DE BEERS GROUP

January 4, 2022

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

Via Email: james_hodson@gov.nt.ca

Dear Mr. Hodson:

RE: Gahcho Kué Mine - Wildlife Management and Monitoring Plan

De Beers Canada is pleased to submit the Gahcho Kué Mine - Wildlife Management and Monitoring Plan (WMMP) Version 1.1, in accordance with Subsection 95(2) of the *Wildlife Act* and the WMMP Process and Content Guidelines (July 2019).

Version 1.1 of the WMMP incorporated the review comments received from the Government of Northwest Territories, Environment and Climate Change Canada, Mackenzie Valley Land and Water Board, and Ni Hadi Xa, during the public review period in June 2021.

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.

DE BEERS GROUP

Gahcho Kué Mine

Wildlife Management and Monitoring Plan

Version 1.1

December 2021

REVISION HISTORY

Version	Date	Notes/Revisions
Version 1	April 2021	Submitted to the Mackenzie Valley Land and Water Board and Government of Northwest Territories for review, no previous versions.
Version 1.1	December 2021	The MVLWB made a decision as part of the issuance of Land Use Permit MV2021D0009 that Wildlife Management and Monitoring will no longer be regulated under the Land Use Permit. Therefore, this version of the WMMP is submitted to the GNWT only. Revisions are based on comments from NHX, GNWT and ECCC.

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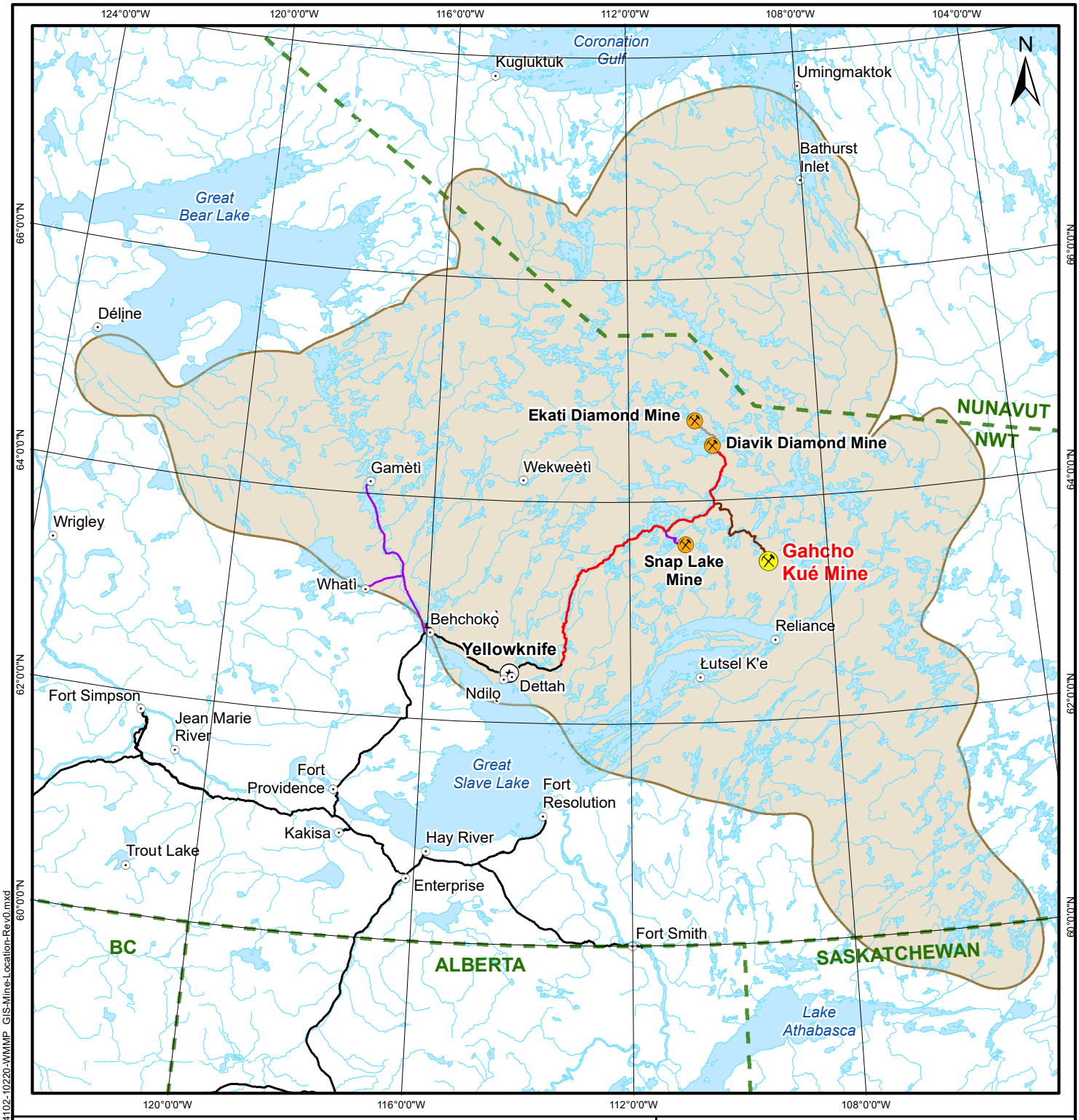
1 INTRODUCTION

De Beers Canada Inc. (De Beers) will conduct open pit mining, milling, and associated activities at the Gahcho Kué Mine (Mine), located approximately 280 kilometres (km) northeast of Yellowknife, and 80 km southeast of the Snap Lake Mine (Figure 1-1). The three phases of the life of Mine include construction (2 years), operations (13.6 years), and closure (21+ years; De Beers 2020a). Activities at the Mine include:

- dykes and berms to facilitate the dewatering of Kennady Lake;
- open pit mining of the Hearne, 5034 and Tuzo kimberlite pipes;
- milling facilities and infrastructure;
- ore and low grade ore stockpiles;
- a Fine Processed Kimberlite Containment Facility;
- a Coarse Processed Kimberlite Containment Facility;
- a West Mine Rock Pile;
- a South Mine Rock Pile;
- deposition of kimberlite and waste rock into the Hearne and 5034 open pits;
- quarrying;
- the existing exploration camp, winter access spur road camp, and a mining camp;
- fuel, lubricant, and glycol storage facilities and laydown areas;
- explosives storage facilities and use of explosives;
- a landfarm;
- construction and operation of the winter access road;
- site facilities and infrastructure including the water supply facility, sewage treatment plant, pipelines, incinerator, site roads, all-season airstrip and apron, power plant, electrical distribution, and material storage and sorting facilities; and
- use of equipment, vehicles, and machines.

The Mine site and location of infrastructure are shown in Figure 1-2. Further details on Mine activities are provided in the 2020 Updated Project Description (De Beers 2020a).



LEGEND

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

NOTES

Source: Base Data Obtained From Geogratis, © Department of Natural Resources Canada. All Rights Reserved.

GAHCHO KUÉ MINE

Location of the Gahcho Kué Mine

PROJECTION: Canadian Lambert Conf. Conic	DATUM: NAD83	DE BEERS GROUP
Scale: 1:5,500,000 (100 50 0 100 Kilometres)		
FILE No: 20374102-10220-WMMP_GIS-Mine-Location-Rev0		DATE: April 23, 2021
JOB NO: 20374102	REVISION NO: 0	Figure 1-1
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NOTES:

Satellite Image Provided by KARI and SIIS. Photo Date: October 2, 2020

GAHCHO KUÉ MINE

SITE INFRASTRUCTURE LAYOUT

PROJECTION: UTM Zone 12	DATUM: NAD83	DE BEERS GROUP
500 0 500 SCALE 1:30,000 METRES		
FILE No: ENG.EARC03068-Figure 2		DATE: March 3, 2021
JOB No: ENG.EARC03068	REVISION No: A	**Figure 1-2**
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1.1 BACKGROUND

As part of the Environmental Impact Review (EIR) process for the Mine, De Beers developed a Wildlife Monitoring Plan with government and Indigenous groups and communities. The Wildlife Monitoring Plan included components of both the Wildlife and Wildlife Habitat Protection Plan (WWHPP) and the Wildlife Effects Monitoring Program (WEMP) (De Beers 2012a). The public hearing for the Mine was held in December 2012, followed by the Gahcho Kué Panel Report of Environmental Impact Review and Reasons for Decision in July 2013 (Gahcho Kué Panel 2013). In the decision report, the Panel included measures specifying that De Beers prepare a WEMP (De Beers 2014a), a Caribou Protection Plan, and a WWHPP (De Beers 2014b) and that these plans and programs should be well coordinated. A WWHPP and WEMP were prepared for the Mine that included protection for barren-ground caribou (*Rangifer tarandus groenlandicus*) in accordance with guidelines from the Government of Northwest Territories, Department of Environment and Natural Resources (GNWT-ENR 2013a).

The WEMP included monitoring of indirect effects that would take place outside of the Mine footprint, while the WWHPP described wildlife mitigation and monitoring of direct effects within the Mine footprint. The Caribou Protection Plan was incorporated into the WWHPP. If the WEMP indicated that effects at the Mine scale were larger than predicted in the Environmental Impact Statement (EIS; De Beers 2010), then additional mitigation was to be included in the WWHPP. Thus, the Wildlife Monitoring Plan was divided into a WEMP and WWHPP (Version 1) for the Land Use Permit MV2005C0032 application in November 2013. The WEMP and the WWHPP needed to be considered together to fully understand wildlife monitoring and mitigation for the Mine.

Further refinements were made to both the WEMP and WWHPP following:

1) consultation with Indigenous groups, Environment and Climate Change Canada (ECCC), and the GNWT;
2) the technical sessions (February 11 to 13, 2014) and public hearings for the mining and milling Land Use Permit and Water Licence (May 6 to 9, 2014);
3) the development of a Memorandum of Understanding (MOU) with the GNWT on the Mine, review and refinement of the WWHPP and WEMP; and
4) lessons learned at the Mine site.

Version 2 of the WEMP and WWHPP were submitted to the Mackenzie Valley Land and Water Board (MVLWB, the Board) on May 30, 2014 (De Beers 2014a,b). Version 2 included a Concordance Table indicating where each of the Panel Measures, corporate commitments, and regulatory requirements were addressed.

The Board issued a Type A Land Use Permit on August 11, 2014 (MV2005C0032). The Land Use Permit includes three conditions directly related to the WWHPP (Part C, conditions 44 to 46; MVLWB 2014a). The GNWT, ECCC, the Board, and Indigenous groups reviewed Version 2 of the WWHPP and submitted comments on or before August 26, 2014. De Beers reviewed all comments, as well as the conditions in the Land Use Permit (MV2005C0032) and updated the WWHPP accordingly. Version 3 of the WWHPP was submitted to the Board on September 2, 2014.

On September 10, 2014, the Board approved the wildlife habitat provisions within the WWHPP but also requested that De Beers resubmit the WWHPP to the Board within sixty days to provide further clarity on vehicle headlights and the construction and design of winter access road berms as recommended by reviewers. The Board also encouraged De Beers to continue to engage with government and local communities regarding wildlife issues. De Beers hosted a workshop on September 23, 2014 for Indigenous groups and communities, regulators, and government representatives to discuss De Beers' winter access road caribou behavioural monitoring program, winter access road mitigation and monitoring including snow berms, headlights, and other measures. Version 3.1 of the WWHPP was submitted to the Board in October 2014. On September 24, the Board issued the Type A Water Licence (MV2005L2-0015; MVLWB 2014b).

In August 2019, the 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 WWHPP and 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 is submitted to the GNWT addressing reviewer comments from the GNWT, ECCC, Ni Hadi Xa, and MVLWB.

1.2 STUDY AREA

The Mine is located approximately 280 km northeast of Yellowknife, and 80 km southeast of the Snap Lake Mine (Figure 1-1). The EIS used a range of applicable spatial and temporal scales to assess the effects from the Mine (and other developments) on the various VCs considered in the EIS (De Beers 2010). Effects are related to the changes in both the magnitude of the stressor from the Mine and the response by wildlife, which can be related to a particular phase of the Mine, and the current phase of the population cycle (increasing, decreasing, and stable).

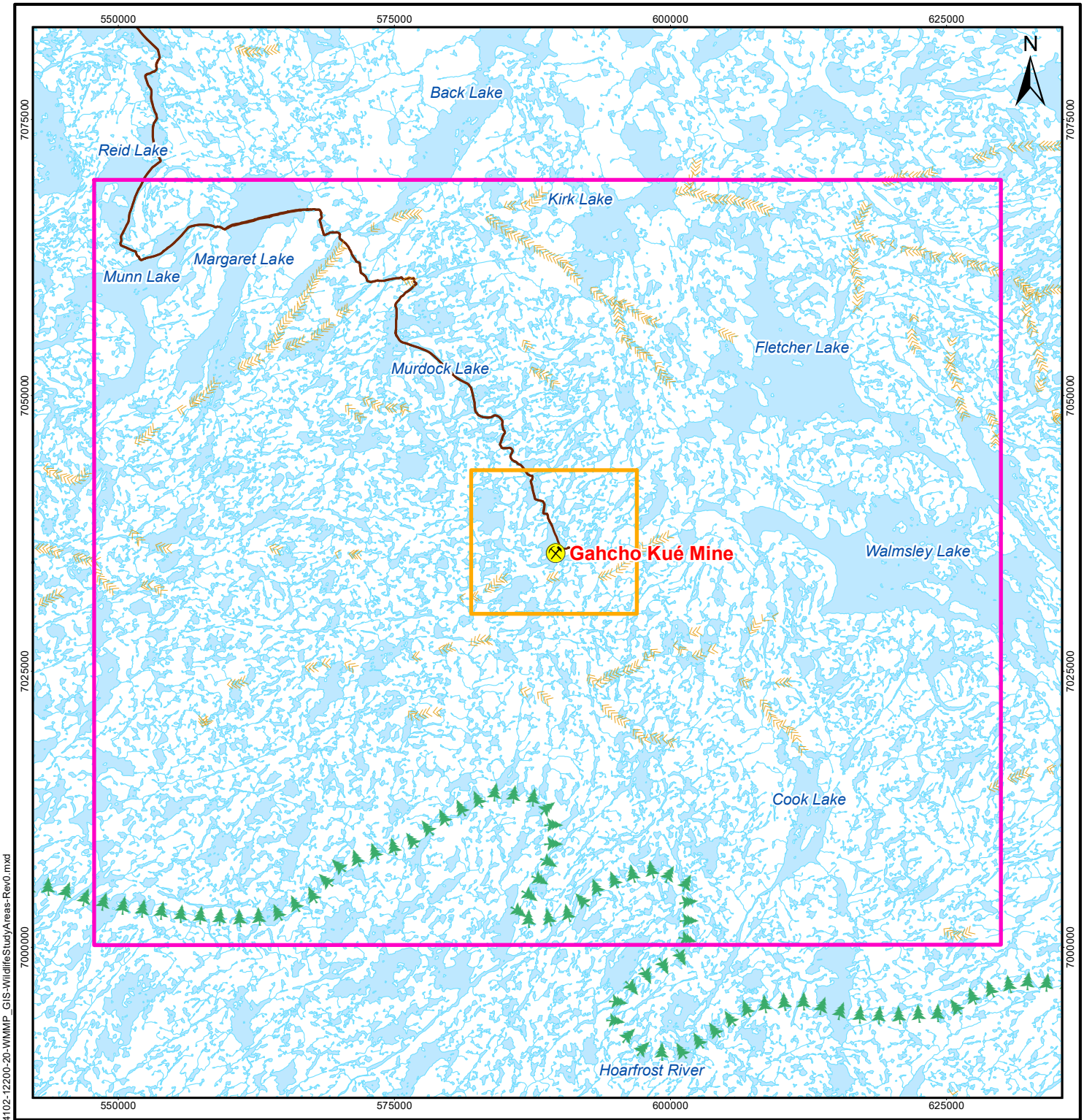
For example, the effect from direct loss of habitat from the Mine on caribou and other wildlife is likely strongest during construction and is mostly limited to the Mine footprint, which influences individuals. Alternately, the spatial scale of indirect changes to habitat extends further from the Mine footprint and can affect several groups of individuals causing a change in local abundance and distribution of the VC (i.e., a zone of influence [ZOI]).

Because several of the wildlife VCs have large seasonal and annual ranges, providing data that can be used to analyze and manage cumulative effects should also be considered (collaboratively with government and other land users) in the design of monitoring studies. Subsequently, studies are proposed within the following spatial boundaries:

- the annual range of the Bathurst Caribou Herd (GNWT-ENR 2019b);
- the Regional Study Area (RSA) for the Mine, including the winter access road (Figure 1-3); and
- the Local Study Area (LSA) for the Mine (Figure 1-3).

The wildlife LSA (about 200 square kilometres [km^2]) was selected to assess the immediate direct and indirect effects of the Mine on individual animals and habitat. The wildlife RSA (approximately 5,600 km^2, or 75 km by 75 km) 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). The annual range of the Bathurst herd overlaps both the LSA and the RSA.

Temporal scales for monitoring consider the three phases of the Mine, which include construction (2 years), operations (13.6 years), and closure (21+ years) (De Beers 2020a).



LEGEND

- Gahcho Kué Mine
- Gahcho Kué Winter Access Road
- Watercourse
- Waterbody
- Esker
- Treeline
- Local Study Area
- Regional Study Area

NOTES

Source: Base Data Obtained From Geogratis, © Department of Natural Resources Canada. All Rights Reserved.

GAHCHO KUÉ MINE

Gahcho Kué Mine
Wildlife Study Areas

PROJECTION: UTM Zone 12	DATUM: NAD83	DE BEERS GROUP
Scale: 1:500,000 10 5 0 10 Kilometres		
FILE No: 20374102-12200-20-WMMP_GIS-WildlifeStudyAreas-Rev0		DATE: April 23, 2021
JOB NO: 20374102	REVISION NO: 0	Figure 1-3
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1.3 PURPOSE AND OBJECTIVES

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.

The objectives for the WMMP are linked to the Adaptive Management Plan (De Beers 2014c) for monitoring barren-ground caribou and other wildlife. As discussed by the Wek'èezhìi Land and Water Board (WLWB 2010), some management actions may not be identified initially, but will likely be determined in response to the outcome of monitoring programs. Therefore, adaptive management can be considered as the process of 'learning by doing'.

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. Operating procedures relevant to mitigating effects to wildlife and wildlife habitat are provided in this document (Appendix A).

The overarching objectives of the WMMP are to:

- implement the Mine with the least effect on the wildlife and wildlife habitat as possible;
- evaluate the accuracy of key predictions made in the EIS regarding the direct and indirect effects of the Mine on wildlife and wildlife habitat and adjust environmental management practices accordingly;
- to develop best management practices that can be shared across the NT mining sector;
- use the results from monitoring for adaptive management actions (e.g., additional mitigation practices, modify objectives or study designs, or conduct special studies to better understand effects) when required (WLWB 2010);
- provide a means for interested groups or parties to participate in wildlife monitoring;
- incorporate local and TK throughout the life of the Mine; and

- design studies and data collection protocols that are consistent and standardized with other programs in the region so that data can be used by government to assess and manage cumulative effects.

1.4 CONCORDANCE

The WMMP serves to meet De Beers' obligations to a range of authorities. This includes the various Acts and Regulations relevant to wildlife in the NT, the Review Panel Measures and follow-up program requirements, and commitments made by De Beers. All relevant requirements are provided in the concordance table (Table 1-1). The concordance table also indicates where these requirements are met within the WMMP.

Table 1-1 Concordance of the Wildlife Management and Monitoring Plan

Legislation/Regulation	Requirement	Corresponding Section in WMMP	Responsible Regulatory Agency
Species at Risk Act and *Species at Risk (NWT) Act*	De Beers will adhere to requirements of all applicable Regulations or Recovery Plans that may be developed over the duration of the Project.	Section 1.5	CWS (ECCC) GNWT
NWT *Wildlife Act*	A developer or other person or body may be required, in accordance with the regulations, to prepare a wildlife management and monitoring plan for approval by the Minister, and to adhere to the approved plan, if the Minister is satisfied that a development, proposed development, or other activity is likely to: (a) result in a significant disturbance to big game or other prescribed wildlife; (b) substantially alter, damage or destroy habitat; (c) pose a threat of serious harm to wildlife or habitat; or (d) significantly contribute to cumulative impacts on a large number of big game or other prescribed wildlife, or on habitat.	Entire Document	GNWT
NWT *Wildlife Act*	A wildlife management and monitoring plan must include: (a) a description of potential disturbance to big game and other prescribed wildlife, potential harm to wildlife and potential impacts on habitat; (b) a description of measures to be implemented for the mitigation of potential impacts; (c) the process for monitoring impacts and assessing whether mitigative measures are effective; and (d) other requirements that are outlined in regulations.	Entire Document per GNWT-ENR (GWNT-ENR 2019a)	GNWT
NWT *Wildlife Act*	Wildlife Management and Monitoring Plan (WMMP) Process and Content Guidelines (GNWT-ENR 2019a)		GNWT
	Introduction	Section 1	
	Purpose and Objectives of the WMMP	Section 1.2	
	Measures, conditions, and developer commitments concordance table	Section 1.3	
	Engagement	Section 1.7	
	Mention of associated operational or management plans	Section 1.8	
	Project description	Section 1	
	Project map	Section 1	
	Affected species or habitat features	Section 1.5	
	Potential impacts to wildlife and wildlife habitat	Section 2	
	Employee wildlife awareness education and training	Sections 3.3.2 and 3.3.3	
	Infrastructure design and camp layout for bear safety and/or to prevent denning, nesting, and roosting	Section 3.3	

Table 1-1 Concordance of the Wildlife Management and Monitoring Plan

Legislation/Regulation	Requirement	Corresponding Section in WMMP	Responsible Regulatory Agency
NWT *Wildlife Act*	Management of camp waste and other wildlife attractants	Section 3.3.2, Appendix A	GNWT
	Timing restrictions and/or set back distances to protect wildlife and wildlife habitat features	Section 3.3	
	Direct habitat loss – minimizing the project's physical footprint	Section 3.1	
	Habitat alteration – minimizing physical manipulation of habitat that would decrease its value to wildlife	Section 3.2	
	Indirect habitat loss – minimizing functional habitat loss due to sensory disturbance, dust, etc.	Section 3.2	
	Management of hazards to wildlife (e.g., open pits, tailings ponds, roads, airstrips, spills)	Section 3.3	
	Wildlife deterrence procedures	Sections 3.3.3, 3.3.4, Appendix A	
	Habitat restoration	Section 4.1	
	Description of the role of community wildlife monitors in implementing aspects of the plan	Section 1.7	
	Offsetting or compensatory measures	Section 3	
	Mitigation monitoring	Section 4	
	Wildlife effects monitoring	Sections 4.4	
	Project footprint size reporting	Section 3.1	
	Support for cumulative effects assessment, monitoring, or management	Sections 3 and 4.4	
	Description of approach to adaptive management	Section 5	
	Formal response frameworks with action levels	Section 5.1	
	Reporting protocols	Section 6	
	Roles and responsibilities	Section 7	
	Literature cited	Section 8	
	Glossary	Section 9.3	
	SOPs	Appendix A	
	Monitoring forms and data sheets	Appendix A	
	Reporting form templates	Appendix A	
	WMMP revisions tracking table	Page i	

Table 1-1 Concordance of the Wildlife Management and Monitoring Plan

Legislation/Regulation	Requirement	Corresponding Section in WMMP	Responsible Regulatory Agency
Migratory Birds Convention Act, *1994*, *Migratory Bird Regulations*	The taking of nests or eggs of migratory game or insectivorous or nongame birds shall be prohibited, except for scientific or propagating purposes under such laws or regulations as the High Contracting Powers may severally deem appropriate.	Sections 3.3.3 and 5.1.3.3 Migratory Bird Nest Management Plan (De Beers 2015a; Appendix B)	CWS (ECCC)
MVEIRB Panel Decision, July 19, 2013. Measure 1	Minimize impacts to caribou and the extent of the zone of influence around the mine site to the extent that is technically feasible.	Section 3.2	GNWT
MVEIRB Panel Decision, July 19, 2013. Measure 1	Prior to construction, develop a caribou protection plan that ensures protection of caribou and caribou habitat. The caribou protection plan should include an adaptive management framework demonstrating how the Wildlife Effects Monitoring Program and the Wildlife and Wildlife Habitat Protection Plan are linked.	Sections 4.3.1, 4.4.1, and 5	GNWT
MVEIRB Panel Decision, July 19, 2013. Measure 2	Construct and operate the winter access road in a way that minimizes its adverse effects as a partial barrier to caribou movement and migration.	Sections 3.4, 4.3.1, and 4.3.2	GNWT
MVEIRB Panel Decision, July 19, 2013. Measure 2	Monitor to determine the presence and behaviour of caribou along the winter access road using means in addition to satellite collar data, such as track counts and visual observations.	Sections 4.4.1.3 and 4.4.1.4	GNWT
MVEIRB Panel Decision, July 19, 2013. Measure 2	Ensure that the caribou protection plan, the wildlife effects monitoring program and the wildlife and wildlife habitat protection plan address the effects on caribou movement and behaviour along the winter access road.	Sections 4.4.1.3 and 4.4.1.4	GNWT
MVEIRB Panel Decision, July 19, 2013. Measure 3	Monitor project specific effects (e.g., size of the Zone of influence, changes in habitat, effects of the winter access road on caribou movement and behaviour) and will report to the GNWT and make the results public on how project specific effects contribute to cumulative effects for the duration of the Project.	Sections 4 and 6	GNWT
MVEIRB Panel Decision, July 19, 2013. Suggested Follow-up Program for barren ground caribou	Monitoring the zone of influence and its likely causes (e.g., noise, dust, mine activity) (can be completed as part of the Wildlife Effects Monitoring Program).	Sections 4.2 and 4.4	GNWT
MVEIRB Panel Decision, July 19, 2013. Suggested Follow-up Program for barren ground caribou	Using results from monitoring the extent of the zone of influence and likely causal mechanisms (completed as part of the Wildlife Effects Monitoring Program) to intensify or reduce mitigations that will minimize the zone of influence.	Section 5.1.2	GNWT
MVEIRB Panel Decision, July 19, 2013. Suggested Follow-up Program for barren ground caribou	Monitoring the presence of caribou along the winter access road and the effects of the road on caribou movement and behaviour.	Section 4.3.2	GNWT

Table 1-1 Concordance of the Wildlife Management and Monitoring Plan

Legislation/Regulation	Requirement	Corresponding Section in WMMP	Responsible Regulatory Agency
MVEIRB Panel Decision, July 19, 2013. Suggested Follow-up Program for barren ground caribou	Describing action levels that will be used to determine when monitoring or mitigations or changes to existing mitigation are necessary.	Section 5	GNWT
MVEIRB Panel Decision, July 19, 2013. Suggested Follow-up Program for barren ground caribou	Demonstrating how existing baseline information (such as the caribou trails as a model for likely caribou approaches to the site) and Traditional Knowledge are incorporated in monitoring and management plans.	Section 1.7 Section 3 Section 4	GNWT
MVEIRB Panel Decision, July 19, 2013. Suggested Follow-up Program for other wildlife and species at risk	The WMMP must be designed as a follow-up program that: • is prepared by De Beers prior to mine construction; • addresses recommendations made by GNWT and ECCC in their technical reports; • is adaptively managed by De Beers during the life of the Project with input from GNWT, ECCC, and Ni Hadi Xa; • contributes to regional cumulative effects monitoring; and • incorporates information from the regional cumulative effects monitoring into the project specific management of the Gahcho Kué Project.	Entire Document	GNWT
MVEIRB Panel Decision, July 19, 2013. Wildlife Mitigation Commitments	De Beers will implement the Wildlife and Wildlife Habitat Protection Plan as submitted to the Panel on October 4, 2012. The Wildlife and Wildlife Habitat Protection Plan will be refined prior to construction to address the recommendations made by GNWT and Environment Canada in their technical reports. The Wildlife and Wildlife Habitat Protection Plan will be adaptively managed by De Beers during the Project life with input from GNWT, Environment Canada, and Ni Hadi Xa.	Entire Document	GNWT
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	Downward directional and low impact lighting will be used to reduce light pollution.	Section 3.2	GNWT
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	Low profile roads will be used so that they do not act as a barrier to movement for wildlife.	Section 3.2	GNWT
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	Winter road snow berms will be removed so that they do not act as a barrier to movement for wildlife	Sections 3.2 and 3.4	GNWT
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers will implement the Wildlife Effects Monitoring Program as submitted to the Panel on October 4, 2012. The Wildlife Effects Monitoring Program will be refined prior to construction to address the recommendations made by GNWT and ECCC in their technical reports. The Wildlife Effects Monitoring Program will be adaptively managed during the Project life by De Beers with input from GNWT, Environment Canada, and Ni Hadi Xa.	Sections 1, 4.4, and 6	CWS (ECCC) GNWT
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers is committed to using a collaborative approach – with communities and regulators – in developing the Wildlife Effects Monitoring Plan (WEMP).	Sections 1.7 and 6	GNWT

Table 1-1 Concordance of the Wildlife Management and Monitoring Plan

Legislation/Regulation	Requirement	Corresponding Section in WMMP	Responsible Regulatory Agency
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers commits to providing Environment Canada with a plan to avoid the incidental take of nest and eggs from flooding of terrestrial habitat.	Migratory Bird Nest Management Plan (De Beers 2015a, Appendix B)	CWS (ECCC)
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers commits to including surveys of waterbird use of collection ponds and the water management pond (WMP) as part of the Wildlife Surveillance Monitoring. De Beers commits to reporting the results of this survey annually. De Beers commits to notifying Environment Canada of any injuries or mortalities to migratory birds.	Section 4.3	CWS (ECCC)
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers has committed to implementing an upland bird monitoring program as outlined in the Wildlife Effects Monitoring Program.	Sections 4.3 and 4.4.3	GNWT
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers agrees that if species at risk or their nests and eggs are encountered during project activities or monitoring programs, the primary mitigation measure for each species should be avoidance. The species-specific nest setback distances recommended by Environment Canada will be used to determine zones of avoidance. Monitoring will be undertaken to ensure that mitigation measures are successful and the results of monitoring will be provided to the relevant agency and De Beers will ensure that mitigation and monitoring strategies are consistent with any applicable status reports, recovery strategies, action plans and management plans that may become available during the duration of the project and should consult with GNWT and Environment Canada on adaptive management strategies should they be required. In instances where an at risk avian species nests within the established Project footprint and the setback distances specified cannot be met, nest-specific guidelines and procedures will be developed in consultation with Environment Canada to protect the nest.	Sections 3.3.3 and 5.1.3.3 Migratory Bird Nest Management Plan (De Beers 2015a, Appendix B)	ECCC - GNWT GNWT
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	Flight paths other than take-offs, landings and specific monitoring studies will be above 650 m. Normal flight operations will discourage excessive hovering or circling below these altitudes and pilots will be informed of the mitigations.	Section 3.2	GNWT
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers has committed to implementing an upland bird monitoring program as outlined in the Wildlife Effects Monitoring Program.	Section 4.4.3	ECCC
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers committed to monitoring of the zone of influence (ZOI) in the WEMP submitted to the public registry on October 4, 2012.	Section 4.4.1.4	GNWT
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers commits to additional discussions with the GNWT on (a) caribou monitoring program collaboration; and (b) the regional wolf monitoring program and wolf predation study as it relates to the Bathurst herd.	Section 1	GNWT
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers will continue to work with GNWT, communities and Aboriginal governments to address potential wildlife mortalities, harvest and other issues that may arise on the Project winter access road.	Sections 4.3.3, 4.3.5, and 6	GNWT

Table 1-1 Concordance of the Wildlife Management and Monitoring Plan

Legislation/Regulation	Requirement	Corresponding Section in WMMP	Responsible Regulatory Agency
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers commits to working with GNWT to develop an MOU for collaborating on the development and operation of check stations along the Project winter access road and the development of public education programs and materials that emphasize respect for caribou and hunter excellence.	Section 1	GNWT
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers commits to discuss opportunities to coordinate the timing for reporting monitoring and adaptive management results with the GNWT and Aboriginal groups.	Section 6	GNWT
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers is committed to incorporating the lessons learned at other mines in the design and operation of the Project, which includes the mitigation and management policies and practices at the Snap Lake Mine.	Section 2.1	GNWT
Type A Land Use Permit (MV2021D0009) (MVLWB 2021)	Condition 39. The Permittee shall take all reasonable measures to prevent damage to wildlife and fish habitat during this land-use operation.	Sections 3 and 4	MVLWB

WMMP = Wildlife Management and Monitoring Plan; GNWT = Government of Northwest Territories; GNWT-ENR = Government of Northwest Territories, Department of Environment and Natural Resources; CWS (ECCC) = Canadian Wildlife Service, Environment and Climate Change Canada; MVEIRB = Mackenzie Valley Environmental Impact Review Board, MVLWB = Mackenzie Valley Land and Water Board.

1.5 VALUED COMPONENTS

Valued components (VCs) represent physical, biological, cultural, social, and economic properties of the environment that are considered to be important to society. The process and rational for choosing the VCs that are used in the WMMP are summarized in Table 1-2. Grizzly bear (*Ursus arctos*) and wolverine (*Gulo gulo*) were included as VCs in the WEMP and were monitored though regional hair-snagging programs in collaboration with GNWT and the other diamond mines (De Beers 2014a). Discontinuation of these programs was determined at a diamond mine wildlife monitoring meeting in February 2021 (GNWT-ENR 2021). Subsequently, grizzly bear and wolverine are not included as VCs in the effects monitoring component of the WMMP, but remain a priority for protection and mitigation at the Mine site.

Table 1-2 Valued Components for the Wildlife Management and Monitoring Program

Valued Component	Rationale	Sensitive Timing Windows
Barren-ground caribou	Barren-ground caribou are seasonal migrants to the area, are an important component of the culture and economy of the NT.	Pre-calving/ calving/ post calving period between May to August
Raptors	Peregrine falcon and short-eared owl are species of concern. Peregrine falcons are known to nest on cliffs in the Mine regional study area, and De Beers intends to contribute to regional monitoring.	Breeding season March to July
Upland Migratory Birds	Common nighthawk, olive-sided flycatcher, Harris's sparrow and rusty blackbird are species of concern, and De Beers intends to contribute to PRISM.	Breeding season mid- May to mid-September
Shorebirds and waterbirds	Bank swallow, red-necked phalarope, lesser yellowlegs are species of concern, and De Beers intends to contribute to PRISM.	Breeding season mid- May to mid-September

NT = Northwest Territories; PRISM = Protocol for Regional and International Shorebird Monitoring.

Incidental observations of other wildlife species during monitoring, such as muskox (*Ovibos moschatus*), moose (*Alces alces*), wolf (*Canis lupus*), grizzly bear, and wolverine will also be recorded. Following the principles of adaptive management, the VCs and monitoring objectives may be periodically reviewed by government, communities, and regulatory agencies, and changed as necessary.

1.6 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, grizzly bear, wolverine, 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 1-3). In the WMMP, monitoring for species of concern is primarily focused on detection so that site-specific protection can be implemented.

Table 1-3 Species of Concern for the Mine, Potential Effects, and Related Monitoring Components in the Wildlife Management and Monitoring Program

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

Table 1-3 Species of Concern for the Mine, Potential Effects, and Related Monitoring Components in the Wildlife Management and Monitoring Program

Species	NWT General Status Ranking[a]	*Species at Risk (NWT) Act*[b]	COSEWIC Assessment[c]	Federal *Species at Risk Act*[d]	Potential Mine Impacts	Components of the WMMP
Short-eared owl	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
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.

Barren-ground caribou were listed as threatened by the NWT SARC on July 11, 2018 (NWT SARC 2018). The COSEWIC assessed barren-ground caribou in November 2016 as threatened (COSEWIC 2016). Barren-ground caribou are seasonal migrants to the area and are an important component of the culture and economy of the NT. Caribou populations have dramatically declined in the region over the past two decades, and a Recovery Strategy for Barren-ground Caribou in the Northwest Territories was issued by the Conference of Management Authorities in 2020 (CMA 2020). De Beers is committed to the protection of caribou and will work towards facilitating their movement around the Mine site, and monitoring changes in caribou distribution in relation to the Mine. In addition, De Beers has made financial contributions to support NT key initiatives for the Bathurst caribou range in the past and will continue to explore opportunities to contribute in the future.

Barren-ground grizzly bears are listed as a species of 'special concern' by COSEWIC. They are at risk of population decline because they have low reproduction rates and inhabit areas of low forage productivity and extreme environmental conditions. However, factors other than adaptation to natural conditions appear to govern the life history of central arctic populations, such as harvest biased towards male bears (McLoughlin 2000), and limited ability for range expansion because of increased human development (McLoughlin et al. 1999). As a result, population size and distribution may be affected by both natural and human factors. As described in the WEMP (De Beers 2014a), De Beers contributed to regional monitoring of grizzly bears through a joint hair-snagging program with other mining operators. The hair snagging program was discontinued based on participant consensus at a diamond mine wildlife monitoring meeting in February 2021.

Wolverine are the largest member of the weasel family and have a circumpolar distribution in the tundra, taiga, plains, and boreal forests of North America (Weir 2004). These animals are an important cultural and economic resource for people of the NT and are harvested primarily for their fur, and sometimes killed as an emergency food source. Wolverines are annual residents in the regional study area surrounding the Mine. It was predicted in the EIS that the cumulative impacts from the Mine and other developments should not significantly influence the abundance and distribution of wolverine populations. The western population of wolverine was considered during development of the WWHPP and WEMP. In May 2014, COSEWIC combined the eastern and western populations of wolverine into a single unit, with the status of 'special concern'. As described in the WEMP (De Beers 2014a), De Beers contributed to regional monitoring of wolverines through a joint hair-snagging program with other mining operators. The hair snagging program was discontinued based on participant consensus at a diamond mine wildlife monitoring meeting in February 2021 (GNWT-ENR 2021).

The **Horned Grebe** is a small waterbird that inhabits both natural and manmade ponds, marshes, and wetlands (NWT SARC 2021). The breeding season (from May through mid-August) represents the most vulnerable or sensitive period for this species. Though reputed

to be the least wary grebe species with respect to human interactions, the horned grebe has been observed taking flight when approached by humans on foot or in boats (Stedman 2020). Waterbirds are predicted to lose direct habitat as a result of the Mine and birds that choose to nest in Mine-altered water may also be harmed. The horned grebe is considered a species of concern because of 'special concern' designation by COSEWIC.

Raptors, including the **Peregrine Falcon** and **Short-eared Owl**, hunt in a variety of habitat types used by their prey. Although there are other raptor species present in the area (such as the gyrfalcon [*Falco rusticolus*], rough-legged hawk [*Buteo lagopus*], and snowy owl [*Bubo scandiacus*]), the peregrine falcon and short-eared owl are considered specifically because they were both species of 'special concern' by COSEWIC during development of the original WEMP and WWHPP (De Beers 2014a, b). Short-eared owl remains a species of 'special concern'; however, COSEWIC updated the designation of the peregrine falcon *anatum-tundrius* complex to 'not at risk' in 2017 (Table 1-3). Both the peregrine falcon and the short-eared owl have been recorded nesting in the regional study area. The peregrine falcon has adapted to many North American habitats and breeds throughout the continent. Peregrines are tolerant of human disturbance and have nested near human development including mine sites (BHPB 2010; DDMI 2010; Coulton et al. 2013). This can be problematic if the nest is in an area of the Mine that could cause harm to the peregrine falcon or may cause delays to the Mine operations. Short-eared owls typically nest in marsh habitat or open tundra (Wiggins et al. 2020). With respect to disturbance, short-eared owls are sensitive to habitat loss and fragmentation. This owl is a ground nester requiring large breeding territories. Fragmentation of these landscapes increase nest predator efficiency resulting in decreased nest success (Wiggins et al. 2020).

The **Rusty Blackbird** is an upland breeding bird of concern observed in the regional study area and is listed as 'special concern' by COSEWIC. Although observations of the species have been limited, the spring migration of upland breeding birds to the NT begins in early May and peaks around mid-to-late May, with the breeding season continuing from May to July. During the breeding period, natural and human-induced (e.g., mining activities) disturbances can be associated with changes in density and species richness. Another potential risk to this species includes nesting on Mine infrastructure in hazardous areas.

The **Bank Swallow** is a threatened species and on Schedule 1 of SARA. They breed near open habitats along waterbodies and gravel pits where they can forage on flying insects. Bank swallows nest in colonies and dig burrows on natural and artificial sites, including sand and gravel mounds, aggregate quarries and road cuts (COSEWIC 2013). The bank swallow population in Canada has demonstrated a severe 90% population decline since the 1970s (ECCC 2016), likely as a result of cumulative effects on breeding grounds, wintering grounds and during migration (COSEWIC 2013). There are no known bank swallow colonies on site, and in areas that may be suitable nesting habitat, the slopes are maintained at less than 70 degrees to prevent nesting (ECCC 2016).

Harris's Sparrow is an upland breeding bird who breeds along the treeline in northern Canada (COSEWIC 2017). It is designated as Special Concern by COSEWIC and on Schedule 1 of SARA as a result of significant long-term population declines. Harris's sparrow nest on the ground in semi-forested tundra in June. Pesticide use in wintering grounds is a risk to this species, and deforestation associated with human developments including mines at the northern edge of its range has resulted in loss of breeding and nesting habitats (COSEWIC 2017).

Red-necked Phalarope is a small shorebird that is designated as Special Concern by COSEWIC and on Schedule 1 of SARA. They breed in tundra or tundra-forest transition habitats, and nests are located in vegetation adjacent to wetlands, lakes, ponds and rivers (COSEWIC 2014). Red-necked phalaropes gather in large flocks on the ocean during winter, and are thus susceptible to pollutants and oil exposure. Climate change is expected to reduce freshwater ponds and increase the expanse of shrubs and trees into wetlands, and build up of contaminants in the Arctic environment will contribute to a decrease in the availability of breeding habitat in the northern extent of their range (COSEWIC 2014).

Lesser Yellowlegs is a medium-sized shorebird that is considered a Threatened species by COSEWIC (2020). They breed in boreal forests, and make their nests beginning in mid-May on the ground in dense vegetation near open water. Lesser yellowlegs populations have been in decline since the 1970s, with hunting during migration and on winter grounds the greatest threat. Shorebirds are predicted to lose direct habitat as a result of the Mine and birds that nest in Mine-altered wetlands may also be harmed.

1.7 ENGAGEMENT

De Beers is committed to involving Indigenous communities and regulatory agencies in the design and implementation of wildlife programs for the Mine. Engagement with communities began prior to development and submission of the EIS and will continue through the life of Mine. Involving Indigenous groups and communities in wildlife mitigation and monitoring allows members to judge for themselves how well De Beers is reducing effects to wildlife and to identify further mitigation. They also assist De Beers in ensuring that the mitigation and monitoring activities are acceptable to communities and provide knowledge to help understand and minimize Mine effects.

De Beers engaged both technical experts and community members in the development and review of the Wildlife Monitoring Plan (De Beers 2012a); the precursor to this WMMP. The first Wildlife Monitoring Plan Working Group meeting was held on August 7, 2012 to discuss caribou monitoring. This was followed by a second meeting regarding carnivores and birds on September 5, 2012, and a third meeting on September 18, 2012 where community representatives as well as technical experts were invited to discuss all aspects of the proposed wildlife monitoring and the ways for integrating communities into the monitoring. Recommendations for ways of including local and TK in wildlife mitigation and monitoring included:

- incorporating input from communities to reflect their priorities in the WMMP;
- providing opportunities for community members to participate in monitoring;
- involving community representatives in adaptive management;
- providing opportunities for ongoing visits to the Mine by community representatives;
- providing annual updates to communities as the Mine progresses;
- employing a TK position at De Beers;
- providing a cabin at Kirk Lake for community-based monitoring and TK cultural events;
- initiating a survey in conjunction with community-based monitors if caribou are present near the Mine winter access road while the road is in operation; and
- using public education materials and signage on conservation and hunting from the Mine winter access road.

The De Beers Engagement Plan (Version 2, De Beers 2015b) will be updated as required in the Land Use Permit and Water Licence conditions. A frequent interest among Indigenous communities is that roads are constructed with consideration for caribou and other wildlife. Communities also expressed their desire that the Mine site be returned to its natural state following closure. De Beers initiated conference call updates in 2014

(February 5 and April 10) on winter access road caribou monitoring activities and hosted a Caribou Behavioural Monitoring Workshop on September 23, 2014 to review the outcomes of the 2014 monitoring program as well as seek input on the 2014 monitoring program. Several suggestions concerning mitigation and monitoring were made at that workshop, which were included in the Wildlife Monitoring Plan and maintained in this WMMP, include:

- clarify the trigger for initiation and conclusion of the caribou behavioural monitoring program;
- limit the height and slopes of snow berms along the winter access road;
- continue the behavioural monitoring program;
- consider points of constriction and natural crossing locations when siting mitigation measures along the winter access road; and
- collaborate with GNWT to share data along the winter access road.

Since the start of the mining operations, De Beers has hosted annual site visits from each of the communities. Comments and recommendations related to the wildlife management and monitoring during the site visits have been incorporated into the ongoing wildlife management at Gahcho Kué.

1.7.1 Ní Hadi Xa

The Ní Hadi Xa Agreement is a legally binding agreement which provides for environmental monitoring and management of the Gahcho Kué Diamond Mine in addition to such matters governed by legislation, regulations and Regulatory Instruments and for the establishment of and the identification of roles of the Ní Hadi Xa Governance Committee, in order to achieve the following objectives:

(a) respecting and protecting land, water, Wildlife, Plants and the land-based economy, essential to the way of life and well-being of the Indigenous Parties and present and future generations;

(b) ensuring ongoing review of Environmental Monitoring and Management Plans, activities, and reports of De Beers and the Regulators in relation to the Gahcho Kué Diamond Mine;

(c) developing and improving the capacity of the Indigenous Parties to participate in adaptive environmental management;

(d) ensuring ongoing review of priority issues and monitoring through provision of technical advisory resources and third party review;

(e) making recommendations to De Beers with respect to these objectives;

(f) integrating and promoting equal use of traditional knowledge in environmental monitoring and management;

(g) wherever possible, promoting efficiency through the reduction of costs and coordination of efforts;

(h) providing a formal mechanism to confirm De Beers' Commitments in the case of uncertainty or disputes; and

(i) communicating to the Parties and the public on activities and achievements of the above objectives.

Ní Hadi Xa Agreement was signed and is being implemented between De Beers and six Indigenous Parties, including:

- Deninu Ku'e First Nation
- Łutsel K'e Dené First Nation
- North Slave Métis Alliance
- Northwest Territory Métis Nation
- Tłı̨chǫ Government
- Yellowknives Dene First Nation

1.8 Relevant Management Plans

The WMMP is part of several inter-connected management and monitoring plans and programs that have been created in compliance with various licenses and agreements to verify the accuracy of potential effects, and to determine the effectiveness of mitigation. Other management and monitoring plans, programs, licenses, and agreements that are related to the WMMP include:

- Adaptive Management Plan (De Beers 2014c);
- Aquatic Effects Monitoring Program (AEMP; De Beers 2016a);
- Air Quality and Emissions Monitoring and Management Plan (De Beers 2015c);
- Engagement Plan (De Beers 2015b);
- Emergency Response and Spill Contingency Plan (De Beers 2017a);
- Erosion and Sediment Management Plan (De Beers 2014d);
- Interim Closure and Reclamation Plan (De Beers 2019a);
- Migratory Bird Nest Management Plan (De Beers 2015a, Appendix B)
- Updated Project Description (De Beers 2020a);
- Vegetation and Soils Monitoring Program (De Beers 2014e);
- Waste Management Plan (De Beers 2019b).

2 EFFECTS TO WILDLIFE AND WILDLIFE HABITAT

The EIS (De Beers 2010) predicted three main effects of the Mine on wildlife and wildlife habitat:

- direct habitat loss;
- indirect habitat loss; and
- Mine-related mortality and injury.

Direct habitat loss refers to the physical disturbance and immediate loss of wildlife habitat (e.g., upland and riparian vegetation, wetlands and water) within the Mine's physical footprint. Direct habitat disturbance occurs during Mine construction, such as the creation of roads, mine rock piles, core Mine facilities, and increased water levels in local lakes and streams.

Indirect habitat loss results from changes in the movement and behaviour of wildlife that occurs outside of the Mine footprint and can affect the local abundance and distribution of animals. Changes in movement and behaviour can result from sensory disturbance around mining operations (i.e., a ZOI), which may be caused by dust deposition, noise, general human activity, and animal memory of previous encounters with industrial developments. Sensory disturbance can reduce habitat quality for wildlife even where vegetation remains intact. Monitoring dust and noise can contribute to overall knowledge of the Mine's ZOI. These effects are monitored through the WMMP, and other management plans (such as the Air Quality and Emissions Monitoring and Management Plan and Vegetation and Soils Monitoring Program).

Occasionally, mining operations have contributed to the mortality or injury of wildlife. This may be either accidental (such as vehicle collisions with wildlife), or the deliberate removal (re-location or intentional destruction) of problem wildlife to protect worker safety. Encounters between animals and people are inherently dangerous for people and animals. Deterrent actions should always start with the least intrusive method and then increase with intensity as needed. In the past, an effective way to reduce wildlife mortality has been to establish and enforce low speed limits on Mine roads. Reducing the availability of food and shelter for wildlife, thus limiting the attraction and presence of animals within the Mine site, is also highly effective at preventing mortality or harm to wildlife.

2.1 MINES AND WILDLIFE

The Mine is the fifth diamond mine to be constructed in the NT and Nunavut. There are currently three diamond mines in operation in the NT (Ekati, Diavik and Gahcho Kué), one in care and maintenance (Snap Lake) and one that is now dormant in Nunavut (Jericho).

Various mitigation designs and practices to avoid and minimize effects on wildlife have been implemented, monitored, and evaluated at these mines. This WMMP draws on the lessons learned at these mines and aims to improve further on what these mines have been able to accomplish. Documents reviewed in the preparation of the WMMP included:

- Gahcho Kué Mine Annual Wildlife Reports (De Beers 2020b);
- Snap Lake Wildlife Effects Monitoring Program (De Beers 2019c);
- Diavik Diamond Mine Wildlife Management and Monitoring Plan (DDMI 2020);
- Diavik Diamond Mine Wildlife Management and Monitoring Report (Golder 2021);
- Ekati Diamond Mine Wildlife Effects Monitoring Plan (Dominion Diamond 2016);
- Ekati Diamond Mine Wildlife Effects Monitoring Program Report (ERM 2017); and
- Reports from two diamond mine wildlife monitoring workshops (Marshall 2009; Handley 2010) and one diamond mine wildlife monitoring meeting (GNWT-ENR 2021).

Some of the improvements documented include improved landfill practices, use of fencing, construction of skirting around buildings, employee education, and monitoring site nesting activity by raptors. A summary is provided below.

Carnivores and scavengers (particularly wolverine, fox, and ravens) may become attracted or habituated to mine sites if they are fed by staff or have access to food waste (CWS 2007). This was/is an on-going concern at the mines. A major improvement in mitigation occurred with a re-design of the Ekati landfill in 2002. Prior to the changes, the landfill was a stand-alone facility, covered occasionally with waste rock. In 2002, Ekati incorporated the landfill directly into the waste rock pile. This led to much more frequent covering of garbage. Following this, and improvements to employee education, the percent of landfill inspections where attractants were observed dropped from over 90% to 65% between 2001 and 2003 (BHPB 2004). This also led to a reduction in the number of scavengers present at the landfill. For example, observations of ravens dropped from 13 occurrences in 2001 to 1 occurrence in 2003 (BHPB 2002, 2003).

There are indications that improved and continual employee education has resulted in a decrease in the presence of scavengers and food waste items at landfills (BHPB 2010; DDMI 2010). The use of skirting on buildings has also successfully prevented wildlife from accessing the area underneath buildings as shelter or dens (BHPB 2008). Skirting is most effective if wire mesh, sheet metal sheathing or another chew-resistant material is used and frequent monitoring of the skirting integrity is necessary.

Electric fencing, flagging, and inuksuks have all been used in an attempt to deter caribou from airstrips and roads at mines with varying success. At the Ekati Diamond Mine, six caribou were entangled in the electric fence surrounding the airstrip from 2001 through 2009 and four of these animals died (BHPB 2003, 2005, 2010). At the Diavik Diamond Mine, a caribou became entangled in an electric fence, and was then killed by a grizzly

bear (DDMI 2006). Since these fences resulted in caribou mortalities it was not recommended that fences be used for the Mine. Instead, caribou will be deterred from airstrips by driving a truck down the strip, getting out of the vehicle, and making noise by yelling and, if required, using bear bangers. This will only be done when there is an imminent flight scheduled to land on airstrip.

Wildlife-vehicle collisions along the 350 km Tibbitt-to-Contwoyto winter road have been infrequent. From 1996 to 2009, there were three reported road-related wildlife mortalities along the Tibbitt-to-Contwoyto winter road. In 1996, a wolverine was killed by a pick-up truck (Banci, pers. comm. in EBA 2001), five caribou were killed by a grocery (meat) truck on a portage near Gordon Lake in 1999 (EBA 2001), and a red fox was killed in 2009 (Madsen 2010, pers. comm.) These collisions were often linked to poor visibility due to fog or blowing snow, and the number of occurrences has been few considering the volume of traffic at the mines and along winter roads. In 2014, two caribou died after running into a parked vehicle on the Mine winter access road (De Beers 2015d). Providing wildlife with the right-of-way, speed limits and regular communication between drivers about the presence of wildlife have been effective at limiting wildlife injuries or mortalities caused by vehicle collisions.

Wildlife mortalities have been more common on mine roads, which are in operation throughout the year. For example, there were 26 wildlife mortalities associated with vehicles at Ekati in 2013, including Arctic hare (*Lepus arcticus*), ptarmigan (*Lagopus muta*), Arctic ground squirrel (*Urocitellus parryii*), and greater white-fronted geese (*Anser albifrons*). Vehicle-caused mortalities of Arctic hare, muskrat (*Ondatra zibethicus*), ptarmigan, and Arctic ground squirrels have also been reported at Diavik (Golder 2018, 2019). There have been few road-related mortalities at the Mine and have included one Arctic hare and two ptarmigan (De Beers 2016b, 2017b). Mitigation to limit vehicle-related mortalities includes speed limits, giving all wildlife the right-of-way, removal of attractants (including carcasses) from the roadside, communication between drivers, signage, and ongoing driver education.

Monitoring has been introduced to detect possible nesting by raptors and ravens at the mines. At Ekati in 2002 there were two instances of rough-legged hawks nesting or attempting to nest within open pits and a peregrine falcon nested on the stairs of a fuel tank (BHPB 2002). Following these instances, monitoring was implemented each spring to detect nesting behaviour before egg-laying occurred. For example, systematic surveys for nests and nesting behaviour are completed at mine infrastructure areas and open pits (De Beers 2014b; DDMI 2020).

3 MITIGATION

The Mine environmental design features and management policies, practices, and procedures that De Beers plans to implement to avoid and reduce effects to wildlife abundance and distribution are collectively referred to as mitigation. The Mine uses mitigation that avoids, minimizes, and reclaims adverse effects associated with environmental risks or effects pathways (BBOP 2021).

In keeping with the EIS, this document divides wildlife and wildlife habitat concerns into four categories, and proposes mitigation specific to each:

- direct habitat loss;
- indirect habitat loss;
- wildlife protection; and
- caribou protection.

3.1 DIRECT HABITAT LOSS

De Beers' objective is to monitor that Mine-related habitat loss remains within the footprint authorized by the Land Use Permit (MV2021D0009). Management and mitigation measures to achieve this objective include the following:

- confirm the Mine footprint is kept within the area authorized by the Land Use Permit;
- promote natural re-vegetation and practice progressive reclamation as the Mine develops;
- backfill the mined-out pits with processed kimberlite and mine rock to decrease the on-land Mine footprint; and
- maintain downstream flows within baseline levels.

The methods, frequency and duration of monitoring of the Mine footprint and progressive reclamation is described in Section 4.1. Action levels for direct habitat loss are presented in Section 5.1.1.

3.2 INDIRECT HABITAT LOSS

De Beers' objective concerning indirect habitat loss is to reduce the indirect loss of habitat to less than that predicted in the EIS. Management and mitigation measures to achieve this objective include the following:

- cover and contour pipelines so they will not be a barrier to wildlife movement;
- use dust suppression strategies (following *Guideline for Dust Suppression*, GNWT-ENR 2013b), such as regular road watering during snow free conditions;
- enforce speed limits of 50 km/h on haul roads and 30 km/h on other roads to assist in reducing the production of dust;
- reduced speed limits when caribou and other large wildlife are within 200 m of roads;
- enclose processes that create dust (such as rock crushing), where feasible;
- maintain a minimum flying altitude of 650 m above ground level (except during takeoff and landing) for cargo and passenger aircraft outside of the Mine site (GWNT-ENR n.d. [Flying Low brochure]; Appendix A, OP-006);
- limit as many equipment noise sources as possible by locating equipment inside buildings;
- use downward directional low impact lighting to reduce light pollution;
- construct low profile roads that do not act as a barriers to movement for wildlife (relative to surrounding landscape);
- maintain snow berms along the winter access road at heights of less than 1.6 m to not hinder wildlife movement
- conduct a pre-blasting search for large mammals in the area within 1 km of the blasting site; blasting activities would be suspended until caribou have moved away (Appendix A, OP108);
- suspending mining activities in areas where caribou are present at the Mine site;
- prohibit recreational vehicle use by personnel; and
- provide environmental sensitivity training for personnel.

Mitigation action thresholds and monitoring methods, frequency, and duration are described in Section 4.2. Action levels for indirect habitat loss are presented in Section 5.1.2.

3.3 WILDLIFE PROTECTION

De Beers' objective is to prevent Mine-related wildlife mortalities and incidents. This includes vehicle-wildlife collisions, incidents resulting from habituation, harm to wildlife during human-wildlife encounters, and damage or harm to active bird nests. Management and mitigation measures to achieve this objective include the following:

- prohibit hunting, trapping, harvesting and fishing by employees and contractors at the Mine site;

- all wildlife will have the right-of-way on roads;
- establish and enforce speed limits 50 km/h on haul roads and 30 km/h on other roads;
- when vehicles are stopped at night due to wildlife presence, bright headlights will be turned off, low beams or driving lights will remain on;
- warn drivers with signage and radio when wildlife are moving through an area;
- staff and contractors to report all relevant observations of wildlife (particularly caribou, fox, wolverine, and bear) to on-site environment staff;
- land clearing for all facilities is to be completed outside of the breeding season for migratory birds (May 15 to September 15). If clearing during the breeding season is required, pre-clearing nest sweeps will be conducted;
- prevent or discourage upland breeding birds and raptors from nesting on Mine infrastructure and man-made structures;
- skirt buildings to limit opportunities for animals to find suitable shelter; accommodations buildings, waste management buildings, and heated buildings will have the highest priority for skirting;
- conduct a pre-blasting search for large mammals in the area within 1 km of the blasting site (Appendix A, OP108). Blasting will be delayed when large mammals are present within the search area;
- isolate and remove any physical or chemical hazards to wildlife (i.e., spill management);
- contact GNWT to receive additional direction regarding new wildlife incident issues as they arise; and
- contact GNWT for approval to destroy problem wildlife (this will only be done as a last resort).

3.3.1 Management of Toxic Substances

The following are specific mitigation policies and procedures to decrease the risks to wildlife from ingestion of toxic substances or encounters with toxic spills during all phases of activity on the Mine site:

- follow the procedures outlined in the Waste Management Plan (De Beers 2019b);
- adhere to and regularly update the Emergency Response and Spill Contingency Plan (De Beers 2017a);
- designate and train a spill response team consisting of on-site personnel;
- provide spill containment supplies at fuel transfer and storage areas;
- immediately isolate, clean and report any spills;

- keep spill response equipment readily available and maintained;
- maintain vehicles and equipment; and
- store fuel in double-walled containers or single-walled containers in lined containment areas.

3.3.2 Management of Attractants

The Waste Management Plan (De Beers 2019b) closely follows the procedures and practices presently in place at the other mines in the region, and incorporates the lessons learned from those mines. The following policies and practices are included in these management plans to reduce the numbers of scavenging wildlife (such as carnivores and birds) attracted to the Mine, and limit human-wildlife interactions:

- education and enforcement of proper waste management practices to all workers and visitors to the site;
- implement waste management awareness programs;
- monitor waste and identify and manage sources of misdirected waste;
- provide training to on-site personnel about wildlife awareness and safety including the dangers of improper food waste disposal and feeding wildlife;
- provide designated indoor areas for lunch and coffee breaks for staff working outdoors;
- separate food waste and non-food waste through the use of designated garbage cans;
- incinerate food waste and other attractants regularly to reduce holding time and odours;
- store food waste, fuel waste and other potential animal attractants inside buildings prior to incineration or transportation off-site for disposal;
- install steel skirting around waste management facilities (including the compost facility, should it be reactivated) to limit opportunities for animals to access compost storage;
- burn food waste and non-toxic combustible waste in oil-fired incinerators;
- ship hazardous material off site for recycling or disposal at an appropriate facility;
- inspect the landfill and cover it progressively;
- collect, sort, and place waste products that cannot be incinerated or deposited in the landfill in designated areas within the waste management and storage area until they can be shipped off-site;

- establish a fenced area for the handling and temporary storage of hazardous wastes. Fencing will be 2 m high, slatted-type, and partially buried to prevent animals from burrowing underneath; and
- continue monitoring and review of the efficiency of the waste management program and improvement through adaptive management.

3.3.3 Measures to Avoid Harm to Nesting Birds

Harm to migratory birds and their nests will be avoided or minimized during Mine-related activities, primarily by reducing the attractiveness of the site to nesting birds (e.g., cover or remove potential nesting sites). Specific measures to avoid damage and harm to migratory birds during nesting period includes:

- staff and contractors will be made aware of the potential presence and habitat of birds listed under SARA who have potential to occur at the Mine;
- land clearing for all facilities is to be completed outside of the breeding season for migratory birds (May 15 to September 15). If clearing during the breeding season is required, pre-clearing nest sweeps will be conducted by qualified personnel (Appendix A, EP-DOP 747, Migratory Bird Nest Pre-Construction Survey);
- prevent or discourage upland breeding birds and raptors from nesting on Mine infrastructure, man-made structures, and idle and stationary equipment;
- prevent or discourage upland breeding birds and shorebirds/waterbirds from nesting in natural areas in the Mine site by installing visual deterrents and/or noise makers in natural areas scheduled to be disturbed as part of the Mine plan (De Beers 2015c);
- prevent or discourage bank swallow from establishing colonies on site by contouring slopes to less than 70 degrees;
- report any raptor nesting activity observed within the mine footprint or within 1.5 km of the Mine;
- report bank swallow nesting or nesting habitat (i.e., slopes greater than 70 degrees) on site; and
- if species at risk nests are identified on site, contact ECCC's Canadian Wildlife Service (cwsnorth-scfnord@ec.gc.ca) as soon as possible to ensure adequate mitigation and monitoring measures are put in place.

3.3.4 Deterring Wildlife

The goal of wildlife deterrent action is to respond to situations using humane methods that keep both humans and wildlife safe. Wildlife will only be deterred when there is a risk to either humans or wildlife, as judged by the environment staff. All deterrent actions start with the least intrusive method, and then increase in intensity as needed. Each deterrent action will stop as soon as the animal moves away from the potentially hazardous site and no longer poses a threat to humans. Deterrents may be used to remove wildlife from the airstrip and potentially hazardous sites and activities including nesting activity within open pits. All deterrent actions will approved under the General Wildlife Permit issued by GNWT.

Wildlife deterrent actions (Appendix A, EP-DOP 015 Nesting Deterrence Procedures, OP 193 Bear Deterrents, OP 078 Responding to Bears or Aggressive Animals) will be performed by designated individuals (such as the environment staff or security staff). Training for these individuals includes:

- basic wildlife ecology and behaviour;
- prevention of wildlife-human encounters;
- contingencies for wildlife-human encounters;
- proper use of deterrents (such as bear bangers and firearms); and
- documentation and reporting procedures when deterrent actions are undertaken.

For deterrent actions to be successful there must be:

- knowledgeable, trained personnel who will select deterrent actions based on each situation;
- consistent application of deterrents;
- evaluation of the success of each deterrent action;
- documentation and reporting of deterrent actions to inform other staff, communities and regulatory agencies;
- effective implementation of the Waste Management Plan (De Beers 2019b), particularly as it relates to the disposal of food waste; and
- absence of food, shelter, or other rewards for wildlife within the Mine site.

Procedures and follow-up for grizzly bear and black bear encounters in camp will follow the Bear Encounter Response Guidelines, provided by the Department of Environment and Natural Resources, Government of the Northwest Territories (GNWT-ENR 2017).

3.4 CARIBOU PROTECTION

Caribou occur seasonally in the area of the Mine and are an important component of the culture and economy of the NT. Baseline studies indicated that the Bathurst herd has a greater likelihood of interacting with the Mine relative to the Beverly/Ahiak herd; however, Beverly/Ahiak collared caribou have also been present in the area. Currently, the most common season for caribou to encounter the Mine is during the winter. Historically caribou were also occasionally present during the post-calving and autumn periods. De Beers is committed to the protection of caribou and will work towards facilitating their movement around the Mine site. In addition to the mitigation previously identified for wildlife (Section 3.3), the following policies, practices, and procedures will be implemented to provide additional protection for caribou:

- all sightings of caribou will be reported to environment staff;
- all incidents involving interactions, use of deterrents or potential injury of caribou will be documented and evaluated;
- all interactions involving injury to caribou will be reported to GNWT;
- site roads may include caribou crossing features at key locations as identified by Indigenous communities;
- winter access road snow berms 1.6 m or higher will be reduced below this threshold;
- if caribou are crossing Mine roads, traffic will stop and wait for them to cross (i.e., caribou have the right-of-way);
- if vehicles are stopped on roads at night due to wildlife presence, high-beams will be turned off, and low beams or running lights will remain on;
- caribou will only be moved away from roads or the airstrip under specific circumstances, such as when there are incoming flights or if there is an emergency; and
- caribou will be deterred from the airstrip by driving a truck down the strip, getting out of the vehicle and making noise by yelling. When there is an imminent flight scheduled to land at the airstrip, firing bear bangers into the air may be used to move caribou slowly away.

4 MITIGATION MONITORING

The primary Mine effects to wildlife and wildlife habitat, as predicted in the EIS, are related to changes in habitat quantity and quality. Concerns also remain regarding the potential for wildlife injury and mortality. Mitigation will be implemented to avoid and limit these effects (Section 3). The monitoring component of the WMMP is designed to measure the implementation of mitigation strategies, to determine the effectiveness of those strategies, and to use that information to improve upon them when required through adaptive management (Section 5).

4.1 DIRECT HABITAT LOSS

4.1.1 Mine Development Area

The Mine development area, or footprint, was predicted to be 1,153 ha (Land Use Permit Application MV2005C0032). This includes areas of disturbance due to the Mine footprint and areas that will be flooded through water diversion (including lakes D2, D3, E1, and N14). In 2018, a Water Licence and Land Use Permit amendment was approved to increase the footprint to 1,292 ha to accommodate essential changes in the Mine plan due to the presence and orientation of joint sets at the pits. (De Beers 2018). In March 2021, a Water Licence and Land Use Permit amendment was approved to increase the Mine footprint to 1,428 ha. (De Beers 2020a).

Wildlife habitat loss from this disturbance will be mitigated through progressive reclamation, as per the Interim Closure and Reclamation Plan (De Beers 2019a). Ongoing monitoring of the Mine footprint will confirm that the approved disturbance footprint is not exceeded.

Following engagement with ECCC, De Beers developed a Migratory Bird Nest Management Plan (Appendix B) outlining measures to mitigate effects to migratory bird nests on the margins of lakes D2, D3, E1, and N14 during flooding (De Beers 2015a).

4.1.1.1 Methods

The Mine footprint will be delineated through aerial photographs (satellite imagery) and Geographical Information System (GIS) software, and/or through alternate means such as ground-based surveys. The estimated Mine footprint will be overlaid on the existing land cover maps to determine the area of each land cover class disturbed, providing a measure of direct habitat loss for wildlife. Tables and figures that illustrate the actual and predicted habitat loss will be included in a wildlife report at the end of construction and every five years.

The AEMP includes monitoring of levels in downstream receiving waters to confirm the water level increase in Lakes D2, D3, and E1 (De Beers 2016a).

4.1.1.2 Frequency and Duration

Mine footprint updates will be provided at the end of construction and every five years.

4.1.1.3 Supporting Documentation

- AEMP (De Beers 2016a); and
- Erosion and Sediment Management Plan (De Beers 2014d).

4.2 INDIRECT HABITAT LOSS

4.2.1 Noise

Noise is believed to cause sensory disturbance to some wildlife species and may cause them to avoid or reduce time spent in an otherwise suitable habitat. Although noise was not predicted to be a primary driver of indirect habitat loss for any of the wildlife VCs, it is still a form of potential disturbance that should be reduced. Activities at the Mine that will generate noise include aircraft, vehicles, generators and other equipment, and blasting.

Baseline noise levels were established by monitoring ambient noise at the anticipated Mine site as part of the EIS. A continuous, 24-hour assessment of baseline noise was completed at selected locations in June 2010. The noise assessment predicted sound emissions associated with the Mine activities and the potential effects on people and wildlife. Information on pre-Mine noise levels in the area as well as the changes expected to result from the Mine can be found in the EIS (Annex C, De Beers 2010).

4.2.1.1 Methods

Time-weighted noise average will be measured using daytime and nighttime energy equivalent sound levels over a 24-hour sampling period as per EUB Directive 038 (EUB 2007), both within the Mine area and at a designated location 1.5 km from the Mine.

4.2.1.2 Frequency and Duration

Noise from the Mine was modelled for operations years one, five, and eight (De Beers 2010). Monitoring of noise was completed in Year 1 of Mine operations in 2017, in Year 5 in 2021, with a future assessment planned for Year 8 (2024). This schedule may be adjusted to align with other regional monitoring efforts or to accommodate changes in mining activities.

4.2.1.3 Supporting Documentation

- EIS, Section 7, Appendix 7.II Noise Assessment (De Beers 2010);
- EIS, Annex C Noise Baseline (De Beers 2010); and
- De Beers Gahcho Kué Mine 2017 Noise Monitoring Program technical memorandum (Golder 2017).

4.2.2 Dust

The Mine will create fugitive 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 this dust on the environment and wildlife health, particularly caribou.

De Beers is committed to minimizing the amount of dust through mitigation listed in Section 3.2. However, dust cannot be completely controlled and is predicted to settle in the area near the Mine. Monitoring is proposed to measure the extent of dust emissions.

De Beers is not aware of any evidence demonstrating that measured smaller particulates from mining activities influences caribou distribution. Airborne particulate matter (PM) consists of coarse particulates or total suspended particulates (TSP with diameter >2.5 µm) and fine particulates (PM2.5 with diameter ≤ 2.5 µm) (USEPA 1995). PM2.5 is monitored at the air quality monitoring station on the Mine site under the approved Air Quality Effects Management and Monitoring Plan (AQEMMP; De Beers 2015c). The location was selected in consultation with the GNWT and is located at the perimeter of the Mine site.

4.2.2.1 Methods

A monitoring program has been implemented to evaluate the influence of dust on soils and vegetation as it relates to the Mine, as part of the Vegetation and Soils Monitoring Program (De Beers 2014e). Dustfall collectors will be set up on tripods at nine set distances from the Mine to the SW (0 m, 50 m, 150 m, 1 km, 5 km, 10 km, 15 km, and 20 km). Vegetation and soils will be monitored at the location of dustfall stations to assess potential habitat alterations associated with dust. Dust will also be analyzed for chemical composition.

4.2.2.2 Frequency and Duration

Application of water or commercial dust suppression products to roads to reduce dust is the primary mechanism for limiting fugitive dust emissions and the magnitude and extent of deposition. Water will be applied when drivers report that the road is dusty. Dust control will consider GNWT-ENR guidelines (GNWT-ENR 2013b).

As described in the Vegetation and Soils Monitoring Program, dustfall collectors will be measured every month throughout the growing season (May to September/October) and once at the end of winter (November to April). Dust will be measured at all nine sampling distances. The magnitude and extent of dust deposition will be reviewed annually and the dust suppression mitigation will be adjusted, if necessary.

4.2.2.3 Supporting Documentation

- Vegetation and Soils Monitoring Program (De Beers 2014e, 2020c); and
- Air Quality and Emissions Monitoring and Management Plan (De Beers 2015c).

4.3 WILDLIFE AND CARIBOU PROTECTION

The 120 km winter access road connects the Mine to the Tibbitt-to-Contwoyto Winter Road at MacKay Lake (Figure 1-1). It is operational each year for approximately two months during February and March. The winter access road has the potential to increase recreational use (e.g., hunting) of the area and may also lead to changes to caribou movement and behaviour. The monitoring programs for the winter access road are focused on measuring these potential effects.

4.3.1 Winter Road Reconnaissance Survey

An aerial reconnaissance survey is used to determine if caribou are present near the winter access road. The information collected during this survey will be used to inform haul truck drivers of the presence and location of any caribou groups near the winter access road. The results of the aerial reconnaissance survey will also be used as a trigger for Caribou Behaviour Monitoring (Section 4.4.1).

4.3.1.1 Methods

The reconnaissance survey will include a fixed-wing or helicopter flight along the entire length of the winter access road from the Mine to MacKay Lake. The flight will be undertaken by aircraft at an altitude of approximately 120 m above ground level, and airspeed of approximately 100 km/h. The number and location of all caribou and caribou sign will be recorded and reported to De Beers environment staff immediately following the survey to determine whether caribou behaviour monitoring should be implemented (Section 4.4.1).

4.3.1.2 Frequency and Duration

The reconnaissance survey will be conducted every year prior to the commissioning of the winter access road and is expected to be completed in a single day of flying.

4.3.1.3 Supporting Documentation

- Winter Road Aerial Reconnaissance Survey (Appendix A, EP-DOP 002).

4.3.2 Public Use Monitoring

Concerns have been raised regarding a potential increase in wildlife mortality resulting from the increased access provided by the winter access road. De Beers will monitor both wildlife occurrence and public use of the winter access road. Security personnel will be contracted to patrol the length of the winter access road every day during the haul season so long as weather permits. The security patrols will frequently be accompanied by an Indigenous environmental monitor. De Beers does not intend to restrict the recreational use of the winter access road, and disclosure of information by recreational users is purely optional and voluntary. However, the information will be shared with GNWT who do have the mandate to regulate access and harvesting of wildlife in the region.

4.3.2.1 Methods

All wildlife and wildlife sign observed along the winter access road will be recorded using the Winter Access Road Wildlife Sightings Form (Appendix A, EP-DOP-001). When an animal is detected, the observer will estimate the distance from the winter access road to the animal and the location of the observation will be recorded. The species and estimated age of the animal (adult or juvenile) will also be recorded. Records will be kept for each survey of the winter access road, including observers, date, patrol start time and end time.

Observations of public use of the winter access road is documented on a Winter Access Road User Survey (Appendix A, EP-DOP-001). Security staff will note the type of vehicles present on the winter access road and types of activity of the users. Where possible the following types of information will be recorded regarding recreational use of the winter access road:

- location;
- number and type of vehicles;
- number and type of accessory vehicles;
- number of people in party;
- purpose of trip; and
- species they are hunting.

Disclosure of information by recreational users is purely optional and voluntary. Security staff will also note the location of any wildlife carcasses seen, the species (if possible), day, time, and any other related information such as whether or not scavengers are present.

Photographs and a GPS location at the site will be taken if possible. In the event of a safety concern (e.g., large numbers of hunters or caribou), GNWT will be contacted immediately.

All safety concerns, including wildlife occurrences will be communicated to haul truck drivers and Environment staff immediately. If 100 animals, and/or 20 or more groups of caribou are detected along the winter access road, caribou behaviour monitoring will be triggered (Section 4.4.1.3).

4.3.2.2 Frequency and Duration

Security staff will undertake surveys of the winter access road every day when weather permits for the duration of active hauling. Security staff will report their observations to De Beers' environment staff and describe all areas of elevated risk to caribou or drivers.

4.3.2.3 Supporting Documentation

- Winter Road User Survey (Appendix A, EP-DOP-001); and
- Winter Access Road Wildlife Sightings Form (Appendix A, EP-DOP-001).

4.3.3 Wildlife Sightings Log

Wildlife sighting logs provide a simple means for staff working at the Mine to record and report wildlife observations to the Environment Department. While the information is not collected systematically and often contains repeated observations of the same animal, it provides an indication to Environment staff of the potential for wildlife incidents or problem wildlife. It also improves staff involvement with the Environment programs and fosters awareness of wildlife-related issues.

4.3.3.1 Methods

The wildlife sighting logs will be maintained at various areas around the Mine site for staff to record observations of wildlife both on the patrols of the winter access road and at other areas around the Mine site. All staff will be encouraged to add observations to the log. This may include observations of commonly observed species, unusual species, potential problem wildlife, and observations of caribou. Observations of species that pose a risk to human safety, or alternatively observations that pose a risk to wildlife will be reported to Environment staff immediately.

4.3.3.2 Frequency and Duration

Wildlife sighting logs will be maintained at the Mine throughout construction, operations, and closure phases, and throughout the year. Environment staff will review the logs weekly. Environment staff will respond to wildlife sightings or trends of concern, such as repeated observations of a scavenging animal near a work site, when they occur.

4.3.3.3 Supporting Documentation

- Wildlife Sightings Form (Appendix A, CL 031);
- Winter Road Wildlife Sighting Form (Appendix A, EP-DOP 001); and
- Deterrents Technical Procedures (Appendix A, OP 193).

4.3.4 Site Surveillance Monitoring

Wildlife is expected to be present near the Mine throughout construction, operations, and closure. Site surveillance monitoring is intended to provide timely and continual information of wildlife activity at the Mine and will provide direct feedback to Mine operations regarding the effectiveness of waste management and wildlife mitigation practices. Examples of wildlife activities that will be documented through the 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 recording the presence of all wildlife within and around the Mine footprint, environment staff will remain appraised of current and emerging issues and will be able to manage issues as they arise. To use a common example, surveillance monitoring may detect that wildlife has gained access and is taking shelter beneath a building. The common mitigation is to block the access through improved skirting, and follow-up surveillance monitoring will confirm whether the mitigation was successful, or if further action is required.

4.3.4.1 Methods

Environment staff will undertake systematic tours of the Mine site and record all wildlife observations or recent wildlife sign (e.g., tracks, scat). The survey will be completed on foot and by truck, and staff will record the area surveyed, and the nature and location of all observations. The surveillance monitoring survey will include areas of the Mine where there is risk of wildlife attractants (such as waste management areas), risk of wildlife using the Mine for shelter, denning or nesting, or where there are people working outdoors. Areas with high nesting potential, and water management ponds that may be attractive to waterfowl and shore birds will be included in wildlife site surveys seasonally.

The wildlife site surveillance monitoring will include an inspection of all building skirting for disrepair and signs of wildlife access. The monitoring will also include checks for nesting activity in the open pits, and waterfowl and shore birds in the collection ponds and water management ponds both before and during the nesting period (May 15 to September 15).

4.3.4.2 Frequency and Duration

Surveillance monitoring will occur systematically at least once per week, or more as necessary. Monitoring will be continuous throughout all phases of the Mine.

4.3.4.3 Supporting Documentation

- Environmental Inspections Procedure (Appendix A, OP 014); and
- Collection Pond Bird Surveys (Appendix A, EP-DOP-021).

4.3.5 Waste Stream Management

Carnivores and scavengers have a keen sense of smell and can be attracted from long distances if food items are present. Mining projects in the region have reported attraction of wolverine, fox, grizzly bear, ravens, and gulls. This increases the risk for accidental mortality of wildlife (e.g., collisions with vehicles) and the potential for wildlife interactions with people and the Mine.

Effective waste management practices and staff education are key to decreasing the availability of attractants at mine sites. Environmental design features, mitigation, and waste management will be implemented at the Mine to limit the attraction of wildlife, and the associated increased risks of wildlife interactions and mortality. These mitigation strategies will be similar to proven best management practices and policies at other mines in the NT and Nunavut, including the Snap Lake Mine.

At the Mine, food waste will be collected and stored indoors until it can be transferred to the incinerator. Dual-chamber, diesel oil-fired incinerators will incinerate combustible waste, and will be located inside a building to reduce odour and maintain maximum combustion temperature. Inert solid waste (including the incinerator ash) will be deposited into the landfill. The inert solid waste will be buried on an as-needed basis to provide containment and reduce the potential for odour.

4.3.5.1 Methods

Environment staff will complete inspections of all waste management process components that involve potential attractants. Inspections will include a systematic survey of all waste management facilities and infrastructure, including waste storage areas, transfer vehicles, incineration areas, landfill, and grey and sewage water treatment systems. The effectiveness of the waste management system, as it pertains to wildlife attractants, will be monitored through regular inspections of key waste management areas including the accommodation complex, kitchen, landfill, and the incinerator as part of Site Surveillance Monitoring (Section 4.3.4).

Some level of wildlife activity is anticipated regardless of the efficiency of waste management as wildlife are expected to be present naturally even if there is no food reward. Regardless, the availability of food waste for wildlife will be the trigger to initiate an investigation and corrective action.

Should the inspections identify misdirected waste, wildlife attractants (food waste in particular), or should observations of wildlife, wildlife sign, or wildlife incidents point to problems in the waste management process, immediate corrective actions will be taken or delegated by Environment staff. Corrective actions include immediate removal of misdirected waste, notification to the manager of the area, heightened monitoring and enhanced training.

4.3.5.2 Frequency and Duration

Inspections will be completed systematically at least once per week throughout the year and during construction, operations, and closure as part of the Wildlife Site Surveillance Monitoring (Section 4.3.4). More inspections may be undertaken if required.

4.3.5.3 Supporting Documentation

- Waste Inspection (Appendix A, OP 014, CL 071).

4.3.6 Migratory Bird Nest Avoidance Monitoring

Mitigation measures to avoid migratory bird nest disturbance are focused on completing vegetation clearing associated with construction outside the breeding season (May 15 to September 15) and when necessary, conducting pre-clearing nest sweeps.

Mitigation measures will be monitored by tracking dates and amount of vegetation clearing to assess the proportion of activities that avoid the general migratory bird nesting period. This information will be recorded in the wildlife monitoring database by staff in the Environment Department and fosters awareness of SAR-listed bird issues by staff on site.

4.3.6.1 Methods

Dates of construction that may incur vegetation clearing will be recorded for staff to assess the potential impact on migratory species, and make recommendations to reschedule outside of the nesting period, if possible. Dates, locations and results of pre-clearing nest sweeps will be conducted by qualified personnel and recorded in the wildlife monitoring database.

4.3.6.2 Frequency and Duration

Tracking of migratory bird nesting avoidance measures will be maintained at the Mine throughout construction, operations, and closure phases prior to and during the nesting season (May 15 to September 15).

4.3.6.3 Supporting Documentation

- Nesting Deterrence Procedures and Inspection Log (Appendix A, EP-DOP- 015 and CL220); and
- Bird surveillance data sheet (Appendix A, CL 119).

4.3.7 Wildlife Incidents

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

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

Monitoring will be undertaken to identify all such incidents to prevent future incidents or escalation of problems.

All incidents will be investigated and reported. All wildlife incidents will also require immediate follow-up. They will be reviewed and reported to determine if Mine operations contributed to an incident, and what can be done to prevent similar occurrences in the future. If wildlife must be deterred due to possible harm resulting in a wildlife-human incident, then an effort will be made by Environment staff to use the least intrusive method. More information regarding methods to deter wildlife from site can be found in Section 3.3.4.

4.3.7.1 Methods

Documentation of wildlife incidents will include photographs, names of people involved, the nature of the incident, the potential reason(s) why an animal was attracted to the site, and supporting information such as the time, date, location, and follow-up actions that occurred.

Encounters with bears (grizzly bears and black bears) will follow the guidance provided in the GNWT-ENR Bear Encounter Response Guidelines and Bear Complaint Checklist, the

Safety in Grizzly Bear and Black Bear Country brochure and the De Beers deterrents procedure (Appendix A, OP 193).

4.3.7.2 Frequency and Duration

Wildlife incident monitoring will be undertaken as required, continuously throughout the construction, operations, and closure phases of the Mine. All incidents will require follow-up to determine what can be done to prevent a similar incident from occurring in the future. All wildlife injuries and mortalities will be reported to GNWT immediately.

4.3.7.3 Supporting Documentation

- Bear Deterrents Procedure (Appendix A, OP 193);
- Incident and non-conformance Investigation Report (Appendix A, CL 002); and
- Waste Inspection Procedure (Appendix A, CL 071).

4.4 WILDLIFE EFFECTS MONITORING

4.4.1 Caribou

The Bathurst caribou herd moves through the Mine RSA (Figure 1-3) during the northern migration to the calving grounds near Bathurst Inlet, and during the post-calving migration to the wintering grounds south of the treeline (De Beers 2010). Bathurst caribou may also be present in winter and baseline studies indicated that Beverly/Ahiak caribou may also be present in winter.

Objectives of caribou monitoring for the Mine include:

- to determine if caribou behaviour changes with distance from the Mine; and
- determine whether a caribou ZOI changes in relation to mining activity.

Following the Review Board public hearings for the Mine in December 2012, GNWT-ENR convened a series of workshops in February and March 2013 that focused on monitoring and cumulative effects assessment approaches for barren-ground caribou. Participants included representatives from industry, GNWT-ENR, co-management boards, land and water boards, monitoring agencies, and Indigenous governments and local communities. Participants discussed topics including a research strategy, common monitoring protocols, modeling tools, the need for a “state of knowledge” report, and the need for guidance regarding when it is suitable and useful to undertake aerial surveys.

De Beers and GNWT-ENR agreed that the regional caribou monitoring plans for the Mine would be informed by the outcome of the workshops, lessons learned, and subsequent

path forward on cumulative effects assessment and management to be advanced by GNWT-ENR in 2014. As a result, the caribou section of the WMMP will be subject to on-going collaborative discussion regarding how to structure industry-scale monitoring in a manner that informs GNWT-ENR's cumulative effects initiatives and Indigenous concerns. Subsequent meetings have been hosted by GNWT-ENR in 2018 and 2021. At the meeting in 2021, it was discussed that caribou behaviour monitoring by the mines could be discontinued. De Beers will engage local communities and determine whether to discontinue caribou behaviour monitoring and discuss the potential use of alternative monitoring approaches (e.g., collar data) to evaluate changes in caribou behaviour in relation to distance to Mines.

4.4.1.1 Habitat Loss and Alteration

The loss and alteration of caribou habitat will occur from several components of the Mine infrastructure and local dust deposition and noise emissions. These changes in habitat can influence the local abundance and distribution of caribou and other wildlife. The monitoring objective involves determining the loss and alteration of habitats on the landscape (including vegetated and non-vegetated areas) due to the physical Mine footprint. Although caribou often use frozen lakes in winter and during the spring migration, monitoring will focus on habitat use during the summer and fall seasons when caribou are travelling and foraging in the area. As habitat loss occurs within the Mine footprint, it is monitored as a component of the WMMP (Section 4.1).

Habitat alteration, resulting from factors such as dust deposition on vegetation, will be monitored through the Vegetation and Soil Monitoring Program (De Beers 2014e). Dust deposition will also be monitored as part of the Air Quality Emissions Monitoring and Management Plan (De Beers 2015c; Section 4.2.2). The Vegetation and Soil Monitoring Program uses a gradient sampling design to test for changes in dust deposition and soil and vegetation variables as a function of distance from the Mine prior to and during the life of Mine. Dustfall monitoring will occur throughout the growing season (May to September/October) and during winter (November to April). Dustfall collectors will be set up at nine set distances up to 20 km from the Mine and will be collected and replaced every 30 days during the growing season and once at the end of winter.

Changes in noise levels also have the potential to affect people and wildlife. Activities at the Mine site during construction and operations, as well as ancillary activities such as air and winter road traffic will be monitored. Noise from the Mine was modelled for operational years one (2017) and five (2021), and will be modeled again in year eight (2024) (De Beers 2010; Section 4.2.1). Cumulative noise is assessed during these years both within the Mine area and at a designated location 1.5 km from the Mine (Golder 2017). This schedule may be adjusted to align with other regional monitoring efforts or to accommodate changes in mining activities.

4.4.1.2 Direct Mine-Related Mortality

The incidence of direct mine-related mortality on caribou at diamond mines has been extremely low. Marshall (2009) reported two NT diamond mine-related caribou mortalities over a period of 10 years. In 2014, two caribou died after running into a parked vehicle on the Mine winter access road. Although, there have been instances where caribou have died near mines, only rarely has the cause of death been attributed to mining activity. At the Diamond Mine Wildlife Monitoring Workshop (Marshall 2009), participants did not provide any substantive comments with respect to mine-related caribou mortalities, or suggestions for improvements. Mitigation appears to have been successful at minimizing mine-related mortality on caribou. Monitoring of Mine-related caribou incidents and mortalities is included in Section 4.3.7.

4.4.1.3 Change in Caribou Behaviour

The winter access road is located within the range of the Bathurst and Beverly/Ahiak caribou herds. Caribou in proximity to the winter access road is a cause for concern for both the safety of the animals and the drivers, and monitoring to avoid and limit caribou-vehicle interactions is included in the WMMP (Section 4.3.2). Monitoring is also an opportunity to better understand the interactions between the caribou and winter roads in the NT through behavioural monitoring.

In 2014, a pilot study to monitor caribou behaviour was initiated along the winter access road where caribou were present. The objective of the pilot behavioural monitoring program was to describe caribou behaviour in relation to the winter access road and traffic. Behaviour monitoring along the winter access road was triggered in 2014, 2018, and 2019. Engagement with Indigenous groups and communities and GNWT will be key to determining continuation, appropriate methods, and objectives of future behavioural monitoring.

In addition to the winter access road monitoring, caribou behaviour monitoring may occur in the RSA around the Mine. Studies at Ekati and Diavik have observed that in some cases there are minor behavioural changes in caribou near mines, which was predicted to have a negligible effect on the energy budget of caribou (BHPB 2010; Golder 2011). These changes were detected with broadly defined behaviours by grouping observations into feeding/resting and moving categories, and comparing caribou groups into those with calves and without calves. However, the GNWT has cautioned that it is difficult to separate the effects associated with mines from natural factors that affect caribou behaviour such as weather and insect harassment (Marshall 2009; Witter et al. 2012).

There have also been consistent difficulties in collecting sufficient data for analysis, because behavioural studies can only be undertaken when there are large numbers of caribou present in the study area and when environmental monitors are available to respond immediately (Marshall 2009; BHPB 2011). Due to the variability associated with

natural factors, a large amount of data is required before conclusions can be made. In several years, there have been too few caribou in the study area (or for too short a duration) for sufficient data to be collected. For example, a simple power analysis for sample size requirements indicates that 55 caribou groups are required in two distance strata to detect an 15% change in feeding behaviour, assuming a Type I error rate of 0.10 at a power of 0.80 (Golder 2015).

The objective for monitoring changes in caribou behaviour is based on recommendations from the Diamond Mine Wildlife Monitoring Workshop (Marshall 2009). The data collected could be provided to GNWT to further develop caribou behaviour and energetic models. As noted for monitoring changes in caribou distribution (Section 4.4.1.5), 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.

4.4.1.3.1 Methods

Behavioural monitoring methods will be consistent with those implemented at Diavik and Ekati mines. The monitoring will be completed by a crew of two observers stationed along the winter access road 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 (BHPB 2014) but can also identify patterns related to changes in group behaviour in response to stressors or other stimuli.

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 five 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, gender and age 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., speed of vehicles).

The permeability of snow berms to caribou will be evaluated concurrently with the caribou behavioural program. Road width, snow berm height and slope will be measured every 2 km along the winter access road. At the conclusion of the survey, berms 1.6 m or higher will be reduced below this threshold.

4.4.1.3.2 Frequency and Duration

Caribou behavioural monitoring will be triggered by the detection of either 100 animals, or 20 groups of caribou along the length of the winter access road during either the reconnaissance survey (Section 4.3.1) or the Public Use Monitoring (Section 4.3.2). A group is one or more animals. Individuals will be considered to belong to different groups if separated by 100 m or more. This threshold will be responsive to low numbers of caribou near the winter access road (i.e., as little as 20 animals), while also providing sufficient data from which to draw conclusions. If the caribou behavioural monitoring is initiated, observations of caribou behaviour will continue for the duration of the hauling season, or until caribou are no longer present above the trigger level.

4.4.1.4 Supporting Documentation

- Winter Spur Road Snow Berm Survey (EP-DOP-013, Appendix A);
- Caribou Activity Budgets (Specific Work Instructions, Appendix A).

4.4.1.5 Change in Caribou Distribution

Monitoring completed for this objective by the Mine previously addressed two different levels of caribou behaviour; changes in distribution (i.e., a ZOI) and changes in activity budgets (De Beers 2014a). Current monitoring will focus on changes in distribution.

Zone of Influence Monitoring

Changes to caribou distribution from alterations in movement are anticipated to occur as caribou respond to habitat loss and sensory disturbance. The monitoring objective is to determine if the ZOI changes in relation to Mine activity (i.e., there is a change in the magnitude and spatial extent of the ZOI through time). The objective is based on recommendations during the Diamond Mine Monitoring Technical Workshop in September 2010 (Handley 2010). It was assumed in the EIS for habitat modelling purposes that the ZOI at the Mine will be similar (i.e., 15 km) to that observed at the Ekati-Diavik diamond mine complex (Golder 2011; Boulanger et al. 2012). Under the existing level of development, these local changes in the distribution of animals around the Mine and other previous, existing, and reasonably foreseeable developments were predicted to have no significant effect on the abundance and movement of caribou across their seasonal ranges (De Beers 2012b).

Studies on the ZOI around the Mine are not likely to provide information helpful to adaptively manage mining operations. However, monitoring caribou distribution around the Mine could contribute information for future environmental assessments and for the ongoing assessment and management of cumulative effects by government under different development scenarios. ZOI estimates are used by government in implementing the Bathurst Caribou Range Plan and in particular calculating total disturbance levels across the range. The GNWT also regularly uses cumulative effects models (e.g., the Integrated Caribou Cumulative Effects model as well as ALCES) which rely on ZOI estimates to examine range-scale impacts to barren-ground caribou herds in the NT. As suggested during the Diamond Mine Wildlife Monitoring Workshop (Marshall 2009), the aerial surveys may not necessarily be undertaken annually if no new information is being gathered (i.e., caribou are infrequently in the study area).

Past methods of monitoring changes in caribou distribution in relation to Mine activities included the use of aerial surveys, beginning in 1999 during baseline studies. As the Bathurst caribou herd declined, the effectiveness of aerial surveys to provide an adequate number of caribou observations during the post-calving period for analysis also decreased (Handley 2010). Instead of collecting aerial survey data De Beers will use collared caribou data to complete ZOI monitoring following recommendations at a diamond mine wildlife monitoring meeting in February 2021 (GNWT-ENR 2021).

4.4.1.5.1 Methods

Satellite and GPS collared caribou location data provided by the GNWT will be used for monitoring caribou distribution. The GNWT monitors caribou locations with satellite and GPS collars annually. Changes in caribou habitat use relative to available habitat will be measured. Regression or other similar statistical models will be used to evaluate changes in a ZOI in relation to mining activity and natural factors. Mechanism(s) causing such changes are uncertain and likely related to sources of sensory disturbance operating simultaneously. Therefore, this monitoring does not directly inform on mitigation but is used to test predictions of the EIS (De Beers 2010) and fill an information gap regarding incremental and cumulative effects.

De Beers will follow the ZOI guidelines from the Caribou ZOI Technical Task Group (GNWT-ENR 2015). De Beers will include annual ZOI estimates during operations for years where sample sizes are sufficient; ZOI estimates will be presented in the comprehensive Wildlife Management and Monitoring Reports, which are prepared every five years (Section 6).

4.4.1.5.2 Frequency and Duration

De Beers will complete analysis of collar data at the end of construction, operations, and closure, and once during post-closure, depending on availability of collar data in the Mine study area.

4.4.2 Raptors

Raptors are birds of prey such as falcons, eagles, hawks, and owls. Raptor species observed nesting within the Mine RSA include peregrine falcon (likely the *tundris* subspecies), gyrfalcon, rough-legged hawk, and short-eared owl. The short-eared owl is a species of 'special concern' and the peregrine falcon anatum-tundrius complex is under consideration for 'special concern' (Section 1.5, Table 1-3). Peregrine falcon is scheduled for assessment by the Northwest Territories Species at Risk Committee in March 2022, and short-eared owl has not been scheduled for assessment through 2022 (NWT SARC 2021).

The Mine was predicted to have no significant effect on raptors (De Beers 2010). Therefore, monitoring of raptor habitat loss is not necessary or required. Monitoring at the Mine for raptors will focus on the three standardized mine-related monitoring objectives at diamond mines (Handley 2010):

- determine if pit walls or other infrastructure are utilized as nesting sites for raptors;
- determine nest success in areas of development and document effectiveness of deterrent efforts used; and
- document and determine the cause of direct Mine-related mortalities of raptors.

Raptor interactions with the Mine will be monitored through the wildlife sightings log (Section 4.3.3), site surveillance (Section 4.3.4), and wildlife incident monitoring (Section 4.3.7). Monitoring of pit walls and other infrastructure for nests is completed as part of site surveillance monitoring (Section 4.3.6. Deterrent actions will be carried out to prevent raptors from nesting in active open pits to mitigate interaction with hazardous areas at the Mine (Section 3.3.3). Deterrent methods include bear bangers, propane noise cannons, air horns, and predatory effigies. Deterrent actions will be measured for success and reported.

4.4.2.1 Direct Mine-Related Mortality

In northern environments, raptor species such as peregrine falcons, rough-legged hawks, gyrfalcons, and common ravens nest on ledges and cliff faces. In landscapes with human-made structures, cliff-nesting birds have been observed to nest on human-built ledge structures such as cairns, buildings, towers, mining dredges, and bridges (Kessel 1989). Open pit walls at the Mine resemble steep-sided ledges and offer attractive nesting locations for falcons and other cliff-nesting birds. Raptor incidents and mortalities will be monitored as part of wildlife incidents (Section 4.3.7).

4.4.2.2 Regional Raptor Monitoring

The Mine is not anticipated to affect local raptor populations (De Beers 2010). Over a decade of surveys showed little effects from the Diavik and Ekati mines on nesting raptors relative to natural factors operating on a regional scale (Coulton et al. 2013). Through discussions and engagement with communities, monitoring agencies, and government, the decision was made to discontinue monitoring for indirect effects of mines on raptor occupancy and productivity. Instead, mine operators were asked to contribute to regional monitoring through the Canadian Peregrine Falcon Survey (Marshall 2009; Handley 2010). Currently, the Canadian Peregrine Falcon Survey is no longer completed. Instead, regional falcon (and other raptors) data are collected and stored by GNWT for distribution. Therefore, the monitoring objective for the WMMP is:

- To contribute to regional raptor monitoring initiatives.

4.4.2.3 Methods

De Beers will contribute nest survey data to GNWT for inclusion in the NWT-Nunavut raptor database. Nest sites will be surveyed by helicopter using standard fly-by methods to identify occupying species, and to count eggs and young. The presence of eggs and chicks will be noted, and the number of eggs and chicks will be recorded, if possible. The timing and methods will be developed in partnership with GNWT and other operators in the region.

The survey area will not be limited to the Mine RSA but will also include raptor nests in the Snap Lake Mine RSA, and any known nests between these two areas. As the contributed data do not have a Mine-related monitoring objective, De Beers does not intend to carryout analyses.

4.4.2.4 Frequency and Duration

The frequency of monitoring is currently set at once every five years (beginning in 2015). Raptor nest monitoring data will contribute to GNWT for regional monitoring purposes throughout Mine operations.

4.4.3 Upland Birds

Upland birds (including shorebirds and songbirds) are found in low densities in the central Canadian Arctic. This group includes the species of concern rusty blackbird and horned grebe (Table 1-3). Past monitoring at the Ekati Diamond Mine found limited effects within 1 km on the upland bird community, and no measurable effect on the reproductive success of Lapland longspurs (Male and Nol 2005; Smith et al. 2005).

De Beers contributes upland bird monitoring to the ECCC Program for Regional and International Shorebird Monitoring (PRISM) surveys. This monitoring was completed in 2015, 2017, and 2019. These surveys are designed to document population numbers of Arctic shorebirds (and upland birds) and contribute to regional knowledge in an effort to set population targets and assist with management and conservation of these species (CWS 2008). The objective of monitoring for upland birds is to detect changes in regional bird populations over time.

4.4.3.1 Methods

Upland birds are monitored using ECCC's rapid survey (PRISM) approach (CWS 2008). The rapid survey approach includes ground-based surveys of 12 ha plots completed by two staff to record species encountered and habitat conditions present. This type of survey provides 100% coverage of the sampled plot. The location and number of plots to meet the monitoring objective will be determined with input from ECCC.

4.4.3.2 Frequency and Duration

De Beers will complete PRISM surveys approximately every other year during the operating life of the Mine. De Beers contributes PRISM data to ECCC and does not intend to complete detailed analyses. A summary of survey dates, number of plots monitored, and species observed during PRISM surveys will be included in annual Wildlife Management and Monitoring Report (Section 6).

4.4.4 General Monitoring

Although not a WMMP component or related to an impact prediction, the following section identifies information that may be collected at the Mine to either fill an information gap, or to provide supporting information for the monitoring described in the WMMP.

4.4.4.1 Small Mammals

The periodic population cycles of small mammals strongly influence other components of the Arctic ecosystem such as the reproductive success of raptors and fox. The nearest

small mammal monitoring location to the Mine is at the Daring Lake research facility, operated by GNWT resulting in a large spatial gap. De Beers will undertake monitoring of small mammals (including lemmings and voles) to fill this information gap.

4.4.4.1.1 Methods

Methods will follow those outlined in Carrière (1999). All small mammal samples collected will be provided to GNWT and with no further analysis completed.

4.4.4.1.2 Frequency and Duration

De Beers has contributed this monitoring annually since 2015 but may discontinue it at any time. All small mammal samples collected will be provided to GNWT.

4.4.4.2 Environmental Indicators

To help describe the environmental setting of the Mine some basic environmental indicators or covariates will be recorded by environmental technicians on site. This will include:

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

4.4.4.3 Mine Activity

To help explain possible changes in wildlife behaviour and distribution, covariates associated with overall Mine activity will be recorded. This will include, by month:

- camp occupancy;
- fuel consumption;
- waste rock moved;
- ore processed; and
- domestic water consumption.

5 ADAPTIVE MANAGEMENT

Adaptive management links environmental monitoring results to management responses; it is a structured, pre-defined response strategy to changes in regulatory, environmental, or operational conditions (De Beers 2014c). Adaptive management is generally considered to include four themes (Greig et al. 2008, WLWB 2010):

- learning to reduce management uncertainties;
- using what is learned to change policy and practice;
- focusing on improved management; and
- basing adaptive management on a structured and systematic approach.

The Adaptive Management Plan describes the process through which the Mine will practice adaptive management (De Beers 2014c). The Adaptive Management Plan introduces a Monitoring Program Framework and an Adaptive Management Response Framework, which defines how results from annual environmental monitoring programs will contribute to the adaptive management process. The Adaptive Management Plan provides the structure and intention through which the Adaptive Management Response Framework and the Monitoring Program Framework will be enacted and connected to adaptively manage the Mine. De Beers will also seek recommendations from Ni Hadi Xa. Ni Hadi Xa will provide a forum where Indigenous groups may identify their technical review needs, and access that expertise to allow a more meaningful understanding on specific areas of interest, including the outcome of environmental monitoring (Ni Hadi Xa 2012).

5.1 ADAPTIVE MANAGEMENT ACTION LEVELS

Adaptive management is undertaken in the WMMP through monitoring effects, mitigation audits and the setting of Action Levels (Sections 5.1.1, 5.1.2, and 5.1.3). Objectives were identified that align with mitigation strategies and measurable predefined monitoring metrics (Table 5-1). Action Levels mark changes to the wildlife and wildlife habitat and trigger a management response. These Action Levels are assigned varying thresholds (low, moderate, and high) and each corresponding management response builds upon the previous levels response (WLWB 2010). In some cases, a progression of thresholds from Low to High Action Levels provides a staged response.

5.1.1 Direct Habitat Loss

5.1.1.1 Mine Development Area

No strict Action Level is required as De Beers is required to keep the Mine footprint within the boundaries of the Land Use Permit area. However, should it be anticipated that the Mine will need to expand beyond the predicted footprint, the Mine plan will be reviewed for opportunities to limit the Mine footprint in future years and if necessary De Beers will amend the Land Use Permit (Table 5-1). A mitigation strategy is also proposed for progressive reclamation, which will be initiated when a disturbed area becomes available for reclamation (Table 5-1).

Table 5-1 Direct Habitat Loss Metrics, Action Levels, and Management Responses

Objective	Mitigation Strategies	Metrics	Action Levels	Management Responses
Minimize direct habitat loss	Keep Mine footprint to within the predicted footprint described in the Land Use Application	Total area of directly disturbed land (ha)[(a)]	• Mine footprint exceeds approved footprint	• inform the MVLWB; and • apply for an amendment to the Land Use Permit if required
	Progressively reclaim disturbed areas	Area of land (ha) progressively reclaimed per year	• plot of land (greater than 1 ha) becomes available for progressive reclamation	• initiate progressive reclamation on that site within two years of reclamation readiness
			• reclaimed area shows unsatisfactory progress based on engagement with regulators and Indigenous groups three years post treatment	• review progressive reclamation methods; • conduct site-specific investigation; and • consider adjusting reclamation methods
			• reclaimed area shows unsatisfactory progress based on engagement with regulators and Indigenous groups five years post treatment	• review Interim Closure and Reclamation Plan and Reclamation Research Plan; and • engage broader reclamation experts and Indigenous groups on best management practices and innovations

a) Does not include area disturbed due to flooding.

ha = hectare; MVLWB = Mackenzie Valley Land and Water Board.

5.1.2 Indirect Habitat Loss

5.1.2.1 Noise

There are currently no applicable environmental noise regulations or guidelines for the NT. Although there are noise guidelines and regulations for community noise levels in jurisdictions across Canada, there are few that are applicable to developments in rural or remote areas. There are also no guidelines or requirements regarding the effects of noise on wildlife.

The regulatory guidelines used for noise monitoring were taken from Directive 038 from the Alberta Energy and Utilities Board (EUB). Directive 038 requires that industrial noise meet an energy equivalent sound level (Leq) maximum of 40 A-weighted decibels (dBA) during nighttime hours and 50 dBA during daytime at a distance of 1.5 km from the Mine fence line (EUB 2007). The Mine Action Levels in the WWHPP were based on these guidelines. However, baseline monitoring results for nighttime ranged from 24.9 to 44.9 dBA (Golder 2017), which exceeds the 40 dBA Action Level so application of the EUB guideline is not meaningful as an Action Level (i.e., it will typically be exceeded based on ambient site-specific noise levels). A more appropriate Action Level is 45 dBA, which is reflective of baseline or ambient conditions.

Although it will not be possible to reduce all sources of noise, such as momentary noise produced by aircraft and blasting, De Beers will attempt to reduce Mine noise sources that produce continuous noise during operations. For this reason, noise will be measured using daytime and nighttime energy equivalent sound levels over a 24-hour sampling period as defined in EUB Directive 038 (EUB 2007). If steady state noise during operations exceeds 45 dBA at 1.5 km from the Mine, De Beers will undertake additional noise monitoring and investigate potential sources of noise to be reduced. If steady state noise during operations exceeds 50 dBA at 1.5 km from the Mine, De Beers will investigate alternative mitigation strategies for noise and pursue options to reduce noise at identified sources (Table 5-2). Monitoring during Year 1 (2017) was 45.1 dBA during nighttime and 42.0 dBA during daytime at 1.5 km from the Mine. Nighttime noise in Year 1 (2017) was slightly higher than EIS prediction (43 dBA), the noise benchmark and measured baseline values. Daytime noise in Year 1 (2017) was less than EIS prediction (44 dBA), less than the noise benchmark and within measured baseline values for daytime noise (Golder 2017). No management response was taken and additional noise mitigation was not required.

5.1.2.2 Dust

Overall changes in vegetation communities due to dust deposition are anticipated to be minor relative to baseline conditions (De Beers 2014e). When drivers report that the Mine roads are dusty the roads will be watered. The volume of water used to suppress dust will be recorded and reviewed on an annual basis (Table 5-2). If dustfall collectors indicate that

dust levels will exceed predictions in the EIS, then a review of all Mine sources of dust will be conducted. The extent of implementation of dust mitigation will also be conducted and additional mitigation strategies for any additional dust sources will be developed (Table 5-2), in consideration of GNWT-ENR dust suppression guidelines (GNWT-ENR 2013b).

5.1.2.3 Barriers to Movement

There is some evidence that barren-ground caribou cross winter roads less frequently when snow berms are high (Rescan 2011). During a snow track study along the Misery Road at the Ekati Diamond Mine, monitors found that caribou crossed the road frequently where berms were less than 0.5 m high and deflected when berms were higher than 1.6 m (Rescan 2011). Based on this finding, De Beers will take a precautionary approach to mitigation along the winter access road by making a concerted and persistent effort to maintain snow berms below 1.6 m. This mitigation will be implemented by either winging-out snow berms with a plow blade or by pushing snow berms down and away from the road with a dozer. Other road construction methods may also be applied. Snowfall, windspeed, and temperature are not entirely predictable parameters; however, and it may not be possible to maintain snow berms below this height at all times and all places along the winter access road. In that situation, De Beers will place breaks in the snow berms in key areas frequented by caribou. De Beers will also monitor snow berm heights and slopes in conjunction with caribou behavioural monitoring. De Beers will use this information to further refine winter access road maintenance and mitigation practices to facilitate the protection and safe movement of caribou in the area.

The Mine does not have an all-season spur road for haul traffic; all vehicle traffic is contained within the Mine site. As such, use of convoys within the footprint is not predicted to reduce indirect habitat loss. Haul traffic cannot be used on the winter access road because it would create unsafe conditions for drivers as a result of the weight limits of the ice.

Table 5-2 Indirect Habitat Loss Adaptive Management Framework

Objective	Mitigation Strategies	Metrics	Action Levels	Management Responses
Minimize Mine-related indirect habitat loss	To maintain the noise footprint of Mine at or below predicted levels in the EIS	Energy equivalent sound level (Leq)	• Energy equivalent sound level (Leq) exceeds 45 dBA at 1.5 km from the Mine on any given sampling day during operations	• Additional noise monitoring will be undertaken to confirm measure; and • If the measure is confirmed then potential sources of noise will be investigated and reduced if possible
			• Energy equivalent sound level (Leq) exceeds 50 dBA at 1.5 km from the Mine on any given sampling day during operations	• Investigate alternative mitigation strategies for noise; and • Pursue options to reduce noise at identified sources
	To reduce dust produced by Mine activities and keep dust footprint at or below predicted levels in EIS	Volume of water (L) applied to Mine roads each year, or other dust suppression initiatives	• Drivers communicate roads are dusty	• Roads are watered and volume of water is recorded
		Mean weight of dust (g) collected in jars at stations up to 20 km from Mine site	• Dust deposition metrics approach EIS predicted levels	• Conduct review of all Mine sources of dust; • Review the extent of implementation of dust mitigation; • Increase the implementation of existing dust mitigation; and • Develop additional mitigation for additional dust sources

Table 5-2 Indirect Habitat Loss Adaptive Management Framework

Objective	Mitigation Strategies	Metrics	Action Levels	Management Responses
Minimize Mine-related indirect habitat loss	To reduce sensory disturbances produced by Mine activities on caribou	Collared caribou presence in the RSA (GNWT-ENR maps) Caribou presence within 200 m of roads (winter road monitoring, incidental observations or surveillance monitoring) Pre-blasting surveys for caribou and wildlife Caribou observed at the Mine site	• Collared caribou maps from GNWT-ENR indicate one or more collared caribou are present in the RSA • Caribou observations within 200 m of roads • One or more caribou within 1 km of blasting area; • Caribou observations at Mine areas (incidental observations or surveillance monitoring)	• Site-wide alerts of caribou presence in the RSA or near roads • Reduced speed limits and communication to drivers • Blasting suspended while caribou are within 1 km of blast area • Mining activities suspended where caribou are present at site and continued monitoring
	To reduce barrier effects to caribou	Snow berm height	• Snow berm height exceeds 1.6 m	• Berms are reduced below the action level, or if berm must remain at this height, then discuss with GNWT about additional mitigation to allow caribou crossings.

EIS = Environmental Impact Statement; GNWT-ENR = Government of the Northwest Territories, Department of Environment and Natural Resources; RSA = Regional Study Area; L = litres; g = grams; dBA = A-weighted decibels.

5.1.3 Wildlife and Caribou Protection

5.1.3.1 Vehicle Wildlife Collisions

If wildlife are on the road, traffic will stop and wait for them to cross (i.e., wildlife have the right-of-way). If vehicles are stopped at night due to wildlife presence, high beams will be turned off. Low beams or running lights will be left on to alert other drivers to the presence of the stopped vehicle. If large animals such as caribou or bears are located in close proximity (i.e., within 200 m) to the road, an announcement will be made on the radio with the number of animals seen, the location, and an order to slow down to 10 km/h in the area (Table 5-3).

Vehicular incidents involving wildlife are to be reported by drivers to their direct supervisor and De Beers Environment staff. More information regarding wildlife incidents can be found in Section 4.3.7. If a wildlife collision occurs, De Beers Environment staff will be contacted immediately, who will in turn report the collision to GNWT.

De Beers cannot restrict public use of the winter access road. Therefore, no Action Levels are proposed for public use the winter access road. The information collected during monitoring of the winter access road will be supplied to GNWT, Crown-Indigenous Relations and Northern Affairs Canada, and other interested land managers.

5.1.3.2 Habituation

Environment staff may at any time suggest or undertake improvements or repairs to environmental design features, mitigation and management practices and policies, the need for additional training for staff, or other improvements to mitigation identified by the surveillance monitoring, as required. Investigation and reporting of incidents will be completed as they occur.

Surveys of wildlife at the waste management areas will be undertaken so that a clean camp is being maintained. The presence of wildlife is an indicator of inefficient waste handling. If wildlife or wildlife sign are observed at the waste management area for two consecutive weeks, a management response will be initiated and additional mitigation will be applied where possible (Table 5-3).

If bears or wolverines are recorded on the Mine site for three consecutive days through any type of survey or incidental observations the frequency of site surveillance monitoring will be increased to daily observations until the animal is not seen on site for two consecutive days. If fox or wolverine are observed for five consecutive days or if a potential den is discovered within the Mine site, De Beers will contact GNWT, investigate all sources of attractants, and investigate the Mine site for potential denning (Table 5-3).

5.1.3.3 Nesting Birds

If birds are observed constructing a nest in an area of risk, nest construction will be deterred by removing nesting materials or reducing the attractiveness of the site to nesting birds (e.g., cover potential nesting site, remove potential nesting site). An area of high risk is defined as an area where there is a risk to the Mine (delay due to nesting birds) or to the birds (high probability of nest failure due to mining activity). Nesting behaviour observed outside of these areas of risk will not be deterred. If an active nest is detected (eggs, hatchlings, or fledglings present) in area of risk, then Mine activities will be reduced within a buffer surrounding the nest as advised by GNWT and/or CWS, depending on the species (Table 5-3).

Table 5-3 Wildlife and Caribou Protection Adaptive Management Framework

Objectives	Mitigation Strategies	Metrics	Action Levels	Management Responses
To prevent wildlife-vehicle collisions on Mine roads	Wildlife have right-of-way on Mine roads	Number of wildlife collisions per year on Mine roads	• Wildlife are reported near Mine roads	• Alert staff; and • Reduce speed on Mine roads to 10 km/h.
			• Wildlife-vehicle near miss	• Conduct interview of personnel involved; • Consider additional mitigation options (e.g., speed limit adjustments, signage); and • Review policies and procedures concerning driving.
			• Wildlife-vehicle collision	• Notify GNWT; • Conduct an investigation of collision; and • Review policies/procedures to reduce likelihood of additional collisions.
To prevent habituation of wildlife to the Mine site	Manage wildlife attractants by maintaining a clean camp	Number of wildlife or wildlife sign observed at a waste management area per day	• Wildlife is seen at a waste management area for two consecutive weeks	• Monitor the waste management area; • Relocate wildlife as recommended by GNWT; and • Review waste management practices
		Number of days that a wolverine/bear is detected at the Mine site	• Wildlife observed for three consecutive days	• Increase frequency of monitoring to daily (e.g., routine surveillance, remote cameras).
			• Wildlife observed for five consecutive days	• Contact GNWT; • Investigate of all sources of attractants; • Survey Mine site for potential denning sites; and • Apply additional mitigation as necessary (such as removing wildlife shelter, educating employees, erecting barriers or signage).
			• Persistent wildlife on site (more than seven consecutive days), or a den is discovered	• Contact GNWT to discuss options to address issue, including possible relocation of wildlife.

Table 5-3 Wildlife and Caribou Protection Adaptive Management Framework

Objectives	Mitigation Strategies	Metrics	Action Levels	Management Responses
To prevent damage or harm to active bird nests	Deter wildlife from nesting in areas of risk	Nests or nesting activity observed within areas of risk	• Birds observed constructing nests in areas of risk	• Contact GNWT to discuss options and acquire general wildlife permit, as required; and • Nest construction may be deterred by removing nesting materials or reducing the attractiveness of the site to nesting birds (e.g., cover potential nesting site, remove potential nesting site).
			• Active nest is detected (eggs, hatchlings or fledglings present) in area of risk	• Mine activities will be reduced within a buffer surrounding the nest as advised by GNWT and/or CWS.

GNWT-ENR = Government of the Northwest Territories, Department of Environment and Natural Resources; CWS = Canadian Wildlife Service.

5.2 Mitigation Audit

The mitigation described in this document stems from current practices at existing mines or was suggested during the environmental assessment process. However, an auditing system is required to evaluate the mitigation. In other words, it should be confirmed that the mitigation proposed in the WMMP is used and that it works. Further, new mitigation should be documented. Thus, an audit should be undertaken annually, specific to the mitigation policies and actions described in Section 3, to evaluate:

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

This audit is implemented annually, as part of the annual Wildlife Management and Monitoring Report (WMMR). The results of the audit should include, site mitigation measures that are regularly implemented by Mine staff, and results from any additional special studies undertaken to further understand effectiveness of mitigation actions intended to reduce residual effects,.

5.3 Contingencies

Contingencies refer to actions taken to manage unforeseen circumstances or non-compliance issues. The surveillance monitoring (Section 4.3.4) is in essence a form of contingency monitoring, as it will be undertaken throughout the year and throughout the Mine site. Surveillance monitoring will detect unforeseen events involving wildlife or wildlife habitat. Any unforeseen events detected through the wildlife surveillance monitoring will be managed either through wildlife incident reporting (Section 4.3.7) or through the mitigation audit (Section 5.2) and discussed with GNWT on an as-needed basis.

If an animal is suspected of rabies, the GNWT wildlife veterinarian (WildlifeVeterinarian@gov.nt.ca or naima_jutha@gov.nt.ca) should be contacted for advice on how to proceed. If someone has been bitten, the Office of the Chief Public Health Officer will be contacted, and immediate medical attention sought. If a carcass is found and suspected of rabies, the head should be preserved, and arrangements for shipping made with GNWT.

6 REPORTING

De Beers will report on the progress and implementation of the mitigation and monitoring described in the WMMP annually, in an annual WMMR. The WMMR will be submitted to the GNWT (by email to WMMP@gov.nt.ca). The report will document activities for the previous year's activities. Consistent with other De Beers' management plans, De Beers will review the WMMP annually to reflect changes in Mine operations. If required, the WMMP will be updated and submitted to the GNWT for approval.

Each year, the WMMR will summarize the current's year's monitoring results in the context of past findings. A summary of any additional research related to interactions of barren-ground caribou with the winter access road will be included within the WMMR, if available. The main body of the report will be technical, providing details on the study design, sampling protocols, analyses (where applicable), and results. A plain English summary will also be included. Records of wildlife incidents during the reporting year will also be appended.

Experience has shown that significant trends associated with effects from mining operations and natural factors are typically not apparent with data collected during one- or two-year periods. However, if significant results are obtained within the short-term, then a discussion of these results will be provided annually. All results will be discussed in the context of predictions made in the EIS and relative to potential environmental significance. A comprehensive WMMR will be prepared every five years. The comprehensive report will include more formal statistical analysis of all subsequent data to assess trends from the Mine on direct habitat loss, indirect habitat loss, and related mortality and injuries. The comprehensive reports will include analyses of monitoring results related to specific mitigations, where appropriate, using data collected and comparing it to times and locations that mitigations were applied. Deterrent actions will also be assessed for success. The comprehensive WMMR will be more technical in nature than an annual WMMR.

The WMMR will provide a mechanism for determining the certainty of effects predictions, unanticipated ecological effects, and effectiveness of mitigation policies, procedures, and actions. The WMMR will also be used to help assess the effectiveness and utility of various components of the WMMP. Using the principles of adaptive management, the assessment will be used to make recommendations regarding the intensity, frequency, and duration of recording of wildlife observations, and possible changes to the components included in WMMP.

7 ROLES AND RESPONSIBILITIES

The Environment Department is led by the Manager of Safety, Health, Environment, Risk, and Training (SHERT), who oversees regulatory concordance, reporting, and engagement associated with the WMMP and provides the resources necessary to implement the WMMP, which is also intended to engage interested parties and solicit feedback.

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9 ACRONYMS AND GLOSSARY

9.1 ACRONYMS AND ABBREVIATIONS

BHPB	BHP Billiton Diamonds Inc.
COSEWIC	Committee on Status of Endangered Wildlife in Canada
CWS	Canadian Wildlife Service
DDMI	Diavik Diamond Mines Inc.
De Beers	De Beers Canada Inc.
ECCC	Environment and Climate Change Canada
EIR	Environmental Impact Review
EBA	EBA Engineering Consultants Ltd.
EIS	Environmental Impact Statement
EUB	Energy and Utilities Board
GIS	Geographical Information System
GNWT	Government of the Northwest Territories
GNWT-ENR	Government of the Northwest Territories, Department of Environment and Natural Resources
INAC	Indigenous and Northern Affairs Canada
LSA	Local Study Area
Mine	Gahcho Kué Mine
MVEIRB	Mackenzie Valley Environmental Impact Review Board
MVLWB (the Board)	Mackenzie Valley Land and Water Board
NT	Northwest Territories
NWT SARC	Northwest Territories Species at Risk Committee
Project	Gahcho Kué Project
RSA	Regional Study Area
TK	Traditional Knowledge
WEMP	Wildlife Effects Monitoring Program
WLWB	Wek'èezhìi Land and Water Board
WMMP	Wildlife Management and Monitoring Plan
WMMR	Wildlife Management and Monitoring Report
WWHPP	Wildlife and Wildlife Habitat Protection Plan
MOU	Memorandum of Understanding
TSS	total suspended solids
VC	valued component
ZOI	zone of influence

9.2 UNITS OF MEASURE

dBA	A-weighted decibels
ha	hectares
km	kilometres
km^2	square kilometre
km/h	kilometres per hour
L	litre
Leq	energy equivalent sound level
m	metres
Mt	million tonnes

9.3 GLOSSARY

Adaptive Management	The exact definition of adaptive management varies among monitoring components, but typically adheres to having four themes as follows (WLWB 2010): 1) learning in order to reduce management uncertainties; 2) using what is learned to change policy and practice; 3) focusing on improving management; and 4) doing the above in a formal, structured and systematic way.
Habitat	The physical location or type of environment in which an organism or biological population lives or occurs.
Monitoring Components	A term used to broadly describe the aspect of the environment and population that may be impacted and monitored. Monitoring components used here included: - habitat; - caribou and other wildlife VCs; and - people.

Appendix A Technical Procedures, Data Sheets and Report Forms

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Section:	Monitoring	Effective Date:	April 23, 2018

DEPARTMENT OPERATING PROCEDURE –*Winter Road Wildlife and Public Use Surveillance*

Revision:	1	Replaces:	0
APPROVED:	*Original Signature: Refer to Item 7. APPROVAL*		

1.0 PURPOSE

The purpose of this program is to gather information on the use of the Gahcho Kué winter road by members of the public, contractors, by staff, and wildlife. This surveillance program is designed to address concerns that the construction and operation of the winter road will lead to increased wildlife mortalities due to vehicle traffic and increased access to hunters. DeBeers will monitor both wildlife occurrence and public use of the road and where possible will gather information on wildlife mortalities and incidents.

2.0 SCOPE

Security personnel will patrol the length of the road in pick-up trucks daily during the haul season so long as weather permits. Duties related to traffic flow, delay reporting, accident reporting and investigation, obtaining emergency service for transport vehicles and first aid are not addressed in this department operating procedure. This procedure addresses only the recording and reporting of wildlife observations and the use of the road by members of the public.

3.0 RESPONSIBILITIES

3.1. Environment Department (DBC)

The Environment Department is responsible for communicating with the Contractor on at least a weekly basis during the contract. This can be done either through face-to-face contact, radio, email, phone or other means. The Environment Department will be responsible for refining the department operating procedure as needed including revisions to maps, division of responsibilities, and data sheets. The Environment Department will provide the relevant logs (a.k.a. data sheets) to the Contractor. The Environment Department will hire and supervise an Indigenous Community Monitor who may accompany the Security Contractor during their daily surveillance of the Gahcho Kué road. The Environment Department is responsible for reporting to government, regulators, communities, and the public.

3.2. Security Contractor

The Security Contractor will be responsible for conducting the daily surveillance of the road. The Security Contractor will record their wildlife and public use observations on the relevant data sheets, and will provide those data to the Environment Department on a weekly basis.

The contractor will report any key observations, such as the occurrence of caribou, hunters, or collisions to the Environment Department on a daily basis. Data sheets shall be submitted to the Environment Department on a weekly basis. The Security Contractor shall allow an Aboriginal Community Monitor to accompany them on the daily surveillance of the road upon request.

4.0 CRITICAL CONTROLS

See attached Job Risk Assessment.

5.0 DEPARTMENT OPERATING PROCEDURE

5.1. Equipment to be provided by DeBeers Canada

- Map of the winter road
- Data sheets (attached)

5.2. Equipment to be provided by Security Contractor

- One GPS unit/vehicle set to NAD83, and spare batteries
- Field supplies including pencils and field notebook
- Digital camera

5.3. Procedures

5.3.1. Public Use Surveys

De Beers and its contractors will not restrict public or recreational use of the winter access road. Disclosure of information by recreational users is purely optional and voluntary. De Beers and its Contractors will maintain a friendly and hospitable demeanor when conversing with members of the public and hunters who may be using the road. De Beers and its contractors will explain the rules of the road to users as necessary to ensure the safety of workers and members of the public. These include the check-in procedures if arriving at site, road speed limits, and right-of-way for wildlife among others.

Security Contractors will record occurrences of recreational users of the Gahcho Kué Spur Road on the Winter Road User Form. These observations shall include vehicles that were observed but not stopped as well as those that were stopped. One data form shall be filled in for every recreational vehicle observed on the road. Security Contractors may, at their discretion, stop recreational users of the road to converse and gather information. This interview shall be cordial, and if users do not wish to provide personal information they shall not be pressed to. Security personnel shall record the information on the Winter Road User Form. Key pieces of information include number

of people, names, purpose of trip, community of origin, description of vehicle, license plate number, number of snowmobiles, the location (portage number/lake name) and number of animals killed (if hunting).

Information on public use of the road, including names, license plate numbers, locations, and photos will be shared with the Government of Northwest Territories, Environment and Natural Resources upon request.

5.3.2. Wildlife Observations

All wildlife the size of a fox or larger observed from the road must recorded on the Winter Road Wildlife Sightings Form. The original observer shall record their observations on field sheets provided in their vehicles or the Gahcho Kue Winter Road Dispatch. The Security Contractor shall record their own winter road wildlife sightings and shall provide completed forms to the Environment Department on a weekly basis. The Security Contractor can record the observations relayed by others, but must make note of the original observers name on the form.

The Security Contractor shall make every effort to enforce the rules of the road as they relate to wildlife including ceding the right of way to wildlife, slowing to 10km/h when wildlife are present, and turning off bright head-lights when stopped at night due to wildlife presence on the road.

5.3.3. Incident Reporting

All incidents concerning wildlife and/or members of the public shall be investigated, recorded, and reported as per the standard incident reporting procedures. The contractor shall use the Incident and SHE NC Investigation Reporting (CL-002) to record all relevant observations including but not limited to:

- Location (UTM, lake, portage)
- Time and Date
- Names, companies of people involved
- Photographs
- Potential Causes/contributing factors
- Management response actions taken (e.g. re-routed traffic, reported to Environment/Dispatch)

Incidents involving wildlife or members of the public shall be reported immediately to the Environment Department.

5.4. Example Data Sheets

5.4.1. Winter Road Wildlife Observations Form

WINTER ROAD WILDLIFE SIGHTINGS FORM

YEAR:_____ SHEET:_____ De Beers Group of Companies

DATE (Y/M/D)	TIME (24 h)	SPECIES	NUMBER	LOCATION				PROXIMITY TO ROAD[1]			OBSERVER	COMPANY
				Lake Name	Portage Number	UTM						
						Easting	Northing	on	bank	off		

1. A check mark to indicate animal is on the road, on the bank of the road, or off the road is fine. Observer may also estimate distance from center of road to animal in meters.

5.4.2. Winter Road User Survey

De Beers Winter Road Access Reporting

Winter Road User Survey

SIDE ONE: USER INFORMATION

Monitoring Station: ☐ Gahcho Kué Winter Road ☐ Snap Lake

Monitor's name: _____

Vehicle Information
Description of vehicle:_____

Vehicle license place origin (Territory/Province):_____ License plate no:_____

Accessory vehicles: (Snowmobiles/ATVs) **NO** ☐ **YES** ☐ How many? _____

Number of people in the vehicle: _____

Northbound Date: _____ Time: _____ am / pm
(Spell out Month)

Southbound: Date: _____ Time: _____ am / pm
(Spell out month)

Community representation **(indicate the community for EACH person in the vehicle)**

Yellowknife	_____	N'Dilo	_____	Ingraham Trail	_____
Dettah	_____	Rae/Edzo	_____	Wha Ti	_____
Gameti	_____	Wekweti	_____	Lutsel K	_____

Other (specify) _____

Purpose for using the winter road (check all that apply):

Sight-seeing: ____ Camping:____ Trapping:___ **(Licence #)**_____
Fishing: ___ **(Licence #)**_____
Hunting: ___ **(Licence #)**_____
Other (specify) _____

Hunter classification: GHL ____ Special GHL ____ Resident ____ Non-Resident ____
(Use one √ per hunter) Non-Resident Alien _____

How many days for hunting? 1 2 3 Other _____

What animal species are you hunting? (check all that apply)

Caribou	_____	Moose	_____	Grouse	_____
Wolf	_____	Wolverine	_____	Ptarmigan	_____

Other (specify) _____

SIDE TWO: HARVEST / SURVEY DATA

See previous page for road user data.

Did any of you kill any wildlife this trip? YES / NO If **YES**, what species and how many?

(please specify details below)

Caribou _____ Moose _____ Wolf _____ Wolverine _____ Grouse _____
Ptarmigan _____ Other (specify) _____
Where? _____

Did you notice any disease or injury with these? **YES / NO**

What wildlife did you see? (Indicate how many):
Caribou _____ Moose _____
Wolf _____ Wolverine _____ Other (Specify) _____
Where were these sightings? (identify lake or portage #, if possible)
_____

Were any of them lame or injured? **YES / NO** (please specify details below):
_____

Did you see any infractions, e.g., meat wastage? **YES / NO** If **Yes** (identify where) _____

Did you see any contaminant spills? **YES / NO** If **Yes** (identify where) _____

Comments: _____

_____

_____

5.4.3. Field Map

6.0 APPROVAL

Name	Title	Date	Signature
Patrick Kramers	Environmental Superintendent	April 23, 2018	

7.0 REVISION HISTORY

Noted below is the revision history of this document.

Revision	Date	Comments
0	January 30, 2015	Approved for Use
1	April 23, 2018	Format and Content Updated

8.0 DEFINITIONS

None

9.0 REFERENCES and RELATED DOCUMENTS

9.1. De Beers. 2014. Wildlife and Wildlife Habitat Protection Plan – Version 3.1. Gahcho Kué Mine. Submitted to the Mackenzie Valley Land and Water Board, Yellowknife, NWT. October 2014.

9.2. Incident & SHE Non-Conformance Investigation Report, 2020 (CL-002)

10.0 APPENDIX 1: JOB RISK ASSESSMENT

SECTION A - GENERAL INFORMATION	
Job/Task Description: **Winter Road Public Use Survillance**	
Job/Task Objective: **To obtain information regarding public winter road use**	
Date JRA Conducted: **November 5, 2021**	**Department:** **Environment**
JRA Leader: **M. Elwood**	**JRA Recorded by:** **M. Elwood**
List Equipment/tools required for task: **As listed above**	
Do the task activities impact on other people/work? *Yes ☐ / No ☐ If 'Yes' indicate who/what and how as well include them in the JRA* **No**	

SECTION B – JOB/TASK INFORMATION

#	Task /Activity Step	Hazards	Unwanted Event	Controls in place	Residual Risk #
1	Pre-Operation Equipment Checks	1. Pinch Points 2. Sharp Edges	1. Personal injury	1. Wear proper PPE (eg: gloves) 2. Avoid exposure to line of fire	3
2	Refueling Equipment	1. Fuel handling	1. Spills 2. Fire or explosion	1a. Carry spill kit or spill absorbents 1b. Never refuel on or near waterbodies (including frozen waterbodies) 2a. Shut down machines prior to fueling 2b. Carry fire extinguisher as standard equipment.	3
3	Light Vehicle Equipment Operation - General	1. Uneven Terrain 2. Unsafe ice conditions 3. Hidden obstacles (under snow) 4. Extreme Weather Conditions 5. Equipment failure 6. Working remotely	1a. Vehicle rollover 1b. Loss of control 1c. Sudden/violent motion (eg: bouncing) 2a. Fall through ice 3. Contact with hidden obstacles. 4a. Cold weather exposure (eg: hypothermia, frostbite) 4b. Warm weather exposure (eg: sunburn, dehydration, heatstroke) 4c. Reduced visibility 5a. Being stranded in the field 6a. Wildlife interactions 6b. Vehicle collision and interactions	1a. Trained operators 1b. Drive to conditions and reduce speed on unfamiliar terrain 1c. Use established routes of travel when possible 1d. Wear proper PPE (eg: helmet) 1e. . 2b. Ice Rescue Gear 2c. Ice Rescue Training for field crews 2d. Plan travel to avoid ice crossings if possible 2e. Use of floater suits during transition season 2f. Maintain adequate spacing of snowmobiles when crossing ice 2g. Avoid travelling or working on ice near lake inlets and outlets, and areas of moving water (rivers and streams) 3a. Drive to conditions and reduce speed on unfamiliar terrain 3b. Use established routes of travel when possible 3c. Wear proper PPE (eg: helmet) 4a. Establishment of minimum threshold temperature (-35 C) for remote field work 4b.Carrying properly equipped winter survival kit 4c. Dress to conditions and bring extra warm clothing 4d. Monitor weather	15

				conditions/forecasts, and rescheduling work if high winds or severe weather are forecast 4e. Use sunscreen 4f. Stay hydrated. Carry adequate food and water. 5. Return to site if lightning is observed or anticipated. If caught in an electrical storm, find a low area of terrain away from trees, and hunker down. 6a. Carrying properly equipped survival kit 6b. Always working in pairs (buddy system) 6c. Remote Travel Plan completed prior to work 6d. Redundant means of communication (eg: Radio, Sat Phone, SPOT/In Reach) 6e. Complete pre-op check prior to leaving site 6f. Regularly scheduled vehicle maintenance (PMs) 6g. First Aid and Wilderness Survival training 7a. Be aware of surroundings 7b. Do a circle check (wildlife scan) of work area before parking/stopping vehicles 7c. Always carry wildlife deterrents (bangers, air horn, bear spray), know how to use them, and keep them in a readily accessible location 8. Ensure employees have completed the required training and awareness for operating vehicle.	
4	Remote Field Work	1. Unsafe ice 2. Extreme temperatures 3. Stranding	1. Falling through ice 1b. Loss of control of vehicle and/or damage to vehicle 2a. Frostbite 2b. Hypothermia 3. Equipment failure, breakdown getting stuck - stranding	1a. Vehicle training – awareness. 1b. Appropriate monitoring of road conditions and changing weather and lighting conditions. 2a. Establishment of minimum threshold temperature (-35 C) for remote field work 2b. Carrying properly equipped winter survival kit 2c. Always working in pairs (buddy system) 2d. Remote Travel Plan completed prior to work 2e. Redundant means of communication (eg: Radio, Sat Phone, SPOT/In Reach) 2f. All crew members to have valid First Aid and CPR training	15
6	Vehicle Operation - Winter Road Operation	1. Driving and working on uneven terrain; 2. Vehicle interactions (light vehicles, hauling, and wildlife) 3. Remote working 4. Lighting and visibility 5. Slips, trips, and falls 6. Vehicle stranding – blown snow on roads 7. Hunting activities on the WR	1a. Vehicle roll over. 1b. Personal injury (back strain), 1c. Slips, trips, and falls. 2a. Vehicle or wildlife collision 3a. Stranding; 3b. Hypothermia 4a. Low light conditions or inclement weather conditions causing loss of control or unwanted interactions with vehicles or wildlife. 5a. Personal injury. 6a. Stranding. 6b. Vehicle damage 7. Potential risk of being struck by projectile associated with hunting activities	1a. Ensure proper training prior to using winter road; 1b. Drive to road conditions; 1c. Use proper PPE while working on ice. 2a. Proper training and use of winter road specific communications. 2b. Monitor road for wildlife. Slow speeds when wildlife is present in the area. 3a. Ensure proper winter road survival kits are stocked appropriately. 3b. Remote travel plan completed; 3c. Redundancy in communication devices. 4a. Ensure pers. Is monitoring changing weather. Use buddy system in poor conditions to avoid driver fatigue. 5. Ensure appropriate PPE (i.e. Ice cleats) are being worn. 6. Ensure vehicle extraction equipment is available (emergency snow shovel and towing straps). Contact supervisor prior to commencing any towing or extracting techniques. 7a) Maintain situational awareness, wear high visibility clothing, ensure presence is known to all hunters in the immediate area.	15

JRA Comments/Remarks:

SECTION C - SIGN OFF

	Name	Signature	Date
Supervisor/Lead:	M. Elwood/Allan Knight		
Team member/s:	Jarrett Vornbrock		
	Alex Perrett		
	Lee-Ann Knee		
	Caleb Dickey		

DE BEERS GROUP	GAHCHO KUÉ MINE		
Department:	Environment & Permitting	**Document No.:**	**EP-DOP 002**
Section:	Monitoring	**Effective Date:**	January 29, 2021
DEPARTMENT OPERATING PROCEDURES – *Winter Road Aerial Reconnaissance Survey*			
Revision:	2	**Replaces:**	1
APPROVED:	*Original Signature: Refer to Item 6. APPROVAL*		

1.0 PURPOSE

The aerial reconnaissance survey will be conducted prior to (1-2 weeks) opening of the winter road to determine the presence of Barren Land Caribou (*Rangifer trandus groenlandicus*). The information collected will be used to inform construction and maintenance crews, and the project management team as to the presence of Caribou along the route. If more than 20 groups (or 100 individual animals) are detected along the road, Caribou Behavioral Monitoring Program will be initiated as described in the Tier 3 Wildlife Management Monitoring Plan, V 1 (DeBeers 2021).

2.0 SCOPE

The survey will involve a single flight, using a small aircraft (e.g. Aviat Husky, Found Bush Hawk or helicopter) along the route of the Gahcho Kué winter road (WR) and back. The survey shall be flown at 80-100 km/h (43-54 nm/h) approximately 120m (400ft) above ground level. The survey will be undertaken by a third party air charter with experience completing Caribou aerial surveys. The entire survey is expected to take no more than 2 hours of flight time.

3.0 RESPONSIBILITIES

3.1. Environmental Coordinator

The Environmental Coordinator is responsible for budgeting, commissioning, managing, and paying for the survey on an annual basis. This will include contracting an aircraft operator (e.g. Dave Olsen Hoarfrost Huskies, Acasta Heliflight) and providing environment staff to complete the survey. An environmental consultant (e.g. Golder Associates) may also be arranged as a substitute if internal resources are unavailable. The Environmental Coordinator shall manage the project. The Environmental Coordinator is also responsible making every effort to ensure that a Traditional Ecological Monitor, or substitute, is given the opportunity to participate as an observer.

3.2. Environmental Staff and/or Environmental Consultant (primary contractor)

The Environmental Staff will be responsible for complying with this Department Operating Procedures (DOP-002) and ensuring the proper completion of field work, data sheets and end of program reporting. They shall (in consultation with the Environmental Coordinator) prepare a safe work plan and review it with both DBC and the sub-

contractors prior to work being commenced. Environmental staff shall provide the department operating procedures to the pilot and ensure comprehension. Should it be required, the Environment Department will entrust the field portion this program to an Environmental Consultant such as Golder Associates should DBC staff be unavailable.

3.3. Approved Aircraft Operator (sub-contractor)

An aircraft operator must be contracted for the successful completion of the program. In most cases, they will contracted by the Environmental Department, but may be contracted be sub-contracted by the Environmental Consultant if required. The pilot will be responsible for providing a charter service for the purpose of conducting the survey.

4.0 CRITICAL CONTROLS

These are identified in the Job Risk Assessment (JRA) form attached.

5.0 DEPARTMENT OPERATING PROCEDURE

5.1. Equipment Required

- One GPS unit set to NAD83, and spare lithium ion batteries. This GPS should have the flight track preloaded, as well as having tracking activated to record the current surveys flight.
- Binoculars
- One satellite phone or inReach communicator and a spare battery
- Map of area surrounding Gahcho Kué Mine to MacKay Lake
- Field supplies including pencils and field notebook
- Field Camera
- Survival equipment appropriate for the time of year that the survey is flown
- First Aid Kit
- Proper outdoor clothing appropriate for spending an extended period of time outside at the time of year the survey is flown.
- CL 005 - Aerial Reconnaissance Survey Data Sheet

5.2. Field Procedures

The reconnaissance survey should be conducted 1-2 weeks prior to the opening of the winter road. It should be completed during clear weather using a small aircraft (i.e. fixed-wing aircraft or helicopter) at an altitude of approximately 120 metres (400ft) above ground level, and airspeed of 80 to 100 km/h (43-54 nm/h). The survey will cover the area between the Gahcho Kué Mine and MacKay Lake (see map below). A minimum of two spotters should be utilized (one on each side of the aircraft). Both these spotters should have a GPS, binoculars & field sheets to record observations. Two transects will parallel each side of the winter road corridor. The center of each transect (flight path) will be 600 m from the road, providing a survey width of approximately 1.2 km on each side of the road. All Caribou observed, the approximate group size and GPS location will be recorded on CL #005 - Aerial Reconnaissance Survey Data Sheet – See *Reference 8.2.* If a large group is observed, it is recommended that a photo be taken in order to obtain an accurate count post flight

Sex and activity will be recorded opportunistically, with the focus being on total Caribou individuals and group sizes observed. Caribou sign will also be opportunistically recorded, including tracks, trails, beds, and feeding craters.

Incidental observations of other species will be made, but there will be no excessive deviation from the flight path in connection with such observations.

The GPS track logs will also be recorded to determine where exactly the flight path took place. If the survey detected no Caribou, then a "0" should be entered on the data sheet.

5.3. Post-Field Procedure

Data sheets completed in the field will be reviewed for completeness and accuracy after returning to site. Completed datasheets, GPS waypoints and flight track logs will be entered into the environmental database share point file (S115/Wildlife/*Year*/Caribou Monitoring). Environmental Staff are also responsible for completing a technical summary of the program, which will reviewed by the Environmental Coordinator for completeness. The Coordinator will then determine whether that year's Caribou Behavioral Monitoring will be initiated as described in the Tier 3 Wildlife Management Monitoring Plan, V 1 (DeBeers 2021).

Data sheets (or all of the information recorded on the data sheets) shall be scanned into the SharePoint file upon completion of data entry, as well as being physically filed with the onsite environmental records.

5.4. Example Data Sheet (Aerial Reconnaissance Survey Data Sheet CL-005)

De Beers Group of Companies	GKM CHECKLIST TEMPLATE **Aerial Reconnaissance Survey Data Sheet**	ID No.: CL 005 Date: January 15,2015

Project Name:	Gahcho Kué Winter Access Road Survey	**Page Number:**	1 of 1
Project Number:	1313650007	**Date** (dd/mm/yy):	12/1/2015
Pilot and Observer Name(s):	Dave Olsen	**Aircraft:**	
Weather:	Sunny, Clear	**Temperature** (°C):	-25
Flight Start Time:	10:00	**Flight End Time:**	14:00

Waypoint	UTM Coordinates		Species	Approximate Number	Wildlife Sign (tracks, beds, craters)	Comments: Behaviour (B, F, S, A, T, R)[a] Group Composition (M, F, C)[b]
	Easting	Northing				
WI	565048	7066617	Caribou	25	Tracks	B, M/F. On Lake

[a]B=bedded; F=feeding; S=standing; A=alert; T=trotting; R=running; [b]M=male; F=female; C=calf.

5.5. Field Map of Typical Winter Road Route (2015-2021)

6.0 APPROVAL

Name	Title	Date	Signature
Patrick Kramers	Safety, Health, Environment, Risk & Training Manager	January 29, 2021	

7.0 REVISION HISTORY

Noted below is the revision history of this document.

Revision	Date	Comments
Draft	January 15, 2015	Environmental Superintendent to Approve
0	January 27, 2015	Approved by Environmental Superintendent
1	April 23, 2018	Format and Content Updated
2	January 29, 2021	JRA Completed. Format and Content Updated

8.0 DEFINITIONS

8.1. Aircraft: fixed wing or helicopter.

8.2. Reconnaissance Survey: an aerial flight to collect visual observations about the characteristics or occurrences within a given area.

9.0 REFERENCES and RELATED DOCUMENTS

9.1. De Beers. 2021. Tier 3 Wildlife Management and Monitoring Plan – Version 1. Gahcho Kué Mine. Submitted to the Mackenzie Valley Land and Water Board, Yellowknife, NWT. November 2021

9.2. CL 005 – Aerial Reconnaissance Survey Data Sheet

10.0 APPENDIX 1: JOB RISK ASSESSMENT

SECTION A - GENERAL INFORMATION

Job/Task Description:
Winter Road Aerial Reconnaissance Survey

Job/Task Objective:
Observations of Barren Land Caribou along the Gahcho Kue Winer Road

Date JRA Conducted: November 3, 2021	Department: Environment
JRA Leader: M. Elwood	JRA Recorded by: M. Elwood

List Equipment/tools required for task:

- One GPS unit set to NAD83, and spare lithium ion batteries
- One satellite phone or inReach communicator and a spare battery
- Map of area surrounding Gahcho Kué Mine to MacKay Lake
- Field supplies including pencils and field notebook
- Field Camera
- Survival equipment appropriate for the time of year that the survey is flown
- First Aid Kit
- Proper outdoor clothing appropriate for spending an extended period of time outside at the time of year the survey is flow.
- CL 005 - Aerial Reconnaissance Survey Data Sheet

Do the task activities impact on other people/work? *Yes ☐ / No ■ If 'Yes' indicate who/what and how as well include them in the JRA*

SECTION B – JOB/TASK INFORMATION

#	Task /Activity Step	Hazards	Unwanted Event	Controls in place	Residual Risk #
1	Aircraft Operation	Emergency landing, impact with terrain, onset of IFR (instrument flight rules) conditions resulting in incident	Death, Significant Injury, LTI, Stranding	- Ensure that aircraft is being within Canadian Aviation Regulations Standards (CARs) with an approved, licensed commercial operator. - Obey pilots commands at all times. - Ensure the pilot is supplied with the most up to date forecasts prior to departure. - Carry an inReach communicator or sat phone on your person at all times. - Carry appropriate survival equipment onboard aircraft.	15

2	Aircraft Operation	Unexpected engine failure with a controlled landing.	Stranding, Exposure/Cold Weather Injury	- Carry an inReach communicator or sat phone on your person at all times. - Carry appropriate survival equipment and clothing onboard aircraft.	15
3	Aircraft Operation	Impact with rotor blades or propeller.	Death, Significant Injury, LTI	- Staying within the sightline of pilot and obeying pilot instructions at all time. - Ensure all participants have had a thorough pre-flight briefing from the pilot. - Avoiding “hot” entry or exits of the aircraft while blades are in motion.	10
4	Boarding/Loading Aircraft	Ergonomics, pinch points and slip hazards.	Slips, trips and falls. Strain injury.	- Take time while loading aircraft. - Use cleats when walking on slippery terrain. - Ask for help lifting heavy/awkward objects	3
5	Light Vehicle Operation	Collision with mobile equipment/light vehicles.	Death, Significant Injury, LTI, medical aid, first aid, property damage.	- Only allow site licensed individuals operate light vehicles in accordance to the site traffic management plan. - Ensure vehicles have been appropriately inspected prior to use. - Maintain positive communication with vehicles and equipment within the operating area.	10

JRA Comments/Remarks:

SECTION C - SIGN OFF

	Name	Signature	Date
Supervisor/Lead:	Mason Elwood		January 29, 2021
Team member/s:	Jarrett Vornbrock		
	Garrick Lafferty (Ni Hadi Xa)		
	Lee-Anne Knee		
	Alex Perrett		
	Caleb Dickey		
	Trisa Ngo		

DE BEERS GROUP	GAHCHO KUÉ MINE		
Department:	Environment & Permitting, SHRT	**Document No.:**	**OP 006**
Section:		**Effective Date:**	
OPERATING PROCEDURE – *Wildlife Procedure*			
Revision:	4	**Replaces:**	3
APPROVED:	*Original Signature: Refer to Item 6. APPROVAL*		

1.0 PURPOSE

This procedure describes how disruptions to natural wildlife (including fish and birds) are to be minimized, what to do in a situation where wildlife is encountered, and related regulations to be complied with at the Gahcho Kué Mine (GKM). It also addresses the disposal of animal carcasses encountered near areas of human activity.

2.0 SCOPE

This procedure applies to all employees and contractors at the GKM.

3.0 RESPONSIBILITIES

3.1. Mine General Manager or Designate:

3.1.1. Overall management of the GKM sites and workforce.

3.2. Heads of Departments/Contractor Managers, Superintendents or their Designates:

3.2.1. Ensure this procedure is communicated to their employees as applicable;

3.2.2. Ensure their employees have received the appropriate training; and

3.2.3. Ensure this procedure is implemented.

3.3. Responsible Person for Airstrip Operations of Designate:

3.3.1. Ensure the inbound aircraft is alerted to the presence of large animals on or near landing areas, via the GKM Travel Clerk or other means.

3.4. Safety, Health, Environment, Risk & Training (SHERT) Manageror Designate:

3.4.1. Decide when herding actions will be taken to disperse animals, and ensuring that details are recorded;

3.4.2. Contact the appropriate regulatory authorities to notify and/or arrange the removal of an aggressive or nuisance animal;

3.4.3. Maintain records of wildlife activities through the Wildlife Sighting Log: CL 031 and incident reports;

3.4.4. Liaise with appropriate regulatory authorities on wildlife management issues;

3.4.5. Report on wildlife management issues in regular environmental reports;

3.4.6. Monitor the implementation of this procedure; and

3.4.7. Ensure this procedure is maintained.

3.5. Supervisors:

3.5.1. Implement this procedure as applicable;

3.5.2. Ensure this procedure is followed.

3.6. All Employees:

3.6.1. Report bear sightings immediately, as specified in OP 078: Responding to Bears or Aggressive Animals At or Near GKM – Emergency Situation;

3.6.2. Record wildlife sightings in the *Wildlife Sighting Log: CL 031*;

3.6.3. Be aware of current GKM site rules;

3.6.4. Take reasonable precautions to prevent disturbing wildlife; and

3.6.5. Ensure wastes are properly disposed of to avoid attracting wildlife;

3.6.6. Understand and practise this procedure as required; and

3.6.7. Ask their supervisor for clarification if they are unsure of any aspect of this procedure.

Responsibilities of Employers, Contractors, Supervisors and Employees are also described in the NWT Mine Health and Safety Act (Sections 15 – 18) and throughout the NWT Mine Health and Safety Regulations.

4.0 CRITICAL CONTROLS

A completed Job Risk Analysis can be found in Section 10.0, and lists hazards, unwanted events and controls in place for the following task/activities:

- Report all wildlife sighting;
- Report all nesting activity
- Wildlife Collision Prevention Plan
- Disposal of Dead Wildlife
- Bear Encounters

5.0 PROCEDURE

5.1. General

5.1.1. Site orientation sessions for staff and contractors shall include instruction relating to wildlife encounters (see Section 5.4);

5.1.2. Do not feed wildlife, offer them food or leave food out for them. Feeding wildlife may cause them to stay at the site and become habituated to human contact;

5.1.3. The consequences of feeding may result in serious harm to humans, and/or the animal being relocated or destroyed. Feeding of wildlife is also illegal under the NWT Wildlife Act;

5.1.4. Ensure that all food and garbage that might attract wildlife are stored in wildlife-proof containers or buildings;

5.1.5. When wildlife, other than common small animals or birds, are observed at or near the site, fill out the *Wildlife Sighting Log: CL 031* just outside the dining area, promptly upon returning to the camp, or advise Environmental Staff of the sighting;

5.1.6. Any nesting sites of eagles, hawks or owls; den areas of bears, wolves, wolverines or foxes; and calving areas of moose or caribou are items of significant interest and should also be recorded;

5.1.7. Human interactions with animals that have safety or environmental implications must be reported according to *OP 1026: Incident and SHE NC Documentation Process, Reporting and Investigation*. This includes actual or threatened animal attacks, injuries to animals caused by vehicles, feeding of animals, etc.;

5.1.8. For safety reasons, no DBCI employee or contractor is permitted to hunt or use firearms at or within 3 km of the GKM site, or within 1 km of active winter roads, except as part of authorized wildlife deterrent actions. The only exception is the removal of an aggressive or nuisance bear, following notification of the ENR (except in extreme emergencies). Removal or killing of an animal involving the use of firearms may only be authorized and directed by the Project Manager or their designate;

5.1.9. No fishing or hunting for food or sport in the lands, rivers or streams around the GKM site is allowed by De Beers Canada employees and contractors while they are residing at the on-site camps, or visiting the site for business purposes;

5.1.10. Scientific studies of fish and wildlife must obtain all necessary permits and licenses from provincial and/or federal agencies. Fish or wildlife which is incidentally killed during these studies will be offered to First Nation (FN) members for use, where appropriate, or otherwise dealt with as specified in collection permits and licences;

5.1.11. To the extent practical, disruptive or noisy work activities (i.e. drilling, low level aircraft flights) will be scheduled to avoid sensitive times for wildlife known to be in the area, such as migrations, breeding seasons and times when young are being reared;

5.1.12. Where practical, avoid disturbing wildlife by flying over them. Where possible, aircraft should travel at an altitude of 300 m (1000 feet) or greater to reduce noise and disturbance to wildlife. Exceptions apply when landing or taking off, for specially permitted environmental studies, and when weather conditions (e.g. low cloud) restrict flight altitudes. See *OP 003: Aircraft - Environmental Factors* for details.

5.1.13. All wildlife shall be left as undisturbed as possible. Vehicles, boats or aircraft shall not be used to purposefully kill, injure, capture, harass, pursue or chase wildlife of any type;

5.1.14. The only time a vehicle may be used to interact with wildlife is when the animal is posing a threat to either company property, employee safety and health or its own health – and then only under the guidance and direction of the SHRT/E Superintendent or their Designate;

5.1.15. No employee shall disturb, destroy or take a nest or egg of birds on and around site without specific advance permission from the Environmental Superintendent in consultation with ENR and/or Wildlife Monitors. Likewise, den areas of other mammals (i.e. bears, beavers, fox, wolverines, etc.) are not to be disturbed without permission;

5.1.16. If a nesting or den area is discovered, take note of the location and notify the Environmental Superintendent or designate of the situation and the animal involved if known (Section 5.1.6).

5.2. Wildlife Collision Prevention Plan

5.2.1. Wildlife is considered to have the right-of-way over light vehicles and mobile equipment, but this shall not take precedence over people's safety. When encountering wildlife while operating a machine, if it safe to do so:

a. Stop your vehicle and turn off or dim the headlights;

b. Avoid using the horn, and remain with the vehicle;

c. Use a radio to report the presence of the animal in the immediate area of the GKM site to the Environmental Superintendent or designate;

d. Wait for the wildlife to pass before continuing;

e. On return to camp complete the *CL 031: Wildlife Sighting Log*.

5.2.2. Due to the massive size of heavy mine equipment, making emergency stops or sudden turns is very dangerous to the operator, so it is not appropriate to take such emergency actions to avoid small wildlife that suddenly runs in front of such machines;

5.2.3. Special precautions are necessary at any airstrip (runway) for fixed-wing aircraft:

a. A visual check of the airstrip is to be done early in the day on which aircraft landings are expected, and again 15 to 30 minutes prior to the estimated arrival time;

b. The Responsible person in charge of the airstrip and apron area will drive the entire length of the runway, looking for large animals within 100 meters of it;

c. Radio a report to the GKM Travel radio operator or their designate, who will alert inbound aircraft to the probable presence of animals on the runway;

d. Where necessary, and particularly in emergency situations such as a medical evacuation flight, an attempt may be made to herd animals off the runway on foot or with vehicles, with the approval of the SHRT/E Manager or their designate. If this is not successful the aircraft will be told not to take off, or if already airborne, not to land without further radio clearance;

e. As soon as the animals have moved 100 meters off the runway, no further approach to them should be made;

f. If the animals do not move more than 100 meters from the runway perimeter, or look like they may attempt to re-enter it, workers on the ground should remain between the animals and the runway to prevent them from returning before the inbound aircraft lands;

g. In addition to an entry in the Wildlife Sighting Log: CL 031, a detailed report must be made to the SHRT/E Manager or their designate after

any herding attempts, describing what was tried and how the animals responded.

5.3. **Disposal of Dead Wildlife**

5.3.1. Dead or sick animals encountered must be managed so as not to put people or other wildlife at risk from diseases or scavengers. Dead animals discovered must be reported through the near miss reporting system (see *OP 1026: Incident and SHE NC Documentation Process, Reporting and Investigation*) and removed at least 25 metres from roadways and active work areas;

5.3.2. Large carcasses that might attract bears are to be removed 1 km away from areas of human activity;

5.3.3. When handling carcasses, appropriate personal protective safety measures must be taken;

CARCASSES OF MOOSE, BEAR OR CARIBOU:

5.3.4. CAUTION - When approaching a dead moose, bear or caribou (check caribou for radio tracking collars), during seasons when bears are active, there must be at least two people present, each equipped with pepper spray, air horns and/or other devices to deter bears. See *OP 193: Bear Deterrents*;

5.3.5. If the carcass is more than 1 km from areas of human activity:

a. Carcasses of moose, caribou and bear will not be removed. Removing the kill may cause the bear feeding on it to approach areas of human activity in search of its food;

b. Everyone on-site will be alerted to the presence of the carcass, and the area closed to human activity until the SHRT/E Manager or designate has determined that the area clear/safe.

5.3.6. If the carcass is within 1 km of human activity, any dead moose, caribou or bear will be relocated due to the danger posed by a bear feeding on it:

a. Relocate the carcass by dragging it at least 1 km away from areas of human activity, preferably in an upwind direction. Dragging leaves a scent trail so that a bear can easily relocate the kill. If the carcass is removed entirely the bear may come into camp looking for it;

b. An ATV, snowmobile, or other vehicle may be used to drag the carcass. Use of a helicopter for this is considered unsafe due to the chance of snagging the load;

c. Everyone on-site will be alerted to the presence of the carcass, and the area closed to human activity until the SHRT/E Manager or designate has determined that the area is clear/safe.

5.3.7. Animals which appear sick or for which the cause of death is not apparent:

a. The greatest concern is with animals behaving in ways that suggest they may be infected with rabies. These include unusual aggression or tameness, partial paralysis, drooping head, excess saliva ("frothing at the mouth"), and general poor physical condition. Foxes and skunks are the most frequently affected animals;

b. Cases of suspected rabies must be reported to the local office of the Canadian Food Inspection Agency. For the GKM, the closest CFIA office is in Edmonton at (780) 395-6701. These reports are to be made by the SHRT/E Manager or their designate;

c. If people have been directly exposed (scratched, bitten or exposed to saliva), the animal carcass must be sent to the CFIA for testing to see if special medical care is required;

d. The CFIA will advise on shipping requirements which will include rigorous dangerous goods transportation requirements;

e. The ENR recommends burying diseased animals at least 1 metre deep in the ground, to prevent infecting other wildlife. Cremation in the burn pit, with prior permission from the ENR and FN, may be more appropriate. See *OP 009: Open Fires (Burn Pit*).

5.4. Bear Encounters

5.4.1. The GKM is located in a zone that sees the presence of both black and grizzly bears. Usually, bears hibernate from late October to April. Bears have a tendency to avoid encounters with humans if they are aware of their presence in time;

5.4.2. When surprised, a bear may become aggressive. Therefore, good awareness of surroundings should be practiced at all times;

5.4.3. Poor food handling or waste management will attract them into areas of human activity. Bears will usually avoid people, but can be aggressive if threatened or surprised;

5.4.4. Any bear that approaches the main GKM camp or active work areas must be promptly dealt with to protect both the bear and people.

5.4.5. The following are tips to prevent bear encounters:

- **a.** Be alert at all times;
- **b.** Have respect for all bears, they are potentially dangerous;
- **c.** Never approach a bear for any reasons;
- **d.** Ensure food wastes are not available to any wildlife; and
- **e.** If leaving the immediate GKM site, ensure regular communication with Security via radio or satellite phone, be aware of surroundings, and carry applicable bear deterrents.

5.4.6. Be aware that you may encounter a bear at closer than expected distance. Bears are unpredictable and do not respond to human presence in a consistent manner;

5.4.7. Always treat the presence or proximity to a bear as a danger. They will fiercely defend their young and food supply;

5.4.8. They have also been known to travel together as a family group as well as during mating season. For this reason, be extra careful and cognizant that there may be others in close proximity. Although there is no guaranteed formula, the following tips may help:

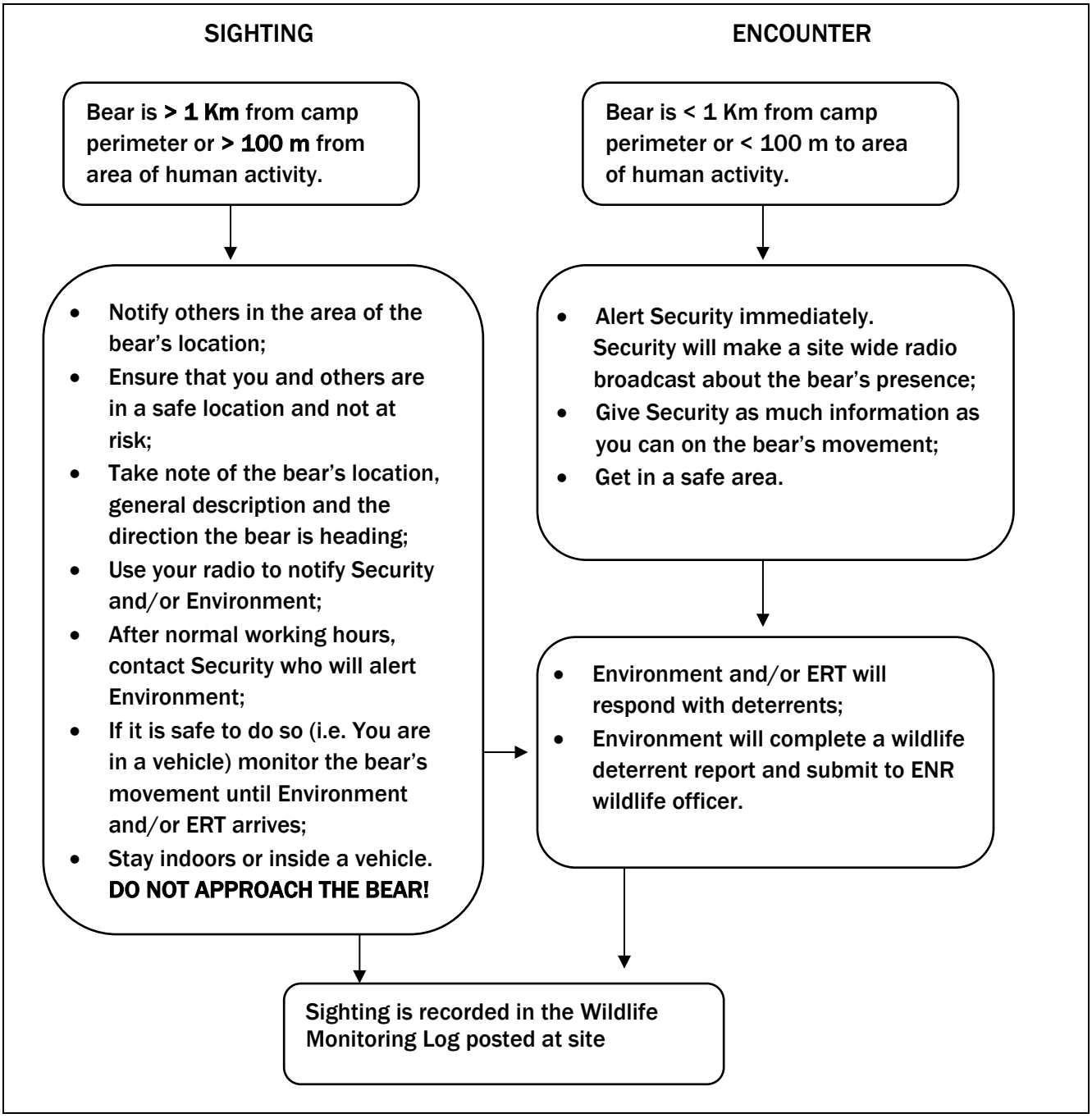
- **a.** Do not panic, stop, stand still and stay calm;
- **b.** If you are not alone, group together, it will make you appear bigger, raising your arms will also contribute to making you appear bigger;
- **c.** Assess the situation, looking at egress options, including barriers to your moving away;
- **d.** Avoid direct eye contact. While keeping sight of the bear, slowly back up until you feel confident that the risk has decreased;
- **e.** Do not run;
- **f.** If the bear is aware of your presence, identify yourself as a human by talking. Being in an upwind position will allow the bear to identify you as a human;
- **g.** If possible, move to a safe location (i.e. vehicle, building, boat, etc. and report the encounter, request support, should you need to be removed from the area;
- **h.** Have your deterrent materials readily available; be prepared to use them as dictated by the conditions; and

i. Immediately alert your supervisor of your situation (by radio if possible), and report the occurrence to Site Security;

5.4.9. Where it is necessary to drive a bear (or other types of large animal) away, this must be done with care to avoid causing the animal to overheat. Air-horns, "bear-bangers", rubber bullets and pepper spray are available and will be used at the direction of the Project Manager or Designate to encourage a bear to leave. See *OP 193: Bear Deterrents*;

5.4.10. No more should be done than is necessary to get the animal to move. Once they are doing what you need them to do, stop your approach;

5.4.11. In the event that a bear becomes a persistent nuisance or significant safety risk to workers, refer to *OP 078: Responding to Bears or Aggressive Animals at or Near GKM* – Emergency Situation for instructions on a progressive deterrent response, up to and including the killing of the bear by authorized persons.



5.5. Training

5.5.1. Limited training is provided to site staff if work occurs within the mine footprint. Staff required to work at some distance from the mine footprint will require additional information on bear biology and behaviour.

6.0 APPROVAL

Name	Title	Date	Signature
Patrick Kramers	SHERT Manager		

7.0 REVISION HISTORY

Noted below is the revision history of this document.

Revision	Date	Comments
0	October 17, 2013	Approved for Use
1	September 29, 2017	Format and Content Updated
2	April 26, 2018	OP reviewed by HOD, format & content updated
3	November 4, 2018	OP updated to include Critical Controls & JRA
4		

8.0 DEFINITIONS

8.1. **Encounter:** The animal is seen **closer than 1 km** from the camp perimeter, and is **less than 100 m** from any area of human activity.

8.2. **ENR:** Department of Environment and Natural Resources

8.3. **Rabies:** An infectious and deadly disease sometimes carried by wildlife, usually spread by direct contact with blood, saliva or other body fluids. Symptoms in animals include unusual aggression or tameness, partial paralysis, drooping head, excess saliva ("frothing at the mouth"), and general poor physical condition. Foxes and skunks are the most frequently affected animals.

8.4. **Sighting:** The animal is seen **further than 1 km** from the camp perimeter, and is **more than 100 m** from any area of human activity.

9.0 REFERENCES and RELATED DOCUMENTS

9.1. NWT Mine Health & Safety Act and Regulations, Section 15.06 (1)

9.2. NWT Wildlife Act

9.3. General Site Orientation Program

9.4. OP 1004: SHE Objectives

9.5. OP 1010: Operational Control

9.6. OP 1026: Incident and SHE NC Documentation Process, Reporting and Investigation

9.7. OP 003: Aircraft – Environmental Factors

9.8. OP 009: Open Fires (Burn Pit)

9.9. OP 010: Waste Management Program

9.10. OP 078: Responding to Bears or Aggressive Animals at or Near GKM – Emergency Situation

9.11. OP 156: Housekeeping & No Littering Protocol

9.12. OP 162: Personal Protective Equipment

9.13. OP 193: Bear Deterrents

9.14. REC 005: Site Drivers Manual

9.15. CL 031: Wildlife Sighting Log

10.0 APPENDIX 1: JOB RISK ASSESSMENT

SECTION A - GENERAL INFORMATION

Job/Task Description:
Wildlife Procedure

Job/Task Objective:
This procedure describes how disruptions to natural wildlife (including fish and birds) are to be minimized, what to do in a situation where wildlife is encountered, and related regulations to be complied with at the Gahcho Kué Mine (GKM). It also addresses the disposal of animal carcasses encountered near areas of human activity.

Date JRA Conducted: 6 July 2018	Department: Environment
JRA Leader: Kimberly Balsillie	JRA Recorded by: Kimberly Balsillie

List Equipment/tools required for task:

- Report all wildlife sighting
- Report all nesting activity
- Wildlife Collision Prevention Plan
- Disposal of Dead Wildlife
- Bear Encounters

Do the task activities impact on other people/work? Yes ☐ / No ☐ If 'Yes' indicate who/what and how as well include them in the JRA

Yes – harm to animal or human can have direct impact on work (DBCI employess, contractors, and visitors)

SECTION B – JOB/TASK INFORMATION

#	Task /Activity Step	Hazards	Unwanted Event	Controls in place	Residual Risk #
	Report All Wildlife Sightings and Nesting Activity	Wildlife in work area that is not reported may result in serious harm to humans, and/or the animal being relocated or destroyed	- Feeding wildlife - Hunting wildlife - Not reporting wildlife or nesting	- Training – Bear Awareness and Educational materials about wildlife interaction, prevention, and reporting - CL 108 Wildlife Sighing Logs - Migratory Birds OP NWT Wildlife Act – no feeding wildlife	18S
	Widlife Collision Prevention Plan	Vehicle collision casuing serious harm to humans, and/or the animal being relocated or destroyed	- Death of wildlife or humans - Spills - Disturbing wildlife when not needed - Unnecessary disturbance to wildlife	- NWT Wildlife Act - WWHP and WEMP as references - Restrict flight altitudes. See OP 003: Aircraft - Environmental Factors for details. - Wildlife is considered to have the right-of-way over light vehicles and mobile equipment, but this shall not take precedence over people's safety. When encountering wildlife while operating a machine, if it safe to do so: o Stop your vehicle and turn off or dim the headlights; o Avoid using the horn, and remain with the vehicle; o Use a radio to report the presence of the animal in the immediate area of the GKM site to the Environmental Superintendent or designate; o Wait for the wildlife to pass before continuing;	5L

				○ On return to camp complete the CL 108: Wildlife Observation Log.	
	Disposal of Dead Wildlife	Kill site – attrack other wildlife (scavengers) Widlife could be sick/diesaesed (rabies)	Human gets sick from diseased wildlife Bear or other wildlife encounter (scavengers) due to kill-site	- Report all dead or sick wildlife to Enviornment Supervisor and log on wildlife trackers - Dead or sick animals encountered must be managed so as not to put people or other wildlife at risk from diseases or scavengers. Dead animals discovered must be reported through the near miss reporting system (see OP 1026: Incident and SHR/E NC Documentation Process, Reporting and Investigation) and removed at least 25 metres from roadways and active work areas; Cases of suspected rabies must be reported to the local office of the Canadian Food Inspection Agency. For the GKM, the closest CFIA office is in Edmonton at (780) 395-6701. These reports are to be made by the SHR/E Manager or their designate;	10M
	Bear Encounters	Aggressive bear encounter may result in serious harm to humans, and/or the animal being relocated or destroyed	Serious harm to humans, and/or the animal being relocated or destroyed	- Proper waste management - When in the field, take breaks to scan horizon for any signs of wildlife, and scan land with helicopter before landing - The following are tips to prevent bear encounters: ○ Be alert at all times; ○ Have respect for all bears, they are potentially dangerous; ○ Never approach a bear for any reasons; ○ Ensure food wastes are not available to any wildlife; and ○ If leaving the immediate GKM site, ensure regular communication with Security via radio or satellite phone, be aware of surroundings, and carry applicable bear deterrents - Bear Awareness Training - Training on use of bear deterrents Know site call-in for sighting or encounter with wildlife(bear) OP 193: Bear Deterrents;	18S

JRA Comments/Remarks:

SECTION C - SIGN OFF

	Name	Signature	Date
Supervisor/Lead:	Allan Knight		
Team member/s:	Kimberly Balsillie		
	Mason Elwood		
	Sean Kearnan-Carbonneau		
	Dayna Meredith		

DE BEERS GROUP	GKM CHECKLIST **Wildlife Sighting Log**	**ID No.: CL 031** **Revision Date: July 2, 2020**

SIGHTING LOG LOCATION: _____ MONTH / YEAR: _____

DATE (DD-MMM-YYYY)	TIME (24hr)	SPECIES	Count	LOCATION	ACTIVITY / BEHAVIOUR (WALKING, FEEDING, FLYING, NESTING, ETC.)	OBSERVER	COMPANY

DE BEERS GROUP	GAHCHO KUÉ MINE		
Department:	Environment & Permitting	**Document No.:**	**EP-DOP 009**
Section:		**Effective Date:**	
DEPARTMENT OPERATING PROCEDURE – *Small Mammal Survey*			
Revision:	2	**Replaces:**	1
APPROVED:	*Original Signature: Refer to Item 6. APPROVAL*		

1.0 PURPOSE

Small mammals are a major prey species for raptors and other carnivores. Their population undergoes large fluctuations, affecting their predators. Traplines provide a simple and standardized means of monitoring these fluctuations. The Government of the Northwest Territories, Department of Environment and Natural Resources (ENR), undertakes small mammal monitoring across the Northwest Territories. The objective of this monitoring program is to contribute to this regional monitoring.

2.0 SCOPE

This department operating procedure applies to all employees and contractors at the Gahcho Kué Mine who are involved in conducting the annual Small Mammal Survey (SMS).

3.0 RESPONSIBILITIES

3.1. The Environment Coordinator or designate:

a) Ensuring this survey occurs as per the department operating procedure;

b) Storing the data securely;

c) Reporting the results of the survey in the Annual Wildlife Report;

d) Revising the Department Operating Procedure when required.

3.2. The Environment Officer or designate:

a) Conducting the Small Mammal Survey in accordance to this department operating procedure;

b) Recording and compiling the data collected during the SMS.

4.0 CRITICAL CONTROLS

If not currently available, these will be identified during the next document review when the Job Risk Assessment is completed.

5.0 DEPARTMENT OPERATING PROCEDURE

5.1. Equipment:

a) 100 Museum Special snap traps;

b) Bait (peanut butter and oatmeal mixture);

c) Pin flags or wooden survey posts (at least four needed to mark the start and finish of the traplines);

d) Snare wire (optional);

e) Popsicle sticks (optional);

f) Flagging tape (optional);

g) Field supplies including clipboard or notebook, field datasheets and pencil;

h) Field labels;

i) Ziploc bags;

j) 100 meter (m) measuring tape or one GPS unit set to NAD83;

k) Small mammal identification guide;

l) Nitrile gloves;

m) Wildlife Deterrents (bear spray, bear bangers, and air horns).

5.2. Trap Coordinates:

Label	Easting	Northing	Zone	Elevation
T1 START	590457.3	7038985	12	1417.972
T1 END	590668.4	7039120	12	1407.03
T2 END	590615.8	7039205	12	1404.096
T2 START	590404.9	7039070	12	1428.836
T1-1	590404.2	7039069	12	1425.305
T1-2	590413.3	7039077	12	1419.487
T1-3	590421.1	7039083	12	1420.49
T1-4	590429.7	7039087	12	1421.466
T1-5	590438.7	7039092	12	1419.701
T1-6	590446.9	7039096	12	1418.322
T1-7	590456.8	7039100	12	1415.243
T1-8	590464.7	7039107	12	1416.477
T1-9	590473.7	7039111	12	1403.283
T1-10	590482.2	7039115	12	1403.419

Label	Easting	Northing	Zone	Elevation
T1-11	590490.1	7039121	12	1399.75
T1-12	590497.4	7039128	12	1404.755
T1-13	590505.8	7039133	12	1397.803
T1-14	590514.5	7039138	12	1395.37
T1-15	590523.4	7039143	12	1396.163
T1-16	590531.4	7039148	12	1393.35
T1-17	590540.4	7039153	12	1392.72
T1-18	590548.7	7039157	12	1392.535
T1-19	590557.2	7039162	12	1384.157
T1-20	590564.9	7039169	12	1386.766
T1-21	590572.6	7039175	12	1389.005
T1-22	590580.7	7039181	12	1391.743
T1-23	590589	7039187	12	1391.319
T1-24	590597	7039193	12	1390.818
T1-25	590605.2	7039197	12	1389.285
T2-25	590668.9	7039120	12	1401.876
T2-24	590661.5	7039113	12	1398.73
T2-23	590653.1	7039108	12	1398.911
T2-22	590644.9	7039102	12	1398.594
T2-21	590635.7	7039097	12	1394.541
T2-20	590627.8	7039092	12	1393.057
T2-19	590618.2	7039087	12	1396.416
T2-18	590610	7039081	12	1398.859
T2-17	590601	7039076	12	1397.902
T2-16	590592.7	7039070	12	1398.858
T2-15	590584.2	7039065	12	1397.376
T2-14	590575.5	7039060	12	1396.906
T2-13	590566	7039056	12	1401.24
T2-12	590556.7	7039051	12	1406.484
T2-11	590547.5	7039046	12	1407.596
T2-10	590537.7	7039040	12	1410.594
T2-9	590529.1	7039034	12	1408.505
T2-8	590518.5	7039028	12	1411.283

Label	Easting	Northing	Zone	Elevation
T2-7	590507.4	7039021	12	1413.826
T2-6	590498.2	7039016	12	1415.286
T2-5	590489.9	7039009	12	1409.468
T2-4	590480.8	7039001	12	1410.819
T2-3	590473.5	7038997	12	1415.999
T2-2	590464.8	7038990	12	1415.657
T2-1	590457.5	7038985	12	1404.852

5.3. Field Procedure:

Trapping at Gahcho Kué will preferably be conducted in August, and run over five nights, with 100 traps set per night. The study will try to achieve 500 "trap nights" a year, a "trap night" being one trap set for one night.

5.3.1. Trap preparation and operation:

Museum special traps have been provided. Traps should be cleaned between uses, by brushing them off and removing any remaining bait, and washing in plain hot water with scrub brush if really dirty, do not use soap or bleach. If necessary, attach 40 cm of string or snare wire and a piece of flagging tape to the trap, to make it easier to find in the field.

Bait is a mixture of half peanut butter and half oatmeal. Mix in a dish and put in a small large-mouthed container or tub with a lid to bring in the field. To apply bait to the trigger, use a popsicle stick or your finger. Try to push the peanut butter into the trigger mechanism so the animal has to work to get it out, making it more likely to set the trap off. Put bait on the trigger before setting the trap. No more than ½ teaspoon of bait per trap is needed.

To set the trap pull the bail (square wire piece attached to the spring) back until it is opposite the trigger portion of the trap. While holding the bail against the wood, pull the trigger wire over the bail and into the notch on the yellow plastic trigger mechanism. Pull up on the mechanism until the trigger wire remains in place. Keep your palm cupped over the bail to prevent it from going off if something triggers the trap. Place trap on the ground where you want it to be set, hold in place until it is stable then remove hand.

5.3.2. Procedure:

Survey transects will be used for long-term monitoring, so select an area that is accessible, but will not be disturbed by mining operations. The same transects should be used each year, so consider carefully the location of the

transect and how to mark them to make it easier to find in the future. To select a location for the transects, choose an area that has typical habitat for the area. The transect will consist of two parallel lines measuring 250 m in length, about 100m apart from each other. Try to make sure that the entire transect is in the same type of habitat. Mark and take GPS waypoints of both transect ends for reference next year. Use a measuring tape or GPS to measure out the 250 m transect. Mark the beginning and ends of both transects either with pin flags or survey posts to make them easier to find in the field. Starting at the end of the trapline, walk 10 m to the first trap location (do not set traps at the beginning or end of the transects).

Place two traps approximately 1 m apart at each station.

5.3.3. Checking the Traps:

Traps should be checked each day, preferably in the morning. Walk along each transect until you get to a trap location, then look for the traps, being careful not to step on them. At each station record if anything was caught, if there was a misfire or if the trap was not triggered. Using your field guide, try to identify the animal. Record all necessary information on the *Small Mammal Survey Datasheet (CL 183)* and on field label.

If there is a "misfire" (no bait left, trap won't spring when touched), predators robbing traps (trap sprung, moved, hair on bail, look around trap for mouse carcass) or if an animal other than a small mammal has been caught, be sure to record it on the datasheet.

Also record if parts of the small mammal have been fed on by another animal (shrews tend to feed on small mammals in traps, usually starting with the stomach area).

Wearing nitrile gloves, remove the animal from the trap by picking up the trap and the small mammal together and placing it into a ziploc bag, holding the trap by the end. Lift the bail with your finger to release the animal into the bag. Try to handle the carcass as little as possible, as it may have parasites. Fill out field label, insert the field label into the bag, force air out and seal the bag.

Keep all sample bags from one transect together in a larger plastic bag. **Freeze all carcasses as soon as possible.**

Once the traps have been checked at a station, re-set the traps for the next night and set new bait. If nothing was caught and the bait does not appeared to have dried out you do not need to set new bait. Always bring extra traps

into the field in case traps are lost or broken. Aim for five nights of trapping (i.e., 500 trap nights).

5.4. Post Field Procedure:

5.4.1. Environment Officers or designate will:

a) Ensure data sheets completed in the field will be (quality assurance) reviewed for completeness and accuracy after returning from the field while details of the day are fresh. This review should be performed by someone other than the primary data recorder. Completed datasheets should remain at site for safekeeping.

b) Information recorded on data sheets should be entered into a database (excel spreadsheet or access database file). Once data entry is complete, a second person should review data entry to ensure accuracy and completeness. All field notebooks and data sheets should be scanned and saved in the project folder. If data entry occurs in the field, electronic files should be backed up regularly. Once the program is finished traps should be cleaned with water, counted and stored for future use. Ensure traps are **DRY** before storing them for the next deployment.

c) All frozen samples collected should be clearly marked **FROZEN** on all sides of the shipment and sent to:

Wildlife Biologist (Biodiversity)
Wildlife Division
Environment and Natural Resources
Government of the Northwest Territories
Box 1320 / Yellowknife NT X1A 2L9
Phone: (867)-767-9236 ext. 53220

5.4.2. Environment Coordinator or designate will:

a) Review data entry for accuracy and completeness.

5.4.3. Environmental Officer or designate will:

a) Enter data into a database (excel spreadsheet or access database file);

b) Scan and save all data sheets;

c) Will send the Excel spreadsheet containing the data to the ENR Wildlife Biologist (Biodiversity).

5.5. Frequency:

The Small Mammal Survey is conducted annually.

6.0 APPROVAL

Name	Title	Date	Signature
Patrick Kramers	SHERT Manager		

7.0 REVISION HISTORY

Noted below is the revision history of this document.

Revision	Date	Comments
0	February 14, 2017	Approved for Use
1	April 26, 2018	DOP reviewed by HOD, Format & Content Updated
2		

8.0 DEFINITIONS

8.1. **GNWT**: Government of the Northwest Territories

8.2. **ENR**: Environment and Natural Resources

8.3. **SMS**: Small Mammal Survey

9.0 REFERENCES and RELATED DOCUMENTS

9.1. Wildlife and Wildlife Habitat Protection Plan

9.2. Wildlife Effects Monitoring Program

10.0 APPENDIX 1: JOB RISK ASSESSMENT

SECTION A - GENERAL INFORMATION	
Job/Task Description:	
Job/Task Objective:	
Date JRA Conducted:	**Department:**
JRA Leader:	**JRA Recorded by:**
List Equipment/tools required for task:	
Do the task activities impact on other people/work? *Yes ☐ / No ☐ If 'Yes' indicate who/what and how as well include them in the JRA*	

SECTION B – JOB/TASK INFORMATION					
#	Task /Activity Step	Hazards	Unwanted Event	Controls in place	Residual Risk #

JRA Comments/Remarks:					

SECTION C - SIGN OFF

	Name	Signature	Date
Supervisor/Lead:			
Team member/s:			

DE BEERS GROUP	GKM Checklist	ID No: CL 183
	Small Mammal Survey Datasheet	Revision Date: **July 2, 2020**

SAMPLING CREW: _____ DATE (DD-MMM-YYYY): _____

WEATHER: _____ TIME START: _____

TEMPERATURE: _____ TIME FINISH: _____

Transect # _____ Trap Night: _____ GPS Location (Start): _____

GPS Location (End): _____

Site Number:	Trap Number:	AC/TOK/TRIG/MIS* (Circle One)	Species Name:	Additional Comments:
1	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
2	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
3	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
4	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
5	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
6	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
7	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
8	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
9	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
10	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
11	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
12	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		

***AC = Animal Caught; TOK = Trap is ok, no animal caught; TRIG = Trap was triggered, no animal was caught; MIS = Trap was missing**

Original Release Date	

Approved by: Environmental Superintendent

Unauthorized Changes Prohibited

Site Number:	Trap Number:	AC/TOK/TRIG/MIS* (Circle One)	Species Name:	Additional Comments:
13	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
14	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
15	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
16	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
17	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
18	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
19	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
20	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
21	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
22	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
23	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
24	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
25	1	AC / TOK / TRIG / MIS		
	2	AC / TOK / TRIG / MIS		
*AC = Animal Caught; TOK = Trap is ok, no animal caught; TRIG = Trap was triggered, no animal was caught; MIS = Trap was missing				
Original Release Date				

Approved by: Environmental Superintendent

Unauthorized Changes Prohibited

DE BEERS GROUP	GAHCHO KUÉ MINE		
Department:	Environment	**Document No.:**	**OP 014**
Section:		**Effective Date:**	
OPERATING PROCEDURE – *Environmental Inspections*			
Revision:	3	**Replaces:**	2
APPROVED:	*Original Signature: Refer to Item 6. APPROVAL*		

1.0 PURPOSE

This document summarizes the environmental inspections that are required by the Gahcho Kué Safety, Health and Environmental Management System and all applicable environmental operating permits and environmental management plans during the Construction and Operations Phases of the Gahcho Kué Mine (GKM).

2.0 SCOPE

This procedure applies to all employees and contractors at the GKM and associated facilities.

3.0 RESPONSIBILITIES

3.1. Mine General Manager or Designate:

3.1.1. Overall management of the GKM sites and workforce.

3.2. Heads of Departments, Superintendents or their Designates:

3.2.1. General inspections of their work sites for signs of environmental effects resulting from their activities, including waste storage and handling, spills, fuel and hazardous material storage and handling, and wildlife activity;

3.2.2. Accurate completion of inspection forms and other records; and

3.2.3. Reporting any environmental issues identified to the Environmental Manager or designate.

3.3. Safety, Health, Environmental, Risk and Training (SHERT) Manger or Designate:

3.3.1. Monitor the implementation of this procedure; and

3.3.2. Ensure this procedure is maintained.

3.4. Environmental Coordinator or Designate:

3.4.1. Monitor the implementation of this procedure;

3.4.2. Follow up on issues and corrective actions identified, and communicate these to the relevant Department or Contractor representative;

3.4.3. Ensure this procedure is maintained, and revised as required.

3.5. Environmental Technician or Designate:

3.5.1. Regular inspections of storage areas for waste, fuel and chemicals;

3.5.2. Regular inspections of water and sewage treatment systems and treatment facilities;

3.5.3. Compiling records and summaries of inspections carried out;

3.5.4. Accurate completion of inspection forms and other records within their control; and

3.5.5. Reporting the completion of inspection forms and other records.

3.6. All Employees:

3.6.1. Promptly reporting any environmental spills or other environmental problems, including problems with drinking water or sewage to the Environmental Coordinator or designate; and

3.6.2. Understanding and implementing this procedure as required.

Responsibilities of Employers, Contractors, Supervisors and Employees are also described in the NWT Mine Health and Safety Act (Sections 15 – 18) and throughout the NWT Mine Health and Safety Regulations.

4.0 CRITICAL CONTROLS

If not currently available, these will be identified during the next document review when the Job Risk Assessment is completed.

5.0 PROCEDURE

5.1. The Environmental Technician will inspect GKM facilities and work areas, as described below, at specified frequencies defined below or outlined in specific OPS and management plans. Results of these inspections will be recorded in checklists and forms as outlined in this procedure. The regular completion of Environmental Inspections will be tracked by the Environmental Coordinator or their designate using *CL 130: Environmental Inspection Tracking Table*. Any noted deficiencies will be recorded on *CL 035 Work Site Environmental Inspection* (unless otherwise specified), and reported to the Environmental Coordinator so corrective actions can be determined, tracked, and implemented in a timely manner.

5.2. The Environmental Technician will inspect waste storage areas on at least a weekly basis using CL 071: Waste Inspection. This includes inspecting maintenance areas and shops for appropriate handling of hazardous wastes in the workplace to ensure that secondary containment and spill response equipment is in place, containers are

appropriately labelled, and that any full containers have been taken to the central hazardous waste management area. Environment personnel will also inspect the non-hazardous landfill site at least weekly for excessive dust, windblown litter, nuisance animals, odour, gate controls and other issues.

See *OP 008: Maintenance Waste*, *OP 010: Waste Management Program, OP 085: Disposal of Aerosol Containers, Pressurized Containers, and Small Dry Cell Batteries, OP 201: Petroleum Products, and OP 202: Hazardous Material (Transportation, Storage, and Disposal*) for specific details regarding inspection requirements.

5.3. The worker assigned as the "Responsible Person" in control of the open fire burn pit will check that it contains only clean wood and cardboard before starting the fire. This will include checking the area around the pile to be sure that the fire cannot spread to other nearby material and completing *CL 109: Open Burning Record Form.* See *OP 009: Open Fires (Burn Pit*) for specific details.

5.4. When the GKM airstrip for fixed-wing aircraft is in use, a check of the airstrip is required to look for people, mobile equipment or wildlife such as bears or caribou within 100 m of the strip. This will be done on any day which an aircraft arrival is expected and again at reasonable intervals before expected aircraft arrival times. The Logistics radio operator must be immediately notified of any such risks so that they can notify inbound aircraft of the possible presence of animals or other activity on or near the runway. See *OP 003: Aircraft - Environmental Factors and OP 006: Wildlife Procedure* for details if any significant wildlife is seen. These observations are to be communicated to the Environmental Coordinator/Technician or designate and recorded in *CL 031: Wildlife Sighting Log*.

5.5. Equipment Operators must conduct pre-use inspections on any equipment that is about to be operated to ensure that there is no leaking oil or fuel. Any such leakage must be fully contained by absorbent pads or other devices, locked-out to prevent use, and repaired prior to operation. Operators must also investigate any unusually noisy vehicle, generator or stationary engine to ensure that it is equipped with an exhaust muffler system that is in good working order. If not, repairs must be completed before the equipment is used (See *OP 004: Equipment Operations - Environmental Factors, OP 126: Zero Energy and Lockout*).

5.6. The Environmental Technician will inspect soil stockpiles, excavations, water bodies and protection measures on at least a monthly basis looking for signs of soil erosion, contamination or other problems e.g. dead vegetation, discoloured runoff, etc. Observations of any problems will be reported to the Environmental Manager and as appropriate through the *CL 035 Work Site Environmental Inspection* (See *OP 007:*

Vegetation Management). Note that erosion inspections are not required during frozen ground conditions.

5.7. The Environmental Technician will inspect fuel storage areas and tanks and associated secondary containment and fuel handling infrastructure on a weekly basis for evidence of leaks, spills or other environmental problems, and record their observations on *CL 019 Fuel System Inspection Sheet*. See *OP 201: Petroleum Products* for additional details.

5.8. The Environmental Technician will inspect a representative sample of mining equipment, light vehicles and other mobile equipment for evidence of leakage, missing or damaged spill kits and fire extinguishers or other environmentally significant deficiencies on a weekly basis. Any problems noted will be reported to the Environmental Coordinator or designate and, as appropriate, through *CL 035 Work Site Environmental Inspection*.

5.9. Site Services workers will determine, on a weekly frequency, the inventory of gasoline, diesel and Jet-B fuels on site. They will do this by counting the number of fuel drums and measuring the depth of fuel in each bulk tank. The tank level readings will be converted to volume measurements, corrected for temperature expansion to a standard 15^{o} C temperature and recorded in fuel inventory tracking records (written or digital) stored within the Site Services Department. On a monthly basis, the Site Services Supervisor or their designate will reconcile fuel inventory measurements against consumption and deliveries to determine if unexplained losses or leaks are apparent. See *OP 201: Petroleum Products for details*.

5.10. The Environmental Technician will inspect operating pipeline(s) carrying water, wastewater, processed kimberlite or petroleum products on at least a monthly frequency, or as otherwise specified in other operating procedures, permits, or management plans. These inspections will be recorded on inspection form *CL 035 Work Site Environmental Inspection*.

5.11. The Environmental Technician will inspect spill response kits throughout the site, including contractor work areas and the on-site Spill Response Trailers on at least a monthly basis. Basic supplies will be replaced and any problems observed will be reported to the Environmental Coordinator. These inspections will be documented in *CL 035: Work Site Environmental Inspection* and *CL 088: Spill Kit Inspection Form*.

5.12. The Environmental Technician will inspect the on-site explosives blending plant and related storage areas on at least a monthly basis accompanied by the explosives contractor (Orica or other). This inspection will focus on environmental issues such as waste management, materials storage, spills and spill prevention measures, etc.

The inspection will be documented using *CL035: Work Site Environmental Inspection* and any deficiencies raised will be tracked and resolved by the Environmental Coordinator or designate, and the Mining Manager.

6.0 APPROVAL

Name	Title	Date	Signature
Patrick Kramers	SHERT Manager		

7.0 REVISION HISTORY

Noted below is the revision history of this document.

Revision	Date	Comments
0	February 29, 2016	Approved for Use
1	February 7, 2018	Format and Content Updated
2	May 5, 2019	Aligned terminology regarding inspection frequency
3		

8.0 DEFINITIONS

None

9.0 REFERENCES and RELATED DOCUMENTS

9.1. NWT Mine Health and Safety Act and Regulations

9.2. MacKenzie Valley Resource Management Act and Regulations

9.3. NWT Lands Act and Regulations

9.4. Northwest Territories Mining Act and Regulations

9.5. Land Use Permit (MV2021D0009)

9.6. Type A Water License (MV2005L2-0015)

9.7. NWT Environmental Protection Act

9.8. Erosion and Sediment Management Plan

9.9. Vegetation and Soils Monitoring Program

9.10. Waste Management Plan

9.11. OP 1026: Incident and SHE NC Documentation Process, Reporting and Investigation

9.12. OP 003: Aircraft - Environmental Factors

9.13. OP 004: Equipment Operation - Environmental Factors

9.14. OP 006: Wildlife Procedures

9.15. OP 007: Vegetation Management

9.16. OP 009: Open Fires (Burn Pit)

9.17. OP 010: Waste Management Program

9.18. OP 084: Sewage Treatment Plant Operation, Testing, Sampling and Monitoring

9.19. OP 085: Disposal of Aerosol Containers, Pressurized Containers, and Small Dry Cell Batteries

9.20. OP 201: Petroleum Products

9.21. OP 202: Hazardous Material (Transportation, Storage, and Disposal)

9.22. CL 015: Workplace Inspection Report

9.23. CL 019: Fuel System Inspection Sheet

9.24. CL 031: Wildlife Sighting Log

9.25. CL 035: Work Site Environmental Inspection

9.26. CL 071: Waste Inspection

9.27. CL 088: Spill Kit Inspection Form

9.28. CL 109: Open Burning Record Form

9.29. CL 130: Environmental Inspection Tracking Table

10.0 APPENDIX 1: JOB RISK ASSESSMENT

SECTION A - GENERAL INFORMATION	
Job/Task Description:	
Job/Task Objective:	
Date JRA Conducted:	**Department:**
JRA Leader:	**JRA Recorded by:**
List Equipment/tools required for task:	
Do the task activities impact on other people/work? Yes ☐ / No ☐ If 'Yes' indicate who/what and how as well include them in the JRA	

SECTION B – JOB/TASK INFORMATION

#	Task /Activity Step	Hazards	Unwanted Event	Controls in place	Residual Risk #

JRA Comments/Remarks:					

SECTION C - SIGN OFF			
	Name	Signature	Date
Supervisor/Lead:			
Team member/s:			

DE BEERS GROUP	GKM CHECKLIST **Waste Inspection**	ID No.: **CL 071** Revision Date: **July 2, 2020**

Date (DD-MMM-YYYY): _____ Time: _____ Inspected By: _____

Weather: _____

Landfill Burn Pit

Infrastructure Status

Non-Compliance Issues: Yes No

If Yes, Type (i.e. food waste, hydrocarbons, recyclables):

Wildlife Observation

Wildlife Present: Yes No

Type of Observation: Tracks Scat Fur Live Dead

Species: _____

Denning Activity: Yes No

Comments:

Date (DD-MMM-YYYY): _____ Time: _____ Inspected By: _____

Weather: _____

Landfill Burn Pit

Infrastructure Status

Non-Compliance Issues: Yes No

If Yes, Type (i.e. food waste, hydrocarbons, recyclables):

Wildlife Observation

Wildlife Present: Yes No

Type of Observation: Tracks Scat Fur Live Dead

Species: _____

Denning Activity: Yes No

Comments:

Department:	Environment & Permitting	**Document No.:**	**EP-DOP 013**
Section:		**Effective Date:**	March 3, 2021

DEPARTMENT OPERATING PROCEDURE – *Winter Spur Road Snow Berm Survey*

Revision:	3	**Replaces:**	2
APPROVED:	*Original Signature: Refer to Item 6. APPROVAL*		

1.0 PURPOSE

As part of the Tier 2 Wildlife Management and Monitoring Plan (WMMP) 2021, the De Beers Gahcho Kué Mine (GKM) has committed to survey the heights and slopes of snow berms along the Gahcho Kué Winter Spur Road. The surveys contribute towards an understanding of the effect of snow berms on caribou movement patterns and identify specific locations where berm maintenance is required to allow passage of caribou if and when they are present. The GKM reports the results of the snow berm survey on an annual basis in the Annual Wildlife Report.

2.0 SCOPE

This Department Operating Procedure applies to any De Beers' employee or contractor who will be conducting the Gahcho Kué Winter Spur Road Snow Berm Survey.

3.0 RESPONSIBILITIES

3.1. The Environment Coordinator or designate:

3.1.1 Ensuring this survey occurs as per the Procedure;

3.1.2 Reporting the results of the survey in the Wildlife Annual Report;

3.1.3 Revising the Procedure when required.

3.2. The Environmental Officer or designate:

3.2.1 Adhering to the Procedure;

3.2.2 Providing the data to the Environment Department;

3.2.3 Accurately recording and documenting the data in appropriate secure database.

4.0 CRITICAL CONTROLS

Please refer to attached Job Risk Assessment.

5.0 DEPARTMENT OPERATING PROCEDURE

5.1. Equipment:

1. Personal protective equipment (PPE) including hard hat, safety glasses, high-visibility vest, cold weather clothing, and winter steel toed boots;
2. Light Vehicle equipped with Winter Road appropriate survival kit;
3. Current copy of the Gahcho Kué Winter Spur Road Map Book;
4. One GPS units set to NAD83, and spare AA batteries (lithium);
5. One satellite phone and spare battery, and/or In-Reach messaging device;
6. Digital camera;
7. Suunto™ clinometer;
8. *Snow Berm Measurements Survey Data Sheet (CL 111*) and *Wildlife Sighting Form (CL 031); and*
9. Field supplies including: pencils and field notebook, binoculars, and metre sticks;
10. Emergency shovel and towing strap.

5.2. Pre-Field Procedure:

1. Ensure all required training is completed prior to beginning work on the Winter road;
2. Ensure journey management plan is completed and communicated to respective departments / Environmental Coordinator.

5.3. Field Procedure:

1. The Field Crew will drive from the GK Mine to the intersection of the Tibbitt to Contwoyto Winter Road. Working back towards the Mine from the intersection stopping every 2 km and taking field measurements of the snow berms along both sides of the road (right and left banks). All field data will be recorded on the *Snow Berm Measurements Data Sheet (CL-111).* Truck odometer can be used to measure 2 km distances. Zero out odometer when you reach start point (intersection between GK Spur Road and Tibbit to Contwoyto main road).
2. Note the station location by number of kilometres away from the intersection (start point) and include lake or portage # as applicable. Record a waypoint number and the UTM coordinates for each station. A single waypoint and set of UTMs, taken from the road centre line, or as near the centre line as possible, is sufficient to represent both right and left bank stations.

3. Once UTM coordinates are recoded in survey 1, they shall be used as the station sampling locations for the remaining surveys through the season (ie. Survey 2 & 3)

4. Complete the following at both right and left bank stations:

   i. Measure height of bank at its highest point with a metre stick in metric units (m).

   ii. Measure and record the slope of each berm by laying the survey rod down on the berm, perpendicular to the roadway. Rest one end of the rod on the road, at the base of the berm and the other end of the rod at the top of the berm. Place the clinometer on top of the survey rod and record the slope indicated. The slope will be the acute angle formed between the road and the top of the berm (acute angles are measurements restricted between 0° and 90°). If a station lacks a snow berm (<0.5 m) on one or both sides of the Winter Spur Road the berm height and slope will be entered as zero.

   iii. Note the terrain at each station (i.e. flat, sloped, hilly, rocky) and any other natural features (i.e., eskers, bedrock outcroppings, etc.) that may influence caribou movement. Note if station falls on portage or associated lake when applicable.

   iv. Note the snow conditions of each berm (i.e., soft, packed, drifted, etc.).

   v. Take a photograph of the snow berm on either side of the road at each station and record the photo number on the data sheet. Have one worker stand to one side of the survey rod while holding it vertically at the base of the berm. The photograph's purpose is to provide a visual reference to support the quantitative data recorded at each station. Use of visual aid (i.e. milk crate or sample cooler) to identify berm edge may be useful if height of berm is not easily identified in lighting conditions (Image 1).

   vi. Record any incidental wildlife sightings made during the snow berm survey on a Wildlife Sighting Form. Wildlife sightings may include hunting activity and wildlife mortality. When possible record UTM's and document sightings with photographs.

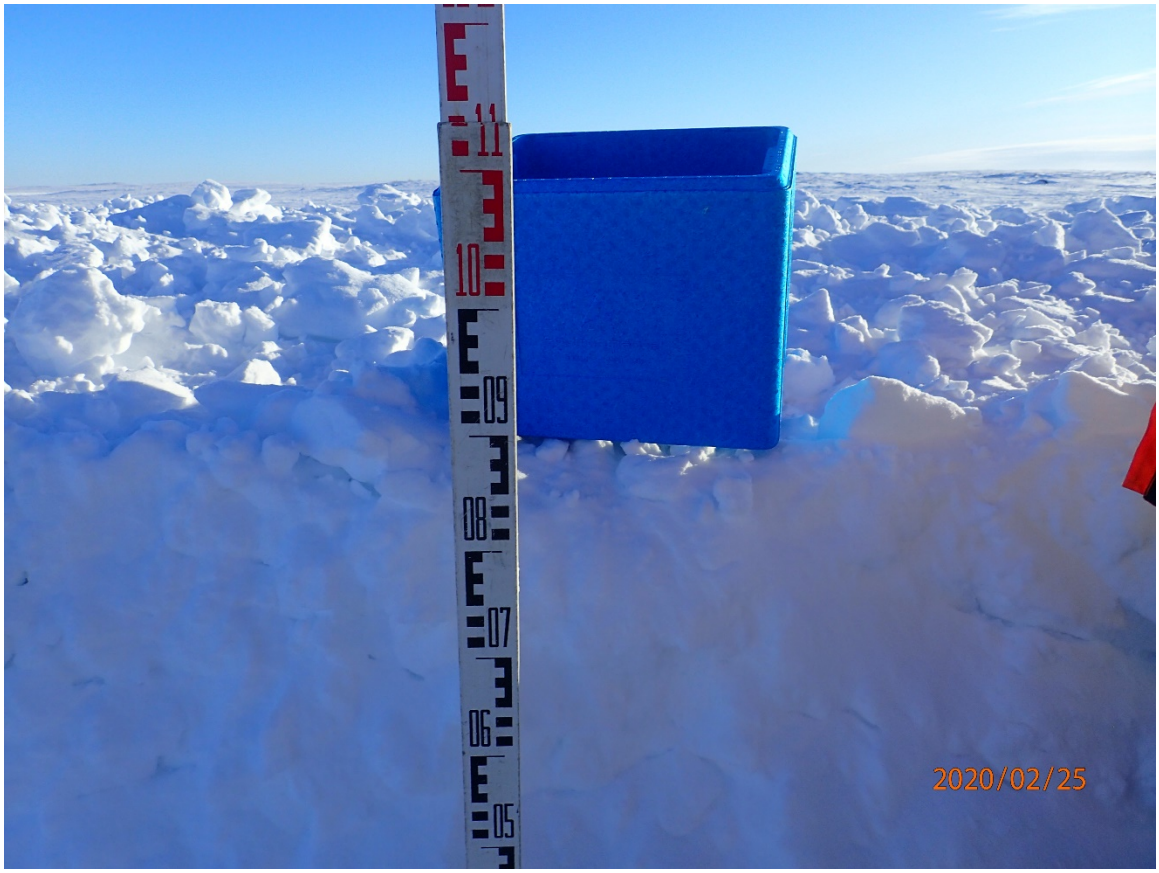


Image 1. Example of crate use to define berm edge.

5.4. Post Field Procedure:

1. Environment Officer or designate will:
   - i. Review data sheets for completeness and accuracy after returning from the field while details of the day are fresh;
   - ii. Enter data into the database (excel or Monitor Pro database);
   - iii. Scan and save all data sheets and photos to applicable folder on EDMS;
   - iv. Ensure all photos are saved with proper station ID's and dates;
   - v. Store raw data field sheets in binder;
   - vi. Review results with Environment Coordinator or designate for exceedances. Berms measured over 1.6 m required follow-up as stipulated in the Tier 2 Wildlife Management and Monitoring Plan (WMMP) 2021.

vii. Update station Id's in GPS for subsequent annual surveys.

2. Environment Coordinator or designate will:

i. Review data entry for accuracy and completeness;

ii. Follow up on results of survey with the appropriate personnel and action any exceedances noted during survey in compliance with the WMMP, 2021.

5.5. Frequency:

1. The Snow Berm Survey is conducted three times during the winter road season. Once at the beginning of the season during initial stage of road opening (within first 1 -2 weeks), once mid-season, and once at the end of the season. These dates are approximate and subject to change from year to year based on the opening date of the winter spur road and duration of operation each year. Coordinate with winter road logistics for approximate winter road season timelines. The Snow Berm Survey requires approximately one day of field work to complete, plus approximately one quarter day to complete the data management tasks associated with each survey.

6.0 APPROVAL

Name	Title	Date	Signature
Patrick Kramers	SHERT Manager	March 3, 2021	

7.0 REVISION HISTORY

Noted below is the revision history of this document.

Revision	Date	Comments
0	March 3, 2017	Approved for Use
1	April 26, 2018	DOP reviewed by HOD, Format & Content Updated
2	March 3, 2021	DOP reviewed by HOD. Format & Content Updated.
3	December 1, 2021	Related Documents updated.

8.0 DEFINITIONS

8.1. **Height**: the height of the snow banks bounding the winter road in meters

8.2. **Slope**: the slope of the snow berm from the height of the highest point to the winter road surface measured in degrees.

9.0 REFERENCES and RELATED DOCUMENTS

9.1. Tier 2 Wildlife Management and Monitoring Plan, Version 1, 2021

9.2. CL 031: Wildlife Sighting Log

9.3. CL 111: Snow Berm Measurements Data Sheet

10.0 APPENDIX 1: JOB RISK ASSESSMENT

SECTION A - GENERAL INFORMATION

Job/Task Description:

Winter Spur Road Snow Berm Survey

Job/Task Objective:

Collect data on snow berm heights along the Gahcho Kue winter spur road.

Date JRA Conducted: 03-Nov-21	Department: Environment
JRA Leader: M Elwood	JRA Recorded by: M. Elwood

List Equipment/tools required for task:

1. Personal protective equipment (PPE) including hard hat, safety glasses, high-visibility vest, cold weather clothing, and winter steel toed boots.,;
2. Light Vehicle equipped with Winter Road appropriate survival kit;
3. Current copy of the Gahcho Kué Winter Spur Road Map Book;
4. One GPS units set to NAD83, and spare AA batteries (lithium);
5. One satellite phone and spare battery, and/or In-Reach messaging device;
6. Digital camera;
7. Suunto™ clinometer;
8. *Snow Berm Measurements Survey Data Sheet (CL 111*) and *Wildlife Sighting Form (CL 031); and*
9. Field supplies including: pencils and field notebook, binoculars, and metre sticks;
10. Emergency shovel and towing strap.

Do the task activities impact on other people/work? *Yes* ☐ */ No* ☐ *If 'Yes' indicate who/what and how as well include them in the JRA*
Yes – Winter road operations controlled by Gahcho Kue site logistics department. Contact Winter Road dispatch prior to commencing work. Complete annual training and follow all applicable rules while travelling on the winter road.

SECTION B – JOB/TASK INFORMATION

#	Task /Activity Step	Hazards	Unwanted Event	Controls in place	Residual Risk #
1	Pre-Operation Equipment Checks	1. Pinch Points 2. Sharp Edges	1. Personal injury	1. Wear proper PPE (eg: gloves) 2. Avoid exposure to line of fire	3
2	Refueling Equipment	1. Fuel handling	1. Spills 2. Fire or explosion	1a. Carry spill kit or spill absorbents 1b. Never refuel on or near waterbodies (including frozen waterbodies)	3

				2a. Shut down machines prior to fueling 2b. Carry fire extinguisher as standard equipment.	
3	Light Vehicle Equipment Operation - General	1. Uneven Terrain 2. Unsafe ice conditions 3. Hidden obstacles (under snow) 4. Extreme Weather Conditions 5. Equipment failure 6. Working remotely	1a. Vehicle rollover 1b. Loss of control 1c. Sudden/violent motion (eg: bouncing) 2a. Fall through ice 3. Contact with hidden obstacles. 4a. Cold weather exposure (eg: hypothermia, frostbite) 4b. Warm weather exposure (eg: sunburn, dehydration, heatstroke) 4c. Reduced visibility 5a. Being stranded in the field 6a. Wildlife interactions 6b. Vehicle collision and interactions	1a. Trained operators 1b. Drive to conditions and reduce speed on unfamiliar terrain 1c. Use established routes of travel when possible 1d. Wear proper PPE (eg: helmet) 1e. . 2b. Ice Rescue Gear 2c. Ice Rescue Training for field crews 2d. Plan travel to avoid ice crossings if possible 2e. Use of floater suits during transition season 2f. Maintain adequate spacing of snowmobiles when crossing ice 2g. Avoid travelling or working on ice near lake inlets and outlets, and areas of moving water (rivers and streams) 3a. Drive to conditions and reduce speed on unfamiliar terrain 3b. Use established routes of travel when possible 3c. Wear proper PPE (eg: helmet) 4a. Establishment of minimum threshold temperature (-35 C) for remote field work 4b.Carrying properly equipped winter survival kit 4c. Dress to conditions and bring extra warm clothing 4d. Monitor weather conditions/forecasts, and rescheduling work if high winds or severe weather are forecast 4e. Use sunscreen 4f. Stay hydrated. Carry adequate food and water. 5. Return to site if lightning is observed or anticipated. If caught in an electrical storm, find a low area of terrain away from trees, and hunker down. 6a. Carrying properly equipped survival kit 6b. Always working in pairs (buddy system) 6c. Remote Travel Plan completed prior to work 6d. Redundant means of communication (eg: Radio, Sat Phone, SPOT/In Reach) 6e. Complete pre-op check prior to leaving site 6f. Regularly scheduled vehicle maintenance (PMs) 6g. First Aid and Wilderness Survival training 7a. Be aware of surroundings 7b. Do a circle check (wildlife scan) of work area before parking/stopping vehicles 7c. Always carry wildlife deterrents (bangers, air horn, bear spray), know how to use them, and keep them in a readily accessible location 8. Ensure employees have completed the required training and awareness for operating vehicle.	15
4	Remote Field Work	1. Unsafe ice 2. Extreme temperatures 3. Stranding	1. Falling through ice 1b. Loss of control of vehicle and/or damage to vehicle 2a. Frostbite 2b. Hypothermia 3. Equipment failure, breakdown getting stuck - stranding	1a. Vehicle training – awareness. 1b. Appropriate monitoring of road conditions and changing weather and lighting conditions. 2a. Establishment of minimum threshold temperature (-35 C) for remote field work 2b. Carrying properly equipped winter survival kit 2c. Always working in pairs (buddy system) 2d. Remote Travel Plan completed prior to work 2e. Redundant means of communication (eg: Radio, Sat Phone, SPOT/In Reach) 2f. All crew members to have valid First Aid and CPR training	15

5	Office Work - General	1. Ergonomic factors; 2. Slips, trips, fall hazards; 3. Electrical hazards; 4. Indoor Air Quality; 5. Heavy or awkward lifting 6. Hazardous materials	1. Musculoskeletal injuries. Including posture, repetition, and force 2. Personal injury 3. Contact with electrical, electrocution. 4. Poor indoor air quality can cause headaches, drowsiness, irritated eyes, nausea and respiratory ailments; 5. Personal injury. Back strain; 6. Contact with hazardous materials.	1. Assess workstations for ergonomic risks involving repetitive motion, significant physical effort or awkward posture; Make appropriate recommendations regarding equipment design, layout and adjustments to suit personnel. See OP 183: Ergonomics Program; 2. Clearly mark slippery floors until the condition is corrected; and b. Plow and sand or salt walkways and parking areas as necessary. See OP 117: Slips, Trips and Falls; 3. Use of certified power bars with circuit breakers. Inspect extension cords on quarterly schedule; Do not cover extension cords with a carpet, tape or similar material that could hide worn or frayed cords. If it is necessary to cover a cord to reduce the risk of the tripping hazard, use appropriate cord covers designed for that purpose; 4. Assess indoor air quality when symptoms of poor air quality become evident or are suspected; Take appropriate action to correct indoor air quality problems. See OP 159: Occupational Hygiene; 5. Use appropriate lifting and moving equipment to move heavy objects; Request assistance when handling heavy or awkward objects. See OP 158: Material Handling; 6. Minimize the use of hazardous chemicals. Reduce the amount of chemical cleaners, aerosol cans and liquid paper; -Ensure that toner cartridges are re-used, use water-based inks for hi-lighters and markers, recycle batteries or use re-chargeable batteries etc.; -The handling of hazardous materials shall be in compliance with WHMIS Regulations. See OP 123: WHMIS & OP 202: Hazardous Materials (Transportation, Storage & Disposal). - continual education for site on the importance of proper waste management	3
6	Vehicle Operation - Winter Road Operation	1. Driving and working on uneven terrain; 2. Vehicle interactions (light vehicles, hauling, and wildlife) 3. Remote working 4. Lighting and visibility 5. Slips, trips, and falls 6. Vehicle stranding – blown snow on roads 7. Hunting activities on the WR	1a. Vehicle roll over. 1b. Personal injury (back strain), 1c. Slips, trips, and falls. 2a. Vehicle or wildlife collision 3a. Stranding; 3b. Hypothermia 4a. Low light conditions or inclement weather conditions causing loss of control or unwanted interactions with vehicles or wildlife. 5a. Personal injury. 6a. Stranding. 6b. Vehicle damage 7. Potential risk of being struck by projectile associated with hunting activities	1a. Ensure proper training prior to using winter road; 1b. Drive to road conditions; 1c. Use proper PPE while working on ice. 2a. Proper training and use of winter road specific communications. 2b. Monitor road for wildlife. Slow speeds when wildlife is present in the area. 3a. Ensure proper winter road survival kits are stocked appropriately. 3b. Remote travel plan completed; 3c. Redundancy in communication devices. 4a. Ensure pers. Is monitoring changing weather. Use buddy system in poor conditions to avoid driver fatigue. 5. Ensure appropriate PPE (i.e. Ice cleats) are being worn. 6. Ensure vehicle extraction equipment is available (emergency snow shovel and towing straps). Contact supervisor prior to commencing any towing or extracting techniques. 7a) Maintain situational awareness, wear high visibility clothing, ensure presence is known to all hunters in the immediate area.	15

SECTION C - SIGN OFF

	Name	Signature	Date
Supervisor/Lead:	Mason Elwood/Allan Knight		
Team member/s:	Jarrett Vornbrock		
	Lee-Ann Knee		
	Alex Perrett		
	Caleb Dickey		
	Trisa Ngo		

DE BEERS GROUP	GAHCHO KUÉ MINE		
Department:	Environment & Permitting	**Document No.:**	**EP-DOP 015**
Section:		**Effective Date:**	
DEPARTMENT OPERATING PROCEDURE – *Nesting Deterrence Procedures for Migratory Birds at the Gahcho Kué Mine*			
Revision:	2	**Replaces:**	1
APPROVED:	*Original Signature: Refer to Item 6. APPROVAL*		

1.0 PURPOSE

This document outlines the mitigating measures that De Beers will implement in order to deter migratory birds from nesting in critical work areas around the mine site (i.e., active mining areas, dyke construction zones, etc.) consistent with the *Migratory Bird Nest Management Plan* (MBNMP). Flood zones surrounding D2, D3, and E1 Lakes, created by construction of Dykes F and G, are also included in this strategy.

2.0 SCOPE

This Department Operating Procedure applies to all De Beers employees and contractors involved in employing active and passive deterrence methodologies during the migratory bird nesting season. Based on the regional location of the Gahcho Kué Mine, this season typically extends from early May to mid-August (Environment and Climate Change Canada, 2017).

3.0 RESPONSIBILITIES

3.1. The Environment Coordinator or designate:

3.1.1 Ensure appropriate deterrence methods applicable to site conditions are selected and employed as per the Department Operating Procedure;

3.1.2 Provide the results of any data collected to the Wildlife and Wildlife Habitat Protection Plan Annual Report; and

3.1.3 Revise this Department Operating Procedure as and when required.

3.2. The Environmental Officer or designate:

3.2.1 Understand and follow the Department Operating Procedure;

3.2.2 Coordinates with other applicable mine departments involved in passive or active deterrence programs;

3.2.3 Records observations and regularly assess effectiveness of deterrence measures being applied; and

3.2.4 Communicates findings to those departments that may be directly impacted by migratory bird nesting behaviours.

3.3. De Beers Mine Operations:

3.3.1 Provide up to date information on any nesting activities on the high-walls of the pit(s); and

3.3.2 Will supply long range forecasts of planned mining activity including proposed drill patterns blast schedules, and any proposed construction activities around site.

3.4. Site Services and contractors:

3.4.1 Report observations of migratory bird nesting activity around site.

4.0 CRITICAL CONTROLS

If not currently available, these will be identified during the next document review when the Job Risk Assessment is completed.

5.0 DEPARTMENT OPERATING PROCEDURE

Mitigation strategies include the use of passive and active deterrents along with active field monitoring to discourage migratory birds from nesting in critical work areas. Passive deterrents include visual objects such as fox decoys, terror eyes, scarecrows, eagle decoys (flying and perching) and auditory devices such as the Phoenix Wailer™ (Phoenix Agritech) and BirdXPeller Pro™ (BirdX Canada). Active deterrents include the use of bear bangers and propane scare cannons (Zon Electra Scare Cannon™) along with the physical presence of Environment Department personnel in the field to discourage migratory birds from a specific area.

NOTE: The use of active deterrents must be documented in a Deterrent Log Book for the season with the information transcribe to an electronic database and filed on the Gahcho Kué Mine Environmental Data Management System server.

5.1. Equipment Required

5.1.1. Binoculars

5.1.2. Digital Camera

5.1.3. Handheld Radio

5.1.4. GPS

5.1.5. Pencils/Pen

5.1.6. Bird Surveillance Data Sheets (CL 119)

5.1.7. Wildlife Sightings Log (CL 031)

5.1.8. Deterrent Placement Data Sheet (CL 115)

5.1.9. Sunglasses/Sunscreen

5.1.10. Field PPE (i.e., hard hat, work boots, safety vest, bear bangers, air horn)

5.1.11. Bird Identification Field Guide

5.1.12. Wildlife Deterrent Log Book

5.1.13. Applicable deterrents for either passive or active mitigation

5.2. Deterrent Inventory and Maintenance

A deterrent inventory will be taken at the beginning and end of each season. The inventory will document that sufficient quantities of deterrents are available, that batteries are serviceable, that propane cylinders have been re-filled or additional ones ordered, that solar panels are functioning and that broken gear has been repaired or replaced. The list of inventory items to be maintained is described in Table 1.

Table 1. Bird Deterrent Inventory List

Deterrent Items	Required Inventory
Fox	20
Falcon Flying Kit	20
Terror Eyes	10
Eagles Perching	20
Large Eagle Perching	8
Foam Flying Eagles	20
Scarecrow	20
Zon Electra Scare Cannon (Propane Cannon)	12
20lb Propane Cylinders	12
Airhorns	40
Pistol Banger	13
Pen Banger	22
Pistol Pouch Kit	3
Pen Pouch Kit	13
Pistol Cartridge Boxes(50/box)	30
Pen Banger Shell Boxes(6/box)	30
Pen Flare Shell Boxes (6/box)	10
Pistol .22 Blank Containers (100/container)	18
12V Batteries	7
BirdXPeller Pro	4
Phoenix Wetland Wailer MK IV	2
Super BirdXPeller Pro	1

5.3. Deterrent Placement Strategy

Prior to deployment or use of any deterrents around active mining areas, discussions with Mine Operations must be conducted and the locations recorded using Deterrent Placement Data Sheet (CL115). For deployment in any other areas of concern the UTM coordinates with photos, date, and time must be recorded and the Deterrent Placement Data Sheet completed. Deterrents will be selected based on distances, terrain, and most effective deterrent for a given area. See *Table 2 for descriptions of potential deterrents available*

Table 2. Deterrent Descriptions

Deterrent	Details
Phoenix Wailer 	• Auditory deterrent for use during nest initiation period in critical locations of concern • Emits a range of electronic and natural sounds • Need a battery to operate
Fox Decoy 	• Foxes are ground nest predators • Decoys will pivot in the wind, replicating movement of fox
Eagle Decoys 	• Eagles are nest predators • The wings will flap in the wind which is a scare tactic
Terror Eyes 	• Mimic predators • Will move in wind • Can be hung or put on ground

BirdXPeller Pro 	• Auditory deterrent that emits a range of predator and electronic sounds • Need battery to operate
Super BirdX Peller Pro 	• Auditory deterrent that emits a range of predator and electronic sounds • Need battery to operate
Scarecrows 	• Mimic humans in the pit
Propane Scare Cannon 	• Auditory deterrent that emits a range of sounds • Need battery to operate and propane
Flying Falcon Kit 	• Mimic predators flying • Will move in wind
Eagle Decoys  	• Eagles are nest predators

Pistol Style Banger 	• Hand pistol that uses .22 caliber blanks to fire a shell that produces a loud "gunshot" style noise
Pen Style Banger 	• Produce a loud "gunshot" style noise when fired • "Flash/Bang" cartridges can also be fired from this style of Banger

5.3.1. 5034 Pit

Passive deterrent deployment should be completed prior to 50% snow melt (beginning in early to mid May) to coincide with the typical arrival period of the first migratory birds around the Gahcho Kué Mine. Specific efforts within the 5034 Pit are aimed at deterring the establishment of nest site by peregrine falcon (*Falco* peregrinus). Deterrents will be installed in and around the 5034 Pit in consultation with Mine Operations. Active monitoring will be conducted as and when required within the 5034 Pit.

NOTE: Pit features continuously change. The repositioning of deterrents may be required on a daily or weekly basis. This will be determined in daily morning meetings with Mine Operations. The placement of all deterrents will be posted on a map and posted in the Mine Operations Lunchroom/Muster Area and in the Environmental Lab.

5.3.2. Dyke E

Deterrents will be deployed within 300 m of the proposed location of Dyke E, and at other active construction sites as applicable. Deterrents will be installed approximately 100 m apart. Daily monitoring will be completed by the Environment Department. Active deterrent strategies will be employed in the event any migratory bird nesting activities are detected in the area.

5.3.3. D2, D3, and E1 Lakes

Deterrents will be deployed using a helicopter and/or light vehicle. Passive deterrent deployment will be completed prior to 50% snow melt (beginning/early May). Deterrents will target the area above and parallel to the shoreline anticipated to be flooded each year.

5.3.4. Pipeline and Diffuser Road Construction Area to Area 8

Engineering and Site Services will be consulted prior to the deployment of any required deterrents related to construction activity associated with the pipeline, diffuser and access road to Area 8.

5.3.5. General Construction Areas

General construction areas include the third 18ML tank pad, the bulk ammonium nitrate (AN) storage building at the primary AN storage area, the Hearne Berm, and any other major construction areas on site where nesting by migratory birds may take place.

5.4. Inspections

Regular inspections will be commence from mid-May to late June to coincide with the peak period of migratory bird nesting activity.

The inspections will consists of filling out the *Bird Surveillance Data Sheet* (CL119) for each location as well as completing the *Wildlife Sighting Form* (CL031) for any incidental sightings of other wildlife (e.g. Red Fox, Common Ravens, Gulls Spp., etc.) Migratory species known to occur around the Gahcho Kué Mine site are listed in Table3.

Table 3. Migratory Species Occurrences for the Gahcho Kué Mine Site

Common Name	Scientific Name	Location of Concern
Harri's Sparrow	*Zonotrichia querula*	D2, D3, E1
American Tree sparrow	*Spizella arborea*	D2, D3, E1
Savannah Sparrow	*Passerculus sandwichensis*	D2, D3, E1
Least Sandpiper	*Calidris minutilla*	D2, D3, E1
Stilt Sandpiper	*Calidris himantopus*	D2, D3, E1
Gray-cheeked Thrush	*Catharus minimus*	D2, D3, E1
Yellow Warbler	*Setophaga striata*	D2, D3, E1
Black Warbler	*Setophaga petechia*	D2, D3, E1
Yellow-rumped warbler	*Setophaga coronata*	D2, D3, E1
White-crowned sparrow	*Zonotrichia leucophrys*	D2, D3, E1
Lapland Longspur	*Calcarius lapponicus*	D2, D3, E1
American Robin	*Turdus migratorius*	D2, D3, E2, Dyke L
Peregrine Falcon	*Falco peregrinus*	5034 Pit
Gyrfalcon	*Falco rusticolus*	5034 Pit
Raven	*Corvus corax*	5034 Pit, Camp site
Red-tailed Hawk	*Buteo jamaicensis*	5034 Pit, Camp site
Broad-wing Hawk	*Buteo platypterus*	5034 Pit, Camp site
Rough-legged Hawk	*Buteo lagopus*	5034 Pit, Camp site
Bank Swallow	*Riparia riparia*	Dyke L, South Mine Rock Pile Shoreline

Inspection activities associated with specific deterrence locations are discussed as follows:

5.4.1. 5034 Pit

5.4.1.1. After the daily morning meeting with Mine Operations, clear communication of activity within and around the pit will be noted and posted on the Mine Operators notification board;

5.4.1.2. The Environmental Assistant will drive around the ring road (with approval of locations) to stop and observe from a N, W, E, S point of view to scan the air, ground, and pit walls for any bird activity for 15 minutes at each point;

5.4.1.3. Drive down into the pit, park 20 m away from pit walls and at a distance from any mining activities;

5.4.1.4. Scan the air, ground, and pit walls for any bird activity for 15 minutes; and

5.4.1.5. If there are areas within the pit that have active bird sightings, more time will be allocated to observe and record behaviour move deterrents into positon or actively deter birds form the pit.

5.4.2. Dyke E

5.4.2.1. Walking along the shoreline of Area 3 within 300 m of the construction activity for Dyke E;

5.4.2.2. Every 150 m, stop and observe for any movement in the air, on the ground, shorelines or in the water for 2 to 5 minutes; and

5.4.2.3. Bird nesting surveillance will be conducted in addition to migratory bird observations.

5.4.3. D2, D3, and E1 Lakes

5.4.3.1. Opportunistic visits will be completed throughout the season at D2, D3, and E1 Lakes;

5.4.3.2. Shoreline walk arounds will be completed to inspect the condition of the deterrents at every 150 m; and

5.4.3.3. Bird nesting surveillance will be conducted during the deterrent inspections.

5.4.4. Pipeline and Diffuser Road Construction Area to Area 8

5.4.4.1. Walk the construction areas 300 m out from active work areas; and

5.4.4.2. Every 150 m, stop and observe for any movement in the air, on the ground, shorelines or in the water for 2 to 5 minutes.

5.4.5. General Construction Areas

5.4.5.1. Walk the construction areas 300 m out from active work areas; and

5.4.5.2. Every 150 m, stop and observe for any movement in the air, on the ground, shorelines or in the water for 2 to 5 minutes;

5.5. Nesting Sites Found

If nesting behaviour is observed or an active nest site is found during inspections, the following procedures will be performed:

5.5.1. Record UTM coordinates of nesting behaviour and/or nest location;

5.5.2. Take photos of the nesting site and nest;

5.5.3. Flag the area, creating an initial buffer zone around the nest site of at least a 20 m radius (adjust accordingly based on species present and type of work activity associated with nest site);

5.5.4. Advise the applicable Supervisors of any findings and inform the Environmental Coordinator and Environmental Superintendent. Increase visits to nest location to verify nesting activity;

5.5.5. Superintendent or designate will notify the appropriate regulators as required. In the case of raptor species the following required notification will be completed: "*Report any raptor nesting activity observed on Mine infrastructure or within 1.5km of the mine to ENR*" – WWHPP; and

5.5.6. Increase the frequency of site visits to the nest location and continue to advise Supervisors of nest status (i.e., bird on nest, eggs present, chicks hatched, nest abandoned, nest predated, etc.).

5.6. Reporting

Completed wildlife sighting logs, deterrent placement sheets, bird surveillance sheets, active deterrents fired/used, and any other information will be recorded into a database and be reviewed for completeness and accuracy on a daily basis. Information will be reported in future annual wildlife reports.

6.0 APPROVAL

Name	Title	Date	Signature
Patrick Kramers	SHERT Manager		

7.0 REVISION HISTORY

Noted below is the revision history of this document.

Revision	Date	Comments
0	May 5, 2017	Approved for Use
1	April 26, 2018	DOP reviewed by HOD, Format & Content Updated
2		

8.0 DEFINITION

8.1. **WWHPP:** Wildlife and Wildlife Habitat Protection Plan

8.2. **UTM:** Universal Transverse Mercator Coordinate System

8.3. **AN:** Ammonium Nitrate

8.4. **ML:** Million Litres (Volume)

8.5. **PPE:** Personal Protective Equipment

9.0 REFERENCES and RELATED DOCUMENTS

9.1. CL 031: Wildlife Sightings Log

9.2. CL 115: Deterrent Placement Data Sheet

9.3. Migratory Bird Nest Management Plan, June 2015

9.4. Wildlife and Wildlife Habitat Protection Plan, October 2014

9.5. CL 119: Bird Surveillance Data Sheet

9.6. Wildlife Deterrent Log Book

9.7. Mine Operations Blasting Schedule

9.8. Mine Operations Forecasted Activity Map (for placement strategy)

9.9. Environment and Climate Change Canada. 2017

General Nesting Periods of Migratory Birds in Canada. (http://www.ec.gc.ca/paomitmb/default.asp?lang=En&n=4f39a78f-1#_03), accessed April 25, 2017

Migratory Breeding Bird Reference Material

Source: Environment and Climate Change Canada, Breeding Bird

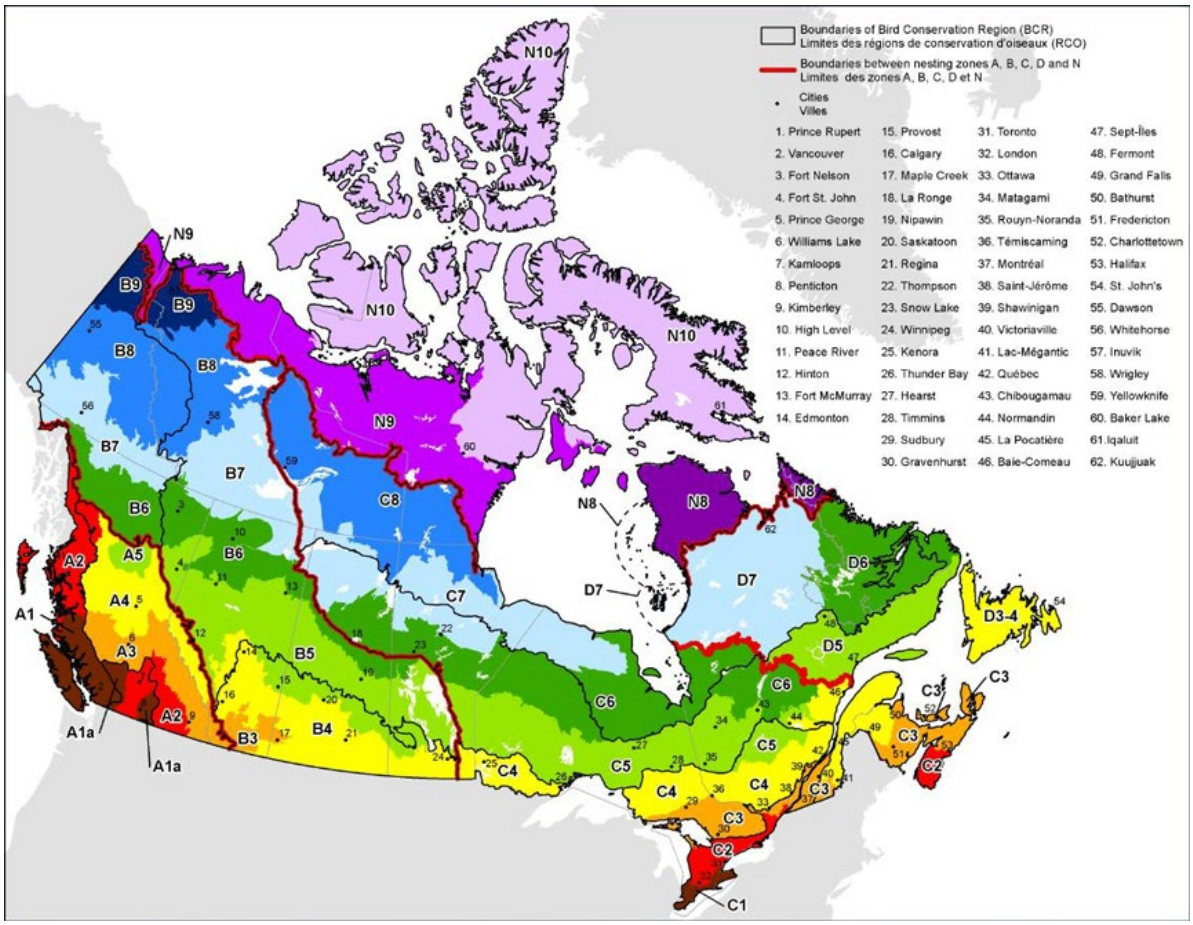


Figure 1: Migratory Bird Nesting Zones in Canada (Environment and Climate Change Canada, 2017)

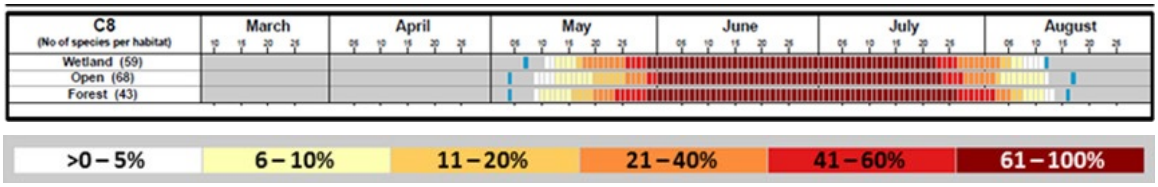


Figure 2: Nesting Calendar for Zone C8, location of Gahcho Kué Mine (Environment and Climate Change Canada, 2017)

Nesting Calendar shows the time period over which nesting activity takes place within Zone C8. Colour codes represent the percentage of species nesting during different time periods. Blue markers show extreme dates predicted for some atypical parts of the nesting zone where nesting could be earlier or later.

10.0 APPENDIX 1: JOB RISK ASSESSMENT

SECTION A - GENERAL INFORMATION	
Job/Task Description:	
Job/Task Objective:	
Date JRA Conducted:	**Department:**
JRA Leader:	**JRA Recorded by:**
List Equipment/tools required for task:	
Do the task activities impact on other people/work? *Yes* ☐ */ No* ☐ *If 'Yes' indicate who/what and how as well include them in the JRA*	

SECTION B – JOB/TASK INFORMATION

#	Task /Activity Step	Hazards	Unwanted Event	Controls in place	Residual Risk #

JRA Comments/Remarks:					

SECTION C - SIGN OFF

	Name	Signature	Date
Supervisor/Lead:			
Team member/s:			

De Beers Group of Companies	GKM FORM **Deterrent Placement Data Sheet**	ID No: **CL 115** Revision Date: **May 14, 2018**

Site: Gahcho Kué	**Weather:**	
Date:	**Start Time:**	**End Time:**
Observers/Company:		

Deterrent Number	Deterrent Type	UTM Coordinates		Photo Number	Time	Wildlife Observed
		Easting	Northing			

Approved by: Environmental Superintendent

Unauthorized Changes Prohibited

De Beers Group	GKM FORM **BIRD NESTING DATA SHEET**	ID No.: CL 117 Revision Date: July 2, 2020

Site: Gahcho Kué	**Weather:**	
Date (DD-MMM-YYYY):	**Start Time:**	**End Time:**
Observers/Company:	**Location Inspecting:**	

Nest #	Location of Nest	UTM Coordinates		Photo #	Time	Wildlife Observer
		Easting	Northing			

Approved by: Environmental Superintendent

Unauthorized Changes Prohibited

DE BEERS GROUP	GKM CHECKLIST **Bird Surveillance Data Sheet**	**ID No.: CL 119** **Revision Date: July 2, 2020**

OBSERVER		WEATHER			DATE (DD-MMM-YYYY)	

LOCATION	TIME	BIRD SPECIES	PRESENCE (Y/N)	# OF INDIVIDUALS	ACTIVITY / BEHAVIOUR	COMMENTS

Entered in Excel Database _____ QA/QC Excel Database _____ Page ____ of _____

Common Name	Scientific Name	Code
Harris Sparrow	*Zonotrichia querula*	HRSP
American Tree sparrow	*Spizella arborea*	ATSP
Savannah Sparrow	*Passerculus sandwichensis*	SASP
Least Sandpiper	*Calidris minutilla*	LESA
Stilt Sandpiper	*Calidris himantopus*	STSA
Gray-cheeked Thrush	*Catharus minimus*	GCTH
Yellow Warbler	*Setophaga striata*	YEWA
Black Warbler	*Setophaga petechia*	BLWA
Yellow-rumped warbler	*Setophaga coronata*	YRWA
White-crowned sparrow	*Zonotrichia leucophrys*	WCSP
Lapland Longspur	*Calcarius lapponicus*	LALO
American Robin	*Turdus migratorius*	AMRB
Peregrine Falcon	*Falco peregrinus*	PEFA
Raven	*Corvus corax*	RAVN
Gull	*Laridae*	GULL
Bank Swallow	*Riparia riparia*	BKSW
Red-tailed Hawk	*Buteo jamaicensis*	RTHA
Broad-winged Hawk	*Buteo platypterus*	BAEG
Rough-legged Hawk	*Buteo lagopus*	BULA
Bald Eagle	*Haliaeetus leucocephalus*	BAEG
Greater white-fronted Goose	*Anser albifrons*	GWGO
Rock Ptarmigan	*Lagopus muta*	ROPT

Reference: http://www.birdpop.org/docs/misc/Alpha_codes_sci.pdf

Activity/Behavior	Code
Flying	FL
Resting	RS
Perching	PR
Nesting	NS
Tracks	TR
Feeding	FD
Deceased	DE
Swimming	SW
Other	OT – put in comment

Location	Code
Dyke L	DL
South Mine Rock Pile	SMRP
5034 Pit	PT

DE BEERS GROUP	GKM FORM **Bird Deterrent Inspection Log**	**ID No.: CL 220** **Revision Date: July 2, 2020**

Site:	Gahcho Kué	**Weather:**			
Date (DD-MMM-YYYY):		**Start Time:**		**End Time:**	
Observers / Company:					

Deterrent Identification Number	Type	Status (Active/Inactive)	Location	Repairs or Refills Conducted

Approved by: Environmental Superintendent	**Page: 1 of 1**

DE BEERS GROUP	GAHCHO KUÉ MINE		
Department:	Environment & Permitting	**Document No.:**	**EP-DOP 747**
Section:		**Effective Date:**	November 23, 2021
DEPARTMENT OPERATING PROCEDURE – MIGRATORY BIRD NEST PRE-CONSTRUCTION SURVEY			
Revision:	Original Version	**Replaces:**	-
APPROVED:	*Original Signature: Refer to Item 6. APPROVAL*		

1.0 PURPOSE

The purpose of this guideline is to provide direction to field operations with regard to federal and provincial regulatory requirements relating to non-intrusive migratory bird nest surveys. These surveys are intended to reduce the risk of incidental take of federally or provincially protected bird species due to construction activities.

2.0 SCOPE

This survey is to be completed in advance of construction activities occurring at the Gahcho Kué (GK) Mine during the spring/summer nesting period. This is defined as May 1st to August 15th (ECCC 2021) based on the GK Mine presence in Nesting Zone C8 .

3.0 RESPONSIBILITIES

3.1. SHERT Manager

3.1.1. Ensure that document is appropriately reviewed on an annual basis to ensure new information is updated as required, and all risks are appropriately mitigated.

3.2. Environmental Coordinator or Designate

3.2.1. Ensure the procedure is reviewed prior to the completion of surveys by field staff

3.2.2. To coordinate with the Mine Operations & Projects Team to identify any construction that may occur during the nesting season, and to ensure that a nest sweep has been conducted prior to work commencing.

3.2.3. Review results of surveys to ensure completeness and all follow up actions are appropriately taken.

3.3. Environmental Technician

3.3.1. To review the procedure and conduct it full, as required in advance of construction activities.

3.3.2. Ensure all field notes and finding are appropriately filed and reviewed with the Environmental Coordinator.

4.0 CRITICAL CONTROLS

See the attached Job Risk Assessment.

5.0 Required Equipment

- Wildlife Deterrent Kit
- Appropriate PPE and outdoor clothing for conditions
- 10x42 (or equivalent) binoculars
- Sunscreen & Bug Spray as required
- GPS
- Field Notebook and Stationery
- Camera
- Site Radio
- Regionally Appropriate Bird Identification Guide
- CL-117 Bird Nesting Data Sheet

6.0 PROCEDURE

6.1. Timing

The GK Mine lies within the nationally designated Nesting Zone C8, which has a potential nesting period of May 1st to August 15th (ECCC 2021). During this period all construction activities that will incur land clearing must have a migratory bird nest survey completed prior to construction.

6.2. Field Procedure

The focus of the survey should be to search for birds exhibiting breeding behaviour, such as paired birds, territorial singing, alarm calls, distraction displays, or birds carrying food, fecal sacs, or nesting material (ECCC 2021). Depending on the time of year, cues for finding nests can vary. The following information on breeding bird behaviour and signs may be used as guidance:

6.2.1. Surveys should be conducted by qualified Environment Staff quietly moving through vegetation, pausing intermittently to observe bird behaviour.

6.2.2. Working in pairs can help with this process; however, minimal verbal communication should be made between observers.

6.2.3. In addition, the more familiar an observer is with the habitat and the behaviour of the potential species in that habitat, the easier it is to locate females and observe breeding behaviour. It is recommended that observers spend some time prior to surveys determining which species are likely to occur in the area they

are surveying and ensure familiarity with the identification and behaviours of those species prior to conducting the survey.

6.2.4. Survey rate expected for treed or undisturbed areas is 0.5 ha/hr, survey rate expected for disturbed areas is 2 ha/hr.

6.2.5. The focus of the survey should be to search for birds exhibiting breeding behaviour, such as paired birds, birds carrying nesting material, birds carrying food, territorial singing, alarm calls, or distraction displays. Depending on the time of year, cues for finding nests can vary.

6.2.6. While searching for nests, observers should be cognizant of a birds' response to their presence (e.g., feigning broken wing, distraction displays, fixation on a spot with no food, circling and eyeing observers, alarm calling).

6.2.7. During nest building do not get too close to the suspected nest or verify the nest only when the female is absent to prevent abandonment. During incubation, if a female is behaving as if there is a nest in the area but does not appear to be going to it, then assume a nest is present and back away from the area because a female should not be off her eggs too long, especially during cold weather.

6.2.8. If nests are observed, ensure that a waypoint & coordinates (UTM), the species, location and suspected activity (nest building, incubation or rearing of young) are recorded on CL 117. Photos should also be taken of the nesting site if possible. The nesting area should also be properly demarked (with survey stakes or high visibility marking tape), with care being taken to cause as minimal disturbance as possible.

6.3. Results

Once completed, ensure the results are provided to the Environmental Coordinator, who will communicate these to the Mining and Projects teams. Should any nests be observed within the proposed construction area, construction must be halted until the end of the nesting season, or the nest has been vacated due to predation or young departing the area. All results should be recorded within the wildlife management database.

7.0 APPROVAL

Name	Title	Date	Signature
Patrick Kramers	SHERT Manager	November 29, 2021	

8.0 REVISION HISTORY

Noted below is the revision history of this document.

Revision	Date	Comments
0	November 23, 2021	Original Document

9.0 DEFINITIONS

9.1. Active nest: A nest is considered active if it is under construction or in use for egg laying, incubating or rearing chicks. If a nest is found, but bird activity is not detected at the nest, professional judgment and expert knowledge must be used to determine whether the nest is likely to be in use or whether it has been abandoned. A nest is also considered active if its presence is suspected based on birds exhibiting breeding behaviour (i.e., paired birds, birds carrying nesting material, birds carrying food, or territorial singing) even if its precise location and condition cannot be verified. Dwellings (i.e., nests, cavities, burrows) that are used from one year to the next are generally protected year-round

9.2. Nest: According to the MBCA, "nest" is defined as "the nest of a migratory bird and includes parts of the nest." A broader definition includes any structure, ground scrape or part of the landscape (i.e., burrow, tree cavity, broken treetop, ground or floating vegetation) that a bird species uses for breeding, laying eggs or rearing young.

10.0 REFERENCES and RELATED DOCUMENTS

10.1. ECCC (Environment and Climate Change Canada). 2021. General nesting periods of migratory birds. Available at: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods.html. Modified October 30, 2019. Accessed November 15, 2021.

10.2. ECCC. 2019. Guidelines to reduce risk to migratory birds. Available at: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/reduce-risk-migratory-birds.html#toc5. modified September 19, 2019. Accessed April 24, 2020.

10.3. Golder, 2020. Specific Work Instruction: Non-Intrusive Migratory Bird Nest Survey. Golder to De Deers Communication, March 2020

10.4. CL-117: "Bird Nesting Data Sheet"

11.0 APPENDIX 1: JOB RISK ASSESSMENT

SECTION A - GENERAL INFORMATION

Job/Task Description:
MIGRATORY BIRD NEST PRE-CONSTRUCTION SURVEY

Job/Task Objective:
To clear the area for nesting activity

Date JRA Conducted: November 11, 2021	**Department: Environment**
JRA Leader: M. Elwood	**JRA Recorded by:** **M. Elwood**

List Equipment/tools required for task:
See attached equipment list within the document above

Do the task activities impact on other people/work? ***Yes*** ☐ **/** ***No*** ☐ ***If 'Yes' indicate who/what and how as well include them in the JRA***

SECTION B – JOB/TASK INFORMATION

#	Task /Activity Step	Hazards	Unwanted Event	Controls in place	Residual Risk #
1	Light Vehicle Operation	1. Negative Mobile Equipment Interaction 2. Impact with Berm/Fixed Object 3. Roll Over	1. Death, LTI, MA, FA, Property Damage 2. Death, LTI, MA, FA, Property Damage 3. Death, LTI, MA, FA, Property Damage	1a. Site Drivers Procedure 1b. Equipment Pre-Operations Inspections 1c. Positive Communication between LV's & Mobile Equipment 1d. Mine safe traffic collision avoidance system. 1e. Working beacon, reflective identifiers & buggy whip. 2a. Equipment Pre-Operations Inspection (Brake Test) 2b. Drive to conditions, report unsafe conditions 3a. Roll Over Protection	10
2	Field Work	1. Slips Trips & Falls 2. Sun Exposure/Heat Related Injury 3.Negative Wildlife Interaction 4. Lightning & Inclement Weather	1. LTI, MA, FA 2. Death, LTI, MA, FA 3. Death, LTI MA, FA 4. Death, LTI, MA, FA	1a. Walk to conditions, get help if required. 1b. Proper footwear appropriate for the terrain. 1c. Cleats if icy conditions are present. 2a. Drink appropriate volumes of water, ensure that it is carried in the field	6

				2b. Wear sunscreen and appropriate clothing for conditions. 3a. Maintain situational awareness for wildlife, conducting 360 sweeps every 5 minutes to scan for wildlife. 3b. Carry bear kit and ensure that is in an easily accessible location (arms reach) at all times. 3c. Never work alone, always work in pairs at a minimum. 4a. Be continually aware of site weather conditions. Should conditions worsen follow the site lightning procedure and seek shelter immediately.	

JRA Comments/Remarks:

SECTION C - SIGN OFF

	Name	Signature	Date
Supervisor/Lead:	Mason Elwood/Allan Knight		
Team member/s:			

DEPARTMENT OPERATING PROCEDURE – *Collection Pond Bird Surveys at the Gahcho Kué Mine*

Revision:	1	**Replaces:**	0
APPROVED:	*Original Signature: Refer to Item 6. APPROVAL*		

1.0 PURPOSE

The purpose of this Department Operating Procedure (DOP) is to outline the proper procedures for conducting an observation based survey of bird presence/absence on or near surface water collection ponds at the Gahcho Kué Mine Site (GK Mine). Birds of interest include migratory, seasonal and year round species ranging from waterfowl, shorebirds, and other upland species that may frequent the GK Mine.

2.0 SCOPE

De Beers is responsible for taking appropriate measures to comply with the NWT Wildlife Act, 2020 and the Migratory Birds Conventions Act, 1994, as well as the site Tier 3 Wildlife Management and Monitoring Plan V1, 2021. These programs apply to all phases of mine operation and all activities associated with the GK Mine. Compliance is an integral part of the wildlife protection legislation and aims to ensure that all birds, as individuals and as populations (including their nests and eggs), are protected and conserved.

This document provides direction to personnel recording information on the presence/absence of birds on or near surface water collection ponds at the GK Mine.

3.0 RESPONSIBILITIES

3.1. Environmental Coordinator or Designate:

3.1.1 Make sure field personnel have adequate training and equipment to complete the tasks outlined in the procedure; and

3.1.2 Make sure DOP is current and reflects the objectives of the Tier 3 Wildlife Management and Monitoring Plan V1, 2021..

3.2. Environmental Technician or Designate:

3.2.1 Understand the procedures as outlined in this procedure; and

3.2.2 Ask your supervisor for clarification if unsure of any aspect of this procedure.

4.0 CRITICAL CONTROLS

See attached Job Risk Assessment.

5.0 DEPARTMENT OPERATING PROCEDURE

5.1. Equipment:

4.1.1. CL 206 – Collection Pond Bird Survey Form for the GK Mine

4.1.2. Field binoculars with 10X42 magnification

4.1.3. Field book with appropriate stationary

4.1.4. Bird identification field guides

4.1.5. Current map of survey points and mine infrastructure

4.1.6. Digital camera

4.1.7. GPS

4.1.8. Portable radio

4.1.9. Bear kit (pen launcher, shells, air horn)

4.1.10. Sunscreen, insect repellent, rain gear, back pack

5.2. Survey Procedures:

5.2.1. Observation Stations

Surveys will be conducted using a visual count protocol with observation stations located at fixed locations a set distance away from the shoreline of each collection pond (British Columbia Ministry of Environment, 1999). The collection ponds to be surveyed, and the number of observation stations to be established (Figure 1) are listed as follows:

a. Water Management Pond - 2 observation stations (WMP-1, WMP-3)

b. Area 2 / FPK Tailing Facility – 1 observation station (WMP-2)

c. Collection Pond 1 – 2 observation station (CP1-1, CP1-2)

d. Collection Pond 5 – 1 observation station (CP5-1)

e. Collection Pond 6 – 1 observation station (CP6-1)

Fixed observation stations for each collection pond will be established in advance of the first survey. Observation stations should be located a suitable distance away from each collection pond to provide a substantial view of the water, surrounding shoreline and adjacent upland areas. These locations may

change from year to year as mine infrastructure develops, and should be reviewed annually prior to the start of each program. Ensure that the updated map is uploaded to the Environment Sharepoint for future reference.

Once a location has been selected, it will be marked by driving a survey stake, wood post or other suitable marker into the ground. This marker will be spray painted with a bright colour and labelled with the observation station name. The name, location and GPS coordinates of each observation station will be recorded and the information filed electronically to the Environment Sharepoint for future reference.

5.3. Survey Frequency:

5.3.1. Surveys shall commence as soon as 50% snow cover is reached, or when ice has begun receding from the shore providing adequate habitat for shore birds and waterfowl. Surveys will be conducted bi-weekly while open water persists at each waterbody. This is typically from May through September of each year

5.3.2. Surveys shall be conducted on a bi-weekly basis (twice monthly), with all stations being visited within a single day.

5.3.3. Collection of Scanning Survey Data

a. Proceed to each of the designated observation stations as identified in Figure 1. If possible, conduct the survey with two individuals. Have one individual conduct the scan while the second person records the tally count & species type.

b. From each station marker, use your binoculars to slowly scan a field of view that covers an arc of at least 180°. During this scan tally the bird species type and number of individuals for each species that you observe.

c. Complete a *"Collection Pond Bird Survey Form (CL 206)"* at each observation station visited. Record species names using the four letter codes provided on the back of the form. If no species are observed, ensure that a field sheet is completed, with the notes "no species observed" for each sample location.

d. Do not guess at a species identification. Use a field guide, seek confirmation of identifying characteristics from a second observer or take a photograph if possible to document your sighting. If you are still unsure, it is best to record the sighting as an unknown bird species, grouped by family if possible (*Duck spp, Gull spp* etc.).

5.4. Post Field Procedure:

5.4.1. Environment Technician or Designate:

a. Will return all field gear to its' proper storage location, ready for next use; and

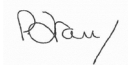
b. Will verify the field forms have been accurately filled out during the survey before entering data into an electronic format. QA/QC standards will be maintained by having a second person reconcile recorded data against what is input into the computer.

c. If a summer student, or other designate, completes the collection pond surveys, ensure that the data is reviewed by Environment Staff prior to filing to SharePoint.

5.4.2. Environment Coordinator or Designate:

a. Will access the data and ensure that it is reported annually as per the Tier 3 Wildlife Management and Monitoring Plan V1, 2021.

6.0 APPROVAL

Name	Title	Date	Signature
Patrick Kramers	SHERT Manager		

7.0 REVISION HISTORY

Noted below is the revision history of this document.

Revision	Date	Comments
0	August 17, 2017	Approved for Use
1	April 26, 2018	Format and Content Updated

8.0 DEFINITIONS

None

9.0 REFERENCES and RELATED DOCUMENTS

9.1. CL 206: Collection Pond Bird Survey Form

9.2. Figure 1: Bird Survey Station Locations

9.3. Province of British Columbia, 1999. *Biodiversity Inventory Methods - Waterfowl and Allied Species.* Available on line at: http://www.for.gov.bc.ca/ric

9.4. Migratory Birds Convention Act, 1994. SC 1994, c 22. Last amended 12 December 2017. Available at https://laws-lois.justice.gc.ca/eng/acts/m-7.01/

9.5. Wildlife Act. SNWT 2017, c 19. Last amended 1 January 2020. Available at https://www.justice.gov.nt.ca/en/files/legislation/wildlife/wildlife.a.pdf

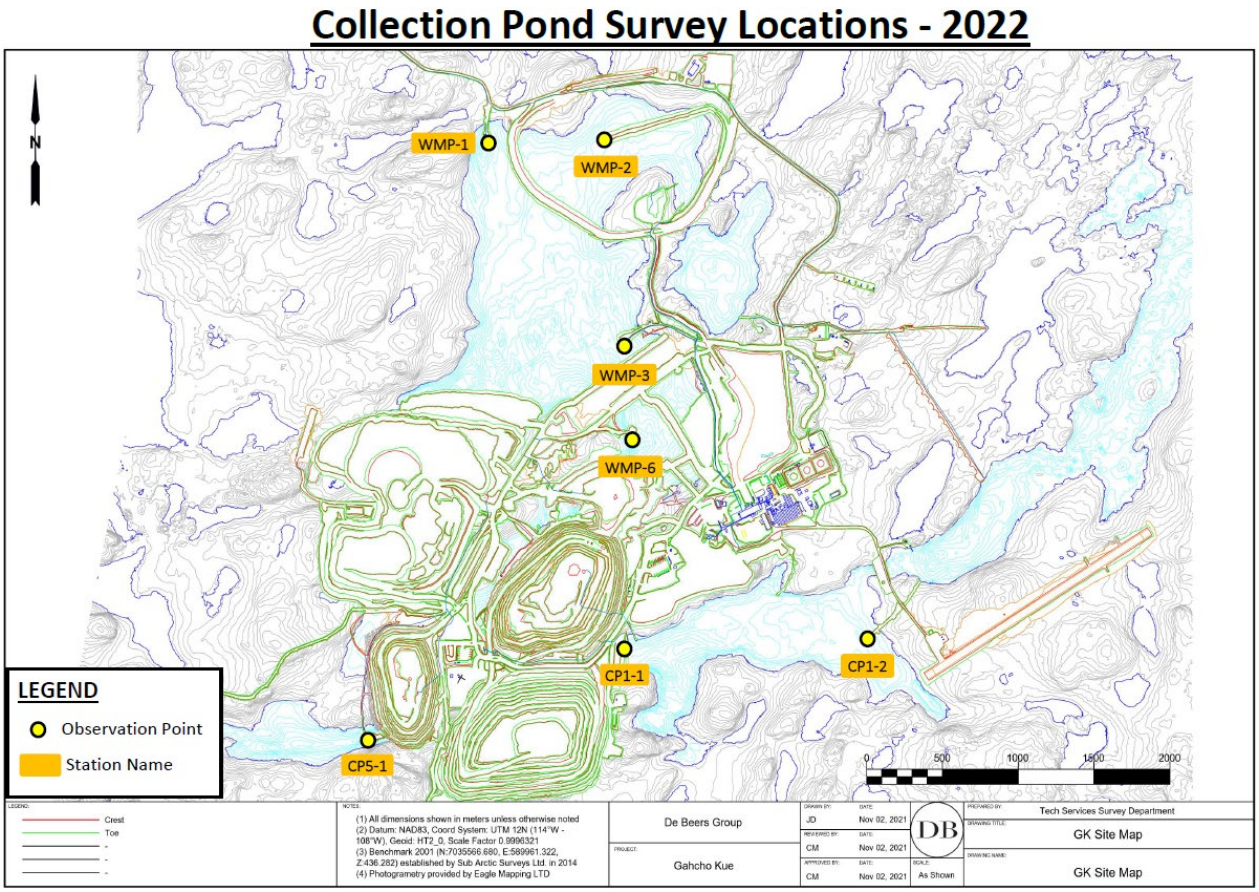


Figure 1: Bird Survey Station Locations

10.0 APPENDIX 1: JOB RISK ASSESSMENT

SECTION A - GENERAL INFORMATION	
Job/Task Description: Collection Pond Bird Survey	
Job/Task Objective: Collect observations of waterfowl, shore birds and upland birds within the collection ponds and water management.	
Date JRA Conducted: November 5, 2021	Department: Environment
JRA Leader: M. Elwood	JRA Recorded by: M. Elwood

List Equipment/tools required for task:

CL 206 – Collection Pond Bird Survey Form for the GK Mine

Field binoculars with 10X42 magnification

Field book with appropriate stationary

Bird identification field guides

Current map of survey points and mine infrastructure

Digital camera

GPS

Portable radio

Bear kit (pen launcher, shells, air horn)

Sunscreen, insect repellent, rain gear, back pack

Do the task activities impact on other people/work? *Yes ☐ / No ☐ If 'Yes' indicate who/what and how as well include them in the JRA*

No

SECTION B – JOB/TASK INFORMATION					
#	**Task /Activity Step**	**Hazards**	**Unwanted Event**	**Controls in place**	**Residual Risk #**
1	Light Vehicle Operations	1. Collision with mobile equipment/light vehicles.	1. Death, Significant Injury, LTI, medical aid, first aid, property damage.	1a) Only allow site licensed individuals operate light vehicles in accordance to the site traffic management plan. 1b) Ensure vehicles have been appropriately inspected prior to use. 1c) Maintain positive communication with vehicles and equipment within the operating area.	10
2	Working Around Water	1.Slip Trips or falls 2. Accidental Submersion	1. LTI, MA, FA 2. Death, LTI, MA, FA	1a) Ensure proper footwear and footing, maintain situational awareness, ask for assistance when moving objects over uneven/slippery terrain. 2a) Ensure PFD is worn when working within 2m of open water body 2b) Do not work around water alone, ensure that other staff are within direct proximity and have access to a throw/reach device.	10
3	Hazardous Wildlife	1. Negative interaction with hazardous wildlife	1. Death, LTI, MA, FA	1a) Ensure wildlife deterrents kits are carried in the field, with personnel having adequate training on their use. 1b) Maintain situational awareness 1c) Ensure to carry a site radio or other forms of communication at all times. 1d) Do not work alone in a remote setting, when out of proximity of a truck/shelter.	10
JRA Comments/Remarks:					

SECTION C - SIGN OFF			
	Name	**Signature**	**Date**
Supervisor/Lead:			
Team member/s:			

DE BEERS GROUP	GKM CHECKLIST **Bird Survey Form for Water Collection Ponds at the GK Mine**	ID No.: **CL 206** Revision Date: **July 2, 2020**

Station Number: _____ Date (DD-MMM-YYYY): _____

Field Crew Members: _____

Time Start (24hr): _____ Time End (24hr): _____

Weather Conditions

Cloud Cover (circle): **1** (Clear) **2** (Scattered Clouds, <50%) **3** (Scattered Clouds, >50%) **4** (Unbroken Clouds)

Wind Direction (circle): **N NE E SE S SW NW**

Strength (Beaufort Scale) (circle): **1 2 3 4 5 6** (*See Reverse for Wind Strength Descriptions)*

Temp. (°C): _____ F (Fog) M (Misty Drizzle) D (Drizzle) LR (Light Rain) HR (Hard Rain) S (Snow)

Scanning Observations

Species *(see reverse for common species codes)*	No. Individuals Observed	Activity/Behaviour *(see reverse for Activity/Behaviour codes)*	Comments

Wind Strength (Beaufort Scale)	Description
0	calm (< 2 km/h), water like a mirror
1	light air (2-5 km/h), waves as ripples with appearance of scales
2	light breeze, (6-12 km/h), leaves rustle, small wavelets
3	gentle breeze, (13-19 km/h), leaves and twigs constantly move, large wavelets, crests begin to break, scattered whitecaps
4	moderate breeze, (20-29 km/h), small branches move, dust rises, small waves, becoming longer, numerous whitecaps
5	fresh breeze, (30-39 km/h), small trees sway, moderate waves, many whitecaps, some spray
6	strong breeze, (40-50 km/h), large branches moving, wind whistling, longer waves forming, whitecaps everywhere

Activity/Behavior Code	Description
FD	Feeding
FL	Flying
NS	Nesting
PR	Perching
RS	Resting
SW	Swimming
DD	Dead

Code	Common Name	Code	Common Name	Code	Common Name
AMGP	Amercian Golden Plover	FOSP	Fox Sparrow	RTHA	Red-tailed Hawk
AMPI	American Pipit	GCTH	Gray-cheeked Thrush	RTLO	Red-throated loon
AMRO	American Robin	GOEA	Golden Eagle	SAVS	Savannah Sparrow
AMWI	American Widgeon	GWGO	Greater White-fronted Goose	SEPL	Semipalmated Plover
ARTE	Arctic Tern	GWTE	Green-winged Teal	SESA	Semipalmated Sandpiper
ATSP	American Tree Sparrow	GYRF	Gyrfalcon	SMLO	Smith's Longspur
BAEA	Bald Eagle	HASP	Harris' sparrow	SNBU	Snow Bunting
BANS	Bank Swallow	HEGU	Herring Gull	SNOW	Snowy Owl
BLPW	Blackpoll Warbler	LALO	Lapland Longspur	SPSA	Spotted Sandpiper
BSGU	Bonaparte's Gull	LESA	Least Sandpiper	STSA	Stilt Sandpiper
BUFF	Buffalohead Duck	LESA	Least Sandpiper	SUSC	Surf Scoter
BWHA	Broad-winged Hawk	LEYE	Lesser Yellowlegs	TUSW	Tundra Swan
CAGO	Canada Goose	LTDU	Long-tailed Duck	UNSP	Unknown Species
CHSP	Chipping Sparrow	MALL	Mallard Duck	WCSP	White-crowned sparrow
COGO	Common Goldeneye Duck	NOPI	Northern Pintail Duck	WIPT	Willow Ptarmigan
COME	Common Merganser	NSHR	Northern Shrike	WIWA	Wilson's Warbler
CORA	Common Raven	PEFA	Peregrine Falcon	WWSC	White-winged scoter
CORE	Common Redpoll	RBME	Red-breasted Merganser	YBLO	Yellow-billed loon
COSN	Common Snipe	RLHA	Rough-legged Hawk	YEWA	Yellow Warbler
DEJU	Dark-eyed Junco	ROPT	Rock Ptarmigan	YRWA	Yellow-rumped warbler

Reference: Pyle, Peter and D.F. DeSante, 2017. Four-letter Alpha Codes for 2143 Bird Species in accordance with the 58th American Ornithological Union Supplement, The Institute for Bird Populations, http://www.birdpop.org/docs/misc/Alpha_codes_sci.pdf

DE BEERS GROUP	GAHCHO KUÉ MINE		
Department:	SHRT, Environment & Permitting	**Document No.:**	**OP 078**
Section:		**Effective Date:**	February 22, 2021
OPERATING PROCEDURE – *Responding to Bears or Aggressive Animals At or Near GKM (Emergency Situation)*			
Revision:	**4**	**Replaces:**	3
APPROVED:	*Original Signature: Refer to Item 6. APPROVAL*		

1.0 PURPOSE

This procedure applies to the Gahcho Kué Mine (GKM) site for the purpose of managing all aggressive animal sightings, encounters, or in-camp situations.

2.0 SCOPE

This procedure applies to Environment department and support personnel (i.e., ERT) responding to all aggressive animal sightings, encounters, and in-camp situations at the GKM. It covers such issues as consideration for the safety of personnel in relation to wildlife presence, requesting support should there be a need, reporting the incident, and dealing with deterrent actions and/or removal of the animal.

Aggressive animals include, but are not limited to bears, wolves, wolverines, moose and muskox. Foxes and large birds are not normally aggressive, but shall be managed in a similar manner if the animal's actions are aggressive in nature.

3.0 RESPONSIBILITIES

3.1. Mine General Manager or Designate:

3.1.1. Ensure that this procedure is implemented and maintained.

3.2. Heads of Departments/Contractor Managers, Superintendents or their Designates:

3.2.1. Ensure this procedure is communicated to their employees;

3.2.2. Ensure their employees have received the appropriate training; and

3.2.3. Ensure this procedure is implemented.

3.3. Environmental Manager or Designate:

3.3.1. Record the sighting on the Wildlife Monitoring Log;

3.3.2. Report and record encounters and actions on a Wildlife Deterrent Report and forwarding to appropriate *ENR Wildlife Officer;*

3.3.3. Ensure carcasses are handled properly, and the skin, including claws, head, and any requested specimen(s), are delivered to the appropriate *ENR Wildlife Officers* in a timely manner; and

3.3.4. Ensure any incident regarding wildlife is reported for the purpose of the Annual Wildlife Report.

3.4. All Environmental Personnel or other Designated Individuals (i.e. ERT and Wildlife Response Team Members) Who Handle or Fire the Shotgun:

3.4.1. Are required to hold a valid *Canadian, Firearms Possession and Acquisition Licence (PAL).*

3.4.2. *Have their valid Pal on file with the environmental department*

3.4.3. *Have taken current and appropriate shotgun handling and predator defence training (or equivalent as verified by the Safety, Heath & Environment Manager*

3.5. Supervisors:

3.5.1. Implement this procedure and ensure it is properly followed.

3.6. Safety, Health, Environmental & Risk Manager or Designate:

3.6.1. Monitor the implementation of this procedure; and

3.6.2. Ensure this procedure is maintained.

3.7. Environmental Coordinator is responsible for:

3.7.1. Monitoring the adherence of this procedure.

3.8. All Employees:

3.8.1. Understand and practice this procedure as required; and

3.8.2. Ask their supervisor for clarification if they are unsure of any aspect of this procedure.

Responsibilities of Employers, Contractors, Supervisors and Employees are also described in the NWT Mine Health and Safety Act (Sections 15 – 18) and throughout the NWT Mine Health and Safety Regulations.

4.0 CRITICAL CONTROLS

- Site radio communication;
- Bear deterrent kits;
- Bear stands containing bear spray, air horns, and informational posters,
- All persons handling firearms at GKM must have a valid Canadian PAL, appropriate training, and have a copy of their PAL on file with the environment department;

- Proper firearms usage techniques, positioning of second person always in line and never in front or behind the first person;
- Correct loading and unloading procedure while ensure the firearms safety is actuated.

5.0 PROCEDURE

5.1. The intent of this procedure is to:

5.1.1. Prevent risk of injury to humans;

5.1.2. Prevent aggressive animals from becoming habituated to the site and its infrastructure;

5.1.3. Prevent aggressive animals from seeking refuge in or around buildings, equipment storage or laydown areas;

5.1.4. Prevent aggressive animals from gaining access to areas or substances that could be harmful to the animal, such as fuel and chemical storage;

5.1.5. Prevent injury or death to aggressive animals;

5.2. WARNING

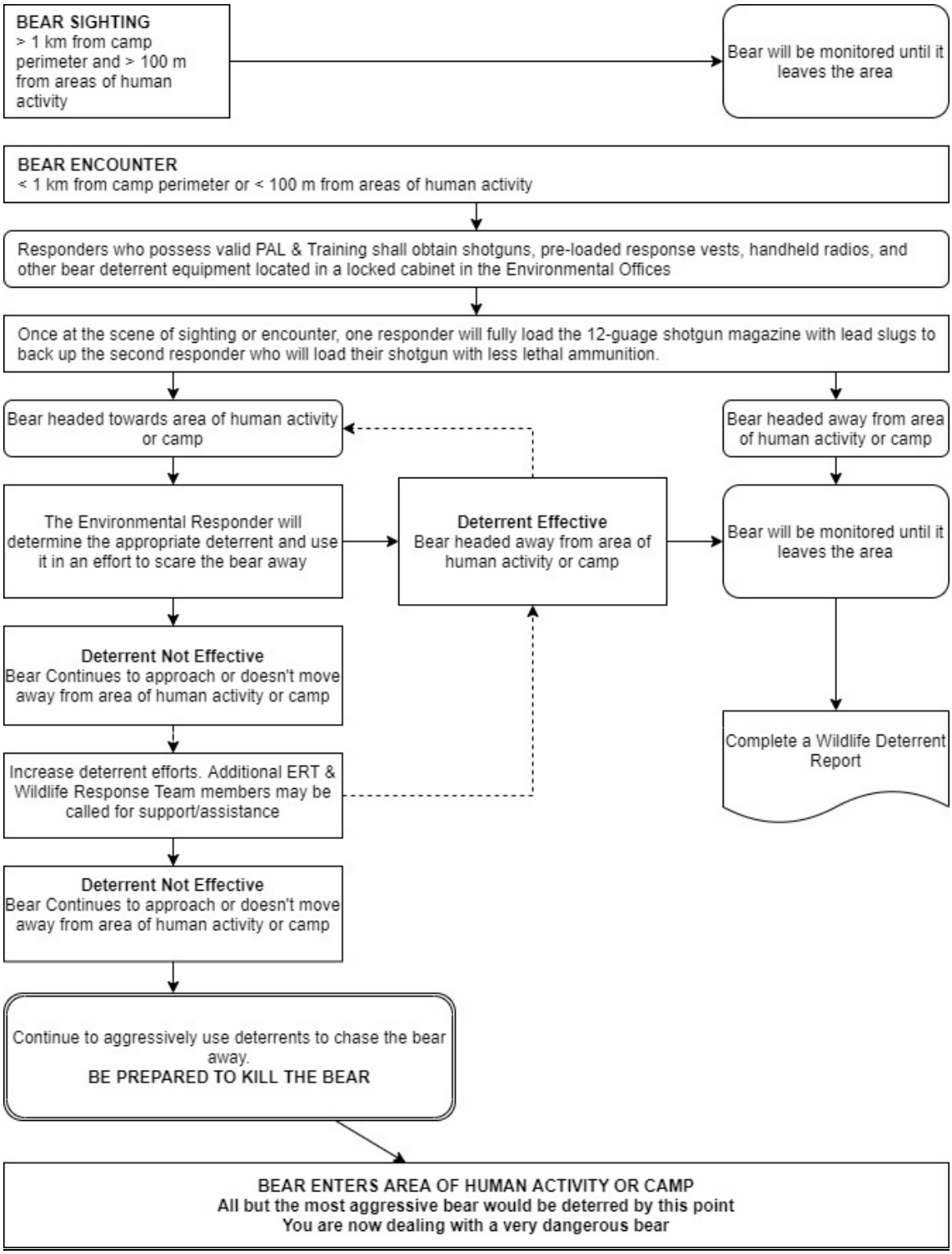
5.2.1. When responding to a hazardous wildlife encounter or an animal in camp, there must be a minimum of two responders;

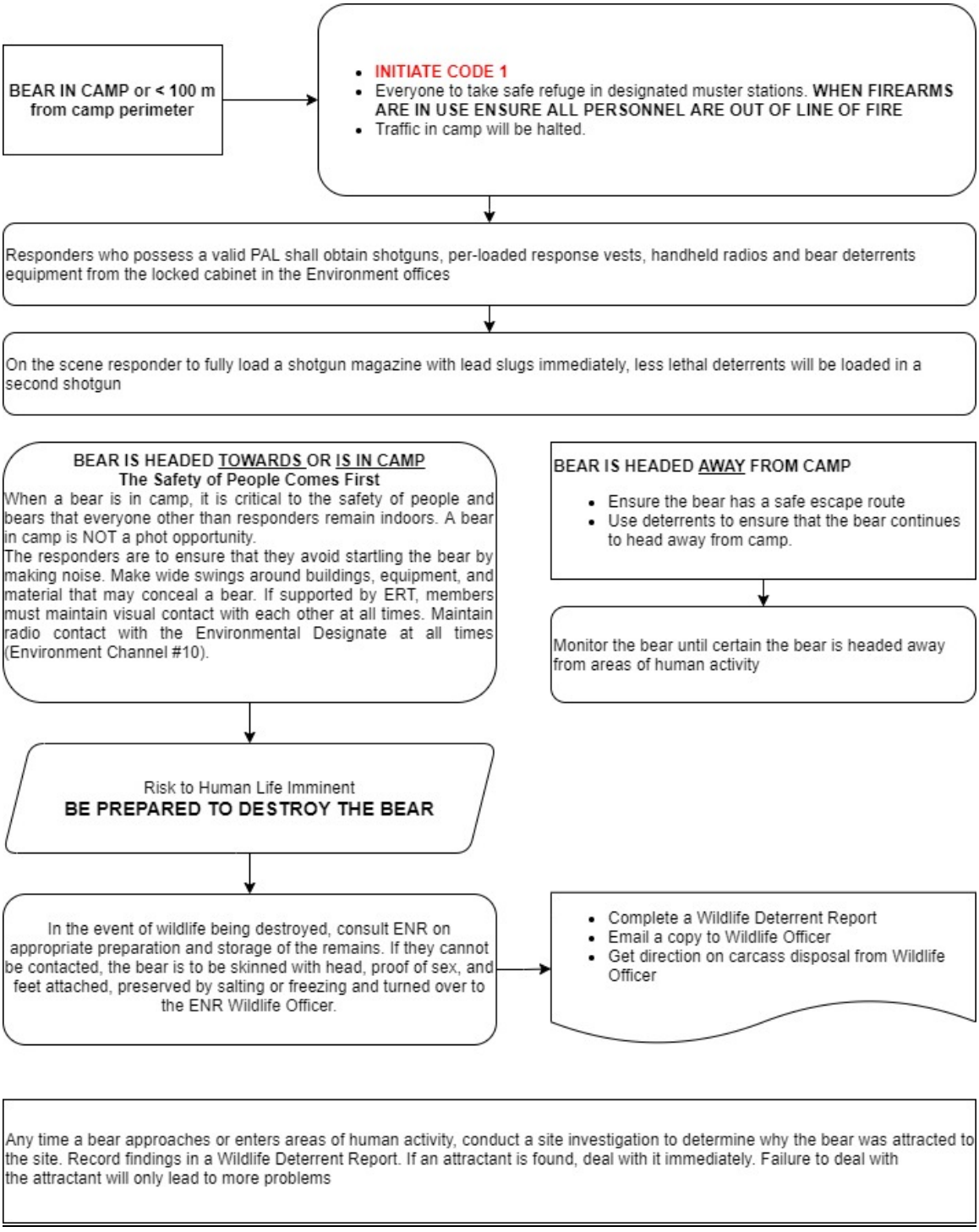
5.2.2. If firearms are determined to be an appropriate response, each responder will outfit themselves with a Remington 870 shotgun and a preloaded wildlife response vest. These vests will be pre-loaded with both lethal and less lethal ammunition. The lethally loaded shotgun may also be substituted for a rifle with lethal ammunition.

5.2.3. One responder will load their shotgun magazine fully with lethal ammunition (lead slugs) to provide backup for the second responder who will load their shotgun with less lethal ammunition(rubber slugs);

5.2.4. When preparing to fire both responders must be clear of each other's line of fire and ensure that the backdrop to the rear of the target is clear of personnel and hazardous materials (i.e. potential explosives).

5.2.5. 15mm bear bangers and other noise makers may be used as a form of non-lethal deterrents, however it is recommended that a second responder is present with a fully loaded shotgun (with lethal ammunition) in the event that the non-lethal deterrents are ineffective..


BEAR SIGHTING
> 1 km from camp perimeter and > 100 m from areas of human activity
Bear will be monitored until it leaves the area
BEAR ENCOUNTER
< 1 km from camp perimeter or < 100 m from areas of human activity
Responders who possess valid PAL & Training shall obtain shotguns, pre-loaded response vests, handheld radios, and other bear deterrent equipment located in a locked cabinet in the Environmental Offices
Once at the scene of sighting or encounter, one responder will fully load the 12-guage shotgun magazine with lead slugs to back up the second responder who will load their shotgun with less lethal ammunition.
Bear headed towards area of human activity or camp
Bear headed away from area of human activity or camp
The Environmental Responder will determine the appropriate deterrent and use it in an effort to scare the bear away
Deterrent Effective
Bear headed away from area of human activity or camp
Bear will be monitored until it leaves the area
Deterrent Not Effective
Bear Continues to approach or doesn't move away from area of human activity or camp
Complete a Wildlife Deterrent Report
Increase deterrent efforts. Additional ERT & Wildlife Response Team members may be called for support/assistance
Deterrent Not Effective
Bear Continues to approach or doesn't move away from area of human activity or camp
Continue to aggressively use deterrents to chase the bear away.
BE PREPARED TO KILL THE BEAR
BEAR ENTERS AREA OF HUMAN ACTIVITY OR CAMP
All but the most aggressive bear would be deterred by this point
You are now dealing with a very dangerous bear


BEAR IN CAMP or < 100 m from camp perimeter
INITIATE CODE 1
Everyone to take safe refuge in designated muster stations. WHEN FIREARMS ARE IN USE ENSURE ALL PERSONNEL ARE OUT OF LINE OF FIRE
Traffic in camp will be halted.
Responders who possess a valid PAL shall obtain shotguns, per-loaded response vests, handheld radios and bear deterrents equipment from the locked cabinet in the Environment offices
On the scene responder to fully load a shotgun magazine with lead slugs immediately, less lethal deterrents will be loaded in a second shotgun
BEAR IS HEADED TOWARDS OR IS IN CAMP
The Safety of People Comes First
When a bear is in camp, it is critical to the safety of people and bears that everyone other than responders remain indoors. A bear in camp is NOT a phot opportunity.
The responders are to ensure that they avoid startling the bear by making noise. Make wide swings around buildings, equipment, and material that may conceal a bear. If supported by ERT, members must maintain visual contact with each other at all times. Maintain radio contact with the Environmental Designate at all times (Environment Channel #10).
BEAR IS HEADED AWAY FROM CAMP
Ensure the bear has a safe escape route
Use deterrents to ensure that the bear continues to head away from camp.
Monitor the bear until certain the bear is headed away from areas of human activity
Risk to Human Life Imminent
BE PREPARED TO DESTROY THE BEAR
In the event of wildlife being destroyed, consult ENR on appropriate preparation and storage of the remains. If they cannot be contacted, the bear is to be skinned with head, proof of sex, and feet attached, preserved by salting or freezing and turned over to the ENR Wildlife Officer.
Complete a Wildlife Deterrent Report
Email a copy to Wildlife Officer
Get direction on carcass disposal from Wildlife Officer
Any time a bear approaches or enters areas of human activity, conduct a site investigation to determine why the bear was attracted to the site. Record findings in a Wildlife Deterrent Report. If an attractant is found, deal with it immediately. Failure to deal with the attractant will only lead to more problems

5.3. Using a Helicopter to Deter an Animal

It is illegal to harass wildlife with aircraft, but if risk to personnel is imminent, and only for reasons of human safety, it may be necessary to use a helicopter to deter wildlife. When using a helicopter to deter an animal from the GKM, the following procedures must be followed:

5.3.1. If possible, at least one member of the Environmental Department (or as designated by the environmental coordinator) should be on board the aircraft. That person will be responsible for the safety of the animal and will provide instructions to the pilot;

5.3.2. The pilot is responsible for the aircraft and the safety of the people on board, and will ensure that it operated safely within the manufacturers specifications;

5.3.3. The pilot must maintain radio contact with GKM site management;

5.3.4. The pilot must keep the helicopter well back from the animal to minimize stress to the animal. The minimum distance between the helicopter and the animal is 100 m (330 ft.) back and 30 m (100 ft.) up. The pilot should only get close enough to get the animal to move. A bear moving at a fast walk has the ability to cover ground quickly and efficiently, creating little need to have the bear running. A running bear may become overheated, overstressed and die;

5.3.5. The pilot must keep the animal in visual contact, observing the minimum distances;

5.3.6. The pilot must keep the helicopter between the animal and the site to prevent pushing the animal into camp;

5.3.7. **DO NOT push an animal uninterruptedly for more than 10 min or 3 km** (2.2 miles), unless personnel are still in imminent danger

5.3.8. Once the Environmental representative is satisfied that the animal is moving away, the pilot may be directed to stop pursuing the animal and take the helicopter to an altitude where they can continue to monitor the animal to ensure it is not returning;

5.3.9. Once satisfied that the animal poses no further immediate risk, the helicopter will return to camp;

5.3.10. Ongoing communication and updates on the animal's condition/location from the helicopter team will be provided.

5.4. Destroying Aggressive Wildlife

5.4.1. Lethal force must be exerted on aggressive wildlife (ie. Bear) when personnel are in immediate danger of attack, or when it is not possible to remove the bear without endangering human life;

5.4.2. Deciding exactly when to shoot an animal is a difficult decision to make and is wholly dependent on the prior experience and training of the shooter. For this reason there is no set range at which to exert lethal force.

5.4.3. Do not handle or touch the dead animal until personal protective equipment (PPE) requirements have been determined;

5.4.4. If a bear is shot, report to the Environment Manager or Designate. The Environmental Department designate will complete an incident report regarding the use of deterrents;

5.4.5. The incident must be reported to the appropriate ENR Wildlife Officer as soon as possible;

5.4.6. ENR should be contacted as soon as possible to provide instructions on the handling of the carcass. If contact cannot be made, the bear hide must be skinned, with the claws, proof of sex and the head attached. This will then be salted or frozen to prevent spoilage. These must be turned over to an ENR Wildlife Officer as soon as possible. Before handling the bear or removing the hide, determine the PPE requirements (i.e. disposable latex gloves, raingear, etc.) as per the Wildlife Disease Investigation Manual and any other special precautions in consultation with the Wildlife Officer;

5.4.7. Dispose of the carcass under the direction of the Wildlife Officer. If contact cannot be made with ENR or the appropriate Wildlife Officer, the carcass must be incinerated to avoid attracting wildlife.

5.5. Training

5.5.1. This Site Wide Operating Procedures (Ops) requires specific training for all Responders;

5.5.2. Advanced Wildlife Safety training is required. This training will include sessions on bear (and other potentially hazardous wildlife) biology, behaviour, wildlife/human encounters, what to do in the event of an encounter, prevention, detection, proper use of deterrents, wildlife response planning and reporting procedures;

5.5.3. All Environmental personnel or other designated individuals who handle or fire the shotgun are required to hold a valid Canadian Possession and Acquisition Licence (PAL) & have completed the training at the required frequency;

5.5.4. All Environmental or other designated individuals who handle or fire the shotgun must take training in the use of the specific on-site firearm(s).

6.0 APPROVAL

Name	Title	Date	Signature
Patrick Kramers	SHERT Manager	February 22, 2021	

7.0 REVISION HISTORY

Noted below is the revision history of this document.

Revision	Date	Comments
0	October 6, 2015	Approved for Use
1	September 27, 2017	Format and Content Updated
2	February 7, 2018	OP reviewed by HOD, format & content updated
3	November 4, 2018	OP updated to include Critical Controls & JRA
4	February 22, 2021	OP review & major update

8.0 DEFINITIONS

8.1. **Area of Human Activity**: Any area within the GKM footprint where people are active. The size of this area will expand and contract based on the level and location of activity on site. For example, when there are only a few people in camp and no one is working outside of the camp area, there will be no need to deter a bear on or near the quarry area. However, there will also be areas of the site where bears will not be allowed regardless of the level of activity on site. These areas include:

8.1.1. Accommodation complex including water plant, sewage plant, incinerator and generator;

8.1.2. Tank farm;

8.1.3. Infrastructure including; shops, warehouses, laydown areas and other areas that could present a risk to the bear or personnel; and

8.1.4. All roads on the GKM, excluding the winter roads.

9.0 REFERENCES and RELATED DOCUMENTS

9.1. NWT Mine Health & Safety Act and Regulations, Section 15.06 (1)

9.2. Firearms Act

9.3. Canadian Possession and Acquisition Licence (PAL)

9.4. Firearms Licences Regulations

9.5. Storage, Display & Transport. of Firearms & Other Weapons by Business Regulations

9.6. Wildlife Disease Investigation Manual

9.7. General Site Orientation Program

9.8. OP 1004: SHE Objectives

9.9. OP 1010: Operational Control

9.10. OP 006: Wildlife Procedure

9.11. OP 104: Cold Weather Safety

9.12. OP 156: Housekeeping & No Littering Protocol

9.13. OP 162: Personal Protective Equipment

9.14. OP 193: Bear Deterrents

10.0 APPENDIX 1: JOB RISK ASSESSMENT

SECTION A - GENERAL INFORMATION

Job/Task Description:
Safely dealing with all aggressive animal sightings, encounters, or in-camp wildlife related situations

Job/Task Objective:
Prevent risk of injury to humans; prevent aggressive animals from becoming habituated to the site and its infrastructure; safely destroy an aggressive animal as a last resort option only.

Date JRA Conducted: February 2021	Department: Environment and Permitting
JRA Leader: Allan Knight	JRA Recorded by: Allan Knight

List Equipment/tools required for task:

- Site Radio or remote communication device as applicable;
- Minimum 2 x 12 Gauge shotguns, and/or 30-06 Rifle
- Rubber slugs, lead slugs, lethal rifle cartridges
- Bear bangers or screamers
- Bear spray
- Light vehicle (When applicable)
- Helicopter (When applicable)
- Wildlife Monitoring Log
- Wildlife Deterrent Report

Do the task activities impact on other people/work? Yes ☑ / No ☐ If 'Yes' indicate who/what and how as well include them in the JRA

Yes – Depending on the location of an aggressive animal, any work area or department could be affected and asked to muster indoors until the situation is resolved. E.g. during a yellow, orange or red alert aggressive wildlife warning.

ERT and the wildlife response team may also be asked to assist the Environment department in deterrence of aggressive wildlife.

SECTION B – JOB/TASK INFORMATION

#	Task /Activity Step	Hazards	Unwanted Event	Controls in place	Residual Risk #
1	Potentially aggressive wildlife is sighted or reported to the environment department	Human/ wildlife interaction; Wildlife habituation	Personal injury or death; Damage to site infrastructures; Impact/delays to production; Death or injury to Wildlife;	Site radio communication; Bear deterrent sign-out kits; Bear stands containing bear spray, air horns, and informational posters,	15 S
2	Notify protective services	Human/ wildlife interaction;	Potential lack of awareness of site personnel to hazard if situation is not broadcast, Injury to personnel;	Procedures for alert warnings, Emergency muster procedures, Supervisors responsible for awareness and mustering of personnel, Informational Environment tool-box visits during key hazardous wildlife potential summer months,	15 S

3	Prepare for response, minimum two armed responders, with additional deterrents on hand	Human/ wildlife interaction; Uncontrolled discharge of firearms or other deterrents	Personal injury or death; Working alone;	Designation of "wildlife response team" members knowledgeable in this procedure and with applicable firearms (PAL) license; Avoid exiting the vehicle until a safe distance to the wildlife is established; Never initiate wildlife response with less than 2 trained persons; If wildlife must be destroyed for the safety of others, minimum two armed responders required;	15 S
4	Response team to locate the aggressive wildlife by light vehicle(s) or by helicopter if applicable	Human/ wildlife interaction;	Wildlife to vehicle impact leading to wildlife injury, potential human injury, and property damage;	Designation of "wildlife response team" members knowledgeable in this procedure and with applicable firearms license; Defensive driving; Regular communication by site radio to locate the animal;	6 M
5	Communicate sightings and movement to other responders and to protective services if the location has changed and may affect other work areas	Human/ wildlife interaction;	Lack of situational awareness leading to surprise wildlife encounters; Injury to personnel; Damage to site infrastructures; Impact/delays to production; Injury to wildlife;	Regular updates to protective services by site radio for ongoing site wide notices;	15 S
6	Use vehicles or helicopter to re-direct the movement of the bear or other wildlife away from the mine site and camp, towards a safe direction away from human activity – do not forcefully chase or cause a bear to run unnecessarily or for anything but brief periods of time	Excessive stress to wildlife; Human/ wildlife interaction; Lack of site situational awareness leading to surprise wildlife encounters;	Personal injury or death; Over chasing wildlife leading to wildlife heat exhaustion injury or death; Reputational damage; Wildlife to vehicle impact; Damage to site infrastructures; Impact/delays to production;	Environment personnel to accompany helicopter pilot and instruct on when to give wildlife a break to reduce undue stress; Coordination between responders in vehicles by site radio; Regular site-wide updates by protective services; Policy to keep doors of buildings and structures closed when not in use; Segregation of wastes to eliminate food sources and wildlife attractants; Safe use of deterrents as needed; Bear stands throughout site; Deterrent kits available for sign out from Environment;	15 S
7	If an aggressive animal is approaching humans, two responders must be at the ready with shotguns loaded, one with rubber slugs, the secondary with lethal lead slugs	Human/ wildlife interaction; Uncontrolled discharge of firearms or other deterrents	Serious human injury or death by wildlife mauling or unsafe discharge of firearms;	All persons handling firearms at GKM must have a valid Canadian PAL; Proper firearms usage techniques, positioning of second person always in line and never in front or behind the first person; Use of firearms 'safety' switch;	15 S
8	Once the aggressive animal has either cleared the footprint of the mine, or been confirmed destroyed and the situation is safe, call and notify protective services. Notify ERT	Human/ wildlife interaction; Possible biohazards of destroyed wildlife,	Injury to persons by injured wildlife not confirmed to be dead,	Always confirm wildlife kills by an additional two lethal shots to vital areas; Let ERT know immediately of any first aid requirements, location and patient details,	10 M

	immediately at any time if any persons require medical attention.	Urgent care needed for injured persons,	Worsening of injuries due to delayed response or poor communication to ERT, Illness or injury due to poor handling of wildlife carcasses, New wildlife on site attracted by wildlife carcasses,	Never approach dead wildlife without training or PPE; Be vigilant of new wildlife attracted to site by carcasses; Environment department to safely remove carcass as soon as possible in accordance with GNWT wildlife officer instructions;	
9	De-brief with all personnel involved in the aggressive wildlife response and call. Record a timeline of events, share what was handled well and what may need to be improved upon.	Lack of awareness or learning of mistakes; Lack of communication to government bodies;	Inefficient or poor future response to the next wildlife emergency; Legal reprimand or paid fines for non-reporting of wildlife incidents; Reputational damage;	Ensure a written report is completed if an incident takes place; Record the wildlife sighting on the wildlife log; If deterrents were used, environment will complete a wildlife deterrent report; Environment to report wildlife mortalities to the GNWT wildlife officer;	3 L
10	Make safe all deterrents and firearms, store in a safe, secure yet accessible location for the next potential wildlife response.	Uncontrolled discharge of firearms or other deterrents; Poor security measures;	Injury to personnel; Unauthorized access to wildlife deterrents or firearms;	All persons handling firearms at GKM must have a valid Canadian PAL. Storage of firearms at GKM complies to all applicable laws and the business firearms license; arms are stored locked and without ammunition, ammunition is locked in a separate container; access to the firearms is readily accessible by environment yet restricted and discrete.	10 M
JRA Comments/Remarks:					

SECTION C - SIGN OFF

	Name	Signature	Date
Supervisor/Lead:	Allan Knight		
Team member/s:	Mason Elwood		
	Jarrett Vornbrock		
	Lee-Ann Knee		

OPERATING PROCEDURE – *Bear Deterrents*

1.0 PURPOSE

To establish a procedure for safe use and transportation of bear deterrents necessary to provide protection from possible bear or other aggressive animal encounters at the Gahcho Kué Mine (GKM).

2.0 SCOPE

This procedure applies to all employees and contractors at the GKM who may have to use bear deterrents.

3.0 RESPONSIBILITIES

3.1. Mine General Manager or Designate:

3.1.1. Overall management of the GKM sites and workforce.

3.2. Head of Departments, Superintendents or their Designates:

3.2.1. Ensure this procedure is communicated to their employees as applicable;

3.2.2. Ensure their employees have received the appropriate training as applicable; and

3.2.3. Ensure this procedure is implemented as applicable.

3.3. Supervisors:

3.3.1. Implement this procedure as applicable; and

3.3.2. Ensure this procedure is followed as applicable.

3.4. Safety, Health, Environment, Risk & Training Manager, (SHERT) or Designates:

3.4.1. Monitor the implementation of this procedure; and

3.4.2. Ensure this procedure is maintained.

3.5. All Employees that use bear deterrents:

3.5.1. Understand and practice this procedure as required;

3.5.2. Be aware of applicable Safe Work Plans related to bears and other aggressive animals and bear deterrents;

3.5.3. Read and understand information contained in the approved Bear Awareness Program(s) before going into the field;

3.5.4. Ensure bear deterrents in use are within the specified expiry dates;

3.5.5. Record use of wildlife deterrents on the SLAM Cards (CL 073)

3.5.6. Ask their supervisor for clarification if they are unsure of any aspect of this procedure.

Responsibilities of Employers, Contractors, Supervisors and Employees are also described in the NWT Mine Health and Safety Act (Sections 15 – 18) and throughout the NWT Mine Health and Safety Regulations.

4.0 CRITICAL CONTROLS

A completed Job Risk Analysis can be found in Section 10.0, and lists hazards, unwanted events and controls in place for the following task/activities:

- Use of Bear Bangers;
- Use of Bear Spray;
- Use of Air Horns, and;
- Bear Awareness Training.

5.0 PROCEDURE

5.1. Introduction

5.1.1. When at site and travelling remote from camp, you must bring with you; wildlife deterrents, (i.e. bear banger, bear spray and air horn) as well as a survival kit. See *OP 006: Wildlife Procedure & OP 078: Responding to Bears or Aggressive Animals at or Near GKM - Emergency Situation*.

5.2. Bear Bangers

5.2.1. Bear Bangers are used as a deterrent when wildlife comes too close to site personnel. Bear Bangers can be compared to blanks. When used correctly, the loud noise from the banger (along with the flash, like a firework or flare) should deter the animal from approaching any further. Revolver (starting pistol style) or Flare-Gun style launchers are allowed. If unsure whether or not a particular style of Bear Banger launcher is allowed check with the SHERT Manager, SHR Superintendent, SHR Coordinator, Environmental Coordinator or Environmental Officer.

5.2.2. To use a bear banger, please follow the instructions available. Always discharge the banger between you and the animal. Pay particular attention not to overshoot, as the animal may now run towards you (away from the loud noise).

5.2.3. If the animal does not leave, walk backwards slowly, never looking the animal directly in the eyes. Make loud noises as you retreat. DO NOT TURN YOUR BACK AND RUN. THE ANIMAL MAY CHASE YOU. Ask your supervisor for other available information.

5.3. Bear Spray

5.3.1. Bear Spray can also be used as a deterrent. The spray works on the principle that the burning sensation the animal feels (in the eyes, nose and lungs) will "scare" it off.

5.3.2. The concern with using bear spray is that you must be in close proximity to the animal and up-wind (30 feet Spray Distance). If you are down-wind, you may be affected by the spray thus rendering you helpless. If you are too far away, the spray will dissipate and not be effective.

5.3.3. A qualified individual will be designated to demonstrate proper loading and firing techniques to all personnel who require bear spray use.

5.4. Air Horn

5.4.1. Using air horns and making noise while in the bush will deter animals from approaching. Making noise while walking is the best advice for protection against bear encounters. Whistles are not recommended because you can sound like an animal. NOTE: Air horns are ineffective at temperatures below 0º Celsius.

5.4.2. When wildlife deterrents are used it must be reported on a) SLAM Cards (CL 073) which must be given to the SHR Coordinator or Environmental Coordinator.

5.5. Travelling with Bear Deterrents

5.5.1. Bear deterrents are restricted from commercial flights. Do not take bear bangers, bear spray, or air horns with you on a commercial plane or in your luggage. For charter fixed wing and helicopter flights, employees are to identify the presence of Bear Spray or Bear Bangers to the pilot and follow his/her directions. Travelling with bear deterrents in chartered helicopters or fixed wing aircraft is at the discretion of the Aircraft Company and pilot. Bear deterrents must be kept out of the passenger section of the helicopter or fixed

wing aircraft at all times. The safe method to transport bear deterrents in a helicopter or fixed wing aircraft is to store them in the cargo hold in a hard plastic lockable container (such as a clam shell or similar). Each field crew is to be assigned a lockable container so that easy removal is achieved from the aircraft. See OP 178: Helicopter Safety – Transport of Hazardous and Bulky Material.

5.6. Bear Awareness

5.6.1. All personnel working outside of the camp area are required to receive the appropriate Bear Safety Awareness and orientation before going out in the field; this is available from the SHR/E and Training Departments.

5.6.2. All personnel working outside of the camp area are to have training on the use and care of bear bangers and bear spray before going out in the field. Training will be conducted by the SHR/E,Training Department or designate, who will maintain a record of the training.

5.7. Sign-In Sheet

5.7.1. In an effort to mitigate the loss, and misplacement of Bear Deterrents, employees and contractors at the GKM site must sign-out and bring back Bear Deterrents on a daily basis to the Environmental Coordinator with the exception of air horns. On a daily basis the Bear Deterrents will be locked in a designated cabinet in the Environmental Coordinator's office with the information recorded on CL 175: Bear Deterrents Sign-Out Checklist.

5.8. Safe Work Plan

5.8.1. All field crews, especially working away from designated bear deterrent stations, will consider adding bear (or wildlife) encounters on their Safe Work Plans and Job Risk Assessments. See OP 208: Safe Work Plan Development Procedure.

6.0 APPROVAL

Name	Title	Date	Signature
Patrick Kramers	SHERT Manager	September 9, 2021	

7.0 REVISION HISTORY

Noted below is the revision history of this document.

Revision	Date	Comments
A	June 19, 2013	Initial Issue of GKM Management System Documents
B	September 6, 2013	DBCI Comments Incorporated
C	October 14, 2013	JDS Comments Incorporated
0	October 17, 2013	Approved for Use
A	June 19, 2013	Initial Issue of GKM Management System Documents
1	March 6, 2018	Format and Content Updated
2	November 4, 2018	OP updated to include Critical Controls & JRA
3	September 9, 2021	Minor updates to responsibilities, changed near hit card to SLAM cards, clarified 5.8 Safe Work Plan

8.0 DEFINITIONS

None

9.0 REFERENCES and RELATED DOCUMENTS

9.1. NWT Mine Health & Safety Act and Regulations, Section 15.05 & 15.06

9.2. General Site Orientation Program

9.3. Bear Awareness Video

9.4. Bear Safety Training

9.5. OP 1004: SHE Objectives

9.6. OP 1010: Operational Control

9.7. OP 1026: Incident and SHE NC Documentation Process, Reporting and Investigation

9.8. OP 006: Wildlife Procedure

9.9. OP 078: Responding to Bears or Aggressive Animals at or Near GKM - Emergency Situation

9.10. OP 178: Helicopter Safety – Transport of Hazardous or Bulky Material

9.11. OP 208: Safe Work Plan Development Procedure

9.12. CL 002: Incident & SHE Non-Conformance Investigation Report

9.13. SLAM Cards (CL 073)CL 175: Bear Deterrents Sign-Out Checklist

10.0 APPENDIX 1: JOB RISK ASSESSMENT

SECTION A - GENERAL INFORMATION

Job/Task Description:
Bear Deterrents

Job/Task Objective:
Procedure for safe use and transportation of bear deterrents necessary to provide protection from possible bear or other aggressive animal encounters at the Gahcho Kué Mine (GKM).

Date JRA Conducted: 5-May-18	**Department:** Environment
JRA Leader: Kimberly Balsillie	**JRA Recorded by:** Kimberly Balsillie and Mason Elwood

List Equipment/tools required for task:

- Bear bangers
- Bear spray
- Air horn
- Bear Awareness Training

Do the task activities impact on other people/work? ***Yes*** ☐ **/** ***No*** ☐ ***If 'Yes' indicate who/what and how as well include them in the JRA***

Yes –depending on the location of a bear or aggressive animal, any work site and personnel in the vicinity may be affected.

SECTION B – JOB/TASK INFORMATION

#	Task /Activity Step	Hazards	Unwanted Event	Controls in place	Residual Risk #
1	Use of Bear Bangers	- Misfire - Not stored properly - Fire in wrong direction	- Bangers goes off and injures someone - Banger goes off behind bear and it comes towards employee(s)	- Do not pre-load the banger - Keep the banger outside of cabs - Training on how to use and actually use one (Bear Awareness Training and Helicopter Transport and Safety of Dangerous Goods)	2L
2	Use of Bear Spray	- Misfire - Not stored properly - Spray in wrong wind direction (Bear spray contains chemicals that irritates the body systems such as burning the throat, wheezing, dry cough, shortness of breath, gagging, gasping and inability to breathe or speak)	- If not stored properly and misfired can cause harm to people in a vehicle, helicopter, or any other type of transportation vessel - If a bear encounter occurs and person were to spray themselves, this would cause them to be unresponsive and at more of a threat	- Training on how to store and spray, not only theory but technically in the field https://wdfw.wa.gov/living/files/BearSpray_SafetyforPeople_SafetyforBears.pdf - Helicopter Transport and Safety of Dangerous Goods – ensure all personnel who will be traveling by helicopter are aware of how and where to store bear kits - Wear appropriate eye protection and other PPE as required	5L
3	Use of Air Horn	- Harmful to hearing - Air horns are ineffective at temperatures below 0° Celsius	- Air horn to misfire due to improper storage - Using air horn in temperatures below 0° Celsius	- Store properly in bear kit bags and to be used in only warmer weather conditions	4L

4	Bear Awareness Training	- Can be harmed or death by a bear encounter if not properly trained in how to deal with a bear encounter	- Personally puts themselves and others in danger if a bear encounter occurs	Training prepares personnel with the knowledge of: - Bear types - Bear behaviors - Bear Ranges - Bear Habitats - Differences between defensive and predatory attacks - Handling and/or preventing encounters - Use of Bear Deterrents	18S

JRA Comments/Remarks:

SECTION C - SIGN OFF

	Name	Signature	Date
Supervisor/Lead:	Allan Knight		10-Oct-2018
Team member/s:	Kimberly Balsillie		
	Mason Elwood		
	Sean Kearnan-Carbonneau		
	Dayna Meredith		

DE BEERS GROUP	GAHCHO KUÉ MINE **Incident & SHE Non-Conformance Investigation Report**	ID No: CL 002 Revision Date: March 10, 2020

*** SEE ATTACHED APPENDICES FOR ASSISTANCE**

STEP 1: INITIAL INCIDENT REPORT				Date of Incident / Non Conformance	Time of Incident / Non Conformance (24 hour clock)
Department		Contractor (if applicable)		Date Reported	Shift
Days on Rotation		Hours on Shift		Specific Location:	

Full Incident Description: (Describe how the incident occurred: include what the person(s) was doing, trying to do and anything unusual)

RISK DISCIPLINE							
(C) Social/Communities		(H) Occupational Health		(M) Material Losses/Damage/Business Interruptions			
(E) Environment		(L and R) Legal & Regulatory		(R) Reputation		(S) Safety	

Reported By:		Responsible HOD	
Reporters Dept.			
Reported To:		SAP Functional List	

STEP 2: INCIDENT REPORT

Activity performed at time of incident				Controlled Activity Y/N	
Energy / Risk Source (add more lines if needed)					
Linked Risk Area (add more lines if needed)					
Immediate Action Taken:					
Initial Observations:					
Is this incident reportable to Authorities ? Who?		Is this a repeat incident? Y/N		Date of last similar incident	

Risk Discipline - Specifics
From RISK DISCIPLINE above, complete corresponding section below

(C) Social/Communities

Actual Social Consequence (Level)		Potential Social Consequence (Level)		Work Related	
Provide brief comments to support your classification					
Social Impact					
Allegations of bias / Unfair preferential treatment		Behaviour of Employees		Employment Opportunities	
Community Health and Safety - Hazards and Risks		Business Ethics/ Integrity/ Corruption		Environmental Impacts	
Complaints related to Implementation On CSI projects		Communication and Engagement		Housing	
Quality of Services Provided by De Beers or Contractor		Community Health and Safety - Crime		Impact on Indigenous People	
Quality of Services Provided by Unrelated Third Party		Damage to De Beers Assets		Impacts on Livelihoods	
Supplier Opportunities		Damage to Community Assets		Land Acquisitions and Resettlement	
Training Opportunities		De Beers/ Site Security Provision		Land Use, Access and Management	

Social Incident		**OR**	Complaints and Grievances				
Date received		Is this an ongoing incident		Lifecycle State		How was complaint submitted	
Geographical Scope of Incident/ Complaint		Name of Complainant/ Affected Persons		Category of Stakeholder submitting complaint			
Main Contact Details for Stakeholder							
Date required for initial Acknowledgement of Receipt to Complainant		Notification Process (Phone, Email, Letter Etc.)					
Person Responsible for Acknowledging Receipt of Complaint		Person Responsible for Acknowledging Receipt of Complaint					
Geographic Location		Indigenous People Affected					

(E) Environment

Primary Element Impact		Impact on other:	
Secondary Element/s Impact		Impact on other:	
Actual Environmental Consequence (Level)			
Potential Environmental Consequence (Level)			
Was there an Environmental Spill / Release / Discharge			
Describe Environmental Impact			

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(H) Occupational Health

Actual Health Consequence (Level)						Potential Health Consequence (Level)							
Health Hazard	Bacterial		Dust			Poor Ergonomics		Ventilation					
	Blood		Fungal			Poor Lighting / Glare		Vibration					
	Body Fluids		Gases / Fumes			Radiation							
	Chemicals		Noise			Thermal Stress							
Short Term Actions													
Long Term Actions													

(L and R) Legal & Regulatory

Actual Legal Consequence (Level)		Potential Legal Consequence (Level)	

(M) Material Losses/Damage/Business Interruptions

Actual Damage and Loss (Level)				Damage and Loss Cost ($)	
Potential Damage and Loss (Level)					
Description of Damage					
Damage (Equipment / Material)		Identification #		Equipment Description	
Loss of Product		Loss of Production Time (Hrs.)		Other (describe)	

(R) Reputation

Actual Reputational Consequence (Level)		Potential Reputational Consequence (Level)	

(S) Safety

Actual Safety Consequence (Level)						Potential Safety Consequence (Level)							
Injured Persons	Brief Description of Duties												
	Injury Classification		First Aid		Medical Aid		LTI		Fatality				
Body Part Affected	Arm		Elbow		Fingers		Heart		Leg		Nose		Toes	
	Back lower		Eye		General		Hip		Lungs		Ribs		Trunk	
	Back upper		Face		Hands		Internal		Mouth		Shoulder		Wrist	
	Ear		Feet		Head		Knee		Neck		Skin			
Nature of Injury	Amputation				Wounds, muscular contusions				Luxations, sprains, squeezing					
	Contusions and internal Lesions				Fractures with or without dislocation				Burns and other effects of electricity and radiation					
	Intoxications, asphyxiations				Multiple lesions or not specified				Other					
Mechanism of Injury	Fall of Ground				Chemical / hazardous substances				Materials Handling					
	Transportation				Other Energy				Other Causes					
	Moving Machinery				Fire / Explosion				Criminal Activity On-site					
	Electricity				Slips, Trips, Falls				Work- related transportation incidents on public roads					
	Hydraulic Energy				Falling from heights				Commuting incident (company provided transport)					
	Pneumatic Energy				Falling Objects									

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SECTION 3: INCIDENT INVESTIGATION

Investigation Details & Investigation Team

Investigation Start Date		Investigation End Date		*ENSURE TO INCLUDE A JOSHEC REP*	
Investigation Facilitator		Investigation Team			
Brief Overview of Investigation Plan					

GROUP STANDARDS

Fatal Risk Standards	Light Vehicle Standard		Surface Mobile Equipment Standard		Equipment Safeguarding Standard		Isolation Standard	
	Working at Heights Standard		Lifting Operations Standard		Hazardous Materials Management Standard			

MRS	Fire Prevention and Management Standard		Explosives Handling Standard		Surface Flooding Standard		Slope Stability and Design Optimization Standard	
	Mineral Residue Deposit Standard		Structural Integrity Standard		Inrush Standard			

Environmental Standards	Environmental Policy		Lifecycle Planning and Management standard		Biodiversity Standard		Water Standard	
	Energy and Climate Change Standard		Hazardous Substances, Waste and Emissions Standard					

Occupational Health Standards	Occupational Health Policy		Hearing Conservation Program Standard		Respiratory Protection Program Standard		Fatigue Management Program Standard	

Preliminary Investigation

IMMEDIATE / DIRECT CAUSE(S) OF THE INCIDENT (Substandard Acts and Substandard Conditions)

Code Selection	REASON FOR SELECTION

ROOT / BASIC CAUSE(S)

Code Selection	REASON FOR SELECTION How does the Basic Root Code Relate to the Immediate Cause Code

HAZARDS BARRIER ANALYSIS - CONTROL ANALYSIS

Control	Critical Control (Y/N)	Control Available (Y/N)	Control Effective

TRAINING - What training was given in the proper performance of the task?

	On the Job		Apprentice		New Equipment		WHMIS
	Common Core		Skill		Environmental		None

DE BEERS GROUP	GAHCHO KUÉ MINE Incident & SHE Non-Conformance Investigation Report	ID No: CL 002 Revision Date: March 10, 2020

Lessons Learned / Recommendations

LESSONS LEARNED	RECOMMENDATION FOR LESSON LEARNED

Investigation Sign-Off

Investigation Sign Off Date			
Investigation Sign Off By		Role In Investigation	
Investigation Sign Off By		Role In Investigation	
Investigation Sign Off By		Role In Investigation	
Investigation Sign Off By		Role In Investigation	

DE BEERS GROUP	GAHCHO KUÉ MINE **Incident & SHE Non-Conformance Investigation Report**	ID No: CL 002 Revision Date: March 10, 2020

SECTION 4: ACTIONS

Corrective Actions

Action Description	Responsible Person	Action Due Date	Action Status

Preventative Actions

SECTION 5: SUPPORTING DOCUMENTATION

Collect all Supporting Documentation And Attach To Report

Photos Take	Statements	Interviews	Tool Box Meetings	SLAM Cards	In-House Training Records
Certifications	Safe Work Plans	Applicable SHE Ops	Maintenance Records	Manufacturer's Instructions	
Hygiene Sampling Results					

SAP Functional List
1310 - Open Pit
2100 - Site Roads
2300 - Airstrip and Apron
2500 - Water Diversions, Dams, and Dykes
2600 - Quarry and Crushers
2700 - Batch Plant
3110 - Primary Crusher
3120 - Coarse Ore Feed, Storage, and Reclaim
3210 - Primary Scrubbing and Screen
3220 - Secondary Crusher
3225 - High Pressure Rolls
3230 - Secondary Scrubber and Screens
3400 - Recovery Plant
3900 - Process Plant Building
4110 - Powerhouse
4200 - Fuel and Lube Supply
4300 - Boilers
4400 - Water Systems
4410 - Water Treatment Plant
4500 - Waste Water Treatment Plant
4810 - Waste Incinerator
5100 - Truck Shop
5100 - Site Services Norseman Dome
5120 - Warehouse, Logistics Dome, CanAm, Mega Dome
5140 - Earthwork Shop
5150 - Light Vehicle Shop (SMS)
5170 - Metlab Building
5180 - Mine Dry Facility
5200 - Common Area, Accommodations, Offices
5900 - Explosive Facilities
5920 - Emulsion Facilities
6100 - Lake Dewatering
6200 - Pit Dewatering

GK Departments
Gahcho Kue
Mine Operations
Mobile Maintenance
Fixed Plant Operations
Technical Services
Engineering & Site Services
Site Services
Electrical & Instrumentation
Maintenance
Projects
Camp Services
Environment
Safety & Health
Supply Chain
Human Resources
Aboriginal Affairs
Protective Services

Social/Communities
0) No Social Impact
1) Minor
2) low
3) Medium
4) High
5) Major

Column1
Yes
No

Shift
Day
Night

Environmental Element Impacted
Land
Biodiversity
Surface Water
Ground Water
Marine Water
Air Quality
Noise

Environment
0 No Environmental Impact
1 Scale Insignificant - 1 Sensitivity Insignificant - 1 Remediation & Clean Up Insignificant
1 Scale Insignificant - 1 Sensitivity Insignificant - 2 Remediation & Clean Up Minor
1 Scale Insignificant - 1 Sensitivity Insignificant - 3 Remediation & Clean Up Moderate
1 Scale Insignificant - 1 Sensitivity Insignificant - 4 Remediation & Clean Up High
1 Scale Insignificant - 1 Sensitivity Insignificant - 5 Remediation & Clean Up Major
1 Scale Insignificant - 2 Sensitivity Minor - 1 Remediation & Clean Up Insignificant
1 Scale Insignificant - 2 Sensitivity Minor - 2 Remediation & Clean Up Minor
1 Scale Insignificant - 2 Sensitivity Minor - 3 Remediation & Clean Up Moderate
1 Scale Insignificant - 2 Sensitivity Minor - 4 Remediation & Clean Up High
1 Scale Insignificant - 2 Sensitivity Minor - 5 Remediation & Clean Up Major
1 Scale Insignificant - 3 Sensitivity Moderate - 1 Remediation & Clean Up Insignificant
1 Scale Insignificant - 3 Sensitivity Moderate - 2 Remediation & Clean Up Minor
1 Scale Insignificant - 3 Sensitivity Moderate - 3 Remediation & Clean Up Moderate
1 Scale Insignificant - 3 Sensitivity Moderate - 4 Remediation & Clean Up High
1 Scale Insignificant - 3 Sensitivity Moderate - 5 Remediation & Clean Up Major
1 Scale Insignificant - 4 Sensitivity High - 1 Remediation & Clean Up Insignificant
1 Scale Insignificant - 4 Sensitivity High - 2 Remediation & Clean Up Minor
1 Scale Insignificant - 4 Sensitivity High - 3 Remediation & Clean Up Moderate
1 Scale Insignificant - 4 Sensitivity High - 4 Remediation & Clean Up High
1 Scale Insignificant - 4 Sensitivity High - 5 Remediation & Clean Up Major
1 Scale Insignificant - 5 Sensitivity Major - 1 Remediation & Clean Up Insignificant
1 Scale Insignificant - 5 Sensitivity Major - 2 Remediation & Clean Up Minor
1 Scale Insignificant - 5 Sensitivity Major - 3 Remediation & Clean Up Moderate
1 Scale Insignificant - 5 Sensitivity Major - 4 Remediation & Clean Up High
1 Scale Insignificant - 5 Sensitivity Major - 5 Remediation & Clean Up Major
2 Scale Minor - 1 Sensitivity Insignificant - 1 Remediation & Clean Up Insignificant
2 Scale Minor - 1 Sensitivity Insignificant - 2 Remediation & Clean Up Minor
2 Scale Minor - 1 Sensitivity Insignificant - 3 Remediation & Clean Up Moderate
2 Scale Minor - 1 Sensitivity Insignificant - 4 Remediation & Clean Up High
2 Scale Minor - 1 Sensitivity Insignificant - 5 Remediation & Clean Up Major
2 Scale Minor - 2 Sensitivity Minor - 1 Remediation & Clean Up Insignificant
2 Scale Minor - 2 Sensitivity Minor - 2 Remediation & Clean Up Minor
2 Scale Minor - 2 Sensitivity Minor - 3 Remediation & Clean Up Moderate
2 Scale Minor - 2 Sensitivity Minor - 4 Remediation & Clean Up High
2 Scale Minor - 2 Sensitivity Minor - 5 Remediation & Clean Up Major
2 Scale Minor - 3 Sensitivity Moderate - 1 Remediation & Clean Up Insignificant
2 Scale Minor - 3 Sensitivity Moderate - 2 Remediation & Clean Up Minor
2 Scale Minor - 3 Sensitivity Moderate - 3 Remediation & Clean Up Moderate
2 Scale Minor - 3 Sensitivity Moderate - 4 Remediation & Clean Up High
2 Scale Minor - 3 Sensitivity Moderate - 5 Remediation & Clean Up Major
2 Scale Minor - 4 Sensitivity High - 1 Remediation & Clean Up Insignificant
2 Scale Minor - 4 Sensitivity High - 2 Remediation & Clean Up Minor
2 Scale Minor - 4 Sensitivity High - 3 Remediation & Clean Up Moderate
2 Scale Minor - 4 Sensitivity High - 4 Remediation & Clean Up High
2 Scale Minor - 4 Sensitivity High - 5 Remediation & Clean Up Major
2 Scale Minor - 5 Sensitivity Major - 1 Remediation & Clean Up Insignificant
2 Scale Minor - 5 Sensitivity Major - 2 Remediation & Clean Up Minor
2 Scale Minor - 5 Sensitivity Major - 3 Remediation & Clean Up Moderate
2 Scale Minor - 5 Sensitivity Major - 4 Remediation & Clean Up High
2 Scale Minor - 5 Sensitivity Major - 5 Remediation & Clean Up Major
3 Scale Moderate - 1 Sensitivity Insignificant - 1 Remediation & Clean Up Insignificant
3 Scale Moderate - 1 Sensitivity Insignificant - 2 Remediation & Clean Up Minor
3 Scale Moderate - 1 Sensitivity Insignificant - 3 Remediation & Clean Up Moderate
3 Scale Moderate - 1 Sensitivity Insignificant - 4 Remediation & Clean Up High
3 Scale Moderate - 1 Sensitivity Insignificant - 5 Remediation & Clean Up Major
3 Scale Moderate - 2 Sensitivity Minor - 1 Remediation & Clean Up Insignificant
3 Scale Moderate - 2 Sensitivity Minor - 2 Remediation & Clean Up Minor
3 Scale Moderate - 2 Sensitivity Minor - 3 Remediation & Clean Up Moderate
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3 Scale Moderate - 2 Sensitivity Minor - 5 Remediation & Clean Up Major
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3 Scale Moderate - 4 Sensitivity High - 3 Remediation & Clean Up Moderate
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3 Scale Moderate - 5 Sensitivity Major - 3 Remediation & Clean Up Moderate
3 Scale Moderate - 5 Sensitivity Major - 4 Remediation & Clean Up High
3 Scale Moderate - 5 Sensitivity Major - 5 Remediation & Clean Up Major
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4 Scale High - 1 Sensitivity Insignificant - 2 Remediation & Clean Up Minor
4 Scale High - 1 Sensitivity Insignificant - 3 Remediation & Clean Up Moderate
4 Scale High - 1 Sensitivity Insignificant - 4 Remediation & Clean Up High
4 Scale High - 1 Sensitivity Insignificant - 5 Remediation & Clean Up Major
4 Scale High - 2 Sensitivity Minor - 1 Remediation & Clean Up Insignificant
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4 Scale High - 5 Sensitivity Major - 3 Remediation & Clean Up Moderate
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5 Scale Major - 1 Sensitivity Insignificant - 2 Remediation & Clean Up Minor
5 Scale Major - 1 Sensitivity Insignificant - 3 Remediation & Clean Up Moderate
5 Scale Major - 1 Sensitivity Insignificant - 4 Remediation & Clean Up High
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5 Scale Major - 2 Sensitivity Minor - 1 Remediation & Clean Up Insignificant
5 Scale Major - 2 Sensitivity Minor - 2 Remediation & Clean Up Minor
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5 Scale Major - 4 Sensitivity High - 4 Remediation & Clean Up High
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5 Scale Major - 5 Sensitivity Major - 2 Remediation & Clean Up Minor
5 Scale Major - 5 Sensitivity Major - 3 Remediation & Clean Up Moderate
5 Scale Major - 5 Sensitivity Major - 4 Remediation & Clean Up High
5 Scale Major - 5 Sensitivity Major - 5 Remediation & Clean Up Major

Occupational Health
0) No Health Impact
1) Early signs of "out of control working environment
2a) Out of control working environment
2b) Health Impacts
3) Signs of ill health
4) Occupational Disease
5) Death / potential future death from occupational disease

Legal and Regulatory
0) No Legal or Regulatory Impact
1) Technical non-compliance
2) Breach of regulatory requirements
3) Minor breach of law
4) Breach of the law
5) Significant breach of the law

Material Losses/Damage/Business Interruption
0) No Damage / Financial Impact
1) Less than 0.01% of Annual Revenue / Total Assets
2) 0.01 - 0.1% of Annual Revenue / Total Assets
3) 0.1 - 10% of Annual Revenue / Total Assets
4) 1-5% of Annual Revenue / Total Assets
5) Greater than 5% of Annual Revenue / Total Assets

Reputation
0) No Reputational Impact
1) Minor Impact
2) Limited Impact
3) Local Impact
4) Suspected reputational damage
5) Noticeable reputational damage

Safety
0) No Safety Impact
1) First Aid Case (FAC)
2) Medical Treatment Case (MTC)
3) Lost Time Injury (LTI)
4) Permanent disability or single fatality
5) Numerous permanent disabilities or multiple fatalities

Immediate/Direct Causes (Substandard Acts & Conditions)
SA01 - Operating Equipment without authority
SA02 - Failure to warn
SA03 - Failure to secure/make safe
SA04 - Operating at improper speed
SA05 - Making safety devices inoperable
SA06 - Using defective equipment
SA07 - Failure to use Personal Protective Equipment properly
SA08 - Improper loading
SA09 - Improper placement
SA10 - Improper lifting
SA11 - Improper position for the task
SA12 - Servicing equipment in operation
SA13 - Horseplay
SA14 - Under influence of alcohol and/or other drugs
SA15 - Using Equipment improperly
SA16 - Failure to follow procedure/policy/practice
SA17 - Failure to identify hazard/risk
SA18 - Failure to check/monitor
SA19 - Failure to react/correct
SA20 - Failure to communication/coordinate
SC01 - Inadequate guards or barriers
SC02 - Inadequate/improper protective equipment
SC03 - Defective tools, equipment, or materials
SC04 - Congested or restricted action
SC05 - Inadequate warning system
SC06 - Fire and explosion hazard
SC07 - Poor or Substandard Housekeeping/Disorder
SC08 - Noise Exposure
SC09 - Radiation Exposure
SC10 - High or low temperature exposures
SC11 - Inadequate or excessive illumination
SC12 - Inadequate ventilation
SC13 - Presence of Harmful Materials or Hazardous Environmental Conditions (gases, dusts, smoke, fumes, vapours)
SC14 - Inadequate Instructions/Procedures
SC15 - Inadequate information/data
SC16 - Inadequate preparation/planning
SC17 - Inadequate support/assistance
SC18 - Inadequate communications hardware/software/process
SC19 - Road Conditions or Ground (rock) Conditions
SC20 - Weather Conditions

Root/Basic Causes (Personal Factors & Job Factors)
RP1 - Inadequate physical/physiological capability
RP1.01 - Inadequate physical/physiological capability - Inappropriate height, weight, size, strength, reach, etc.
RP1.02 - Inadequate physical/physiological capability - Restricted range of body movement
RP1.03 - Inadequate physical/physiological capability - Limited ability to sustain body positions
RP1.04 - Inadequate physical/physiological capability - Substance sentivities or allergies
RP1.05 - Inadequate physical/physiological capability - Sensitivities to sensory extremes (temp, sound, etc.)
RP1.06 - Inadequate physical/physiological capability - Vision deficiency
RP1.07 - Inadequate physical/physiological capability - Hearing deficiency
RP1.08 - Inadequate physical/physiological capability - Other sensory deficiency (touch, taste, smell, balance)
RP1.09 - Inadequate physical/physiological capability - Respitory incapacity
RP1.10 - Inadequate physical/physiological capability - Other permanent physical capabilities
RP1.11 - Inadequate physical/physiological capability - Temporary disabilities
RP 2 - Inadequate mental/psychological capability
RP 2.01 - Inadequate mental/psychological capability - Fear and Phobias
RP 2.02 - Inadequate mental/psychological capability - Emotional Disturbance
RP 2.03 - Inadequate mental/psychological capability - Mental Illness
RP 2.04 - Inadequate mental/psychological capability - Intelligence Level
RP 2.05 - Inadequate mental/psychological capability - Inability to Comprehend
RP 2.06 - Inadequate mental/psychological capability - Poor Coordination
RP 2.07 - Inadequate mental/psychological capability - Slow Reaction Time
RP 2.08 - Inadequate mental/psychological capability - Low Mechanical Aptitude
RP 2.09 - Inadequate mental/psychological capability - Low Learning Aptitude
RP 2.10 - Inadequate mental/psychological capability - Memory Failure
RP 3 - Physical or Physiological Stress
RP 3.01 - Physical or Physiological Stress - Injury of Illness
RP 3.02 - Physical or Physiological Stress - Fatigue due to task load or duration
RP 3.03 - Physical or Physiological Stress - Fatigue due to lack of rest
RP 3.04 - Physical or Physiological Stress - Fatigue due to sensory overload
RP 3.05 - Physical or Physiological Stress - Exposure to health hazard
RP 3.06 - Physical or Physiological Stress - Exposure to temperature extremes
RP 3.07 - Physical or Physiological Stress - Oxygen Deficiency
RP 3.08 - Physical or Physiological Stress - Atmospheric Pressure Variation
RP 3.09 - Physical or Physiological Stress - Constrained Movement
RP 3.10 - Physical or Physiological Stress - Blood Sugar Insufficiency
RP 3.11 - Physical or Physiological Stress - Drugs
RP 4 - Mental or Psychological Stress
RP 1.01 - Mental or Psychological Stress - Emotional Overload
RP 1.02 - Mental or Psychological Stress - Fatigue due to mental task load or speed
RP 1.03 - Mental or Psychological Stress - Extreme judgement/decision demands
RP 1.04 - Mental or Psychological Stress - Routine, monotony, demand for uneventful vigilance
RP 1.05 - Mental or Psychological Stress - Extreme concentration/perception demands
RP 1.06 - Mental or Psychological Stress - "Meaningless" or "degrading" activities
RP 1.07 - Mental or Psychological Stress - Confusing directions/demands
RP 1.08 - Mental or Psychological Stress - Conflicting demands/directions
RP 1.09 - Mental or Psychological Stress - Preoccupation with problems
RP 1.10 - Mental or Psychological Stress - Frustration
RP 1.11 - Mental or Psychological Stress - Mental illness
RP 5 - Lack of knowledge
RP 5.01 - Lack of knowledge - Lack of Experience
RP 5.02 - Lack of knowledge - Inadequate Orientation
RP 5.03 - Lack of knowledge - Inadequate Initial Training
RP 5.04 - Lack of knowledge - Inadequate Update Training
RP 5.05 - Lack of knowledge - Misunderstood Directions
RP 5.06 - Lack of knowledge - Lack of Situational Awareness
RP 6 - Lack of skill
RP 6.01 - Lack of skill - Inadequate Initial Instructions
RP 6.02 - Lack of skill - Inadequate Practice
RP 6.03 - Lack of skill - Infrequent Performance
RP 6.04 - Lack of skill - Lack of Coaching
RP 6.05 - Lack of skill - Inadequate Review Instructions
RP 7 - Improper Motivation
RP 7.01 - Improper Motivation - Improper performance is rewarded (tolerated)
RP 7.02 - Improper Motivation - Proper performance is punished
RP 7.03 - Improper Motivation - Lack of Incentives
RP 7.04 - Improper Motivation - Excessive Frustration
RP 7.05 - Improper Motivation - Inappropriate aggression
RP 7.06 - Improper Motivation - Improper attempt to save time or effort
RP 7.07 - Improper Motivation - Improper attempt to avoid discomfort
RP 7.08 - Improper Motivation - Improper attempt to gain attention
RP 7.09 - Improper Motivation - Inadequate discipline
RP 7.10 - Improper Motivation - Inappropriate peer pressure
RP 7.11 - Improper Motivation - Improper supervisory feedback
RP 7.12 - Improper Motivation - Inadequate performance feedback
RP 7.13 - Improper Motivation - Inadequate reinforcement of proper behaviours
RP 7.14 - Improper Motivation - Improper production incentives
RP 8 - Abuse or misuse
RP 8.01 - Abuse or misuse - Improper conduct that is condoned
RP 8.02 - Abuse or misuse - Improper conduct that is no condoned
RJ 9 - Inadequate Leadership/Supervision
RJ 9.01 - Inadequate Leadership/Supervision - Unclear or conflicting reporting relationships
RJ 9.02 - Inadequate Leadership/Supervision - Unclear or conflicting assignment of responsibility
RJ 9.03 - Inadequate Leadership/Supervision - Improper or insufficient delegation
RJ 9.04 - Inadequate Leadership/Supervision - Giving inadequate policy, procedure, practices, or guidelines
RJ 9.05 - Inadequate Leadership/Supervision - Giving objectives, goals, or standards that conflict
RJ 9.06 - Inadequate Leadership/Supervision - Inadequate work planning or programming
RJ 9.07 - Inadequate Leadership/Supervision - Inadequate instructions, orientation, and/or training
RJ 9.08 - Inadequate Leadership/Supervision - Providing inadequate reference documents, directives, and guidance publications
RJ 9.09 - Inadequate Leadership/Supervision - Inadequate identification and evaluation of loss exposures
RJ 9.10 - Inadequate Leadership/Supervision - Lack of supervisory/management job knowledge
RJ 9.11 - Inadequate Leadership/Supervision - Inadequate matching of individual qualifications and job/task requirements
RJ 9.12 - Inadequate Leadership/Supervision - Inadequate performance measurement and evaluation
RJ 9.13 - Inadequate Leadership/Supervision - Inadequate or incorrect performance feedback
RJ 10 - Inadequate engineering
RJ 10.01 - Inadequate engineering - Inadequate assessment of loss exposure
RJ 10.02 - Inadequate engineering - Inadequate consideration of human factors/ergonomics
RJ 10.03 - Inadequate engineering - Inadequate standards, specifications and/or design criteria
RJ 10.04 - Inadequate engineering - Inadequate monitoring of construction
RJ 10.05 - Inadequate engineering - Inadequate assessment of operational readiness
RJ 10.06 - Inadequate engineering - Inadequate or improper controls
RJ 10.07 - Inadequate engineering - Inadequate monitoring of initial operation
RJ 10.08 - Inadequate engineering - Inadequate evaluation of changes
RJ 11 - Inadequate purchasing
RJ 11.01 - Inadequate purchasing - Inadequate specifications on requisitions
RJ 11.02 - Inadequate purchasing - Inadequate research on materials/equipment
RJ 11.03 - Inadequate purchasing - Inadequate specifications to vendors
RJ 11.04 - Inadequate purchasing - Inadequate mode or route of shipment
RJ 11.05 - Inadequate purchasing - Inadequate receiving inspection and acceptance
RJ 11.06 - Inadequate purchasing - Inadequate communication of safety and health data
RJ 11.07 - Inadequate purchasing - Improper handling of materials
RJ 11.08 - Inadequate purchasing - Improper storage of materials
RJ 11.09 - Inadequate purchasing - Improper transporting of materials
RJ 11.10 - Inadequate purchasing - Inadequate identification of hazardous materials
RJ 11.11 - Inadequate purchasing - Improper salvage and/or waste disposal
RJ 11.12 - Inadequate purchasing - Inadequate contractor selection
RJ 12 - Inadequate maintenance
RJ 12.01 - Inadequate maintenance - Inadequate preventative maintenance
RJ 12.02 - Inadequate maintenance - Inadequate Reparative
RJ 13 - Inadequate tools/equipment
RJ 13.01 - Inadequate tools/equipment - Inadequate assessment of needs and risks
RJ 13.02 - Inadequate tools/equipment - Inadequate human factors/ergonomic considerations
RJ 13.03 - Inadequate tools/equipment - Inadequate standards or specifications
RJ 13.04 - Inadequate tools/equipment - Inadequate availability
RJ 13.05 - Inadequate tools/equipment - Inadequate adjustment/repair/maintenance
RJ 13.06 - Inadequate tools/equipment - Inadequate salvage and reclamation
RJ 13.07 - Inadequate tools/equipment - Inadequate removal and replacement of unsuitable items
RJ 14 - Inadequate work standards
RJ 14.01 - Inadequate work standards - Inadequate development of standards
RJ 14.02 - Inadequate work standards - Inadequate communication of standards
RJ 14.03 - Inadequate work standards - Inadequate maintenance of standards
RJ 14.04 - Inadequate work standards - Inadequate monitoring of compliance
RJ 15 - Wear and tear
RJ 15.01 - Wear and tear - Inadequate planning of use
RJ 15.02 - Wear and tear - Improper extension of service life
RJ 15.03 - Wear and tear - Inadequate inspection and/or monitoring
RJ 15.04 - Wear and tear - Improper loading or rate of use
RJ 15.05 - Wear and tear - Inadequate maintenance
RJ 15.06 - Wear and tear - Use by unqualified or untrained people

RJ 16 - Inadequate Communications
RJ 16.01 - Inadequate Communications - Inadequate horizontal communication between peers
RJ 16.02 - Inadequate Communications - Inadequate vertical communication between supervisor and person
RJ 16.03 - Inadequate Communications - Inadequate communication between different organizations
RJ 16.04 - Inadequate Communications - Inadequate communication between work groups
RJ 16.05 - Inadequate Communications - Inadequate communication between shifts
RJ 16.06 - Inadequate Communications- Inadequate communication methods
RJ 16.07 - Inadequate Communications - No Communication Method available
RJ 16.08 - Inadequate Communications - Incorrect instructions
RJ 16.09 - Inadequate Communications - Inadequate communication due to job turnover
RJ 16.10 - Inadequate Communications - Inadequate communication of safety and health data, regulations, or guidelines
RJ 16.11 - Inadequate Communications - Standard terminology no used
RJ 16.12 - Inadequate Communications - Verification/repeat feedback techniques not used
RJ 16.13 - Inadequate Communications - Messages too long
RJ 16.14 - Inadequate Communications - Speech interference

Activity Performed at the Time of the Incident
Business Improvement
Business Improvement - Administrative Activities
Engineering and Site Services - Camp Services
Engineering and Site Services - Camp Services - Facility Management
Engineering and Site Services - Camp Services - Site Access Maangement/Secuirty
Engineering and Site Services - Camp Services - Travel and Transport
Engineering and Site Services - Electrical and Instrumentation
Engineering and Site Services - Electrical and Instrumentation - Electrical Maintenance and Installation
Engineering and Site Services - Electrical and Instrumentation - Generation / Electrical Distribution / Substations
Engineering and Site Services - Electrical and Instrumentation - Maintenance of Instrumentation and Communications Systems
Engineering and Site Services - Fixed Plant Maintenance
Engineering and Site Services - Fixed Plant Maintenance - Maintenance of Lifting Equipment
Engineering and Site Services - Fixed Plant Maintenance - Plant Maintenance
Engineering and Site Services - Projects
Engineering and Site Services - Projects - Construction
Engineering and Site Services - Projects - Maintenance of Lifting Equipment
Engineering and Site Services - Site Services
Engineering and Site Services - Site Services - Airstrip Maintenance
Engineering and Site Services - Site Services - General Maintenance and Site Services
Engineering and Site Services - Site Services - Lifting Operations
Engineering and Site Services - Site Services - Waste Management
Environment
Environment - Air Management
Environment - Land and Biodiversity Management
Environment - Permitting, Reporting, and Consultation
Environment - Waste Management
Environment - Water Management
Exploration Drilling
Exploration Drilling - Core Shack/Sample Prep
Exploration Drilling - Drilling
Exploration Drilling - Metallurgical Laboratory
Exploration Drilling - Resources and Reserve Estimate
Exploration Drilling - Surveying, Exploration, and Sampling
Finance
Finance - Administrative Activites
Finance - Business Planning
Fixed Plant Operations
Fixed Plant Operations - Air Pollution Control
Fixed Plant Operations - Monitoring Devices / Nuclear Sources
Fixed Plant Operations - Operating Plant Equipment
Fixed Plant Operations - PKC Facility
Fixed Plant Operations - Process Plant Laboratory Activities
Fixed Plant Operations - Reagent Mixing / Storage
Fixed Plant Operations - Sorting and Recovery
Fixed Plant Operations - Waste PK Disposal / Dams
Human Resources
Human Resources - Administrative Activities
Human Resources - Northern Hiring
Information Management
Information Management - Communications Management and Maintenance
Information Management - IT Infrastructure Management and Maintenance
Mine Operations
Mine Operations - Causeway / Dykes Construction
Mine Operations - Drilling / Blasting / Fly Rock
Mine Operations - Explosives Management
Mine Operations - Loading / Hauling
Mine Operations - Open Pit Development and Maintenance
Mine Operations - Parking (Haul Trucks / Heavy Equipment)
Mine Operations - Rock Breaking, Crushing, and grinding
Mine Operations - Surface and Pit Stripping / Excavation
Mine Operations Waste Rock (ARD Potential)
Mobile Maintenance
Mobile Maintenance - Cleaning and Washing of Mobile Equipment
Mobile Maintenance - Handling and Storage of Lubricants
Mobile Maintenance - Maintenance and Services of Mobile Equipment
Mobile Maintenance - Storage and Shelving Activities
Mobile Maintenance - Tire Management
Mobile Maintenance - Welding / Cutting
Protective Services
Protective Services - Access Control / Restructions / Site Patrols
Protective Services - Emergency Communication Center Operation
Protective Services - Product Secuiry and Transportation
Safety, Health, Risk, and Training
Safety, Health, Risk, and Training - Emergency Prepardness and Response
Safety, Health, Risk, and Training - Fire Management
Safety, Health, Risk, and Training - Incident Management
Safety, Health, Risk, and Training - Maintenance and Management of Emergency Equipment
Safety, Health, Risk, and Training - Mecial (On-site / Off-site)
Safety, Health, Risk, and Training - Training and Competency
Social Performance
Social Performance - Community Development
Social Performance - Corporate Social Investiment Activities
Social Performance - Grievance Management
Social Performance - Human Rights Management
Social Performance - Impact Benefit Agreement Management (IBA)
Social Performance - Indigenous Relationship Management
Social Performance - Stakeholder and Community Engagement
Social Performance - Training and Recruitment of Northerns
Supply Chain
Supply Chain - Hydrocarbon Management
Supply Chain - Site and Road Maintenance
Supply Chain - Storage and Warehousing
Supply Chain - Transportation Management
Supply Chain - Winter Road
Technical Services
Technical Services - Geotechnical Activities
Technical Services - Mine Planning
Technical Services - Mineral Resource Management
Technical Services - Surveying
Technical Services - Water Management

Energy / Risk Source
Air
Air - Excessive Gaseous Emissions
Air - Excessive Settleable Dust
Air - Gas Accumulation
Air - Illegal Emissions
Air - Odour
Airborne Pollutants / Dust / Inhalable Particulates
Airborne Pollutants / Dust / Inhalable Particulates - Airborne Dust
Airborne Pollutants / Dust / Inhalable Particulates - CO
Airborne Pollutants / Dust / Inhalable Particulates - Dust Settlement
Airborne Pollutants / Dust / Inhalable Particulates - Exhaust Emissions Excluding GHGs
Airborne Pollutants / Dust / Inhalable Particulates - Greenhouse Gases
Airborne Pollutants / Dust / Inhalable Particulates - Nox
Airborne Pollutants / Dust / Inhalable Particulates - Odours
Airborne Pollutants / Dust / Inhalable Particulates - Ozone Depleting Substances
Airborne Pollutants / Dust / Inhalable Particulates - Particulate Matter
Airborne Pollutants / Dust / Inhalable Particulates - SOx
Airborne Pollutants / Dust / Inhalable Particulates - Volatile Organic Compounds
Biodiversity
Biodiversity - Aquatic Biodiversity Alteration
Biodiversity - Biodiversity Contribution
Biodiversity - Cultural Habitat Destruction
Biodiversity - Erosion
Biodiversity - Hydrocarbon Spill (Soil Contamination)
Biodiversity - Illegal Removal of Fauna/Flora
Biodiversity - Incorrect Storage of Chemicals
Biodiversity - Invasive Species
Biodiversity - Landscape Alteration
Biodiversity - Litter
Biodiversity - Loss / Injury of Wildlife
Biodiversity - Loss of Topsoil
Biodiversity - Marine Benthic Biodiversity Alteration
Biodiversity - Non Adherence to Environmental Design
Biodiversity - Overgrazing
Biodiversity - Overstocking / Overgrazing
Biodiversity - Poor Chemical Control / Use
Biodiversity - Poor Drainage (Water Logging)
Biodiversity - Seascape Alteration
Biodiversity - Slurry Spills (Soil Contamination)
Biodiversity - Soil Compaction
Biodiversity - Soil Contamination - Salinization
Biodiversity - Subsidence
Biodiversity - Tailing Spill (Soil Contaminiation)
Biodiversity - Terrestrial Biodiversity Alteration
Biodiversity - Unauthorized Disturbance
Biodiversity - Unauthroized Entry to Protected Areas
Biodiversity - Unauthroized Utilization of Biodiversity
Biodiversity - Uncontrolled Fire
Biodiversity - Unsecured Gate / Fencing (Cattle Management)
Biodiversity - Vibration
Biodiversity - Weed Infestation
Business Travel
Business Travel - Air - Aeroplane
Business Travel - Air - Helicopter
Business Travel - Light vehicle
Business Travel - Motorcycle
Business Travel - Train
Chemical
Chemical - Chemicals - High Risk (e.g. HF)
Chemical - Low Risk (e.g. HCL)
Chemical - Heavy or Intermediate Fuel Oil
Chemical - Hydraulic Oil
Chemical - Light Fuel Oil (Petrol, Disesel, Marine Gas Oil, Jet Fuel)
Chemical - Lubricating Oil and Grease
Chemical - Solvents / Degreasers
Climatic / Natural Events
Climatic / Natural Events - Disease Epidemics
Climatic / Natural Events - Drought
Climatic / Natural Events - Earthquakes
Climatic / Natural Events - Extreme Temperatures
Climatic / Natural Events - Extreme Weather Event (e.g. rainfall, floods, severe thunderstorms, wind, snow, whiteouts)
Climatic / Natural Events - Insect infestations
Climatic / Natural Events - Landslides
Climatic / Natural Events - Lightning Strike
Climatic / Natural Events - Ocean Storm Surge (e.g. unusually high waves, strong currents)
Climatic / Natural Events - Subsidence
Climatic / Natural Events - Wildfires
Confined Space (Enclosed Spaces)
Confined Space (Enclosed Spaces) - Access Restrictions
Confined Space (Enclosed Spaces) - Confied Spaces
Confined Space (Enclosed Spaces) - Congested Spaces
Confined Space (Enclosed Spaces) - Dust
Confined Space (Enclosed Spaces) - Fire and Explosions
Confined Space (Enclosed Spaces) - Flooding
Confined Space (Enclosed Spaces) - Lack of Natural Light
Confined Space (Enclosed Spaces) - Lack of Oxygen
Confined Space (Enclosed Spaces) - Liquid Filling a Vessel
Confined Space (Enclosed Spaces) - Temperature
Confined Space (Enclosed Spaces) - Toxic Gases / Fumes
Electrical
Electrical - Damaged Insulation
Electrical - Damaged Tools and Equipment
Electrical - Electrical Source Exposure (contact with electricity and arc flash)
Electrical - Electricity Consumption
Electrical - Explosion Causing Equipment Containment Repture (e.g. electrical, transformer, switchgear)
Electrical - Exposed Electrical Parts
Electrical - Improper Grounding
Electrical - Inadequate Wiring and Overloaded Circuits
Electrical - Overhead Power Lines
Electrical - Transformers (HT Lines)
Envrionmental
Envrionmental - Asbestos
Envrionmental - Carbon Monoxide
Envrionmental - Contaminated Water
Envrionmental - Lead
Envrionmental - Mercury
Envrionmental - Pesticides
Envrionmental - Tobacco Smoke
Ergonomics
Ergonomics - Contact Stress / Mechanical Stress
Ergonomics - Individual Risk Factors (psychosocial, obesity, gender)
Ergonomics - Lifting Heavy Objects
Ergonomics - Other Undesired Physical Stress
Ergonomics - Poor Posture
Ergonomics - Repetitive Movement
Ergonomics - Temperature and Lighting
Ergonomics - Vibration (hand-arm or whole-body)
Explosives
Explosives - Miss Fires
Explosives - Pyrotechnics
Explosives - Unexploded Detonators
External Threats
External Threats - Armed Robbery
External Threats - Community Lobby Group Actions
External Threats - Government Actions
External Threats - Riots / Political Unrest
Fire
Fire - Burns
Fire - Emissions
Fire - Fire Load
Fire - Ignition Sources
Fire - Residual Matter
Fire - Smoke Inhalation
Gravitational (Objects)
Gravitational (Objects) - Collapse of Walls (Inrush)
Gravitational (Objects) - Falling Objects
Gravitational (Objects) - Inadvertent Dropping / Swinging of Loads

Linked Risk Area
04 Adverse Environmental Conditions
06 Equipment Machine Guarding
07 Hazardous Materials
11 Confined Spaces
13 Fatigue
16a Mobile Equipment - Surface
16b - Mobile Equipment - Underground
17 Light Vehicles and Buses
18 Aircraft - Fixed Wing and Rotaery
19a Marine Craft - Operations
19b Marine Craft - Flooding
20 Shaft Conveyance
21 Tires and Rims
22 Pressurized Equipment
23 Explosive Atmospheres
24a Explosives - Transport
24b Explosives Handling - Surface
24c Explosives Handling - Underground
25 Buildings and Structures
26 Blasting Operations
30a Fire - Building and Structures
30b Fire - Equipment and Vehicles
30c Fire - Underground
30d Fire - Surface / At Sea
31 Arc Flash
32 Pressurized Equipment
34 Inrush / Engulfment
35 Drowning
37 Working at Heights
38a Open Pit Slopes
38b Underground Ground Control
38c Tailings Storage
38d Water Retaining Structures (Seawall / Dykes)
39 Lifting and Rigging
40 Electrical Energy Isolation

Gravitational (Objects) - Exepected Movement of Ground / Slope
Gravitational (Objects) - Unexpected Movement of Structures
Gravitational (People)
Gravitational (People) - Fall (elevated platforms / heights)
Gravitational (People) - Slip
Gravitational (People) - Trip
Information Technology
Lighting
Lighting - Excessive Light
Lighting - Glares
Lighting - Inadequate Light
Magnetic
Magnetic - Magnetic Sources
Mechanical (Fixed)
Mechanical (Fixed) - Fixed Mechanical - Combustion
Mechanical (Fixed) - Fixed Mechanical - Electrically Powered
Mechanical (Fixed) - Hydraylically Powered
Mechanical (Fixed) - Pneumatically Powered
Mechanical (Mobile)
Mechanical (Mobile) - Mobile Mechanical - Aircraft
Mechanical (Mobile) - Mobile Mechanical - Combustion
Mechanical (Mobile) - Mobile Mechanical - Electrically Powered
Mechanical (Mobile) - Mobile Mechanical - Hydraulically Powered
Mechanical (Mobile) - Mobile Mechanical - Kinetic (Movement)
Mechanical (Mobile) - Mobile Mechanical - Marine Vessels
Mechanical (Mobile) - Mobile Mechanical - Pedestrians
Mechanical (Mobile) - Mobile Mechanical - Pneumatically Powered
Mergers and Acquisitions
Noise
Noise - Blast Noise
Noise - Environmental Noise
Noise - Noise Pollution
Noise - Prolonged Exposure to Excessive Noise
Noise - Sudden Exposure to Excessive Noise
Operational Performance
Other
Personal / Behaviour
Personal / Behaviour - Mistake (lack of knowledge)
Personal / Behaviour - Safe and Commending Behaviours
Personal / Behaviour - Slip / Lapse (lack of concentration / human limitations)
Personal / Behaviour - Undesirable Behavioural Actions
Personal / Behaviour - Unsafe Acts
Personal / Behaviour - Violation (deviation from normal practice)
Political
Pressure / Explosions
Pressure / Explosions - Cylinders
Pressure / Explosions - Hydraulic Pressure
Pressure / Explosions - mechanical (crushing)
Pressure / Explosions - Pressure Waves from Explosions
Pressure / Explosions - Pressurized Systems
Pressure / Explosions - Springs
Project
Psychological
Psychological - Conditional Stressors
Psychological - Event Stressors
Psychological -Situtation Stressors
Radiation
Radiation - Ionizing Radiation
Radiation - Non-Ionizing Radiation
Security
Social / Economic / Cultural / Archaeological
Social / Economic / Cultural / Archaeological - Aesthetics
Social / Economic / Cultural / Archaeological - Community Health and Safety
Social / Economic / Cultural / Archaeological - Distrubance of Archaeological Site / Heritage
Social / Economic / Cultural / Archaeological - Distrubance of Cultural Site / Heritage
Social / Economic / Cultural / Archaeological - Disturbance of Paleontological Site / Heritage
Social / Economic / Cultural / Archaeological - Economical Collapse / Recession / Depression
Social / Economic / Cultural / Archaeological - Personal and Political Security
Social / Economic / Cultural / Archaeological - Social Infrastructure and Services
Social / Economic / Cultural / Archaeological - Socio-Cultural Networks
Thermal
Thermal - Cold
Thermal - Hot
Vibration
Vibration - Exposure to Excessive Blast Vibration
Vibration - Prolonged Exposure to Excessive Vibration
Vibration - Vibration Disturbances
Visual / Aesthetics
Visual / Aesthetics - Dust Emissions
Visual / Aesthetics - Light Pollution
Visual / Aesthetics - Litter
Visual / Aesthetics - Loss of Sense of Place
Visual / Aesthetics - Poor Housekeeping
Waste and Effluent
Waste and Effluent - Greywater Effluent
Waste and Effluent - Hazardous Liquid Waste
Waste and Effluent - Hazardous Soild Waste - Medical Waste
Waste and Effluent - Hazardous Soild Waste - Mixed
Waste and Effluent - Hazardous Soild Waste - Radioactive Waste
Waste and Effluent - Hazardous Soild Waste - Recyclable
Waste and Effluent - Non-Hazardous Liquid Waste - Non-Recyclable
Waste and Effluent - Non-Hazardous Liquid Waste - Recyclable
Waste and Effluent - Non-Hazardous Solid Waste - Non-Recyclable
Waste and Effluent - Non-Hazardous Sold Waste - Recyclable
Waste and Effluent - Oily Water
Waste and Effluent - Process Effluent
Waste and Effluent - Sewage Effluent
Water
Water - Dam / Reservoir Overflows
Water - Desalinated Water
Water - Exceedance of Freeboard / Reportable Limit
Water - Exceedance of Water Quality Specs
Water - Ecess Raw Water Use
Water - Groundwater
Water - Hydrocarbon Contamination
Water - Illegal Discharge
Water - Inadequate Clean and Dirty Water Separation
Water - Inadequate Control of Sediment Load
Water - Large Body of Water
Water - Municipal Water
Water - Non-Adherence to Dam Design / Conditions
Water - Process Water
Water - Rainwater
Water - Reclaimed Water
Water - Seawater
Water - Stormwater
Water - Surface Water (lakes, Rivers)
Water - Unlicenced Water use
Water - Water Leaks (potable / raw water)
Water - Water Leaks (process water)
Working Alone
Working Alone - Stuck at Remote Location

Appendix 1

Incident Type
Spill - Air
Spill - Water
Spill - Land
Compliance - Prosecution
Compliance - Fines/Orders
Compliance - Administrative
Waste Management
Wildlife

Appendix 2

Impact Type
Soil Contamination
Surface Water Contamination
Groundwater Contamination
Wildlife
Habitat
Financial
Reputational

Appendix 3

Contaminant
Oil
Liquid Effluent
Waste
Vapour or Gas
Surface Runoff
Other
Antifreeze
Fuel
Solid
Unknown

Appendix 4

Agency of Injury
Animal/insect
Biological agent
Bodily Motion
Chemical
Drugs or alcohol
Dust
Electrical
Explosion
Extended working hours (fatigue)
Hazardous material
Inexperience
Machinery
Manual material handling
Mobile equipment
Noise/vibration
Non-power tools
Objects
Other
Power tools
Radiation
Repetitive work
Stationary equipment
Thermal (heat/cold)
Vehicle/transport
Walking surface
Weather
Working surface (slippery or rough)
Workstation/equipment design
N/A

Appendix 5

Mechanism of Injury
Animal/insect bite
Caught in, under or between
Contact with electricity
Exposure to biological agents
Exposure to chemicals
Exposure to heat/cold
Exposure to noise
Exposure to pressure
Exposure to radiation
Exposure to vibration
Fall from height
Hitting object
Mental stress
Muscular stress
Other
Overexertion
Repetitive movement
Rubbed or abraded
Slip, trip or fall (same level)
Struck against
Struck by
Unknown
Vehicle accident

Appendix 6

Body Part Injured
Ankle
Back
Buttock
Chest
Ear
Elbow
Eye
Face
Fingers/Thumb
Foot/Toe
Forearm
Groin/Hip
Hand
Head
Internal
Knee
N/A
Neck
Shin/Calf
Shoulder
Stomach/Trunk
Thigh
Upper Arm
Wrist

Appendix 7

Nature of Injury
Allergy or sensitivity
Amputation
Asphyxiation
Back Injury
Bruise
Burn (chemical)
Burn/scald (heat)
Communicable disease
Concussion
Contusion/crush
Electric shock
Fainting
Foreign Body
Fracture/dislocation
Freezing or frost-bite
Hearing loss
Heat stroke or exhaustion
Hernia
Internal injuries
Laceration/deep cut
Multiple injuries
Repetitive use injury
Other
Poison/toxic effects
Pre-existing condition
Psychological/stress effects
Puncture
Respiratory
Sprain/strain
Superficial wound or abrasion
Vision impairment
N/A

Appendix 8

Working Area
Accommodation/Recreation
Aircraft
Airstrip/Pad
Drill/Trench
Haul Road
Office
Open Pit
Other
Plant
Remote/Field
Surface Operations
Underground
Unknown

Appendix 9

Activity
Administration/Office
Commissioning
Decommissioning
Exploration
Maintenance
Other
Production
Storage
Transport
Unknown

Appendix 10

Occupation
Administration/Support
Driver - Mobile Equipment
Driver - Other
Exploration
Maintenance
Other
Production - Plant
Production - Surface
Production - Underground
Unknown
Visitor

Appendix 11

Highest Consequence
Financial - Supply, Demand, (Business Interruption, Material Damage & Other Consequential Losses) Property Damage / Loss of Process
People - Safety & Health
People - Occupational Health
Legal (including Regulatory)
Reputational (Impact on Reputation / Social / Community)
Environmental

Appendix 12a

Code	Substandard Methods
1	Operating equipment without authority (15) 61b, 64b, 62, 65, 71, 75, 76, 78, 79
2	Failure to warn (15) All except 72, 74, 75
3	Failure to secure / make safe (15) 61 to 65, 71, 73, 74, 76, 77, 78, 79
4	Operating at improper speed (15) 61b, 62, 63, 64a, 64b, 65, 71, 72, 74, 75, 76, 78
5	Making safety devices inoperable (15) 61b, 62, 63, 64b, 65, 71, 72, 78
6	Removing safety devices
7	Using defective equipment (15) All except 61a
8	Using equipment improperly (15) All except 74
9	Failure to use personal protective equipment properly (15) All except 63, 72
10	Improper loading (15) All except 77, 79
11	Improper placement (15) 61 to 76, 78
12	Improper lifting (15) All except 73, 74, 75, 77, 79
13	Improper position for the task (15) 61 to 65, 71, 72, 75, 76, 79
14	Servicing equipment in operation (15) 62 to 65, 71, 72, 74 to 79
15	Horseplay (15) 61b, 62, 64a, 64b, 65, 71, 76, 78
16	Under influence of alcohol and / or other drugs (15) 61a, 61b, 62, 64, 65, 71, 76, 78
17	Failure to follow procedure / policy / practice (15) 61 to 65, 76, 78, 79
18	Failure to identify hazard / risk (15) 62, 63, 64a, 64b, 65, 71, 76
19	Failure to check / monitor (15) 61b, 62 to 65, 71, 72, 74 to 77, 79
20	Failure to communicate / coordinate (15) 62, 64, 65, 71, 72, 79

Appendix 12b

Code	Substandard Conditions
21	Inadequate guards or barriers (15) 62, 71 to 75, 77
22	Inadequate ground support
23	Inadequate / improper protective equipment (15) 62, 65, 71 to 75, 77, 78
24	Defective tools, equipment or materials (15) 71 to 75, 77, 78
25	Congested or restricted action (15) 71, 72, 73, 76
26	Inadequate warning system (15) 71 to 75, 77 to 79
27	Fire and explosion hazard (15) 62, 63, 65, 71 to 75, 77, 78
28	Substandard housekeeping (15) 65, 71, 72, 74, 76, 78, 79
29	Hazardous environmental conditions - gases, dusts, smoke, fumes, vapours
30	Noise exposure (15) 62, 65, 71 to 76, 78, 79
31	Radiation exposure (15) 62, 63, 65, 71 to 79
32	High or low temperature exposures (15) 62, 65, 71, 72, 76
33	Inadequate or excessive illumination (15) 62, 65, 71 to 75, 77
34	Inadequate ventilation (15) 62, 65, 71,72, 74,75, 77
35	Ground (rock) conditions
36	Inadequate information / data (15) 62, 63, 65, 71, 72, 73, 74, 76, 79
37	Inadequate preparation / planning (15) 62, 63, 65, 71, 76, 79
38	Inadequate support / assistance (15) 65, 71, 73, 74, 79
39	Inadequate communications hardware / software / process (15) 65, 71 to 75, 77, 79
40	Presence of Harmful Materials (15) 62, 63, 65, 71 to 79
41	Inadequate Instructions / Procedures (15) 62, 63, 65, 71, 72, 76, 79
42	Road conditions (15) 62, 65, 71, 72, 74 to 78
43	Weather conditions (15) 62, 65, 71, 75, 76, 79

Appendix 13 **(refer to Appendix 15a for more detail)**

Code	Root Cause - Personal Factors
61	Inadequate physical / mental capability
62	Lack of knowledge
63	Lack of skill
64	Stress - physical or mental
65	Improper motivation

Appendix 14 **(refer to Appendix 15b for more detail)**

Code	Root Cause - System Factors
71	Inadequate leadership / supervision
72	Inadequate engineering
73	Inadequate purchasing
74	Inadequate maintenance
75	Inadequate tools / equipment
76	Inadequate work standards
77	Wear and tear
78	Abuse or misuse
79	Inadequate Communications

SM = Substandard Methods
SC = Substandard Conditions
PF = Personal Factors
JF = Job Factors

Appendix 15a

Code		Basic / Root Causes - Personal Factors
61a		**Inadequate physical / physiological capability** (16) 104, 106, 111, 112, 113, 115, 118
	61a.1	Inappropriate height, weight, size, strength, reach, etc.
	61a.2	Restricted range of body movement
	61a.3	Limited ability to sustain body positions
	61a.4	Substance sensitivities or allergies
	61a.5	Sensitivities to sensory extremes (temperature, sound, etc.)
	61a.6	Vision deficiency
	61a.7	Hearing deficiency
	61a.8	Other sensory deficiency (touch, taste, smell, balance)
	61a.9	Respiratory incapacity
	61a.1	Other permanent physical capabilities
	61a.11	Temporary disabilities
61b		**Inadequate mental / psychological capability** (16) 101, 104, 106, 108, 112, 113, 115, 118, 120
	61b.1	Fears and phobias
	61b.2	Emotional disturbance
	61b.3	Mental illness
	61b.4	Intelligence level
	61b.5	Inability to comprehend
	61b.6	Poor coordination
	61b.7	Slow reaction time
	61b.8	Low mechanical aptitude
	61b.9	Low learning aptitude
	61b.10	Memory failure
62		**Lack of knowledge** (16) 102, 104, 105, 106, 108, 109, 110, 111, 114, 115, 116, 117, 118, 121, 122
	62.1	Lack of experience
	62.2	Inadequate orientation
	62.3	Inadequate initial training
	62.4	Inadequate update training
	62.5	Misunderstood directions
	62.6	Lack of situational awareness
63		**Lack of skill** (16) 102, 104, 106, 107, 109, 110, 113, 115, 116, 118, 121, 122
	63.1	Inadequate initial instructions
	63.2	Inadequate practice
	63.3	Infrequent performance
	63.4	Lack of coaching
	63.5	Inadequate review instruction
64a		**Stress - physical or psychological** (16) 104, 105, 106, 107, 109, 111, 112, 115, 118, 120, 122
	64a.1	Injury or illness
	64a.2	Fatigue due to task load or duration
	64a.3	Fatigue due to lack of rest
	64a.4	Fatigue doe to sensory overload
	64a.5	Exposure to health hazards
	64a.6	Exposure to temperature extremes
	64a.7	Oxygen deficiency
	64a.8	Atmospheric pressure variation
	64a.9	Constrained movement
	64a.10	Blood sugar insufficiency
	64a.11	Drugs
64b		**Stress - mental or psychological** (16) 101, 104, 105, 106, 107, 109, 110, 112, 113, 115, 116, 118, 120, 121, 122
	64b.1	Emotional overload
	64b.2	Fatigue due to mental task load or speed
	64b.3	Extreme judgment / decision demands
	64b.4	Routine, monotony, demand for uneventful vigilance
	64b.5	Extreme concentration / perception demands
	64b.6	"Meaningless" or "degrading" activities
	64b.7	Confusing directions / demands
	64b.8	Conflicting demands / directions
	64b.9	Preoccupation with problems
	64b.10	Frustration
	64b.11	Mental illness

Appendix 15a - continued

Code		Basic / Root Causes - Personal Factors
65		**Improper motivation** (16) 101, 102, 104, 105, 106, 108, 110, 111, 113, 115, 116, 117, 120, 121, 122
	65.1	Improper performance is rewarded (tolerated)
	65.2	Proper performance is punished
	65.3	Lack of incentives
	65.4	Excessive frustration
	65.5	Inappropriate aggression
	65.6	Improper attempt to save time or effort
	65.7	Improper attempt to avoid discomfort
	65.8	Improper attempt to gain attention
	65.9	Inadequate discipline
	65.10	Inappropriate peer pressure
	65.11	Improper supervisory example
	65.12	Inadequate performance feedback
	65.13	Inadequate reinforcement of proper behaviour
	65.14	Improper production incentives

Appendix 15b

Basic / Root Causes - System Factors		
71		**Inadequate leadership / supervision** (16) 101, 102, 103, 105, 106, 108, 109 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122
	71.1	Unclear or conflicting reporting relationships
	71.2	Unclear or conflicting assignment of responsibility
	71.3	Improper or insufficient delegation
	71.4	Giving inadequate policy, procedure, practices or guidelines
	71.5	Giving objectives, goals or standards that conflict
	71.6	Inadequate work planning or programming
	71.7	Inadequate instructions, orientation and/or training
	71.8	Providing inadequate reference documents, directives and guidance publications
	71.9	Inadequate identification and evaluation of loss exposures
	71.10	Lack of supervisory / management job knowledge
	71.11	Inadequate matching of individual qualifications and job / task requirements
	71.12	Inadequate performance measurement and evaluation
	71.13	Inadequate or incorrect performance feedback
72		**Inadequate engineering** (16) 101, 103, 104, 112, 113, 114, 119, 121, 122
	72.1	Inadequate assessment of loss exposures
	72.2	Inadequate consideration of human factors / ergonomics
	72.3	Inadequate standards, specifications and / or design criteria
	72.4	Inadequate monitoring of construction
	72.5	Inadequate assessment of operational readiness
	72.6	Inadequate or improper controls
	72.7	Inadequate monitoring of initial operation
	72.8	Inadequate evaluation of changes
73		**Inadequate purchasing** (16) 101, 103, 106, 111, 112, 113, 114, 119, 121, 122
	73.1	Inadequate specifications on requisitions
	73.2	Inadequate research on materials / equipment
	73.3	Inadequate specifications to vendors
	73.4	Inadequate mode or route of shipment
	73.5	Inadequate receiving inspection and acceptance
	73.6	Inadequate communication of safety and health data
	73.7	Improper handling of materials
	73.8	Improper storage of materials
	73.9	Inadequate transporting of materials
	73.10	Inadequate identification of hazardous materials
	73.11	Improper salvage and / or waste disposal
	73.12	Inadequate contractor selection
74		**Inadequate maintenance** (16) 103, 104, 106, 108, 110, 113, 114, 119, 121, 122
	74.1	Inadequate preventive
		74.1.1 Assessment needs
		74.1.2 Lubrication and servicing
		74.1.3 Adjustment / assembly
		74.1.4 Cleaning or resurfacing
	74.2	Inadequate reparative
		74.2.1 Communication of needs
		74.2.2 Scheduling of work
		74.2.3 Examination of units
		74.2.4 Part substitution

Code		Basic / Root Causes - System Factors - continued
75		**Inadequate tools / equipment** (16) 101, 103, 104, 106, 107, 108, 111, 112, 113, 119, 121, 122
	75.1	Inadequate assessment of needs and risks
	75.2	Inadequate human factors / ergonomics considerations
	75.3	Inadequate standards or specifications
	75.4	Inadequate availability
	75.5	Inadequate adjustment/repair/maintenance
	75.6	Inadequate salvage and reclamation
	75.7	Inadequate removal and replacement of unsuitable items
76		**Inadequate work standards** (16) All except 107, 118
	76.1	Inadequate development of standards
		76.1.1 Inventory and evaluation of exposures and needs
		76.1.2 Coordination with process design
		76.1.3 Employee involvement
		76.1.4 Procedures / practices / rules
	76.2	Inadequate communication of standards
		76.2.1 Publication
		76.2.2 Distribution
		76.2.3 Translation of appropriate languages
		76.2.4 Training
		76.2.5 Reinforcing with signs, colour codes and job aids
	76.3	Inadequate maintenance of standards
		76.3.1 Tracking of work flow
		76.3.2 Updating
		76.3.3 Monitoring use of procedures / practices / rules
	76.4	Inadequate monitoring of compliance
77		**Wear and tear** (16) 103, 104, 106, 109, 111, 112, 113, 114, 119, 121, 122
	77.1	Inadequate planning of use
	77.2	Improper extension of service life
	77.3	Inadequate inspection and/or monitoring
	77.4	Improper loading or rate of use
	77.5	Inadequate maintenance
	77.6	Use by unqualified or untrained people
	77.7	Use by wrong purpose
78		**Abuse or Misuse** (16) 101, 102, 103, 104, 105, 106, 108, 110, 113, 114, 115, 121, 122
	66.1	Improper conduct that is condoned
		66.1.1 Intentional
		66.1.2 Unintentional
	66.2	Improper conduct that is not condoned
		66.2.1 Intentional
		66.2.2 Unintentional
79		**Inadequate Communications** (16) 101, 102,104, 105, 106, 107, 109, 110, 112, 114, 115, 116, 117, 119, 121, 122
	78.1	Inadequate horizontal communication between peers
	78.2	Inadequate vertical communication between supervisor and person
	78.3	Inadequate communication between different organizations
	78.4	Inadequate communication between work groups
	78.5	Inadequate communication between shifts
	78.6	Inadequate communication methods
	78.7	No communication method available
	78.8	Incorrect Instructions
	78.9	Inadequate communication due to job turnover
	78.10	Inadequate communication of safety and health data, regulations or guidelines
	78.11	Standard terminology not used
	78.12	Verification/repeat feedback techniques not used
	78.13	Messages too long
	78.14	Speech interference

Appendix 16

		Areas of Corrective Action			
101		**Leadership and Administration**	**P**	**S**	**C**
	a	General policy statement			
	b	Loss control coordinator qualifications			
	c	Senior and middle management participation in loss control activities			
	d	Loss control performance standards for all personnel			
	e	Loss control reference manual			
	f	Annual loss control objectives established			
	g	Joint safety and health committee and / or representatives			
	h	Policy on refusal to work due to hazards			
	i	Applicable regulations, codes and standards identified			
	j	Communication with external parties			
102		**Leadership Training**	**P**	**S**	**C**
	a	Training needs analysis			
	b	Loss control orientation / induction for new leaders / managers			
	c	Initial training of senior management			
	d	Update training of senior management			
	e	Initial loss control training for leaders / managers			
	f	Update loss control training for leaders / managers			
	g	Formal training of loss control coordinator			
103		**Planned Inspections and Maintenance**	**P**	**S**	**C**
	a	Planned general inspections			
	b	Follow-up system			
	c	Critical parts / items inspection			
	d	Preventative maintenance system			
	e	Special systems inspections			
	f	Pre-use equipment inspections			
	g	System for employee to report substandard conditions in writing			
	h	Compliance with regulatory requirements for inspections			
104		**Critical Task Analysis and Procedures**	**P**	**S**	**C**
	a	Task analysis system established			
	b	Critical tasks identified			
	c	Controls developed for potential losses			
	d	Controls incorporated into procedures and practices			
	e	Critical task procedures / practices updated			
105		**Incident Investigation**	**P**	**S**	**C**
	a	Incident investigation system			
	b	Operating management participation			
	c	Review of major and high-potential incidents			
	d	Remedial action and follow-up			
	e	Near-hit reporting and investigation			
106		**Task Observation**	**P**	**S**	**C**
	a	System for partial / spot task observations			
	b	System for complete task observations			
	c	Critical task observations performed			
	d	Follow-up system			
107		**Emergency Preparedness**	**P**	**S**	**C**
	a	Identification of potential emergencies			
	b	Emergency plan			
	c	Off-site emergencies			
	d	Sources of energy controls			
	e	Protective and rescue systems			
	f	Emergency teams			
	g	Lessons learned system			
	h	First aid			
	i	Organized outside help and mutual aid			
	j	Post-event planning			
	k	Emergency communication			
	i	Communications with the community			
108		**Rules and Work Permits**	**P**	**S**	**C**
	a	General loss control rules			
	b	Specialized work rules			
	c	Specialized work permit systems			
	d	Regulatory permit-to-operate systems			
	e	Rule education and review			
	f	Rule compliance and recognition			
	g	Use of educational signs and colour codes			
109		**Incident Analysis**	**P**	**S**	**C**
	a	Consequence measurements			
	b	Cause and control analysis			
	c	Property damage / process loss identification and analysis			
	d	Near-hit analysis			
	e	Problem-solving project teams			
110		**Knowledge and Skill Training**	**P**	**S**	**C**
	a	Training needs analysis			
	b	Instructor qualifications			
	c	Training systems			
	d	Training system evaluation and follow-up			

Areas of Corrective Action					
111		**Personal Protective Equipment (PPE)**	**P**	**S**	**C**
	a	Identification of personal protective equipment needs			
	b	Personal Protective Equipment (PPE) available			
	c	Enforcement of standards			
112		**Health and Hygiene Control**	**P**	**S**	**C**
	a	Health hazard identification and evaluation			
	b	Health hazard control			
	c	Occupational health and industrial hygiene monitoring			
	d	Information and training			
	e	Healthcare system			
	f	Ergonomic program			
	g	Professional assistance			
	h	Internal communications			
113		**System Evaluation**	**P**	**S**	**C**
	a	Assessment of loss control requirements			
	b	Regular loss control system monitoring			
	c	Evaluation of compliance with loss control system standards			
	d	Employee perception surveys			
114		**Engineering and Change Management**	**P**	**S**	**C**
	a	Hazard identification and risk assessment			
	b	Project review and change management			
	c	Operational and work process change management			
115		**Personal Communications**	**P**	**S**	**C**
	a	Training in personal communication techniques			
	b	Individual job orientation / induction			
	c	Task instruction			
	d	Planned personal contacts			
116		**Group Communications**	**P**	**S**	**C**
	a	Quantity and quality of group loss control meetings			
	b	Management involvement			
117		**General Promotion**			
	a	Loss control bulletin boards			
	b	Use of incident statistics			
	c	Critical topic promotion			
	d	Individual awards and recognition			
	e	Loss control information publications			
	f	Group awards and recognition			
	g	Housekeeping promotion systems			
	h	Communications with the public about loss control			
118		**Hiring and Placement**	**P**	**S**	**C**
	a	Job capability requirements established			
	b	Medical examination			
	c	General orientation / induction			
	d	Pre-employment / pre-placement qualification checks			
119		**Materials and Services Management**	**P**	**S**	**C**
	a	Procurement of goods			
	b	Contractor selection			
	c	Management of contractors			
120		**Off-The-Job Safety**	**P**	**S**	**C**
	a	Problem identification and analysis			
	b	Off-the-job safety education			
121		**Environmental Management**	**P**	**S**	**C**
122		**Quality Management**	**P**	**S**	**C**

LEGEND

P - Inadequate Program

S - Inadequate Program Standards

C - Inadequate Compliance to Program Standards

De Beers Group of Companies	GKM CHECKLIST **Bear Deterrents Sign-Out Checklist**	**ID No.: CL 175** **Revision Date: May 14, 2018**

Date	Name *please print*	Department / Contractor	Time Signed Out	Time Signed In	Air Horn	Bear Bangers	Bear Spray	Flares	Comments
Example Row									
02-May-14	John Smith	Golder	0830 H	1605 H	1	5	#6	#8 - 6 flares	Used one bear banger

Approved: Safety, Health, Risk & Training Superintendent

Unauthorized Changes Prohibited

SPECIFIC WORK INSTRUCTIONS

Gahcho Kué Mine – Caribou Activity Budgets and Response to Winter Access Road

Introduction

De Beers operates a winter access road from MacKay Lake to supply the Mine site from early February to late March each year. The winter access road is located within the range of the Bathurst caribou herd and likely the Beverly/Ahiak caribou herd, and De Beers has committed to implementing a behaviour monitoring program along the winter access road if sufficient caribou are present (i.e., when 20 or more groups of caribou are observed along the length of the winter access road during either the aerial reconnaissance survey or during public use monitoring). Caribou in proximity to the winter access road is a cause for concern for both the safety of the animals and the drivers, and monitoring is a means of alerting drivers and avoiding vehicle-caribou collisions. It is also an opportunity to better understand the interactions between the caribou and winter roads in the NWT.

Monitoring Objectives

Information regarding the activity budgets (i.e., time spent feeding, standing, resting, alert, walking and running) of caribou exposed to the Mine site and roads can be used to assess the potential impact of the Mine on caribou energetics. The immediate effect of different stressors (e.g., aircraft, vehicles, blasts) on caribou behaviour will also provide general insight into which aspects of the Mine may affect caribou behaviour.

The objectives of this component of the monitoring program are to:

- determine the effect of the Project winter access road on caribou activity budgets; and,
- determine which stressors associated with the Project winter access road have the greatest influence on caribou behaviour.

Procedure

Caribou behaviour monitoring along the winter access road includes two types of surveys: group scans, and focal (individual) behavioural surveys, which measures responses to stressors. 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).

Behaviour types recorded for group scan and focal observations include:

- Bedded;
- Standing;
- Feeding (groups were classified as feeding when they were observed eating, foraging, or searching for food);
- Alert (raising heads and looking towards a stimulus);
- Walking;
- Trotting; and
- Running.

Task 1. Scan Sampling of Caribou Groups

When Mine staff were alerted to the presence of caribou along the winter access road, a team of two observers will be deployed to conduct behavioural assessments of any groups of caribou that are visible from the winter access road. Behavioural observations are repeated at multiple locations along the winter access road where caribou are present. The crew of two observers are stationed along the winter access road or other Mine roads in a truck, and use binoculars to observe caribou. Behavioural monitoring methods follow those described by Murphy and Curatolo (1987).

Observers record instantaneous behaviour observations of the caribou group (one or more individuals) at 8-minute intervals. A minimum of three scans (i.e., span of 24 minutes) and a maximum of eight scans (i.e., span of 64 minutes) are required per caribou group encountered. Observers record the number of individuals in the group displaying each behaviour. The response of caribou to stressors such as vehicle or aircraft traffic will also be recorded. This will be repeated at multiple locations along the road where caribou are present. In addition to recording behaviour, observers will record the group size (i.e., number of individuals), group demographic composition (i.e., sex, age class, group composition), and location of each group in relation to the winter road. Environmental conditions are also recorded at the start of each monitoring session including air temperature, wind direction, wind speed and cloud cover.

If a stressor changes the caribou behaviour, observers record the reaction of the majority of the group and wait until behaviour has returned to pre-disturbance before continuing the scan (this may require a gap of longer than 8 minutes).

Task 2. Focal Observations

Focal surveys monitor a single individual from a group of caribou. Behaviour and time of behaviour changes are recorded for that focal individual. Focal surveys may be undertaken on individuals within the same group being scanned, and may be undertaken

simultaneously. Focal surveys can be undertaken on both cows and bulls, for a minimum of 20 minutes.

To undertake a focal survey, select a recognizable individual in the group (or a single animal). Record the behaviour and amount of time (hr:min:sec). Record the behaviour and time when the focal animal switches activity to a new behaviour category or an industrial or wildlife stressor. Indicate the behaviour by checking the appropriate box for each behaviour. Record response to stressors as indicated below.

Task 3. Response to Stressors

In the event that a stressor is introduced during scan or focal sampling, the observers will note the time (in the comments box) and categorize the response of caribou from to the stressors from 0 to 3 as indicated on the data sheet, where 0 is no response and 3 is severe response (e.g., animal trots or runs away). Estimated distance (m) from the stressor and a description of the stressor will also be recorded. Stressors include trucks, helicopters, airplanes, other wildlife, and blasts from pits.

Weather conditions such as wind speed and direction, temperature, and type of precipitation will be documented.

Caribou Behaviour Monitoring Data Sheet

Project Name:		**Page number:**	
Project Number:		**Observers:**	
Date (dd/mmm/yy):		**Survey type** (circle):	Focal / Scan
Weather:		**Snow cover (%):**	
Cloud cover (%):		**Temperature** (^{0}C):	
Wind speed (km/h):		**Wind direction:**	
If herd is near a road or structure, estimate distance:		**Number of stressors encountered:**	
Herd size:		**Vegetation Type[a]:**	
Herd composition (circle):	females / females+calves / males / females+males / females+males+calves		
UTM Easting:		**UTM Northing:**	

***For focal sampling of an individual, record the time of each behaviour change and check the box to indicate the behaviour, for at least 20 minutes. For scan sampling of a group, record the time at 8 minute intervals and indicate the number of individuals displaying each behaviour, for 4 to 8 intervals.**

Group #	Time	Behaviour[b]							Stressor[c]	Distance to Stressor (m)	Response (0-3)[d]	Time to Return to Previous Behaviour (before stressor)	Comments
		B	F	S	A	W	T	R					

[a] BE=Bedrock (>80%); BO=Boulders (>80%); EC=Esker Complex; HT=Heath Tundra; RB=Riparian Birch; RS=Riparian Shrub; SW=Sedge Wetland; IC=Ice; SW/HT=Wetland/Heath Tundra; HT/BE=Heath Tundra/Bedrock; LA=Lake

[b] B=bedded; F=feeding; S=standing; A=alert; W=walking; T=trotting; R=running.

[c] Stressor types: observer's truck, pickup truck, haul truck, helicopter, airplane, blast, other wildlife, etc. Record the time at which the greatest response was recorded, or when stressor was

[d] Response (majority of group): 0= No reaction, 1= Mild- animals look towards disturbance, 2= Moderate- animals walk away, 3=Severe- animals trot or run away.

***Use separate datasheets for Focal and Scan surveys.**

Field QAQC: _____ Data Entry: _____ Data QAQC: _____

1.0 PURPOSE

To ensure the safe storage, handling, use, and disposal of explosives at the Gahcho Kué Mine (GKM).

2.0 SCOPE

This procedure applies to all employees and contractors at the GKM.

3.0 RESPONSIBILITIES

3.1. Mine General Manager or Designate:

3.1.1. Overall management of the GKM sites and workforce.

3.2. Heads of Departments, Superintendents or their Designates:

3.2.1. Ensure this procedure is communicated to their employees;

3.2.2. Ensure their employees have received the appropriate training; and

3.2.3. Ensure this procedure is implemented.

3.3. Mining Manager:

3.3.1. Ensure this procedure is communicated to their employees;

3.3.2. Ensure their employees have received the appropriate training;

3.3.3. Ensure this procedure is implemented, and

3.3.4. Ensure this procedure is maintained.

3.4. Supervisors:

3.4.1. Implement this procedure and ensure it is properly followed.

3.5. Safety, Health & Risk (SHR) Superintendent or Designate:

3.5.1. Monitor the implementation of this procedure.

3.6. Contractors & All Persons Involved in Blasting at GKM sites:

3.6.1. Ensure that their employees understand and follow this procedure;

3.6.2. Be familiar with and follow all permit / licence requirements specific to GKM including established setback distances from water;

3.6.3. Ensure that all explosives and materials used for the manufacture of explosives are stored in accordance with all applicable territorial and federal regulations, and manufactures specifications; and

3.6.4. Ensure that all blasting agents (explosives) are manufactured and used in accordance with all applicable territorial and federal regulations, and manufacturer's specifications.

3.7. **Drill/Blast Supervisor and Blaster in Charge (BIC):**

3.7.1. Has numerous responsibilities as listed in this procedure in Section 5.6.

3.8. **All Employees**:

3.8.1. Understand and practice this procedure as required; and

3.8.2. Ask their supervisor for clarification if they are unsure of any aspect of this procedure.

Responsibilities of Employers, Contractors, Supervisors and Employees are also described in the NWT Mine Health and Safety Act (Sections 15 – 18) and throughout the NWT Mine Health and Safety Regulations.

4.0 CRITICAL CONTROLS

If not currently available, these will be identified during the next document review when the Job Risk Assessment is completed.

5.0 PROCEDURE

5.1. Relevant Legislation

5.1.1. The procedures used for managing explosives and conducting blasting shall be, as a minimum, in compliance with the relevant legislation pertaining to the GKM. See Section 9 – References & Related Documents.

5.2. Competent Persons

5.2.1. The Mine General Manager or Designate shall review the credentials of the personnel responsible for the design and control of each blast. The competent person shall ensure that each blast is carried out according to the design. Only persons who hold NWT Blasting Certificates are to handle explosives unless they are under the immediate direction and supervision of a person who holds a NWT Blasting Certificate. Blasting operations shall only be carried out by persons who hold NWT Blasting Certificates.

5.2.2. Blasting operations shall only take place with prior approval of the Mine General Manager or Designate.

5.3. Transportation of Explosives

The following requirements apply to the surface transport of explosives:

5.3.1. All persons involved in the transportation of explosives must be certified under Transportation of Dangerous Goods regulations and have additional training for transportation of explosives. All regulations pertaining to Transportation of Dangerous Goods must be followed.

5.3.2. All employees handling or transporting explosives will participate in annual reviews of the site's emergency preparedness and response plan. This will ensure these employees have a clear understanding of how to respond in the event of an emergency involving the transportation of explosives.

5.3.3. The vehicle being used for transporting explosives (see NWT Mine Health & Safety Regulations 14.29) shall:

- **a.** Carry only those persons necessary for handling explosives;
- **b.** Be kept in sound mechanical condition;
- **c.** Be clearly marked on all four (4) sides with appropriate warnings (i.e. orange diamond shaped placards and with clearly visible signs marked "Explosives" in letters not less than 150 mm in height;
- **d.** Have all metal parts, that could come in contact with containers of explosives, covered with wood, tarpaulin or similar non-sparking material;
- **e.** Not be used to transport other goods or materials at the same time as explosives are transported;
- **f.** Be equipped with a type 20-ABC fire extinguisher, which must be checked before loading explosives and replaced if necessary. If the vehicle is equipped with a fire suppression system, ensure that it is operational;
- **g.** Not be loaded with explosives in excess of 80% of its rated carrying capacity;
- **h.** Have explosives secured or fastened so as to prevent any part of the load from becoming dislodged;
- **i.** Transport detonators with other explosives only if the detonators are:
  - **i.** Packed in their original containers and placed in a wooden box with a snugly fitting lid that is separated from other explosives by a solid partition of wood at least 150 mm thick and that extends at least 150 mm above the highest level to which the explosives are packed in the vehicle, and

ii. Five thousand (5,000) or fewer in number;

j. Operated by an authorized person who is in attendance at all times;

k. Not be refuelled if explosives or detonators are on board except where the mobile equipment is designed and used solely for the transportation of bulk blasting agents; and

l. Have its engine shut off, park brake on and wheel chocks placed while loading or unloading explosives, except where the vehicle uses an engine powered device for loading and unloading the explosives.

m. Have the park brake on, with wheel chocks placed where the vehicle uses an engine powered device for loading and unloading the explosives.

5.3.4. Explosives must not be transported by a person or in anything except authorized containers.

5.3.5. No person shall smoke or have an open flame within 20 m of a vehicle transporting explosives. Flammable materials and metal objects must not be transported in the same boxes as explosive materials. Smoking materials are not to be used or carried inside the transport vehicle.

5.4. Maintenance of Transportation Vehicles

The following requirements apply when conducting maintenance on vehicles used to transport explosives:

5.4.1. Where unforeseen maintenance is required on a Bulk Truck, and removing all residual explosives is not practical, the maintenance crew shall conduct a formal risk assessment (i.e. Safe Work Plan, Job Safety Analysis, etc.) with consultation and participation from the Explosives Contractor before commencing work;

5.4.2. The Drill/Blast Supervisor or BIC must ensure that all explosives are removed from the vehicles that transport explosives and that the vehicle is washed clean of any residual explosives prior to giving it to the Maintenance Department for scheduled service or repairs; and

5.4.3. Hot work permits are required for all welding or hot work on explosives vehicles. See *OP 155: Hot Work Permit*.

5.5. Storage of Explosives

5.5.1. Surface Magazines

The following requirements apply to the storage of explosives:

a. Explosives on the surface must be kept or stored in compliance with the Explosives Act (Canada), the Explosives Branch of the Department of Natural Resources (Canada), and NWT Mine H&S Reg. Sections 14.02 – 14.08;

b. Magazines must be:

i. Constructed in conformity with the "Storage Standards for Industrial Explosives, May 2001", published by the Explosives Branch of the Department of Natural Resources (Canada).

ii. Located in conformity with the User Manual, Quantity Distance Tables, published by the Explosives Branch of the Department of Natural Resources (Canada).

Surface Magazines must meet all requirements of the NWT Mine Health and Safety Regulations 14.03 – 14.08 and Federal Regulations.

5.5.2. Defective Explosives

a. Explosives that appear to be defective shall not be used. Defective explosives shall be reported to the Drill/Blast Supervisor.

b. The Drill/Blast Supervisor shall, without delay, report the defective explosives to the Mine Manager.

c. The Mine Manager shall report the matter to the Mines Inspector and to the manufacturer of the explosives, with as much batch identification data as is available; and ensure that the explosives are removed and destroyed in a safe manner in accordance with the manufacturer's recommendations.

5.6. Access Control

5.6.1. Blast Guarding

The following requirements apply to guarding for a blast:

a. The Drill/Blast Supervisor is responsible for appointing all guards and ensuring each guard understands their responsibilities.

b. The Drill/Blast Supervisor and Blaster In Charge (BIC) are responsible for establishing the limits of the danger zone.

c. Upon notification of the Drill/Blast Supervisor, all guards will ensure their assigned areas are clear of all personnel and equipment and proceed to their designated guard post.

d. No guard shall abandon their position or allow any person to enter the blast area until the Drill/Blast Supervisor gives the "ALL CLEAR" signal.

e. All guards will notify the Drill/Blast Supervisor when they have arrived at their assigned positions, and give a status report of their assigned area.

f. The Drill/Blast Supervisor shall announce the blast, either by radio or by a siren.

g. The BIC in charge will inspect the blast area, and when all danger from the blast (10 minute waiting period as well all gases have dissipated) has passed will notify the Drill/Blast Supervisor who will sound the "ALL CLEAR" signal.

Refer to *MO-DOP 072: Mine Operations – Blast Guarding, Firing, and Clearing.*

5.7. Responsibilities of the Drill & Blast Supervisor and Blaster in Charge

The Mine Manager will designate a Drill/Blast Supervisor and BIC for all shifts. They are responsible for:

a. Ensuring all Federal and Territorial regulations relating to the storage, handling, transportation, loading and firing of all explosive are strictly adhered to;

b. Ensuring all mobile equipment transporting explosives meets or exceeds government requirements/regulations;

c. Ensuring a copy of the explosive magazine permit is posted inside the magazine;

d. Ensuring a weekly inspection of the magazines and recording the results in a logbook (which is done by Tli Cho Orica) and ensuring all entries are signed and accurate;

e. Ensuring a record of all explosives issued and received, the inventory of the magazine is kept, and all entries are signed by the authorized persons (performed by Tli Cho Orica);

f. Ensuring appropriate records of each primary blast are kept and ensure record accuracy;

g. Keeping a signed record of the blast, including date, time and location of the blast; burden spacing and number of holes blasted; type of explosives used; wind direction and velocity; and atmospheric conditions (clear or overcast) at the time of the blast;

h. Ensuring the magazine is kept clean, dry and free from grit at all times;

i. Ensuring the stock of explosives is continually rotated so that the oldest stock is used first;

j. Ensuring all signage is visible and in good condition;

k. Ensuring that the magazine is locked at all times except when an authorized person is present;

l. Ensuring all warning, guarding of access routes and clearance of areas has taken place prior to initiating any blast;

m. Exercising authority to safely conduct and direct all activities within the blasting area. All employees must support the BIC in exercising this authority;

n. Ensuring all blasters possess a valid NWT Blasting Certificate;

o. Ensuring all persons who are assisting in the preparation of firing of charges are under the direct supervision of a person who is a holder of a valid NWT Blasting Certificate;

p. Ensuring all blasters shall deliver their blasting certificates to the Mine Manager or designate when commencing employment.

5.8. Blasting Procedures

5.8.1. General Rules

Blasting operations must conform to the following:

a. No person shall enter the blast site without authorization;

b. Any incident involving a premature or unexpected explosion must be reported at once to your immediate supervisor or, if not available, to the nearest next-in-line GKM supervisor, Mine Manager and the SHRT/E Department immediately (*OP 1026: Incident & SHE Non-Conformance Documentation Process*). The appropriate territorial regulatory authorities will also be notified if required;

c. Smoking and the use of an open flame are strictly forbidden at any time while handling explosives or whenever explosives are in the vicinity or within a proximity of 20m;

d. Explosives must not be taken to the blast area until ready to load. Return all unused explosives to the storage boxes and magazines;

e. All holes loaded in the same pattern shall be blasted in one blasting sequence;

f. Avoid having explosives and detonators lying together when loading, except for the purpose of making up primers;

g. Never leave detonators or explosives near any electric cables. All blasting wires must be kept insulated from the ground or other conductors. Lead wires must not be tied or wrapped around steel pipe or any other metal objects. Never strike, tamper with, or attempt to remove the contents or wires of a detonator; and

h. Where loaded holes are present, and atmospheric electrical activity is detected, the area must be evacuated as directed by the Drill/Blast Supervisor or Blaster in Charge.

5.8.2. Blast Notification

Refer to *MO-DOP 072 (Blast Guarding, Firing and Clearing Mining Operations Operating Procedure*)

The following requirements apply to blast notification:

a. All blasting must be done at times authorized by the Drill/Blast Supervisor and the Mine Manager or Designate;

b. Before setting off a surface blast, the Drill/Blast Supervisor and BIC must ensure any area where persons may be endangered by the blast is clear of all personnel. Vehicles must be removed from the immediate blasting area and equipment that may be damaged must be protected as outlined in *MO-DOP 072;*

c. Before setting off a surface blast, the Drill/Blast Supervisor or BIC must ensure that no wildlife are within a 1km radius of the blast, or at risk of injury or undue stress as a result of the blast. Contact the Environmental/Permitting Coordinator well in advance if nearby wildlife present a concern;

d. All Department/Contractor Managers shall be notified of a blast at least 12 hours whenever possible prior to planned blasting times. This notice shall be in the form of a written notice authorized by the Drill/Blast Supervisor;

e. Good communications must be established with all air carriers servicing the site and/or operating in the vicinity, to avoid aircraft landings or incidents during surface blasts. A notice to airmen (**NOTAM**) must be issued by the Logistics Supervisor or assigned travel representative to notify aircraft in the area of GKM of a blast;

f. Blast guards must be established at all access points to a blast area and must be guarded to ensure that no personnel have access to the blast area. The Blast Guards must be in position prior to clearing the blast area of all personnel and must remain in position until the blast has been deemed "All Clear" and released by the Drill/Blast Supervisor or BIC;

g. The Drill/Blast Supervisor will notify the Logistics Supervisor or assigned travel representative by radio to ensure aircraft safety prior to the commencement of the 10 minute blast warnings;

h. A system of radio announcements and siren warnings must be in place to alert all employees of the impending blast (30 minute warning, 10 minute warning, 2 minute warning, and "All Clear" announcement). These radio announcements must be made on the radio frequency common to all contractors at the site. The Drill/Blast Supervisor will announce "Radio Silence" at the 2 minute announcement. "Radio Silence" can only be broken in the event of an emergency or to stop the blasting sequence. Radio announcements are in addition to siren warnings;

i. The Drill/Blast Supervisor shall sound an all-clear siren after all danger from the blast has passed, and ensure that "All Clear" radio announcements are made; and

j. The BIC shall report any suspected misfire to the Drill/Blast Supervisor, Manager so that the following shift is notified.

5.8.3. Misfired Holes in a Muck Pile

Refer to *MO-DOP 072: Mine Operations – Blast Guarding, Firing, and Clearing*.

All persons who operate excavating equipment shall be made familiar with explosives recognition; an understanding of what misfires are and the actions to take when a misfire appears in the excavation face.

When a misfire is encountered by excavating equipment in a muck pile (in all quarrying and pad preparation operations) the following procedures to deal with isolating and removing the hazard in a safe manner will be followed by a Drill/Blast Supervisors, the BIC and equipment operators:

a. Upon recognition of a misfire, the equipment operator shall immediately stop digging and call the supervisor;

b. The excavating unit may resume working provided that it moved at least 8 meters away from the misfire and to another face;

c. Haul trucks, clean-up dozers and all other equipment must also stay at least 8 meters away from the misfire;

d. The BIC shall inspect the misfire. After discussion with Drill/Blast Supervisor a decision to re-blast or wash out hole will be decided in order to make the area safe. Please refer to *14.56 subsection 1-4 of NWT Mines Act*;

e. An initiated down line should not be considered sufficient evidence that the primer has been detonated;

f. Survey is to be advised of the misfire, and if safe to do so, they shall establish the coordinates of the misfire;

g. The Drill/Blast Supervisor or BIC shall attempt to determine the cause of the misfire and shall complete the misfire report;

h. The completed misfire report will be signed by the Drill/Blast Supervisor, BIC, and the Mine Manager or Designate;

i. All misfire reports shall be entered into the misfire report book. The misfire report book is to be kept in an office designated by the Mine Manager or Designate. All misfired holes shall also be reported on an incident report (*OP 1026 Incident & SHE Non-Conformance Documentation Process*) which is to be forwarded to the SHRT Department

j. All misfires shall be marked and identified;

k. If appropriate, samples of the misfired explosives and accessories should be collected, to assist with any investigation;

l. All misfires in the area of excavation shall be communicated to the excavator operator and the operator will not come within 8 meters of the misfire;

m. Any excavator material containing bulk explosives (such as loose anfo prills) is to be dumped near the center (surface) of the dump. This will mitigate the migration of any nitrates. Loose gel or other explosive products will be disposed of according to manufacturer's recommendations;

n. Boulders containing explosives will be moved to a separate location more than 8 meters away from operations and will be blasted with the next blast.

5.9. Disposal of Unused Explosives

General

5.9.1. In the event that it is necessary to dispose of un-used explosives (includes detonators and detonating cord) the manufacturer shall be contacted to determine the appropriate method of disposal. A safe work plan will be approved by the Drill/Blast Supervisor and the SHRT Superintendent prior to the disposal of the explosives.

5.9.2. A Blast Report will be used to document the destruction of all blasting agents, explosives, detonators, and detonating cords that are destroyed in a blast. This record shall be included in magazine inventories.

5.10. Environmental Considerations

5.10.1. Persons involved with blasting must be familiar with and follow all permit / licence requirements established for the project, and in particular adhere to specified setback distances from water.

5.10.2. Any oil or lubricant spillage occurring in the work place must be cleaned up and reported to the Environment department. Where any explosive is spilt or dropped onto the ground before blasting, it must be picked up and repacked into the charge. See *OP 008: Maintenance Waste; and Emergency Response & Spill Contingency Plan*.

5.10.3. As required by explosives regulations, competent persons responsible for the use of blasting materials shall burn all subject packaging which were used for explosive materials. This packaging must be inspected prior to burning to ensure no explosives were inadvertently left in them. The burn will normally be done in a small fire inside a burn cage, at a location where there is minimal risk of the fire causing harm (to persons, equipment or the environment). The burning cage will be inspected and of good condition prior to use. Burning will not take place within 500m of loaded holes, or if there is unfavourable weather conditions. Suitable fire extinguisher equipment shall be readily available, and the fire must be continuously supervised while active burning is in progress.

See *OP 009: Open Fires (Burn Pity) & OP 010: Waste Management Program*.

5.11. Special Precautions for Snowmobile Operations During Periods of Surface Blasting

5.11.1. It is the responsibility of the snowmobile operator's Supervisor to ensure that they are out of the danger zone prior to a blast. It is the responsibility of the snowmobile operator's Supervisor to communicate to the Drill/Blast

Supervisor on blast day on the whereabouts of his/her snowmobile operators.

5.11.2. All snowmobile operators and snowmobiles must be accounted for prior to any surface blast.

5.11.3. The system of radio announcements is in place to alert all personnel of the impending blast (i.e., 30 minute warning, ten-minute warning, two-minute warning and "All Clear" announcement).

5.11.4. These radio announcements are in addition to siren warnings. Snowmobile operators may not hear these radio announcements due to the noise of the machine.

5.11.5. When snowmobile operators are within 1 kilometer of the point when approaching by lake ice or within 1 kilometer of quarrying or surface blasting operations when approaching by land they must call the site office to determine if it is safe to proceed.

6.0 APPROVAL

Name	Title	Date	Signature
Shiwley Paul	SHR Superintendent		
Shayne Paul	Mining Manager		

7.0 REVISION HISTORY

Noted below is the revision history of this document.

Revision	Date	Comments
A	June 3, 2013	Initial Issue of GKP Management System Documents
B	June 12, 2013	DBCI Comments Incorporated
C	July 13, 2013	JDS Comments Incorporated
0	August 19, 2013	Approved for Use
1	December 19, 2014	Included references to following permit and license requirements (Changes to role of persons involved with blasting and Section 4.9). Included R. Coolen comments for 1.0, 4.3.2, 4.7.2. Incorporated revisions/updates by S.Paul & E. Knee (4.3.2, 4.4.2, 4.6)

2	August 10, 2015	Change reference to REC 001A Spill Response to Emergency Response & Spill Contingency Plan
3	August 25, 2017	Format and Content Updated
4	May 1, 2018	OP reviewed by HOD, content & format updated
5	October 10, 2021	Revisions to maintain compliance to wildlife management and monitoring plan.

8.0 DEFINITIONS

8.1. TDG: Transportation of Dangerous Goods

9.0 REFERENCES and RELATED DOCUMENTS

9.1. NWT Mine Health & Safety Act and Regulations, Sections 14.01 – 14.08 & 14.15 - 14.60

9.2. Explosives Act and Regulations (Canada)

9.3. Explosives Branch of the Department of Natural Resources (Canada) – Explosives Storage Requirements

9.4. Explosives Branch of the Department of Natural Resources (Canada) – Magazine Standards for Blasting Explosives and Detonators

9.5. Explosives Branch of the Department of Natural Resources (Canada) – User Manual: Quantity Distance Tables

9.6. Ammonium Nitrate Storage Facilities Regulations C.R.C., c. 1145

9.7. Emergency Response & Spill Contingency Plan

9.8. OP 1004: SHE Objectives

9.9. OP 1010: Operational Control

9.10. OP 1026: Incident and SHE NC Documentation Process, Reporting and Investigation

9.11. OP 008: Maintenance Waste

9.12. OP 009: Open Fires (Burn Pit)

9.13. OP 010: Waste Management

9.14. OP 102: ATV, Argo and Snowmobile Operation

9.15. MO-DOP 072: Blast Guarding, Firing and Clearing

10.0 APPENDIX 1: JOB RISK ASSESSMENT

SECTION A - GENERAL INFORMATION	
Job/Task Description:	
Job/Task Objective:	
Date JRA Conducted:	**Department:**
JRA Leader:	**JRA Recorded by:**
List Equipment/tools required for task:	
Do the task activities impact on other people/work? Yes ☐ / No ☐ If 'Yes' indicate who/what and how as well include them in the JRA	

SECTION B – JOB/TASK INFORMATION

#	Task /Activity Step	Hazards	Unwanted Event	Controls in place	Residual Risk #

JRA Comments/Remarks:

SECTION C - SIGN OFF			
	Name	**Signature**	**Date**
Supervisor/Lead:			
Team member/s:			

DEPARTMENT OPERATING PROCEDURE – *Clearance and Notification of Blasting*

Revision:	3	**Replaces:**	2
APPROVED:	*Original Signature: Refer to Item 6. APPROVAL*		

1.0 PURPOSE

To ensure that the blast area is clear of personnel and equipment and that notification is given prior to and following a blast.

2.0 SCOPE

This procedure applies to the Mine Supervisor, the Drill/Blast Supervisor and all employees working at the Gahcho Kué Mine site.

3.0 RESPONSIBILITIES

The Mine Supervisor is responsible for ensuring that all Mine Workers are notified of a blast, and that all personnel and equipment are clear of the blast area.

3.1 The Drill/Blast Supervisor is responsible for notifying Airstrip personnel.

3.2 The Drill/Blast Supervisor is responsible for notifying the Mine Supervisor and all personnel of the blast times and for providing the required blast warnings.

3.3 All personnel at the mine site are responsible for following this procedure.

4.0 CRITICAL CONTROLS

If not currently available, these will be identified during the next document review when the Job Risk Assessment is completed.

5.0 PROCEDURE

5.1. The Drill/Blast Supervisor and Mine Supervisor will notify all mining employees of the impending blasting times during the daily crew line-up at the beginning of each shift.

5.2. The Drill/Blast Supervisor will ensure that the daily blasting times are posted at all mine entrances at the beginning of the shift.

5.3. The Drill/Blast Supervisor, in consultation with the blaster, will determine the "Blast Danger Zone".

5.4. The Drill/Blast Supervisor will inform the GK Airstrip of the 30 minute blast warning.

5.5. The Drill/Blast Supervisor will broadcast the 30 minute on the appropriate radio channels using the **All Alert Channel**.

5.6. The Drill/Blast Supervisor in consultation with the Mine Supervisor will assign personnel the duties of Guards during the blasting procedure.

5.7. The Mine Supervisor will instruct all workers and equipment operators to evacuate the blasting area at the appropriate time.

5.8. The Mine Supervisor will inform the Drill/Blast Supervisor that the blast area has been cleared of personnel and equipment and that the Guards are in position.

5.9. The Drill/Blast Supervisor will inform the GK Airstrip Communicator of the ten-minute blast warning.

5.10. The Drill/Blast supervisor will conduct a Blast radius sweep and ensure no personnel, wildlife and/or equipment are within their assigned blast clearance zones**Through the blast warning confirmations, Environment will also provide notification if any known wildlife is within the 1km radius prior to the 10-minute warning.**

5.11. The Drill/Blast Supervisor will broadcast the ten-minute warning on the **All Alert Channel.**

5.12. The Drill/Blast supervisor will receive confirmation on the **Mining Channel** from all Departments that their personnel are clear of the affected Blast Area.

5.13. The Blaster will notify the Drill/Blast Supervisor when the blast is ready to be initiated.

5.14. The Drill/Blast Supervisor will inform the GK Airstrip Communicator of the two-minute warning.

5.15. At the two-minute warning the Airstrip Communicator will confirm that no aircraft are in the vicinity of the blast area, or taking off or landing at the airstrip.

5.15.1. If an aircraft is in the vicinity or taking off or landing at the airstrip, the blast must be delayed until all aircraft have landed or left the vicinity of the blast area.

5.16. Confirmation will be received from all guards that their areas are locked down. The Drill/Blast Supervisor will then call for radio silence on the **Mining Channel.**

5.17. The Drill/Blast Supervisor will ensure that the blast warning signal siren is sounded for one full minute.

5.18. At the completion of the one-minute siren warning, the Drill/Blast Supervisor will instruct the Blaster to proceed with the initiation of the blast.

5.19. After the blast has been set off the Blaster will inspect the blast site, following the set procedure and then will inform the Drill/Blast Supervisor that the blast area has been cleared of explosive hazards.

5.20. The Drill/Blast Supervisor will ensure that the all-clear siren is sounded for 20 seconds.

5.21. The Drill/Blast Supervisor will notify the GK Airstrip Communicator of completion of blasting activities.

5.22. The Drill/Blast Supervisor will instruct all guards to resume their regular duties after the "**ALL CLEAR**" has been announced on the **All Alert Channel**.

5.23. The following blasting announcements and blasting signals will be given at the appropriate times:

BLASTING ANNOUNCEMENTS

30 Minute Warning on All Alert Channel - Attention all personnel, this is a 30 minute warning to blast at the Pit (5034, Hearne or Tuzo). I repeat, this is a 30 minute warning to blast at the Pit (5034, Hearne or Tuzo).

10 Minute Warning on All Alert Channel - Attention all personnel, this is a 10-minute warning to blast at the Pit (5034, Hearne or Tuzo).I repeat, this is a 10-minute warning to blast at the Pit (5034, Hearne or Tuzo).

2 Minute Warning on Mining Channel - Attention all personnel, this is a 2-minute warning to blast at the Pit (5034, Hearne or Tuzo). Radio silence will be in effect until the all clear has been sounded. However, in the case of an emergency, radio silence can be broken to stop the blast. I repeat, this is a 2-minute warning to blast at the Pit (5034, Hearne or Tuzo). Radio silence will be in effect until the all clear has been sounded. However, in the case of an emergency, radio silence can be broken to stop the blast.

All Clear Announcement on All Alert Channel – Attention, all personnel, the blast area is all clear. I repeat, the blast area is all clear.

BLASTING SIGNALS

2 Minute Signal - At the 2 minute warning, a 1 minute siren will be sounded.

All Clear Signal - At the all clear, a 20 second siren will be sounded.

6.0 APPROVAL

Name	Title	Date	Signature
Shayne Paul	Mining Manager		

7.0 REVISION HISTORY

Noted below is the revision history of this document.

Revision	Date	Comments
A	June 5, 2015	Initial Draft of Document
0	October 26, 2015	APPROVED
1	February 1, 2017	APPROVED
2	May 29, 2018	OP reviewed by HOD, Format and Content Updated
3		

8.0 EQUIPMENT

None

9.0 DEFINITIONS

None

10.0 REFERENCE and RELATED FORMS/DOCUMENTS

10.1. NWT Mine Health and Safety Act and Regulations

11.0 APPENDIX 1: JOB RISK ASSESSMENT

SECTION A - GENERAL INFORMATION	
Job/Task Description:	
Job/Task Objective:	
Date JRA Conducted:	**Department:**
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Do the task activities impact on other people/work? *Yes* ☐ */ No* ☐ *If 'Yes' indicate who/what and how as well include them in the JRA*	

SECTION B – JOB/TASK INFORMATION					
#	Task /Activity Step	Hazards	Unwanted Event	Controls in place	Residual Risk #

JRA Comments/Remarks:					

SECTION C - SIGN OFF			
	Name	**Signature**	**Date**
Supervisor/Lead:			
Team member/s:			

Appendix B Migratory Bird Nest Management Plan (De Beers 2015a)

De Beers

Group of Companies

Gahcho Kué Mine

Migratory Bird Nest Management Plan

June 2015

PLAIN LANGUAGE SUMMARY

The Gahcho Kué Mine (Mine) is an open-pit diamond mine located at Kennady Lake in the Northwest Territories (NWT). De Beers Canada Inc. (De Beers) received approval from the Mackenzie Valley Land and Water Board for the mining and milling operations in the fall of 2014. Construction was initiated shortly thereafter. Construction will proceed for 2 years, followed by operations for 10 years and finally reclamation for another 12 years.

To access the ore bodies (kimberlite) located under Kennady Lake, De Beers will dewater much of the lake. This dewatering activity requires the construction of several perimeter dykes to prevent the inflow of water to Kennady Lake from small upstream lakes. Flooding at these upstream lakes is predicted to occur as a result of the dykes. Flooding will occur for approximately three years and affect an area of approximately 100 hectares (ha).

The areas that will be affected by flooding provide habitat to wildlife, including migratory birds. The *Migratory Birds Convention Act* (1994) *(MBCA)* prohibits disturbance of designated migratory birds, their eggs and young during the breeding season. Land clearing required for mine construction, is scheduled to occur outside the breeding season to avoid any potential disturbance of breeding birds. Flooding as a result of dyke construction however will occur during the breeding season and therefore additional mitigation of migratory birds is required.

The purpose of this document is to outline the mitigation De Beers will implement to protect breeding birds, their eggs, and young during the anticipated flooding of upstream lakes.

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1 INTRODUCTION

De Beers Canada Inc. (De Beers) will conduct open-pit mining, milling, and associated activities at the Gahcho Kué Mine (Mine), located approximately 280 kilometres (km) northeast of Yellowknife, Northwest Territories (NWT), and approximately 80 km southeast of the Snap Lake Mine. The total area of the Mine footprint is estimated to be 1,235 hectares (ha) including approximately 393 ha of upland and wetland/riparian habitat, and 842 ha of open water. The Mine site and infrastructure includes three open-pits, several roads, buildings, dykes, an airstrip, processing plant, two mine rock piles, and course and fine processed kimberlite storage facilities.

Development and operation of the Mine has the potential for incidental disturbance of migratory birds and their nests through both the land clearing activities to develop site infrastructure and flooding following the re-directing of water from lakes D2, D3, and E1. This Migratory Bird Nest Management Plan (the Plan) describes how these impacts will be mitigated.

The *Migratory Birds Convention Act* (1994) (*MBCA*) prohibits the harm of migratory birds and the disturbance or destruction of nests and eggs. The original aim of this legislation in the early 1900s was to conserve migratory bird populations from overharvest (CWS 2007). Inadvertent disturbance or destruction of migratory birds has been termed “Incidental Take” and Environment Canada currently lacks legal mechanisms to regulate Incidental Take (CWS 2007). This management plan for migratory bird nests in the areas of lakes D2, D3, and E1 describes the mitigation options to reduce impacts to nesting birds and to comply with the *MBCA*.

General mitigation to reduce effects to migratory birds and other wildlife is described in the Wildlife and Wildlife Habitat Protection Plan (WWHPP; De Beers 2014a). Specific mitigation to address the unavoidable increases in water level of lakes D2, D3, and E1 during the migratory bird nesting season (beginning of May to mid-August, Environment Canada 2014) are described herein.

De Beers has considered previous questions and advice from Environment Canada, including information requests and associated responses during the environmental review process (De Beers 2012a), Environment Canada’s Technical Report Submission to the Review Panel (Environment Canada 2012), De Beers’ response (De Beers 2012b) and the fact sheet *Planning Ahead To Reduce The Risk Of Detrimental Effects To Migratory Birds, And Their Nests And Eggs* (Environment Canada 2013). In addition, this document incorporates

suggestions provided by Environment Canada, Canadian Wildlife Service in a face-to-face meeting (Dufour 2015, pers. comm.).

De Beers appreciates the suggestions and feedback received from CWS on an earlier draft of this report and has also taken these into consideration (CWS 2015).

1.1 CONCORDANCE

This Migratory Bird Nest Management Plan will serve to meet De Beers' obligations relevant to migratory birds in the NWT, the Review Panel Measures (listed in MVEIRB 2013), follow-up program requirements and commitments made by De Beers (MVEIRB 2013). All relevant requirements pertaining to migratory birds are provided in the concordance table below (Table 1). The concordance table also indicates where these requirements are met in both the Wildlife Effects Monitoring Program (WEMP; De Beers 2014b) and the WWHPP (De Beers 2014a).

Table 1 Concordance Table of Requirements for Migratory Bird Nest Protection

Legislation/Regulation	Requirement	Corresponding Section in Migratory Bird Nest Management Plan	Corresponding Section in WWHPP[(a)]	Corresponding Section in WEMP[(b)]	Responsible Regulatory Agency
Migratory Birds Convention Act, Migratory Bird Regulations	The taking of nests or eggs of migratory game or insectivorous or nongame birds shall be prohibited, except for scientific or propagating purposes under such laws or regulations as the High Contracting Powers may severally deem appropriate.	Entire Document	Section 5.3.5	n/a	EC-CWS
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers commits to providing Environment Canada with a plan to avoid the incidental take of nests and eggs from flooding of terrestrial habitat.	Entire Document	n/a	n/a	EC-CWS
MVEIRB Panel Decision, July 19, 2013. Wildlife Commitments	De Beers agrees that if species at risk or their nests and eggs are encountered during Project activities or monitoring programs, the primary mitigation measure for each species should be avoidance. The species-specific nest setback distances recommended by Environment Canada will be used to determine zones of avoidance. Monitoring will be undertaken to ensure that mitigation measures are successful and the results of monitoring will be provided to the relevant agency and De Beers will ensure that mitigation and monitoring strategies are consistent with any applicable status reports, recovery strategies, action plans and management plans that may become available during the duration of the project and should consult with GNWT and Environment Canada on adaptive management strategies should they be required. In instances where an at risk avian species nests within the established Project footprint and the setback distances specified cannot be met, nest-specific guidelines and procedures will be developed in consultation with Environment Canada to protect the nest.	Section 3	Section 3 Section 5.3.5	Section 3.3	EC-CWS GNWT

(a) De Beers 2014a.

(b) De Beers 2014b.

WWHPP = Wildlife and Wildlife Habitat Protection Plan; WEMP = Wildlife Effects Monitoring Program; EC-CWS = Environment Canada, Canadian Wildlife Service; MVEIRB = Mackenzie Valley Environmental Impact Review Board; n/a = not applicable; GNWT = Government of the Northwest Territories.

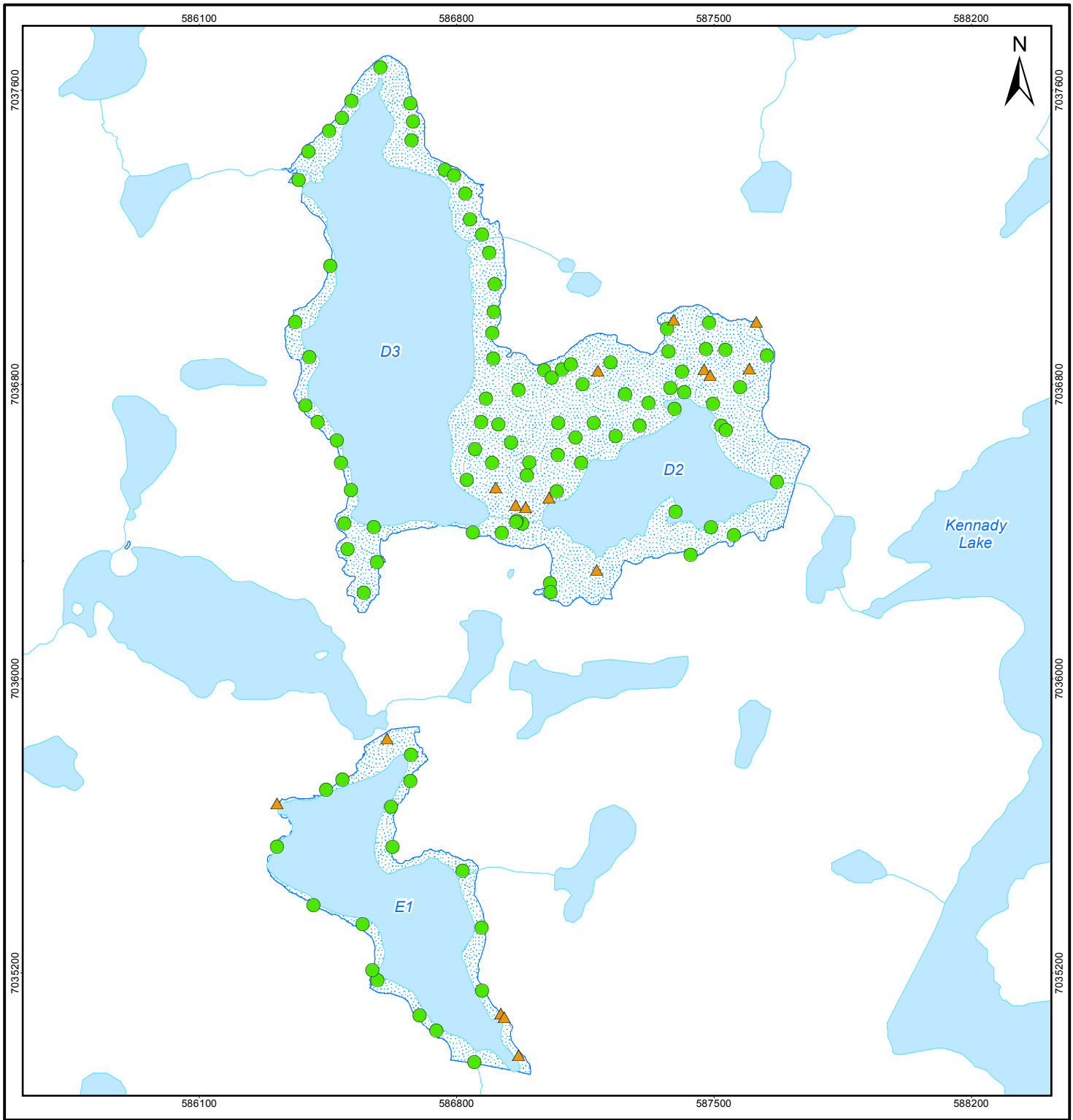
2 MIGRATORY BIRDS

Upland bird surveys were completed in 2013 to document the presence of nesting of migratory birds in the areas that will be flooded surrounding lakes D2, D3, and E1 (Golder 2014). Habitats in the area included riparian shrub, heath tundra, heath tundra with shrub, rock outcrops and sedge wetland (Appendix A, Photographs A-1 to A-3). A total of 143 breeding territories (13 species) and 15 nests (five species) were identified during the surveys (Appendix A, Photograph A-4; Table 2; Figure 1). Survey results indicate a territory density of 2.4 territories per hectare. Territory density and species diversity were greatest in shrub habitat near lake shores and at streams (Golder 2014).

Table 2 Number of Upland Breeding Bird Species Territories and Nests Observed during Upland Breeding Bird Territory and Nest Surveys in 2013

Common Name	Scientific Name	Nests	Territories
Least sandpiper	*Calidris minutilla*	1	3
Stilt sandpiper	*Calidris himantopus*	0	1
Gray-cheeked thrush	*Catharus minimus*	0	1
Yellow warbler	*Setophaga petechia*	0	5
Blackpoll warbler	*Setophaga striata*	0	3
Yellow-rumped warbler	*Setophaga coronata*	0	2
Lapland longspur	*Calcarius lapponicus*	7	46
Savannah sparrow	*Passerculus sandwichensis*	2	42
American tree sparrow	*Spizella arborea*	2	29
Harris' sparrow	*Zonotrichia querula*	3	6
White-crowned sparrow	*Zonotrichia leucophrys*	0	2
Unknown redpoll species	*Acanthis* spp.	0	2
American robin	*Turdus migratorius*	0	1
Total		**15**	**143**

Baseline studies were also undertaken at the Gahcho Kué Project to describe general species occurrence and density in 2004 and 2005 in plots surrounding Kennady Lake (De Beers 2010). These surveys detected a total of 28 species of songbirds, shorebirds, and ptarmigan.



LEGEND

- Watercourse
- Waterbody

Survey Observation

- Nest
- Territory
- Planned Inundation Area

NOTES

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

GAHCHO KUÉ PROJECT

Upland Breeding Bird Territories and Nests Near Lakes D2, D3, and E1, 2013

PROJECTION: UTM Zone 12	DATUM: NAD83	De Beers Group of Companies
Scale: 1:15,000		
300 150 0 300 Metres		
FILE No: B2015-Wild-001-GIS		DATE: May 27, 2015
JOB NO: 1415267	REVISION NO: A	**Figure 1**
OFFICE: GOLD-CAL	DRAWN: CW / CHECK: DP	

I:\CLIENTS\DE_BEERS\1415267\Mapping\MXD\Wildlife\B2015-Wild-001-GIS.mxd

2.1 DISTURBANCE PATHWAYS

Pathways that have the potential to disturb migratory birds and nests include land clearing for development of the Mine site and infrastructure, and flooding of terrestrial areas surrounding lakes D2, D3, and E1 following dyke construction. A full assessment of Project effects to migratory birds is provided in the 2010 EIS (Section 11.12 Subject of Note: Species at Risk and Birds in De Beers 2010).

2.1.1 Mine Infrastructure Construction and Operation

The development of Mine site infrastructure includes three open-pits, several roads, buildings, 14 dykes, an airstrip, processing plant, two mine rock piles, and coarse and fine processed kimberlite storage facilities. Mitigation to avoid disturbance to migratory birds in these areas is described in the WWHPP (De Beers 2014a).

The dewatering of Kennady Lake may result in changes in downstream flows (e.g., isolation and diversion, altered drainage patterns) and water levels, which may affect the quantity of riparian habitat, and could alter species at risk and bird movement and behaviour. Effects to bird nests are not anticipated as water levels will not exceed historic levels. Based on the controlled pumping rates, bird nests around Area 8, Lake N11, and downstream are not at risk of flooding. Water level increases are possible at Lake A1 due to dewatering from Area 7 to Area 8 and subsequent flow to Lake A1; however, this will be controlled to avoid flooding beyond the high water mark during the nesting season.

2.1.2 Flooding of Terrestrial Areas Surrounding Lakes D2, D3, and E1

De Beers is currently planning to install dykes F and G between the fall 2015 and winter 2016 to divert water away from Kennady Lake. Water levels in lakes D2, D3, and E1 are predicted to increase following freshet in the first year post dyke construction (Year 1) and will continue to rise until operations by which time water levels are expected to stabilize (Table 3). As the water levels will rise most rapidly during freshet, the period of flooding will overlap with the migratory bird nesting season. The resulting flooded vegetation has been estimated for lakes D2, D3, and E1 for each of the operation years that flooding is predicted (Table 3). The total amount of annual vegetation surrounding lakes D2 and D3 predicted to be flooded from operations Year 1 to 4 is 99.7 ha. The total amount of annual vegetation surrounding Lake E1 that is predicted to be flooded during operations by Year 2 is 6.2 ha.

The dewatering of Kennady Lake will result in changes in downstream flows and water levels. However, effects to bird nests are not anticipated as downstream water levels will be within the natural range of variability. Water level increases are possible at Lake A1 due to dewatering from Area 7 to Area 8 and subsequent flow to Lake A1; however, this will be controlled to avoid flooding beyond the high water mark during the nesting season.

Table 3 Predicted Timing and Extent of Flooding at Lakes D2, D3, and E1

Timing of Flooding	Operation Year	Extent of Flooding (ha)	
		Lakes D2 and D3	Lake E1
2015	n/a	0.0	0.0
June-October 2016	1	66.6	5.1
June-October 2017	2	18.7	1.1
June-October 2018	3	9.8	0.0
June-October 2019	4	4.6	0.0
Total		**99.7**	**6.2**

Note: Annual flooding estimates will be in addition to flooding from previous years.

ha = hectares; n/a = not applicable.

3 MITIGATION AND MANAGEMENT

To avoid 'Incidental Take' as outlined in the *MBCA*, Environment Canada recommends completing activities that destroy or alter habitat or have the potential to destroy nests to occur outside of the migratory bird nesting season (Environment Canada 2013). Migratory bird nesting season is defined to occur annually from the beginning of May to mid-August (Environment Canada 2014). In addition to the environmental design features used for limiting effects to birds from the Mine, mitigation for birds and bird species at risk include the following (Environment Canada 2013; De Beers 2014a):

- restrict land clearing activities to outside the migratory bird breeding/nesting season;
- perform pre-clearing nest sweeps if clearing during the breeding season is required;
- avoid disturbance to active nest sites; and
- deter birds from nesting on man-made structures and active work areas.

Mitigation options specific to lakes D2, D3, and E1 are described below.

3.1 MITIGATION OPTIONS FOR FLOODING

The following options have been considered to reduce the risk that flooding poses to migratory birds:

- deploying visual and audio bird deterrents;
- changing dyke construction schedule to delay the onset of water level changes;
- actively flooding lakes D2, D3, and E1 to full equilibrium within a single year prior to the nesting season;
- eliminating the habitat in the flood zones of lakes D2, D3, and E1 with a controlled burn;
- covering key nesting habitat within the flood zones of lakes D2, D3, and E1;
- disturbing vegetation and soil in the flood zones to reduce attractiveness to ground nesting birds; and
- removing standing vegetation cover types with the highest potential as nesting bird habitat and placing it about the high water mark.

Each of these mitigation options is discuss in greater detail below.

3.1.1 Bird Deterrents

Commercially available visual deterrents and noise makers could be deployed parallel to and facing the shoreline of lakes D2, D3, and E1 prior to nesting season and remain operational during the nesting season. A variety of predator type calls could be broadcast to prevent habituation for a variety of upland bird species. Noise makers can be equipped with a solar panel to provide power for continuous operation. Visual deterrents may include scare balloons, human, and predator effigies and other visual deterrents (Appendix B). The best scare balloons have large predator eye designs that look threatening to the birds and reflective flash tape rustles in the breeze, preventing habituation in the area.

The location and distribution of visual deterrents would have to be rearranged occasionally so as to maintain their effectiveness, and should be deployed prior to migratory bird nesting period (i.e., the beginning of May, or prior to 50% snow melt).

3.1.2 Changing Dyke Construction Schedule

Altering the dyke construction schedule to delay onset of water level changes was investigated as an option to prevent or minimize flooding during the nesting season. However, most of the water level changes are anticipated to occur during spring freshet, which typically occurs in May and June. Alteration of the dyke construction schedule would therefore have little to no effect on the timing of freshet or to the extent of flooding during the nesting season.

3.1.3 Active Flooding

Flooding during the nesting season could be avoided by actively filling lakes D2, D3, and E1 to the full equilibrium level within a single year prior to the nesting season. Dewatering is regulated by the Mackenzie Land and Water Board via the Water Licence (MV2005L2-0015) and associated Construction Water Management Plan (De Beers 2014c). The locations for dewatering, both the intake and the outflow, have been publicly reviewed and approved. Any adjustments to the location of dewatering activity would be subject to an amendment to the water licence and potentially an environmental assessment. Furthermore, because the dykes will be constructed in the fall of 2015, there may be insufficient time between dyke construction and freeze up to conduct the full amount of pumping required to reach equilibrium.

3.1.4 Controlled Burn

Controlled burning could be used to eliminate vegetation and reduce the quality of nesting habitat in areas scheduled for flooding. A controlled burn along the shores of lakes D2, D3, and E1 could be undertaken prior to flooding. A controlled burn would be carried out by fire experts under specified weather conditions with appropriate permits and regulations. However, this is not considered a suitable option, as the existing tundra is not particularly flammable, and as such large amounts of fuel would be required. This would also lead to the possibility of fuel contamination of the water as the lake levels rise.

3.1.5 Covering

Prior to nesting season, key habitats with high potential for nesting birds within the flood zones could be covered with tarp or other material to reduce access by birds. This option is not considered feasible for several reasons. The total area of predicted flooding in the first year is over 70 ha, spread irregularly around the lake shoreline, in an area without access for vehicles or heavy equipment to deploy the cover material. If cover material could be deployed by hand, frequent maintenance would be required to prevent the cover from blowing away and continual adjustments would be required as water levels rise.

3.1.6 Disturbing Vegetation and Soil

Disturbing vegetation and soil (grubbing) could be conducted to reduce the attractiveness of the area to ground nesting birds in the areas adjacent to lakes D2, D3, and E1. This option is not considered to be feasible due to a lack of access for the required earth moving equipment. The lakes are located west of Kennady Lake, where there is no road access for heavy equipment and support vehicles (e.g., fuel and lubricant trucks). Winter grubbing is not feasible as the ground would be too frozen to disturb. Further, grubbing would lead to soil erosion when flooding begins, likely triggering the *Fisheries Act* for the deposition of deleterious substances (see Erosion and Sediment Management Plan, De Beers 2014d).

3.1.7 Standing Vegetation Removal

The areas subject to flooding as a result of dyke construction at lakes D2, D3, and E1 contain willow and shrub, isolated patches of spruce forest, and areas of low willow, tundra and exposed rock (Appendix A, Photographs A1, A2, and A3). Baseline studies indicated that these cover types provide suitable habitat for nesting birds (Golder 2014). Surveys completed in 2013 indicated that territory

density and species diversity were greatest in shrub habitat near lake shores and at stream inflows and outflows. Different levels of effort would be required to remove the varying types of vegetation; however, effort could be focused on specific areas and vegetation cover types with the highest potential as nesting bird habitat.

Field crews with brush cutters and other hand tools for clearing vegetation could clear standing vegetation (i.e., trees, shrubs, and willows) in the flooded areas prior to dyke construction (and outside of the nesting season). Ground clearing could be staggered over two years for Lake E1 and over four years for lakes D2 and D3, so that only the vegetation expected to be flooded in the following year would be affected, therefore minimizing the habitat loss temporally. Vegetation clearing would include the anticipated flooding for each year until water levels reach equilibrium (Table 3).

3.2 PREFERRED MITIGATION OPTIONS

Upon review of the available mitigation options, De Beers has selected two of the above mitigation options for implementation:

- the installation of bird deterrents specifically targeting ground nesting birds; and
- removal of standing vegetation to reduce the attractiveness of these areas to tree and shrub nesters.

De Beers will install visual bird deterrents to further deter birds from nesting. Bird deterrents would be set-up in the spring prior to 50% snow melt when nesting is initiated. Deterrents will target the area above the shoreline anticipated to be flooded each year. De Beers is proposing to install deterrents such as noise makers including the Phoenix Wailer (Phoenix Agritech) and BirdXPeller Pro (BirdX Canada), fox decoys, and visual deterrents including Terror Eyes and an fox replicas (BirdX Canada) (Appendix B). De Beers plans to evaluate the effectiveness of the proposed bird deterrents during the summer of 2015 at Kennady Lake. Locations of deterrents will be visited and simple area searches for nests surrounding a sample of the deterrents and a sample of similar areas without deterrents will be conducted. The final selection of deterrents will be made following the evaluation of this work.

De Beers will complete standing vegetation removal (e.g., shrub and trees) in key areas known to be attractive to migratory birds. A field crew consisting of one biologist and two community assistants will use brush cutters to clear vegetation in the fall of 2015. Cleared vegetation will be moved above the anticipated high

water mark. Effects of vegetation clearing to other wildlife are anticipated to be negligible.

Vegetation clearing will occur in the fall of 2015, but audio and visual deterrents will be deployed on an annual basis for the three year period until water levels have stabilized.

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5 ACRONYMS AND GLOSSARY

5.1 ACRONYMS AND ABBREVIATIONS

CWS	Canadian Wildlife Service
De Beers	De Beers Canada Inc.
EC-CWS	Environment Canada, Canadian Wildlife Service
MBCA	*Migratory Birds Convention Act*
Mine	Gahcho Kué Mine
MVEIRB	Mackenzie Valley Environmental Impact Review Board
MVLWB	Mackenzie Valley Land and Water Board
NWT	Northwest Territories
Project	Gahcho Kué Project
WEMP	Wildlife Effects Monitoring Program
WWHPP	Wildlife and Wildlife Habitat Protection Plan

5.2 UNITS OF MEASURE

ha	hectares
km	kilometres
m	metres

5.3 GLOSSARY

Adaptive Management	The exact definition of adaptive management varies among monitoring components, but typically adheres to having four themes as follows (WLWB 2010): 1) learning in order to reduce management uncertainties; 2) using what is learned to change policy and practice; 3) focusing on improving management; and 4) doing the above in a formal, structured and systematic way.
Freshet	A sudden overflow of a stream caused by heavy rain or nearby thawing of snow or ice.
Grubbing	Disturbing vegetation and soil.
Habitat	The physical location or type of environment in which an organism or biological population lives or occurs.

APPENDIX A

PHOTOGRAPHS

Photograph A-1 Riparian Area at Outflow of Lake D2

Photograph A-2 Heath Tundra with Willows near Lake D2

Photograph A-3 Sedge Wetland near Lake D3

Photograph A-4 American Tree Sparrow Nest among Willows

APPENDIX B

DETERRENT OPTIONS

Bird Deterrent	Details
Phoenix Wailer 	• auditory deterrent for use during nest initiation period in key areas of concern • emits a range of electronic and natural sounds
Fox Decoy 	• foxes are ground nest predators • decoys will pivot in the wind
Eagle Decoy 	• eagles are nest predators • eagle wings will flap in the wind
Terror Eyes 	• mimic predators
BirdXPeller Pro 	• auditory deterrent that emits a range of predator and electronic sounds
Super BirdXPeller Pro 	• auditory deterrent that emits a range of predator and electronic sounds