No	
	53	Establish a fenced area for the handling and temporary storage of hazardous wastes. Fencing will be 2 m high, slatted-type, and partially buried to prevent animals from burrowing underneath;	Yes	Yes	No	No	Fences intact and proven to be effective
	54	Continue monitoring and review of the efficiency of the waste management program and improvement through adaptive management.	Yes	Yes	No	No	No major concerns or risks noted in 2023
3.3.3 Measures to avoid harm to nesting birds	55	Staff and contractors will be made aware of the potential presence and habitat of birds listed under SARA who have potential to occur at the Mine;	Yes	Yes	No	No	Annual awareness campaign rolled out to supervisors and staff regarding migratory birds and SAR. Proven success in reporting findings.
	56	Land clearing for all facilities is to be completed outside of the breeding season for migratory birds (May 15 to September 15). If clearing during the breeding season is required, pre-clearing nest sweeps will be conducted by qualified personnel (Appendix A, EP-DOP 747, Migratory Bird Nest Pre-Construction Survey);	Yes	Yes	No	No	No land clearing conducted during this time
	57	Prevent or discourage upland breeding birds and raptors from nesting on Mine infrastructure, man-made structures, and idle and stationary equipment;	Yes	Partial	No	No	Extensive migratory bird mitigation program put into place with a wide variety of deterrents. Partially effective as some birds noted to have nested on site (peregrin falcon, bank swallow etc.)
	58	Prevent or discourage upland breeding birds and shorebirds/waterbirds from nesting in natural areas in the Mine site by installing visual deterrents and/or noise makers in natural areas scheduled to be disturbed as part of the Mine plan (De Beers 2015c);	Yes	Yes	No	No	Extensive migratory bird mitigation program put into place, effective with these species
	59	Prevent or discourage bank swallow from establishing colonies on site by contouring slopes to less than 70 degrees;	Yes	Partial	No	No	Bank swallows deterred from critical work areas, however nested successfully in the CPKMR facility despite contouring.
	60	Report any raptor nesting activity observed within the mine footprint or within 1.5 km of the Mine;	Yes	Partial	No	No	Raptor deterrents deployed however nests occurred and were reported to relevant authorities.
	61	Report bank swallow nesting or nesting habitat (i.e., slopes greater than 70 degrees) on site; and	Yes	Partial	No	No	Reported to CWS North June 12, deterrents and contouring in place, but nesting still occurred. Slopes over 70 degrees not reported.
	62	If species at risk nests are identified on site, contact ECCC's Canadian Wildlife Service (cwsnorth-scfnord@ec.gc.ca) as soon as possible to ensure adequate mitigation and monitoring measures are put in place.	Yes	Yes	No	No	Banks swallows the only SAR in the 2023 season, reported June 12
-[(a)]	63	Bank Swall nest preventation at the Course Processed Kimberlite rock pile: Make the habitat less desirable for nesting by re-sloping entire cutbank to less than 70 degrees; Explore idea of creating new alternative habitat in non-active areas; and Install deterrents (noise cannons, kites, "Big eyes") to prevent nest establishment.	Yes	Partial	No	No	Completed by mining in advance of the season, however nesting still occurred
	64	Cliff swallow nesting in Ammonia Nitrate (AN) transfer barns: Install noise deterrents (note: not propane deterrents because there are explosives in the transfer barn); Install visual deterrents (e.g., flagging, plastic raptor silhouettes) at the ends and on top of the structure; and Install physical deterrents (e.g., plastic bird spikes) along the inner peaks of structure.	Yes	No	No	No	All deterrents put into place, however nesting still occurred
3.3.4 Deterring Wildlife	65	Wildlife will only be deterred when there is a risk to either humans or wildlife, as judged by the environment staff. All deterrent actions start with the least intrusive method, and then increase in intensity as needed. Each deterrent action will stop as soon as the animal moves away from the potentially hazardous site and no longer poses a threat to humans. Deterrents may be used to remove wildlife from the airstrip and potentially hazardous sites and activities including nesting activity within open pits. All deterrent actions will approved under the General Wildlife Permit issued by GNWT.	Yes	Yes	No	No	Deterrent use log kept up to date by enviro staff. Methodology used effectivly to deter widlie effectivly from areas as stated.

Table A1: Review of WMMP Mitigations Implemented in 2023

WMMP Section	Mitigation #	Mitigation	Was it implemented in 2023?	Was it observed or demonstrated to be effective?	Was it redundant in application with any other mitigation?	Any special studies required as follow up?	Comments
3.4 Caribou Protection	66	All sightings of caribou will be reported to environment staff;	Yes	Yes	No	No	Site wildlife logs entered monthly, weekly inspections completed by environment
	67	All incidents involving interactions, use of deterrents or potential injury of caribou will be documented and evaluated;	Yes	Yes	No	No	No incidents with Caribou in 2023
	68	All interactions involving injury to caribou will be reported to GNWT;	NA	NA	NA	NA	No Caribou Injures in 2023
	69	Site roads may include caribou crossing features at key locations as identified by Indigenous communities;	Yes	Yes	No	No	Locations on N11 roadway crossing berms in place during 2023, with pipeline also dissassembled.
	70	Winter access road snow berms 1.6 m or higher will be reduced below this threshold;	Yes	Yes	No	No	4 exceedances noted during the 2023 winter road season. All were corrected by winter road operations (Nuna)
	71	If caribou are crossing Mine roads, traffic will stop and wait for them to cross (i.e., caribou have the right-of-way);	Yes	Yes	No	No	Caribou right of way maintained
	72	If vehicles are stopped on roads at night due to wildlife presence, high-beams will be turned off, and low beams or running lights will remain on;	Yes	Yes	No	No	Enforced by Winter Road Security & Environment
	73	Caribou will only be moved away from roads or the airstrip under specific circumstances, such as when there are incoming flights or if there is an emergency; and	Yes	Yes	No	No	Caribou deterred from accessing Area 2 during the 2023 season in order to reduce potential harm to them by inadvertently stepping onto unstable FPK. Only operation deterrence was at airstrip to reduce flight hazard.
	74	Caribou will be deterred from the airstrip by driving a truck down the strip, getting out of the vehicle and making noise by yelling. When there is an imminent flight scheduled to land at the airstrip, firing bear bangers into the air may be used to move caribou slowly away.	Yes	Yes	No	No	Several instances where caribou and muskox needed to be deterred as described

a) Two additional mitigations were added after the WMMP was approved, following recommendations from Environment and Climate Change Canada (ECCC 2022).

ATTACHMENT B

Remote Monitoring Camera Caribou Photo


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