DE BEERS GROUP

March 30, 2022

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 2021 Wildlife Report

De Beers Canada is pleased to provide Gahcho Kué Mine's 2021 Annual Wildlife Report, in accordance with the Wildlife Management and Monitoring Plan (WMMP), Ver.1.1, which was submitted to the Government of Northwest Territories on January 4, 2022.

This report is also submitted to fulfill the reporting requirement in the Wildlife Research Permit (Permit #: WL501014).

If you have any questions regarding this submission, I can be contacted at william.liu@debeersgroup.com or (867) 445-1485.

Sincerely,

William Liu
Regulatory Specialist
De Beers Canada Inc.

cc:
Wildlife Management Information System
Angela Love – MVLWB

DE BEERS GROUP

Gahcho Kué Mine

2021 Annual Wildlife Report

March 2022

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1 INTRODUCTION

De Beers Canada (De Beers) operates the Gahcho Kué Mine (Mine), located at Kennady Lake about 280 kilometres (km) northeast of Yellowknife,NWT. Kennady Lake is north of the East Arm of Great Slave Lake and the small community of Lutsle 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-ENR 2019a) to meet requirements of the NWT *Wildlife Act*. The GNWT then issued a directive letter 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-ENR 2019a). In compliance with the *Wildlife Act* and Land Use Permit MV2005C0032 (expired on August 10, 2021), Version 1 of this 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, ECCC, Ni Hadi Xa, and MVLWB in January 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 Northwest Territories (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.

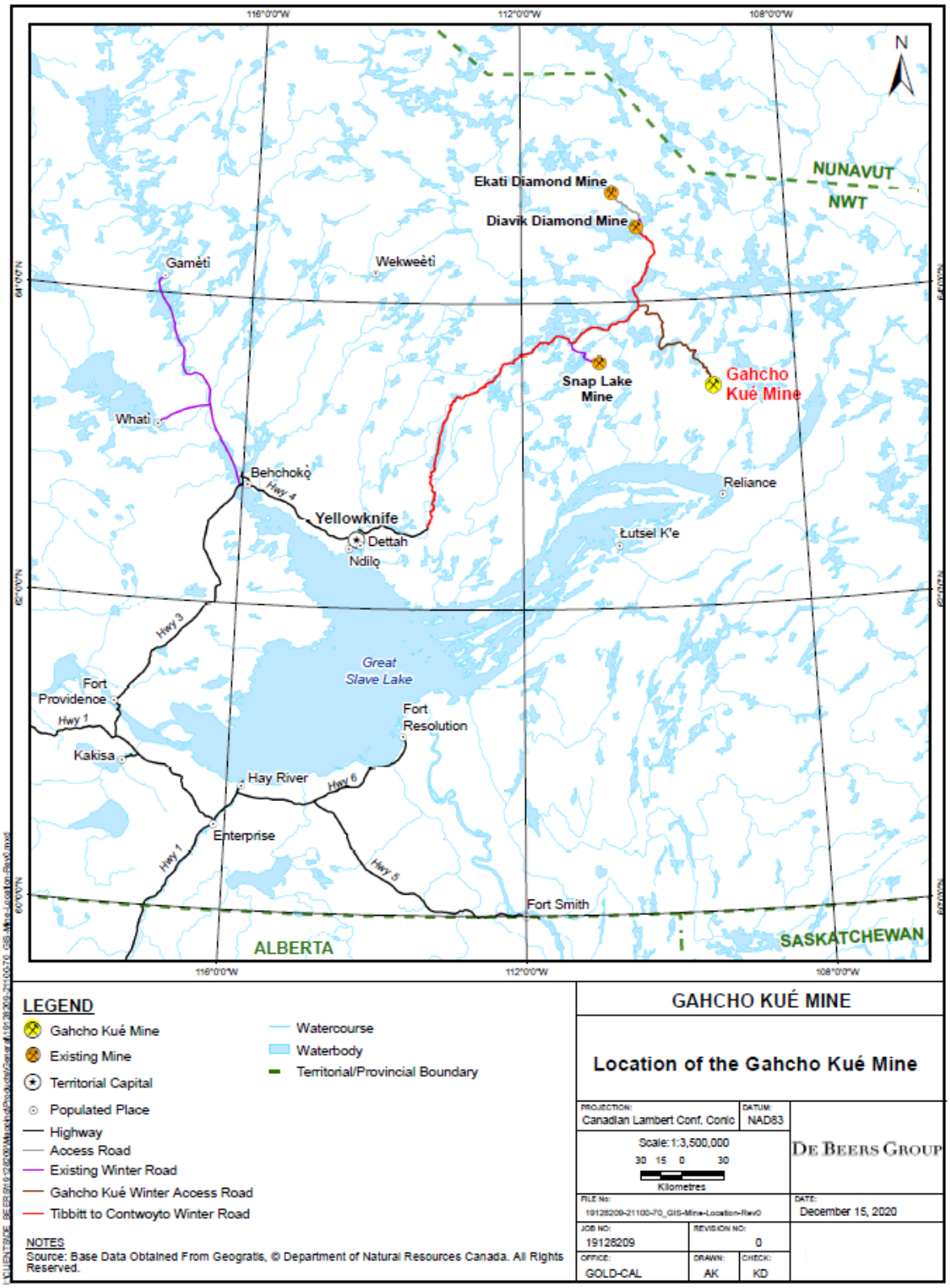
Pursuant to the WMMP (De Beers 2021), this report describes mitigation and monitoring activities at the Mine and in the regional study area from January to December of the current reporting year and includes:

- 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;

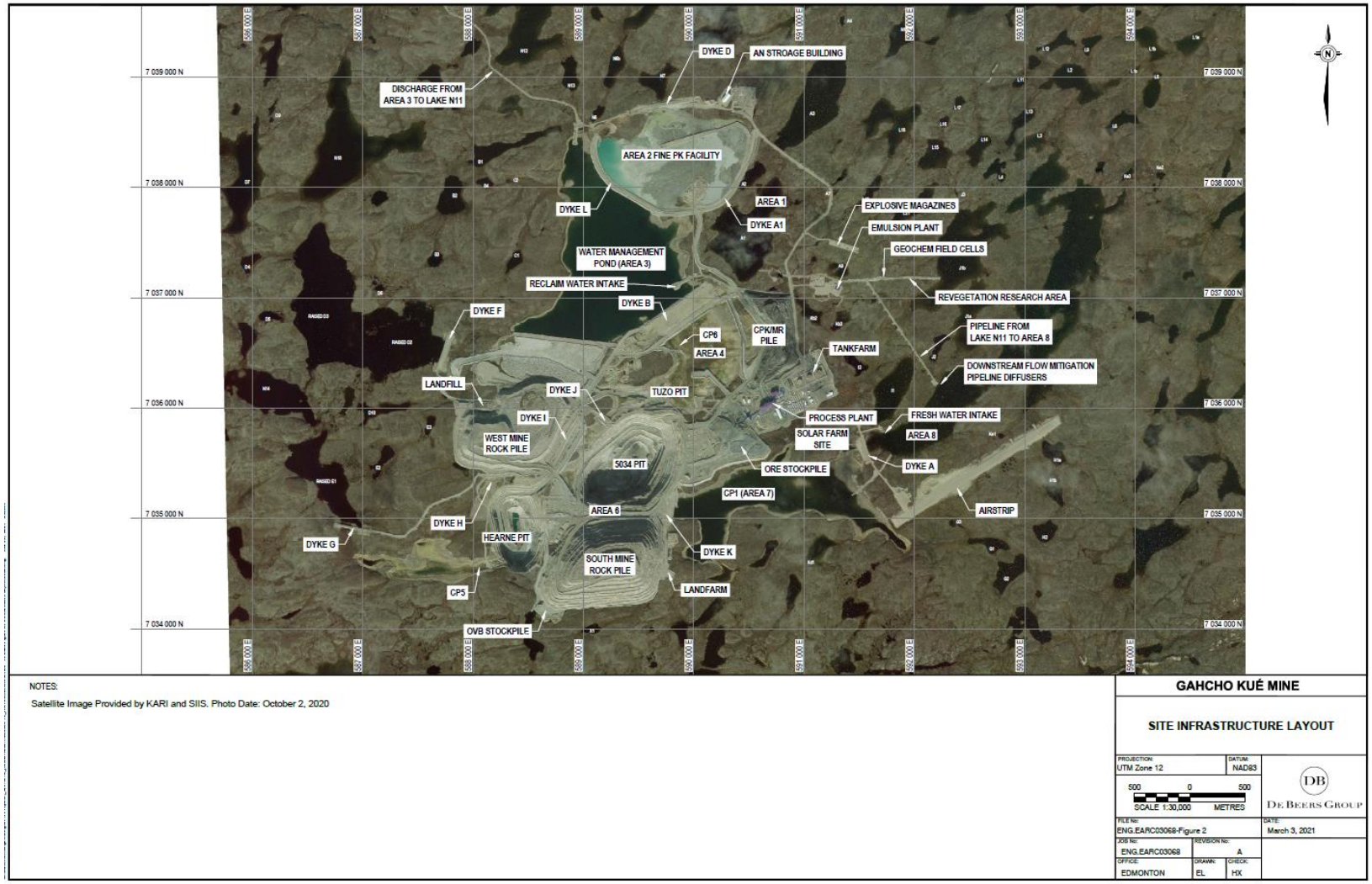
- disturbances to wildlife and wildlife habitat that were not predicted in the Environmental Impact Statement (EIS; De Beers 2010); and
- observations of recreational, traditional, and non-traditional activities near the Mine, including the winter access road.

A comprehensive analysis of mitigation and monitoring activities will be undertaken every five years. The first comprehensive analysis was done in 2019, with the next analysis scheduled for 2024. 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.

Map 1-1 Location of the Gahcho Kué Mine



Map 1-2 2021 Gahcho Kué Mine Site Infrastructure



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 Natural Resources (ENR) of the GNWT, 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 Arctic Program for Regional and International Shorebird Monitoring (PRISM) in 2015. De Beers will continue to participate in ENR 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-ENR 2021).

1.1 Content

The 2021 Annual Wildlife Report includes WMMP activities. 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 will include descriptions and summaries of all of the wildlife monitoring that occurred during 2021.

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

Monitoring	Corresponding Monitoring Plans or Programs	Monitoring Schedule	Completed in 2021	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 ENR, in addition to being reported annually.	Yes	3.3.6

Monitoring	Corresponding Monitoring Plans or Programs	Monitoring Schedule	Completed in 2021	Report Section
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 2021. De Beers intends to use collared caribou data moving forward to assess for Mine-related effects of indirect habitat loss per the Mine's Tier 3 WMMP.	No	-
		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.	No. Surveys did not trigger behaviour monitoring in 2021	3.4.1
		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
		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 2019.	No. Surveys did not trigger behaviour monitoring in 2021	3.4.2
		Snow berm measurements were recorded in 2021.	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
		Raptor nest surveys in the regional study area were completed in 2015. Results were contributed to ENR for their regional nest monitoring database. A RSA was conducted by ENR in 2020. Regional monitoring is anticipated to continue every five years with the next nest surveys scheduled for 2025.	No	3.6

Monitoring	Corresponding Monitoring Plans or Programs	Monitoring Schedule	Completed in 2021	Report Section
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
		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
		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
		Arctic PRISM surveys were completed in 2017 and in 2019.	No	3.7
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	3.8
Environmental Indicators	WMMP	Annual monitoring and reporting of weather-related variables began in 2015 and has continued since.	Yes	3.9
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; ENR = Department of Environment and Natural Resources, Government of the Northwest Territories; 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 Traditional Knowledge 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 Traditional Knowledge monitoring. Ni Hadi Xa currently employs one full-time environmental monitor stationed at the site and works closely with the De Beers environment team. Two Traditional Knowledge monitors and one Traditional Knowledge 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 2021 as outlined in the Engagement Plan (De Beers 2015). Due to COVID-19 travel and social gathering restrictions, De Beers was not able to host previously scheduled in person engagement events, such as mine site visits, community visits and fish tasting after March 2021. Majority of the engagement activities were undertaken through virtual platforms.

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 2021), and possibly leading to changes in the species at risk considered for the Mine.

There are eleven 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*), 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 so that site-specific protection can be implemented.

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	Schedule 1 - 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	Schedule 1 – 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	Special Concern (under consideration for)	• 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	Schedule 1 – 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
Short-eared owl	Sensitive	No Status	Special concern	Schedule 1 – special concern	• May be affected by habitat loss • Sensitive to noise and disturbance and human activity during nesting	• habitat loss • surveillance monitoring • PRISM

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
Bank swallow	At risk	No Status	Threatened	Schedule 1 - 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
Harris's sparrow	Undetermined	No Status	Special Concern	Under consideration	• 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	Schedule 1 – 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	No status	• 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 (2016). Ranking levels, from highest to lowest conservation concern, is: at risk, may be at risk, sensitive, secure, undetermined.
b) NWT SARC (2021).
c) Government of Canada (2021).
d) *Species at Risk Act* (2002).
COSEWIC = Committee on the Status of Endangered Wildlife in Canada; WMMP = Wildlife Management and Monitoring Plan; PRISM = Program for Regional and International Shorebird Monitoring.

3 MONITORING AND RESULTS

3.1 Local and Regional Study Areas

The wildlife regional study area (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 LSA (about 2 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 (MV2005C0032) 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 2014a]).

Results

The Mine currently has a land footprint of 672 hectares (ha), and water (deep and shallow water) footprint of 668 ha, for a total footprint of 1340 ha (Table 3-1). This is currently 93.77% of the total 1,429 ha predicted Project footprint in the approved 2020 Updated Project Description as part of the Water Licence Amendment.

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 2021 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

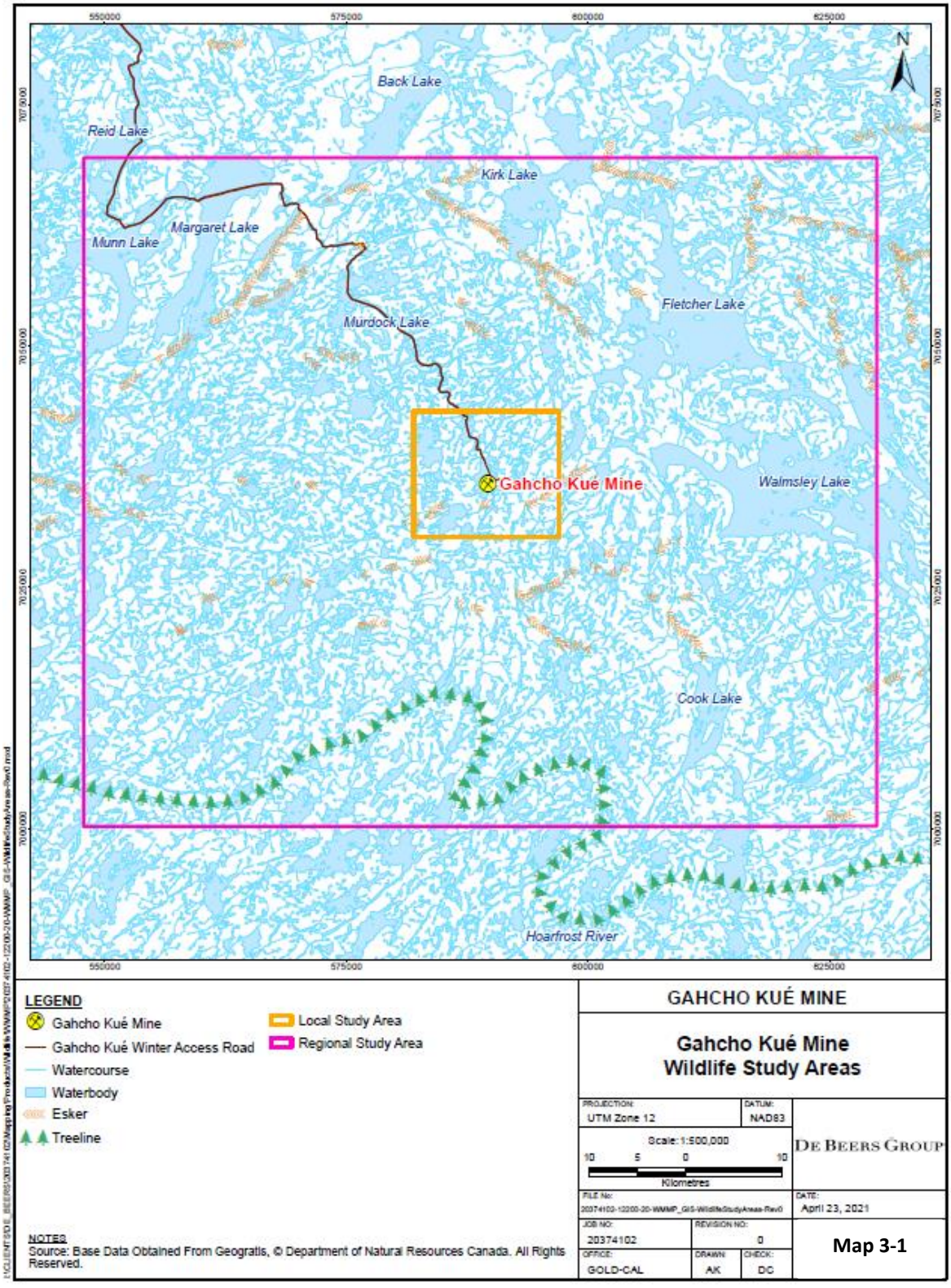


Table 3-1 Expected and Actual Loss of Habitat Types Associated with the Mine Footprint to the end of 2021

Ecological Land Class	Expected Distrubance (ha)[a]	Actual Disturbance (ha)[b]	Difference between Actual and Expected Disturbance (ha)
Bedrock Association	10	9	1
Birch Seep	43	36	7
Boulder Association	8	7	1
Deep Water	494	493	1
Heath Bedrock	68	55	13
Heath Boulder	33	28	5
Heath Tundra	113	98	15
Peat Bog	134	123	11
Sedge Wetland	134	122	12
Shallow Water	176	175	1
Spruce Forest	51	46	5
Tall Shrub	44	39	5
Tussock Hummock	111	99	12
Esker Complex	0	0	0
Unclassified	10	10	0
Total	1,429	1,340	89

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

(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 aniticpated 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) and Year 5 (2021) of Mine operations with future assessments planned for Year 8 (2024) of the operation phase.

Methods

According to Alberta Energy Regultor (AER) Directive 038 (EUB 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, and Year 5 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 5 noise monitoring program, $L_{eq,\ day}$ and $L_{eq,\ night}$ cumulative noise levels were measured at four locations in and around the Mine during mid June (Table 3-2). These four locations used in the Year 5 monitoring program were selected for consistency with the assessment completed for the EIS (De Beers 2010) and the Year 1 noise monitoring program (Golder 2017b).

Table 3-2 Year 5 Noise Monitoring Locations

Year 5 Noise Monitoring Location	Description	Universal Transverse Mercator Coordinates [Zone 12]	
		Easting [m]	Northing [m]
RA	Accommodations complex (west side)	590,632	7,035,849
RB	Accommodations complex (east side)	591,005	7,035,997
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

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 5 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.

Results

Noise monitoring was conducted in 2021 by Golder Associates Ltd. over the course of two days in June (June 19th to June 20th). Noise levels measured during the Year 5 monitoring program are compared to the noise levels predicted for Year 5, to the noise benchmarks from the Mine EIS (De Beers 2010), and to baseline levels measured in June 2010 (Table 3-3). Differences, or changes in noise levels less than 3 dBA are considered negligible, differences between 3-6 dBA are low, differences between 6-10 dBA are medium, and differences greater than 10 dBA are considered high. For all four monitoring locations, daytime and nighttime noise levels from the Year 5 monitoring program are less than corresponding Year 5 model predictions in the EIS.

Table 3-3 Comparison – Year 5 Noise Monitoring Results, Year 5 Model Predictions, Noise Benchmarks, Baseline Noise Levels

Site	Year 5 Noise Monitoring – Cumulative Noise Level [dBA]		Year 5 Model Prediction – Cumulative Noise Level [dBA]		Noise Benchmark [dBA]		Representative Baseline Noise Level from June 2010 [dBA]	
	Day[a] $L_{eq,day}$	Night[b] $L_{eq,night}$	Day $L_{eq,day}$	Night $L_{eq,night}$	Day $L_{eq,day}$	Night $L_{eq,night}$	Day $L_{eq,day}$	Night $L_{eq,night}$
RA	65.8	66.6	69	69	55	55	54.0	48.9
RB	55.5	56.0	58	58	55	55	54.0	48.9
RC	35.1	33.4	38	38	50	40	36.5-48.3	24.9-44.9
RD	38.9	40.4	44	44	50	40	36.5-48.3	24.9-44.9

(a) Day measures taken from 7am to 11pm.

(b) Night measures taken from11pm-7am.

At the station on the west side of the accommodations complex (RA), Year 5 measurements were lower than predictions, but higher than the benchmark. The difference is considered high for both time periods. The measurements were higher than baseline for both day and night with high magnitudes of difference.

At the station on the east side of the accommodation complex (RB), Year 5 measurements were lower than on the west side. Again, as compared with model predictions, measured values were lower. The magnitude of the difference was negligible for day and night. Again, measurements were higher than the benchmark for daytime but the difference was negligible for day and medium for night. The Year 5 measurements at this station were higher than baseline for both day and night, but the difference was negligible and medium, respectively.

At the station on the proposed East Arm National Park boundary (RC), the Year 5 measurements were lower than predicted and benchmark for both day and night. The measures were lower than and within the range of baseline values for day and night respectively.

Finally, at the station located 1.5 km from the Mine boundary, Year 5 measurements were lower than predicted in the day and night.. The measured values were lower than the daytime benchmark and slightly higher than the nighttime. The magnitude of the nighttime increase was negligible. The Year 1 measurements fall within the range of baseline daytime and nighttime measurements.

Generally speaking, daytime and nighttime noise levels from the Year 5 monitoring program are less than corresponding Year 5 model predictions from the EIS, which indicates that actual noise effects from Year 5 operations are less than predicted in the EIS. The Year 5 noise monitoring program validated and confirmed the conclusions of the EIS.

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 Soils Monitoring Program Version 3 (VSMP) (De Beers 2014b), dustfall collectors were deployed in August 2013 and monitoring has continued through 2021.

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 (2015-2021). 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 2021 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 2021 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 days) and distance from the Mine (km). Fixed dustfall values greater than 115.3 mg/100 cm^2/30 days were considered anomalous outliers (n = 5) 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 Vegetation and Soils Monitoring Program report (De Beers 2020b). The results provided herein represent a summary of key findings from that report. Dustfall collection jars were deployed and collected four times at all fifteen sampling areas (Five sampling areas at the Northwest transect and nine sampling areas at the Southwest transect) over the course of the 2020/2021 monitoring year. Collections occurred over four periods beginning:

- September 7 and 12, 2020 to April 29, 2021 (winter);
- April 29, 2021 to June 26, 2021 (spring/early summer);
- June 26, 2021 to August 3, 2021 (summer);

- August 3 to August 24, 2021 (summer); and
- August 24, 2021 to September 22, 2021 (fall).

A total of 65 samples (including duplicates) were collected and submitted for dustfall analysis (none were damaged in the 2021 sampling program).

In 2021, 36 of 52 (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 days (includes duplicate samples). In 2020, 10 of 39 (25.6%) measured values of fixed dustfall deposition during spring, summer, and fall were below the detection limit of 3.0 mg/100 cm^2/30 days (includes duplicate samples). In 2019, 20 of 28 (71.4%) 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). Dustfall rates have declined substantially since 2018 and in 2021 are within or below the range of baseline values.

Fixed dustfall deposition values measured in 2021 at the Northeast transect for the AQEMMP included 21 of 25 values below the detection limit from June to August (Table 3-4). Mean fixed dustfall deposition rates for sampling locations during baseline, construction, and operational sampling periods are shown in Table 3-5.

Table 3-4 Fixed Dustfall Deposition Rates at the Northeast Transect, 2021

Month	Fixed Dustfall [mg/100 cm^2/30 d][(b)]				
	NEDF01	NEDF02[(a)]	NEDF03	NEDF04	NEDF05
Overwinter[(c)]	<3.0	<3.0	<3.0	<3.0	<3.0
June	52.5	4.2	<3.0	<3.0	<3.0
July	12.6	2.55	<3.0	<3.0	<3.0
August	<4.2	<4.2	<4.2	<4.2	<4.2
September	<3.0	<3.0	<3.0	<3.0	<3.0
Annual[(d)]	**14.04**	**2.37**	**1.62**	**1.62**	**1.62**

[(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 7, 2020 to April 29, 2021.

[(d)] Values below detection limit were assumed to be one half of the detection limit for annual averages.

[(e)] 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 3-5 Mean fixed dustfall deposition rates (mg/100 cm2/30 days) for Southwest Transect sampling locations during baseline years (2013-14), construction (2015-2016) and operational (2016-2021) 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]	-	-	-	-	-	-	-	-	-	-

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
	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	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	37.6	28.4	28.6	28.7	30.8
	2018[f]	28	30.4	47	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
	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	17.7	35.7	44.7	37.1	34.6	<5.0	23.7
Summer	2017[e]	26	-	-	-	-	-	-	-	-	-
	2018[f]	34	61.3	145	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
	2013[a]	44	10.3	13	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
Early Fall	2017	31	23.5	37	33.3	35	22.8	27.5	26.4	28.8	25.6
	2018[f]	37	13.3	12.7	26.3	19	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
	2013[a]	-	-	-	-	-	-	-	-	-	-
	2014[b]	42	<5.0	4.8	<5.0	6.6	6	-	<5.0	9	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
Late Fall	2017	28	25.3	40.1	26	21.3	35.5	28.6	34	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

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
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	-	8	-	<5.0	-	<5.0	<5.0
	2017-18[f]	247	6.7	12.2	-	14.5	5.8	5	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

- = No data

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)

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 was mandatory. Observations of species that posed a potential risk to human safety were reported to Environment staff immediately in addition to being documented in the wildlife sightings log.

Results

There were a total of 422 independent wildlife observations in 2021. 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 2021 is reported in Section 3.12.

Fox was the most commonly observed species in 2021, with 160 observations, of which red fox was observed 127 times, and unknown species an additional 33 times. Arctic hare was also a commonly observed species during 2021, with 37 servations recorded. Other frequent species observed were the common raven and muskox (43 and 30 observations respectively). Fourteen observations of caribou were recorded in 2021. In 2021, 6 wolf observations of unknown species were recorded. With the first sighting occurring April 26th, 2021 and last recorded sighting on December 1st, 2021. One grizzly bear observation was recorded in 2021. A full summary of observations recorded on Wildlife Sightings Logs for 2013-2021 can be found in Table 3-6.

Table 3-6 Wildlife Sightings Log Summary of Observations, 2013 to 2021

Species	Type	2013	2014	2015	2016	2017	2018	2019	2020	2021
American robin	Bird	-	-	1	-	2	-	-	1	-
Arctic ground squirrel (sik sik)	Mammal	-	4	11	4	23	3	3	2	8
Arctic hare	Mammal	3	32	45	9	29	5	22	26	37
Bald eagle	Bird	-	-	1	4	1	2	11	5	7
Beaver	Mammal	-	-	-	-	1	-	1	-	-
Cackling goose	Bird	-	-	-	-	-	-	-	-	3
Canada goose	Bird	-	1	2	-	2	-	1	3	5
Caribou	Mammal	17	37	45	-	2	61	16	6	14
Common merganser	Bird	-	-	-	-	-	-	-	-	2
Common radpoll	Bird	-	-	-	-	-	-	-	-	1
Common raven	Bird	-	10	16	13	15	11	27	15	44
Duck spp.	Bird	-	-	-	-	-	-	-	-	2
Fox spp.	Mammal	5	33	155	85	104	91	48	15	33
Gadwall duck	Bird	-	-	-	-	-	-	-	-	1
Golden eagle	Bird	-	-	-	-	-	-	-	-	4
Goose spp.	Bird	-	-	4	6	3	-	7	1	15
Greater white-fronted goose	Bird	-	1	5	1	-	-	-	3	5
Grey wolf	Mammal	7	27	22	2	4	4	40	2	-
Grizzly bear	Mammal	-	-	3	3	2	4	11	4	1
Grouse	Bird	-	-	-	-	-	-	-	-	1
Gull spp.	Bird	-	1	3	-	2	-	1	-	2
Gyrfalcon	Bird	-	-	1	1		-		-	1
Hare spp.	Mammal	-	-	-	-	-	5	14	1	12
Jaeger spp.	Bird	-	-	1	-	-	-	-	1	-

Species	Type	2013	2014	2015	2016	2017	2018	2019	2020	2021
Loon spp.	Bird	-	-	2	-	2	-	1	-	-
Mink	Mammal	1	-	-	-		-	-	-	-
Moose	Mammal	-	-	5	-	4	1	5	2	2
Mouse spp.	Mammal	-	-	3	2	2	7	2	1	2
Muskox	Mammal	1	4	14	10	14	20	24	15	30
Muskrat	Mammal	-	-	-	2	5	-	1	-	-
Northern harrier	Bird	-	-	-	-	-	-	-	-	1
Northern pintail	Bird	-	-	-	1	-	-	-	1	2
Owl spp.	Bird	-	-	2	4	-	-	-	-	-
Pelican spp.	Bird	-	-	-	-	-	-	-	-	1
Peregrine Falcon	Bird	-	1	12	1		2	1	-	4
Pine siskin	Bird	-	-	-	-	1	-	-	-	-
Plover spp.	Bird	-	-	-	-	-	-	-	-	1
Porcupine	Mammal	-	-	-	-	-	1	-	-	-
Ptarmigan spp.	Bird	3	16	10	10	4	9	4	6	15
Red Fox	Mammal	-	-	-	-	-	-	-	-	127
Rock ptarmigan	Bird	-	-	-	-	-	-	-	-	7
Ross's goose	Bird	-	1	-	-	-	-	-	-	-
Rough-legged hawk	Bird	-	2	-	-	-	-	1	1	5
Sandhill crane	Bird	-	-	-	1	1	-	-	1	-
Scoter spp.	Bird	-	-	1	-	-	-	-	-	-
Short-eared owl	Bird	-	1	1	-	1	-	-	-	-
Snow bunting	Bird	-	-	-	-	-	-	-	1	2
Snow goose	Bird	-	-	1	-	-	-	-	2	4
Snowy owl	Bird	-	-	-	-	1	1	1	2	4
Sparrow spp.	Bird	-	-	1	-	-	-	-	-	-
Teal duck	Bird	-	-	-	-	-	-	-	-	2
Tundra swan	Bird	-	1	1	-	-	-	1	-	-
Unidentified duck	Bird	-	-	2	1	1	-	2	-	-
Unidentified raptor	Bird	-	-	2	1	3	4	-	-	-
Unidentified shorebird	Bird	-	-	-	-	-	-	-	-	3
Unidentified songbird	Bird	-	-	2	1	1	2	-	-	3
Willow ptarmigan	Bird	-	-	-	-	-	-	-	-	1
Wolf spp.	Mammal	-	-	-	-	-	-	-	-	6
Wolverine	Mammal	-	-	-	-	8	27	43	4	-
Yellow warbler	Bird	-	-	-	-	-	-	-	-	1

(a) The number of observations represents the number of independent observations for each species, and is not an indication of the number of individuals present.

- = none observed.

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 bag inspections, as per the Waste Management Plan (De Beers 2015b), 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, and staff recorded the area surveyed, and 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 particular in areas scheduled for clearing or disturbance each year (Section 3.9.1). Bird deterrents are deployed in areas scheduled for disturbance 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.

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 waterbird 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 was continued in 2021.

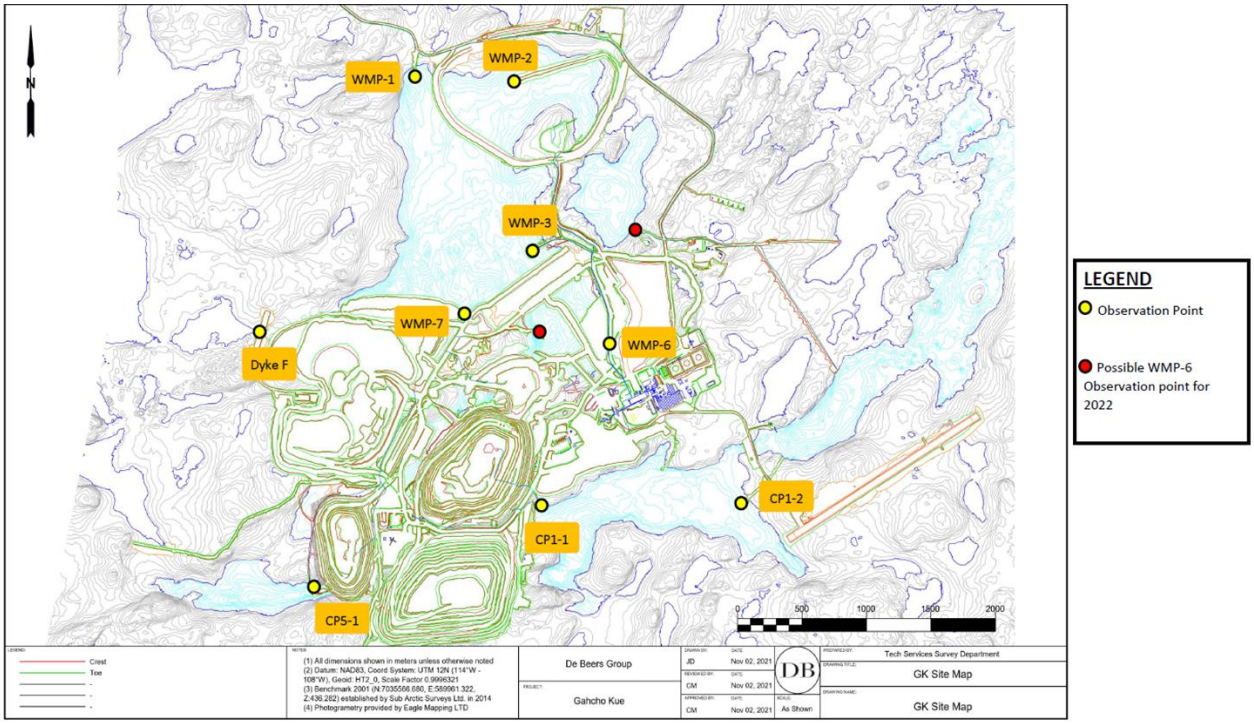
To monitor the use of site water bodies by birds, 8 stations were selected as fixed observation points from which the 2021 surveys were conducted. Five of these stations are located around the Water Management Pond (WMP-1, WMP-2, WMP-3, WMP-6, WMP-7), one station located around collection pond 5 (CP5-1) and, two stations

around collection pond 1 (CP1-1, CP1-2). A single station was also visited as an Ad-Hoc (Dyke F) on July 15th. Due to mining expansion, the 2021 station (WMP-6) has been converted into a road and is no longer in existence as of September 9th. 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 3-7. 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 10-15 minutes to complete. The observer records information including species type, activity (including evidence of nesting behavior), and number of individuals.

Table 3-7 Locations of Collection Pond Stations, 2021

Collection Pond Station	Easting	Northing
CP1-1-20	589803	7035085
CP1-2-20	591606	7035361
CP5-1-20	588133	7034571
WMP-1-20	588811	7038360
WMP-2-20	589693	7038355
WMP-3-20	589814	7037102
WMP-6-20	590451	7036293
WMP-7-20	589233	7036601

Map 3-2 Collection Pond Survey Locations, 2021



Results

In 2021, a total of 49 weekly site surveillance surveys were completed. Wildlife or sign of wildlife (e.g., tracks, scat) was observed during 28 surveys (57%). Fox species were the most commonly observed species in 2021, with 100 observations of red fox, and 1 additional observation of an unidentified species of fox (most likely related to fox sign in the area). Muskox were observed in large quantities: 157 individual muskox were counted over 10 observations during 2021 weekly surveys. Other commonly observed species were unidentified songbirds, common raven, and arctic hare. A full summary of wildlife observations from weekly wildlife surveys can be found in Table 3-8.

Table 3-8 Wildlife and Wildlife Sign Observed During Site Surveillance Surveys, 2021

Species	Number of Surveys with Wildlife Observations	Total Number of Individuals Observed	Number of Surveys with Wildlife Sign
American pipit	4	5	
American robin	6	8	
American tree sparrow	1	6	
Arctic hare	33	27	17
Bald eagle	1	1	
Bank swallow	3	10	
Cackling geese	6	200	
Canada goose	1	9	
Caribou	13	408	
Cliff swallow	3	10	
Common loon	4	6	
Common raven	36	40	6
Crane spp.	1	12	
Duck spp.	20	166	
Fox spp.	1	1	1
Goose spp.	14	1322	
Great white-fronted goose	9	42	
Grizzly bear	1	1	
Ground squirrel	7	7	
Gull spp.	13	21	
Harris' sparrow	1	6	
Lesser scaup	1	1	
Long tailed duck	5	15	
Loon spp.	3	4	
Muskox	10	157	1
Muskrat	1	1	
Northern pintail	8	110	
Peregrine falcon	1	1	
Plover sp.	1	1	
Ptarmigan spp.	14	133	4
Red fox	100	98	83
Rock ptarmigan	8	110	1
Rough legged hawk	2	2	
Semipalpated plover	2	2	
Snow bunting	11	187	
Snow geese	4	12	
Snowy owl	2	1	
Sparrow spp.	7	30	
Surf scoter	1	4	
Unidentified shorebird	7	21	

Species	Number of Surveys with Wildlife Observations	Total Number of Individuals Observed	Number of Surveys with Wildlife Sign
Unidentified songbird	48	129	1
Unknown[a]	2	12	
Unknown raptor	1	1	
White-crowned sparrow	2	2	
White-winged scoter	2	1	
Willow ptarmigan	1	1	
Wilsons warbler	1	6	
Yellow warbler	2	2	

(a) Sighting could not be assigned to bird nor mammal

In 2021, Collection Pond Surveys were conducted on a bi-weekly basis from June 2nd to September 9th. During 9 different survey events, a total of 65 bird observations were made consisting of 212 individuals. A summary of these results is provided in Table 3-9. The survey had positively identified 18 different species. Often birds could not be identified to species, and were classified to family group or as unidentified. A summary of the results is provided in Table 3-10. No nesting activity was observed.

Table 3-9 Birds Observations Collected During Collection Pond Surveys, 2021

Station	Number of bird groups detected	Number of individual birds detected	Average number of individual birds/station/survey
CP1-1-20	15	81	5
CP1-2-20	13	55	4
CP5-1-20	6	20	3
WMP-1-20	8	10	1
WMP-2-20	4	14	4
WMP-3-20	6	9	2
WMP-6-20	3	5	2
WMP-7-20	5	10	2

Table 3-10 Wildlife and Wildlife Sign Observed During Collection Pond Surveys, 2021

Species	Number of individuals observed	Number of survey events (station visits) where species was observed
American pipit	1	1
American Robin	8	5
American Tree Sparrow	1	1
Bank Swallow	4	2
Barn Swallow	2	2
Black Scoter	5	1
Common Loon	6	3
Duck spp.	24	4
Goose spp.	3	1
Greater Scaup	9	1
Gull spp.	10	7
Harris' Sparrow	3	2

Species	Number of individuals observed	Number of survey events (station visits) where species was observed
Lesser Scaup	9	1
Long Tailed Duck	47	4
Loon spp.	24	3
Mew Gull	6	4
Northern Harrier	1	1
Northern Pintail	4	1
Red-Throated Loon	4	3
Semipalmated Plover	3	2
Sparrow spp.	6	2
Surf Scoter	5	1
Swallow spp.	1	1
Teal Ducks	6	1
Unidentifiable songbirds	20	11

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 drove 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 2014a).

Results

In 2021, the winter access road was operational from February 8th to March 31st (i.e., 52 days). There were 1,915 loads on the winter 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. Hunting parties were reported on the winter access road by security personnel on multiple occasions, no major 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 were reported, investigated, and had immediate follow-up actions completed by Environment staff. If wildlife had to be deterred to reduce the risk of a wildlife-human incident, then an effort was 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 were reported immediately to Environment and Climate Change Canada and/or ENR. Documentation of wildlife incidents included 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 2021, two wildlife mortality incidents were reported: a Red fox carcass was sighted on the Airport road on June 19th and an unidentified carcass was sighted in the Pit Muster on September 26th. Programs educating workers to be vigilant with regards to waste management and keeping all doors closed were delivered to all departments. The intent of this education was to remove wildlife access to food rewards. A lack of reward kept the animals from settling in the area, and as such, no adverse human-wolf encounters were reported.

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 what the zone of influence is 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 ENR 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 monitoring programs supporting the Barren-ground Caribou Management Strategy (ENR 2011). De Beers also participates in the ENR-led Zone of Influence Technical Task Group for development of a standardized set of guidelines to monitor the 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 2021, an aerial reconnaissance survey was completed on February 10th, 2021 along the Gahcho Kué winter spur road via helicopter aircraft at an altitude of approximately 120m and speeds of 80-100 km/h. The number of wildlife and wildlife sign observations were recorded by De Beers Environment 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 as a potential trigger for caribou behavioural monitoring.

Results

No signs of caribou or any other wildlife were observed during the 2021 aerial survey. As a result, the Winter Road Caribou Behavioural Monitoring Program (Section 3.4.2) was not triggered during the 2021 season.

3.4.2 Behaviour Monitoring

The objective for monitoring changes in caribou behaviour 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 2021).

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-ENR 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 20 or more groups of caribou 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 NWT 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 NWT 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, and location of each group.

Observers will make note of the location, composition, and herd size of any caribou or caribou tracks observed. They will also 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 not triggered in 2021, as per the WMMP, as no signs of caribou were detected during the 2021 aerial survey.

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 11th, 2021

- Survey 2 – March 2nd, 2021
- Survey 3 – March 18th, 2021

Snow berm height and slope were measured every 2 km along the winter road, at both lake and portage locations, to determine factors affecting the permeability of the winter road to caribou (i.e., whether caribou cross or are deflected by the winter road). These data were also used to inform the maintenance crew of any snow berm heights in excess of 1.6m.

Results

In 2021, the average snow berm heights for lake section surveys of the winter road were 0.45m, 0.70m, and 0.45m with a maximum berm height recorded of 1.40 m during Survey 2. The average snow berm slopes were 9°, 23°, and 17°, with a maximum recorded slope of 65° during Survey 1. On portage sections, average heights were 0.51 m, 0.23 m, and 0.51 m, with a maximum height of 1.45 m during Survey 3. Average snow berm slopes recorded on portages were 18°, 6°, and 15°, with a maximum slope of 50° recorded during Survey 1. The proportion of measurements recorded at lakes was 85% over all three surveys, while 15% of the measurements occurred on portages. The total length of lakes along the winter access road is 100 km (83.0% of the total winter access road), whereas portages account for 20 km (17.0% of the total winter access road). Summary of survey data is located in Table 3-11.

Table 3-11 Snow Berm Monitoring Results for the Winter Access Road, 2021

Measurements		Survey 1 (n = 122)		Survey 2 (n = 122)		Survey 3 (n = 122)	
		Lake	Portage	Lake	Portage	Lake	Portage
height (m)	average	0.45	0.51	0.70	0.23	0.45	0.51
	min	0	0	0	0	0	0
	max	1.25	1.20	1.40	1.30	1.30	1.45
slope (°)	average	9	18	23	6	17	15
	min	0	0	0	0	0	0
	max	65	50	60	45	60	45

n = number of measurements.

Results from the snow berm monitoring program indicate that 100% of the snow berms measured along the winter access road were at or below 1.6 m during the operational season (Table 3-12). If snow berms were observed to be over 1.6 m during the snow berm measurement surveys, De Beers notifies the winter access road maintenance crew so that they could be decreased. No additional maintenance was required from observations recorded during winter road berm monitoring.

Table 3-12 Proportion of Snow Berm Height Measurements for the Winter Access Road, 2021

Height (m)	Survey 1	Survey 2	Survey 3	Average
<1.6	100%	100%	100%	100%
≥1.6	0%	0%	0%	0%

≤ = less than or equal to; ≥ = greater than or equal to;% = percent.

3.5 Arctic Program for Regional and International Shorebird Monitoring Surveys

De Beers is contributing to the Environment and Climate Change Canada 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 these species (EC 2012).

Methods

Monitoring methods adhered to standard techniques for PRISM surveying (CWS 2008). De Beers first partnered with Environment and Climate Change Canada to conduct ground-based rapid assessment surveys of 12 ha plots in 2015. PRISM surveys were conducted in 2017 and 2019 thereafter.

Results

PRISM surveys were not conducted in 2021 in consultation with ECCC due to Covid-19 crestrictions, and are scheduled for June of 2022.

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 peregrine falcon and short-eared owl are currently listed as special concern by COSEWIC and have a general status rank of sensitive in the NWT (NWT SAR 2021). Both species are scheduled for assessment by the Northwest Territories Species at Risk Committee in March 2023 (NWT SAR 2021). 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. The second is monitoring and deterrence of raptors from nesting in the pits. Both are conducted as part of the WMMP.

3.6.1 Regional Raptor Nest Monitoring Program

The objective of the raptor nest monitoring program is to contribute nest survey data to ENR for inclusion in regional databases (De Beers 2014c).

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 ENR and other operators in the region.

Nest site visits 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 2021 due to the COVID-19 restrictions. The next regional survey will occur in 2025.

3.6.2 Pit Raptor Monitoring and Deterrence Program

As described in the WMMP, 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 2014a). Raptors that are observed in dangerous areas of the Mine, such as open pit areas, will be 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 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 2021 bird deterrent and surveillance program began on May 7th, where initial visual observations commenced for the presence of nesting bird species within the 5034, Hearne, and Tuzo open pist, as well as the surrounding pit areas and active construction zones. The visual monitoring of nesting birds within pit areas was performed by environment staff during day shift using binoculars. Initial propane scare cannon deployment began on May 7th, 2021 around the pit areas. Five cannons were deployed around the perimeter of both the 5034 pit, and Herne pit. Five cannons were also distributed to the airport for deployment. Cannon set up continued as bird presence increased throughout the season with a total of 29 cannons set up around the Mine site. These cannons were adjusted and repositioned throughout the duration of the bird deterrent program based on nesting potential areas, visual confirmation of bird activity, and observed effectiveness of each cannon. In addition to propane cannon deployment, predator decoys were also used. A mix of nine eagle and falcon kite decoys and several scare crows were placed around the pit areas and the west mine rock pile (WMRP). These areas were identified as active peregrine falcon and rough-legged hawk and present suitable nesting habitat. Placement of deterrents were moved throughout the program to accommodate mining and construction activities as well as extreme weather events. In addition to Mine environment staff, two full time bird monitors (Edward Roberts and Bethany Nesbit- Khione resources) were brought on to continue visual observations, deployment, and management of deterrents on May 4, 2021. All bird sightings were documented on a daily field sheet.

Results

There were a total of 1,788 individual birds observed in or around the 5034, Hearne, and Tuzo pits in 2021 (Table 3-13). Of the the birds observed in or near the pits, the most common were unidentified goose species which were observed on 14 occasions.

On July 20th 2021, a Peregrine Falcon active nest observed below the 411 bench of the 5034 pit. Subsequently, a management plan in response to this nest was developed by the Environment Department in conjunction with ENR. A setback zone of 300 meters was put in place and mining activity was minimized in the area. The Environment Department conducted scheduled surveys of the nest from a distance intended to negate any

stress during the nesting activity.The hatchling successfully fledged the nest between August 16th and 24th. After it was determined there were no longer young falcons in the nest, mining operations returned to normal on August 25th.

Table 3-13 Observations Birds Within or Near 5034, Hearne, and Tuzo Pits, 2021

Species	Number of Occurrences	Number of Individuals
American pipit	4	4
American robin	2	4
Bald eagle	1	1
Cackling goose	3	17
California gull	1	2
Canada goose	1	40
Common raven	14	19
Duck spp.	4	7
Falcon spp.	4	6
Goose spp.	14	1192
Greater white-fronted goose	2	27
Gull spp.	17	43
Hawk spp.	1	1
Lapland longspur	2	10
Loon spp.	1	1
Northern harrier	3	11
Peregrine falcon	27	43
Ptarmigan spp.	2	6
Raptor spp.	2	2
Red-breasted merganser	1	1
Rough legged hawk	11	11
Snow bunting	2	90
Snow goose	1	200
Sparrow spp.	2	3
Unidentified songbird	28	43
Unknown	2	2
White crowned sparrow	1	1
Yellow warbler	1	1

3.7 Upland Breeding Birds

In 2015, a Migratory Bird Nest Mitigation Plan was developed and submitted to and approved by Environment and Climate Change Canada (De Beers 2015c). 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 and the red-necked phalarope are birds of concern that may occur in the RSA and are listed by COSEWIC (COSEWIC 2021). 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). PRISM monitoring for population trends during the operating life of the Mine would fill existing information gaps in ECCC's N7 Bird Conservation Region.

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.

The objective of monitoring for upland birds is to detect changes in regional bird populations over time. This objective is achieved through participation in Environment and Climate Change Canada PRISM surveys (Section 3.7).

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 3-14). 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 Year 2-3 for Lake E1, and Year 4 for Lakes D2/D3, after which water levels will stabilize until the dykes are removed at closure (Table 3-14). The actual extent of flooding in 2021 at Lakes D2/D3 and E1 is reported in Table 3-14. As the water levels will rise most rapidly during freshet, the period of flooding will overlap with the migratory bird nesting season, which is defined to occur annually from the beginning of May to mid-August (ECCC 2021).

Table 3-14 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	425.21	0	425.21	0
Year 1 (June - October 2016)	425.67	19.7	426.1	34.2	425.98	5.1	425.82	4.5

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)
Year 2 (June - October 2017)	426.3	18	426.61	10.2	426	1.1	425.89	0.5
Year 3 (June - October 2018)	426.81	9.8	426.74	3.1	426	0	425.88	0
Year 4 (June - October 2019)	427	4.6	426.95	4.6	426	0	425.91	0.2
Year 5 (June – October 2020)	n/a	n/a	426.99	2.4	426	0	426.06	1.1
Year 6 (June – October 2021)	n/a	n/a	426.86	0	426	0	426.09	0.2
Total	**n/a**	**52.1**	**n/a**	**54.5**	**n/a**	**6.2**	**n/a**	**6.5**

Note: Annual flooding estimates are cumulative. masl = metres above sea level; ha = hectares; n/a = not applicable
Lakes D2 and D3 were joined as a single lake in 2016, and are therefore reported together.

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 2021. The actual peak elevation in 2021 for Lake D2/D3 was similar to that estimated by the EIS with associated flooding being slightly higher than predicted. 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 is shown in Table 3-14 for both lakes. Until predictions can be verified, monitoring will continue.

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 ENR. In 2015, De Beers began annual monitoring of small mammals, including lemmings and voles, to provide an additional regional monitoring site to ENR.

Methods

The methods for the small mammal survey follow those outlined by Carrière (1999) and Outcrop Communications (2005). The small mammal program in 2021 was conducted from August 08-12th over five nights, with 100 traps set per night. The same two transects established in 2015 northeast of Area 2 of Kennady

Lake were used again in 2021. 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. Traps were baited with a mixture of oatmeal and peanut butter and checked each morning.

Results

The most abundant mammal trapped was the Southern Red-backed Vole (*Myodes gapperi*) with 12 captured over the five consecutive trap nights in 2021 (Table 3-15). Specimens were identified using the NWT Small Mammal Identification Guide (ENR 2005). One mammal was not intact upon arrival at the time of collection while two mammals were unidentifiable. All other animals trapped were intact at the time of collection and appeared to be in good physical condition. Arrangements are being made to ship these samples to ENR laboratories in Yellowknife during the first quarter of 2022.

Table 3-15 Small Mammal Monitoring Program Catch Summary, 2021

Date	Transect No.	Site No.	Trap No.	Species
08-Aug-21	2	11	2	Southern Red-Backed Vole
09-Aug-21	1	24	1	Southern Red-Backed Vole
09-Aug-21	2	11	2	Southern Red-Backed Vole
10-Aug-21	1	6	2	Southern Red-Backed Vole
10-Aug-21	2	4	1	Southern Red-Backed Vole
11-Aug-21	1	13	2	Heather Vole
11-Aug-21	1	24	1	Southern Red-Backed Vole
11-Aug-21	2	9	1	Southern Red-Backed Vole
11-Aug-21	2	11	1	Southern Red-Backed Vole
11-Aug-21	2	11	2	Southern Red-Backed Vole
11-Aug-21	2	19	1	Southern Red-Backed Vole
12-Aug-21	1	4	1	Southern Red-Backed Vole
12-Aug-21	1	9	2	Collard Lemming
12-Aug-21	1	13	1	Unidentified Vole
12-Aug-21	1	13	2	Unknown Rodent
12-Aug-21	2	11	1	Southern Red-Backed Vole

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 2014b).

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 2021 are summarized in Table 3-16.

Table 3-16 Gahcho Kué Environmental Indicators, 2021

Environmental Indicator	Date
Snow melt	June 1, 2021 (50% snow cover)
	June 12, 2021 (10% snow cover)
Kennady Lake thaw	June 21, 2021 (50% ice cover)
	June 26, 2021 (10% ice cover)
Lake freeze	November 2, 2021 (100% ice cover on Kennady Lake
First Snow	October 11, 2021 (date of first snow that did not melt)
Migratory bird arrival	May 5, 2021 (Unidentified Geese flying over Kennady Lake)

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 2014c).

Methods

The indicators recorded monthly by the Mine included the following:

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

Results

In 2021, average monthly occupancy ranged from 206 in February to 689 in August (Table 3-17). The total fuel consumption for 2021 was 48,100,003L of diesel. The total amount of mine rock mined was 34,598,563 tonnes. The total amount of ore processed was 3,082,687 tonnes. The total amount of water consumed for domestic use was 24,868,000L, 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 (14,788,000L).

Table 3-17 Gahcho Kué Camp Occupancy, 2021

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Occupancy	321	206	323	338	327	337	341	353	348	348	354	338

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5 ACRONYMS AND ABBREVIATIONS

AEMP	Aquatic Effects Monitoring Program
ANOVA	Analysis of Variance
AN PAD	Ammonium Nitrate Pad
ARKTIS	ARKTIS SOLUTIONS INC.
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
De Beers	De Beers Canada Inc.
DFO	Fisheries and Oceans Canada
DKFN	Deninu Kué First Nations
DNA	deoxyribonucleic acid
EBA	Tetra Tech EBA
EC	Environment Canada
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
ENR	Department of Environment and Natural Resources, Government of the Northwest Territories
FRMC	Fort Resolution Metis Council
GIS	Geographical Information System
GNWT	Government of the Northwest Territories
Golder	Golder Associates Ltd.
GPS	Global Positioning System
ICRP	Interim Closure and Reclamation Plan
IEMA	Independent Environmental Monitoring Agency
LKDFN	Łutselk'e Dene First Nation
LSA	Local Study Area
Mine	Gahcho Kué Mine
Mine Ops.	Mine Operations
MVEIRB	Mackenzie Valley Environmental Impact Review Board
MVLWB	Mackenzie Valley Land and Water Board
NSMA	North Slave Métis Alliance
NWT	Northwest Territories
NWT SAR	Northwest Territories Species at Risk
NWTMN	Northwest Territories Métis Nation
PK	Processed Kimberlite
PKMRMP	Processed Kimberlite and Mine Rock Management Plan
PRISM	Arctic Program for Regional and International Shorebird Monitoring
RSA	Regional Study Area
SAR	Species at Risk
SHEOP	Safety, Health, and Environment Operational Procedure
sp.	species
spp.	multiple species
TCWR	Tibbitt to Contwoyto Winter Road
UPD	Updated Project Description
TG	Tłı̨chǫ Government

VSMP	Vegetation and Soil Monitoring Program
WEMP	Wildlife Effects Monitoring Program
WMMP	Wildlife Management and Monitoring Plan
WRD	Water Resource Division
WWHPP	Wildlife and Wildlife Habitat Protection Plan
YKDFN	Yellowknives Dene First Nation

6 UNITS OF MEASURE

≤	less than or equal to
≥	greater than of equal to
%	percent
+	plus or minus
>	greater than or equal to
°	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

7 GLOSSARY

Abundance	The number of individuals
De Beers	De Beers Canada Inc.
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 *consume*s, in a generic sense) a collection of physical and biological entities in a habitat
Hemostat	A plier-like locking medical instrument used to secure fine and delicate materials
Home range	The area traversed by an animal during its activities during a specific period of time
Mine	Gahcho Kué Mine
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: 2021 NOISE MONITORING REPORT

GOLDER
MEMBER OF WSP

TECHNICAL MEMORANDUM

DATE 14 March 2022 **Project No.** 21496978/DCN-780

TO Allan Knight and Mason Elwood
De Beers Canada Inc.

CC Charity Beres and Daniel Coulton (Golder Associates Ltd.)

FROM Victor Young and Andrew Faszer **EMAIL** charity_beres@golder.com

GAHCHO KUÉ MINE – 2021 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; 2010b).

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; 2014b). In the WWHPP, De Beers planned to conduct noise monitoring during Year 1 (2017[1]), Year 5 (2021), 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. The WWHPP and WEMP have recently been discontinued and replaced by a consolidated Wildlife Management and Monitoring Plan (WMMP); the WMMP contains consistent requirements and objectives for noise monitoring (De Beers 2021).

In accordance with the WMMP, De Beers requested Golder Associates Ltd. (Golder) complete the Year 5 noise monitoring program in June 2021, 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 June 2021 noise monitoring program.

2.0 REGULATORY GUIDANCE

The NT does not have environmental noise regulations or limits. In the absence of NT-specific guidance, the EIS, Year 1 noise monitoring program, and Year 5 noise monitoring program (Project-specific documentation) made use of guidance from other jurisdictions. In particular, when assessing noise effects at offsite receptor locations,

[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).

Golder Associates Ltd.
2800, 700 - 2nd Street SW, Calgary, Alberta, T2P 2W2, Canada T: +1 403 299 5600 F: +1 403 299 5606

the Project-specific documentation followed guidance provided by the Alberta Energy Regulator (AER) in *Directive 038: Noise Control* (AER 2007).

AER Directive 038 indicates that cumulative noise levels should be maintained below a Permissible Sound Level (PSL) limit. The appropriate PSL value 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 AER Directive 038 definition of daytime and nighttime for consistency with Health Canada guidance (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 and Year 5 noise monitoring programs.

Table 1 summarizes the noise benchmarks considered in the EIS (De Beers 2010b) and in the Year 1 and Year 5 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 2010 EIS and for the Year 1 and Year 5 Noise Monitoring Programs

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

[(a)] Benchmark value taken directly from AER Directive 038 (AER 2007).

3.0 YEAR 5 (2021) NOISE MONITORING PROGRAM

3.1 Locations

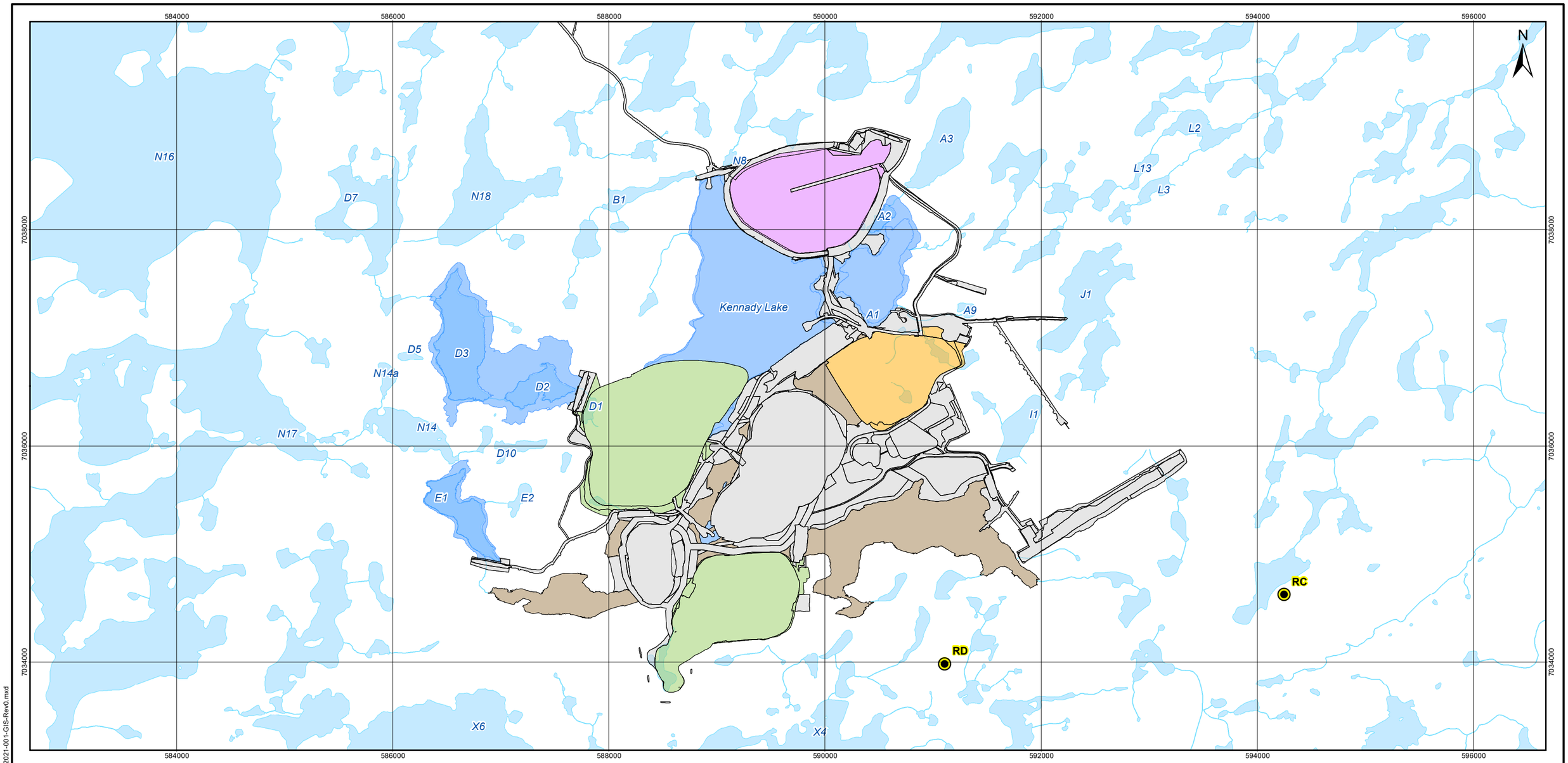
During the Year 5 noise monitoring program, conducted between 19 and 20 June 2021, $L_{eq,day}$ and $L_{eq,night}$ cumulative noise levels were measured at two locations around the Mine:

- RC – an unoccupied location 1.5 km from the Mine boundary southeast of the airstrip
- RD – an unoccupied location 1.5 km from the Mine boundary where the EIS predicted Mine noise levels would be highest

The two offsite locations used in the Year 5 monitoring program were selected for consistency with the assessment completed for the EIS (De Beers 2010b) and the Year 1 noise monitoring program (Golder 2017). Details on these noise monitoring locations are presented in Table 2. Figure 1 presents a map showing the monitoring locations in the context of Mine operations and Figures 2 and 3 show the noise monitoring equipment deployed at the two Year 5 monitoring locations.

Table 2: Year 5 Noise Monitoring Locations

Year 5 Noise Monitoring Location	Description	Universal Transverse Mercator Coordinates [Zone 12]	
		Easting [m]	Northing [m]
RC	unoccupied location 1.5 km from the Mine boundary (southeast of the airstrip)	594,248	7,034,625
RD	unoccupied location 1.5 km from the Mine boundary	591,106	7,033,986



LEGEND

- Gahcho Kué Winter Access Road
- Watercourse
- Waterbody

Footprint

- Coarse PK Pile
- De-watered Lake Bed
- Fine PKC Facility
- Infrastructure
- Mine Rock Pile
- Water

- Year 5 Noise Monitoring Location

NOTES

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

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GAHCHO KUÉ PROJECT

Year 5 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: NoiseMonitoring2021-001-GIS-Rev0		DATE: March 14, 2022
JOB NO: 20374102	REVISION NO: 0	
OFFICE: GOLD-CAL	DRAWN: LMS / CHECK: CB	Figure 1

Figure 2: Year 5 Noise Monitoring Location RC, June 2021

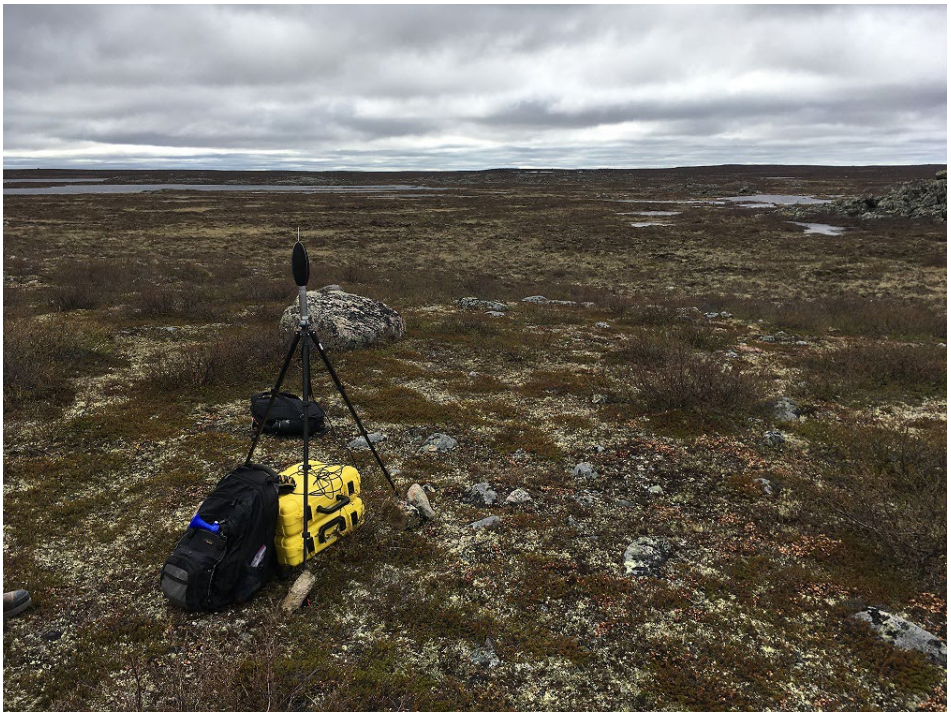

Figure 3: Year 5 Noise Monitoring Location RD, June 2021

3.2 Methods

The Year 5 noise monitoring program was conducted in general accordance with methods described in AER Directive 038, as per the WMMP. At each monitoring location, a Model 2250 Brüel and Kjær Type I integrating sound level meter was deployed for a period not less than 24 hours and used to collect noise measurements and audio recordings (AER 2007). Each meter was configured to log dBA noise levels over one-minute averaging periods ($L_{eq,1min}$) and to log audio data to wav-format digital files. 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) are typically exposed to noise.

In accordance with AER Directive 038, the sound level meter at each monitoring location was calibrated with a Model 4231 Brüel and Kjær Type I calibrator unit immediately before the start of the monitoring program. Meter calibration was also verified immediately after the conclusion of the monitoring program.

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 stations for the duration of the Year 5 noise monitoring program.

Following the conclusion of the 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.

First, wind conditions during the monitoring program were compared to criteria from AER Directive 038 and any $L_{eq,1min}$ data samples logged under unacceptable conditions were eliminated. The AER Directive 038 test for acceptable wind conditions considers both speed and direction. 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:

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

After eliminating data samples logged under unacceptable wind conditions, the raw data were further filtered to eliminate any $L_{eq,1min}$ data influenced by abnormal or invalid noise sources that are not representative of conditions at the monitoring locations. Abnormal and invalid noise sources were identified by listening to the audio data logged coincidently with the $L_{eq,1min}$ noise levels. The only abnormal or invalid noise sources removed from the raw data were those associated with technician activities during deployment or recovery of the noise monitoring equipment and those associated with birds vocalizing very close to the sound level meter's microphone. All other noise sources (e.g., Mine equipment, helicopters and other aircraft, insects, distant birds, and other wildlife) were considered valid and representative of normal conditions at the monitoring locations.

Representative $L_{eq,1min}$ data samples logged under acceptable wind conditions were used to calculate average $L_{eq,day}$ and $L_{eq,night}$ noise levels for each of the monitoring locations.

3.3 Results

Table 3 summarizes the results of the Year 5 noise monitoring program. Table 3 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. For monitoring location RD, it was necessary to calculate the average $L_{eq,day}$ noise level 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 Golder's professional judgement that this noise level is representative of daytime conditions at monitoring location RD. Additional detail on the noise levels measured at the individual monitoring locations is presented in Sections 3.3.1 and 3.3.2.

Table 3: Year 5 Noise Monitoring Program - Summary of Results, 16 to 18 June 2021

Year 5 Noise Monitoring Location	Average Cumulative Noise Level [dBA]		Number of One-Minute Data Samples Used in Average	
	Daytime [$L_{eq,day}$]	Nighttime [$L_{eq,night}$]	Daytime	Nighttime
RC	35.1	33.4	180	480
RD	38.9[(a)]	40.4	176	301

[(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. Notwithstanding, it is Golder's professional judgement that this noise level is representative of conditions at the monitoring location.

3.3.1 RC – 1.5 km from the Mine Boundary

Noise monitoring was conducted at RC from 11:08 am on June 19, 2021 until 2:39 pm on June 20, 2021. The dominant noise sources noted during deployment/recovery and heard in the audio recordings 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 those associated with unacceptable wind conditions (i.e., upwind speeds in excess of 5 km/h or crosswind/downwind speeds in excess of 10 km/h) or because of noise by the field technician during deployment/recovery of the monitoring equipment.

Figure 4 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 using red dots.

At RC, 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 5 noise monitoring program at RC can be considered conclusive for both the daytime and nighttime periods.

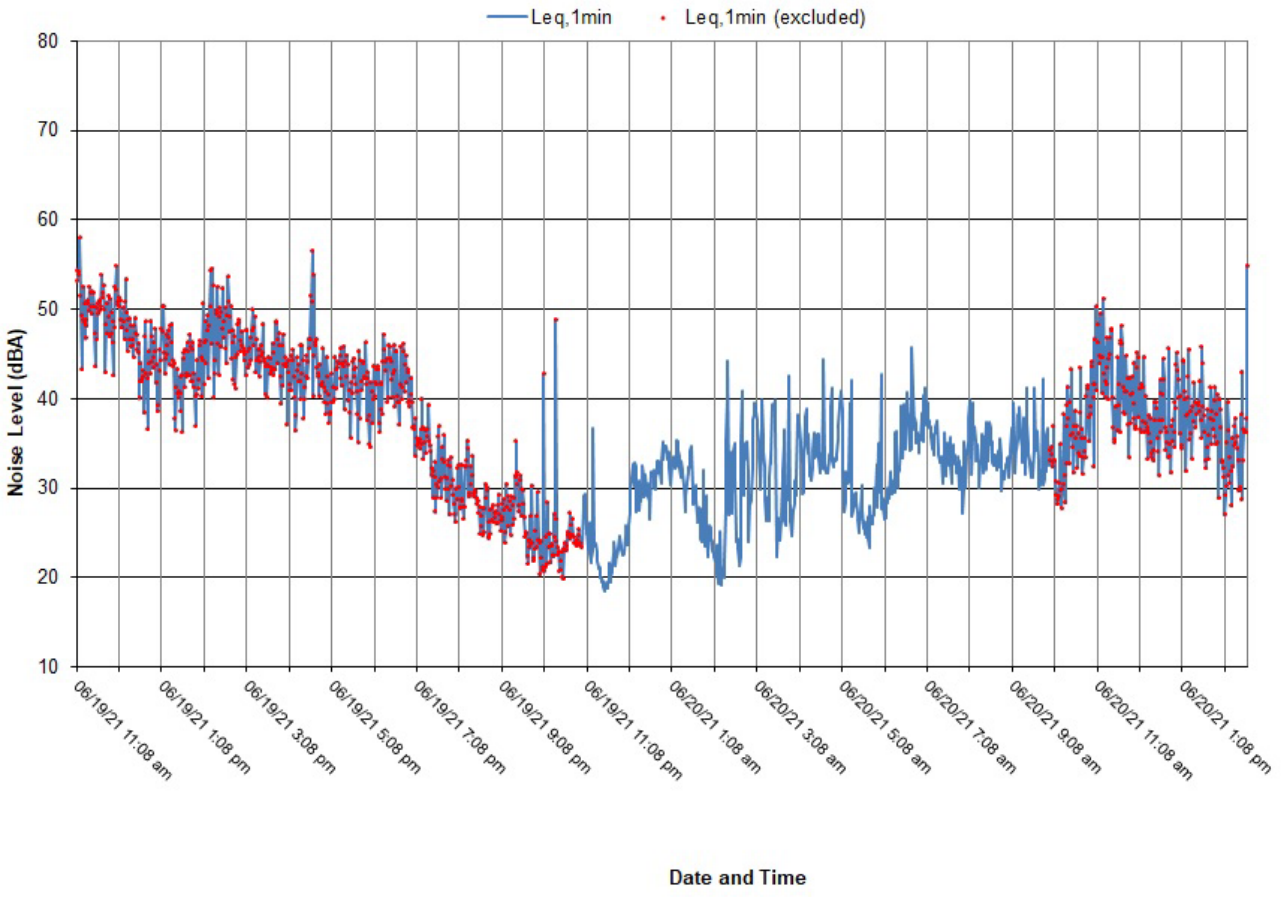

Figure 4: RC - Year 5 Noise Monitoring Data

3.3.2 RD – 1.5 km from Mine Boundary

Noise monitoring was conducted at RD from 10:03 am on June 19, 2021 until 1:29 pm on June 20, 2021. The dominant noise sources noted during deployment/recovery and heard in the audio recordings 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 those associated with unacceptable wind conditions (i.e., upwind speeds in excess of 5 km/h or crosswind/downwind speeds in excess of 10 km/h) or because of influence by the field technician during deployment/recovery of the monitoring equipment or birds vocalizing very close to the microphone.

Figure 5 presents a graph of one-minute noise levels measured at RD, 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 or bird vocalizations. The eliminated data have been highlighted using red dots. Note, that elevated noise levels between approximately 2 am and 6 am are the result of birds vocalizing very close to the microphone.

At RD, it was possible to include 180 or more valid one-minute data samples in the calculation $L_{eq,night}$ but not in the calculation of $L_{eq,day}$. Consequently, the results of the Year 5 noise monitoring program at RD can be considered conclusive for the nighttime period but not for the daytime period. However, it is Golder's professional

judgment that the 176 valid data samples collected during the daytime period are representative of environmental noise levels at RD.

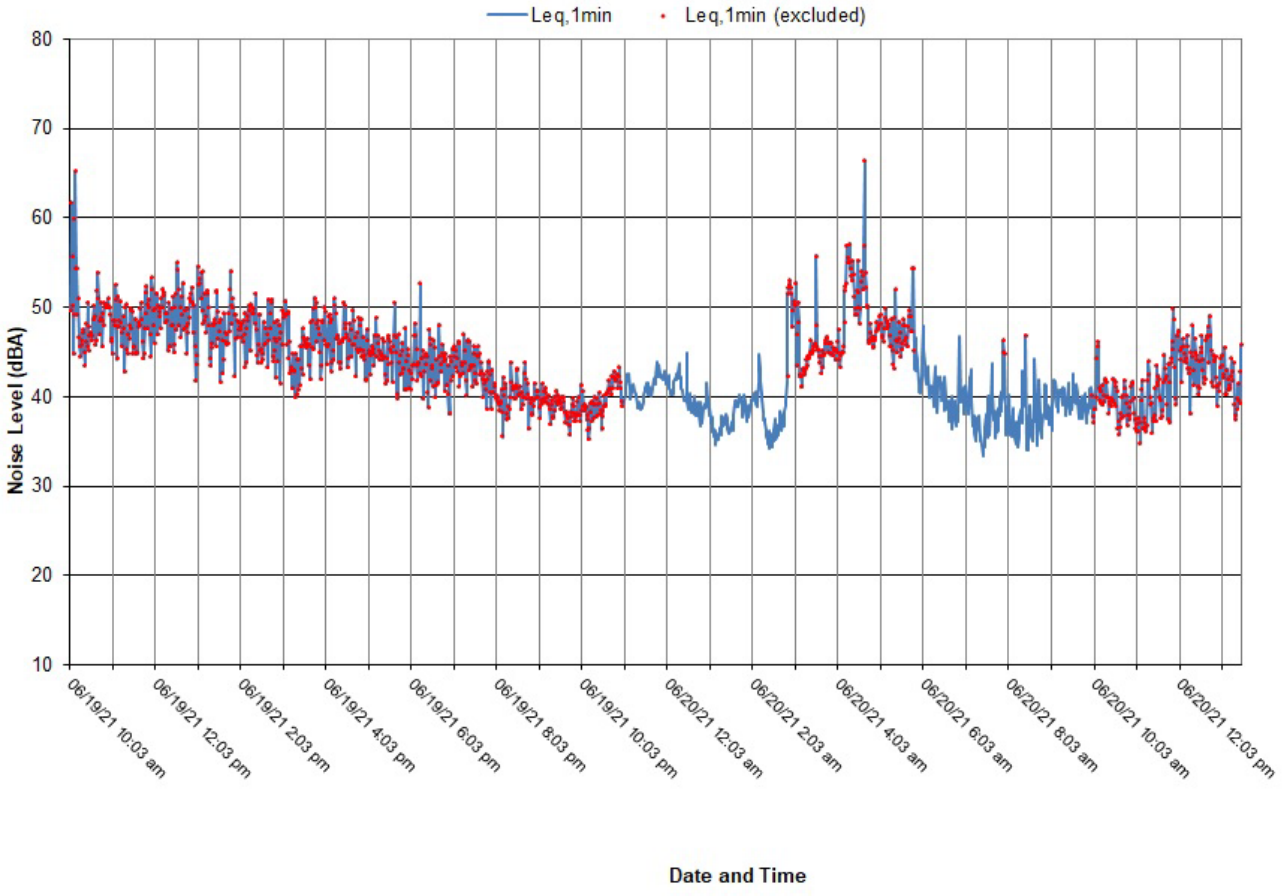

Figure 5: RD - Year 5 Noise Monitoring Data

3.3.3 Comparison to Model Predictions

Table 4 compares noise levels measured during the Year 5 monitoring program to Year 5 model predictions from the EIS (De Beers 2010b), For both monitoring locations, daytime and nighttime noise levels from the Year 5 monitoring program are less than corresponding Year 5 model predictions in the EIS.

Table 4: Comparison - Year 5 Noise Monitoring Results to Year 5 Model Predictions

Year 5 Noise Monitoring Location	Year 5 Noise Monitoring – Cumulative Noise Level [dBA]		Year 5 Model Prediction – Cumulative Noise Level[(a)] [dBA]	
	Daytime [$L_{eq,day}$]	Nighttime [$L_{eq,night}$]	Daytime [$L_{eq,day}$]	Nighttime [$L_{eq,night}$]
RC	35.1	33.4	38	38
RD	38.9	40.4	44	44

[(a)] EIS Section 7, Appendix 7.II, Table 7.II.5-3 Predicted Cumulative Noise Levels from Mine Operations (De Beers 2010b).

4.0 SUMMARY

Daytime and nighttime noise levels from the Year 5 monitoring program are less than corresponding Year 5 model predictions from the EIS. The Year 5 noise monitoring program validated and confirmed the conclusions of the EIS, and indicates that noise management at the Mine during its night and day operations is effective.

5.0 DISCLAIMER

Please be aware that Golder has been acquired by and is now a Member of the WSP family of companies. Golder remains as a legal entity and is the proposed contracting entity for this technical memorandum. We are in the process of integrating the resources of our companies. Correspondence for this technical memorandum should continue to be addressed to the undersigned.

This technical memorandum was prepared solely and exclusively for De Beers Canada Inc. and can only be used and relied upon, in its entirety, by De Beers Canada Inc. The technical memorandum is being submitted electronically in accordance with Mackenzie Valley Land and Water Board's (MVLWB) preferred submission protocol, in the unsecured ADOBE pdf format stipulated in the submission standards issued by MVLWB. The technical memorandum is provided "as is", without warranty of any kind either expressed or implied. Only the native secured file is considered true and final. Any reuse, alteration, extraction, edit, or reproduction of this technical memorandum will be at the sole risk and responsibility of the user, without any liability or legal exposure to Golder Associates Ltd., its affiliates, and their respective directors, officers, employees, agents, consultants and sub contractors.

6.0 CLOSURE

We trust the above information is satisfactory and meets your present requirements. If you have any questions or require additional details, please do not hesitate to contact the undersigned.

Sincerely,

Golder Associates Ltd.

Original Signed by:

Victor Young, MSc
Acoustic Scientist

Original Signed by:

Andrew Faszer, BSc, INCE
Senior Consultant

VY/AF/

https://golderassociates.sharepoint.com/sites/35178g/airquality/2021_20374102/06_noise_reporting/03_final/gk_2021_noise_monitoring_final.docx

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