



KEMESS UNDERGROUND PROJECT


## **Wildlife Management and Monitoring Plan**

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# Wildlife Management and Monitoring Plan

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Appendix A. Effectiveness of Proposed Caribou Mitigation

## ACRONYMS AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

<b>ATV</b>	All-Terrain Vehicle
<b>AuRico</b>	AuRico Metals Inc.
<b>BC</b>	British Columbia
<b>BC EAO</b>	British Columbia Environmental Assessment Office
<b>BC MEMPR</b>	British Columbia Ministry of Energy, Mines and Petroleum Resources
<b>BC MFLNRORD</b>	British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development
<b>BC MOE</b>	British Columbia Ministry of Environment
<b>BC MWLAP</b>	British Columbia Ministry of Water, Land and Air Protection
<b>BFZ</b>	Bear Free Zone
<b>BMPs</b>	Best Management Practices
<b>CEAA</b>	<i>Canadian Environmental Assessment Act</i>
<b>CEO</b>	Chief Executive Officer
<b>CLMA</b>	Caribou Landscape Management Association
<b>cm</b>	Centimetre
<b>COO</b>	Chief Operating Officer
<b>dB</b>	Decibel
<b>EA</b>	Environmental Assessment
<b>EAC</b>	Environmental Assessment Certificate
<b>EC</b>	Environment Canada
<b>ECCC</b>	Environment and Climate Change Canada
<b>EMC</b>	Environmental Monitoring Committee
<b>EMP</b>	Environmental Management Plan
<b>EMS</b>	Environmental Management System
<b>FPAC</b>	Forest Products Association of Canada

<b>FRPA</b>	<i>Forest and Range Practices Act</i>
<b>IEM</b>	Independent Environmental Monitor
<b>H&amp;S</b>	Health and Safety
<b>ILMB</b>	Integrated Land Management Bureau
<b>km</b>	Kilometre
<b>KS</b>	Kemess South
<b>KUG</b>	Kemess Underground Project
<b>LRMP</b>	Land and Resource Management Plan
<b>LSA</b>	Local Study Area
<b>m</b>	Metre
<b>ORAR</b>	Omineca Resource Access Road
<b>QA/QC</b>	Quality Assurance / Quality Control
<b>RISC/RIC</b>	Resources Information [Standards] Committee
<b>ROWs</b>	Right of Ways
<b>RSA</b>	Regional Study Area
<b>SARA</b>	<i>Species at Risk Act</i>
<b>SOP</b>	Standard Operating Procedure
<b>UWR</b>	Ungulate Winter Ranges
<b>TEM</b>	Terrestrial Ecosystem Mapping
<b>TKN</b>	Tse Keh Nay
<b>TSF</b>	Tailings storage facility
<b>UWR</b>	Ungulate Winter Ranges
<b>VCs</b>	Valued Components
<b>WHA</b>	Wildlife Habitat Area
<b>WMMP</b>	Wildlife Management and Monitoring Plan
<b>WMU</b>	Wildlife Management Unit
<b>WQG</b>	Water Quality Guidelines



# 1. PURPOSE AND OBJECTIVES

## 1.1 PURPOSE

The purpose of the Wildlife Management and Monitoring Plan (WMMP) is to identify management, mitigation and monitoring measures to limit potential effects on wildlife and wildlife habitat from the Project during the Construction, Operations, Closure, and Post-closure phases, while taking into account operational requirements and the safety of Project personnel. The WMMP identifies established conservation guidelines and environmental protection measures recommended for constructing the Project in accordance with applicable legislation and proponent commitments.

The WMMP considers the following wildlife species that were included as Valued Components (VCs) in the Application for an Environmental Assessment Certificate (EAC Application) and species at risk:

- Woodland caribou (*Ranger tarandus caribou*);
- Moose (*Alces alces*);
- Mountain goat (*Oreamnos americanus*);
- Grizzly bear (*Ursus arctos*);
- Furbearers;
- Hoary marmot (*Marmota caligata*);
- Bats;
- Raptors;
- Migratory waterbirds;
- Migratory landbirds; and
- Western toad (*Anaxyrus boreas*).

Species at risk that were either included as VCs, were a part of a VC group or were observed in the EAC Application local study area or regional study area are listed in Table 1.1-1.

**Table 1.1-1. Conservation Status of VCs and Species at Risk**

VC or Species	Scientific Name	Conservation Status and Federal Plan		
		Provincial	Federal - <i>Species at Risk Act</i> Schedule 1	Federal Plan
Chase and Wolverine Caribou Herds	<i>Ranger tarandus caribou</i>	Blue	Threatened	Recovery Strategy (Environment Canada 2014)
Thutade Caribou Herd	<i>Ranger tarandus caribou</i>	Blue	Special Concern	Management Plan (Environment Canada 2012a)

(continued)

**Table 1.1-1. Conservation Status of VCs and Species at Risk (completed)**

VC or Species	Scientific Name	Conservation Status and Federal Plan		
		Provincial	Federal – <i>Species at Risk Act</i> Schedule 1	Federal Plan
Grizzly Bear	<i>Ursus arctos</i>	Blue	n/a	n/a
Little Brown Myotis	<i>Myotis lucifugus</i>	Yellow	Endangered	Recovery Strategy (Environment Canada 2015b)
Northern Myotis	<i>Myotis septentrionalis</i>	Blue	Endangered	Recovery Strategy (Environment Canada 2015b)
Short-eared Owl	<i>Asio flammeus</i>	Blue	Special Concern	n/a
Barn Swallow	<i>Hirundo rustica</i>	Blue	Threatened	Threatened
Common Nighthawk	<i>Chordeiles minor</i>	Yellow	Threatened	Recovery Strategy (Environment Canada 2016a)
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Blue	Threatened	Recovery Strategy (Environment Canada 2016b)
Rusty Blackbird	<i>Euphagus carolinus</i>	Blue	Special Concern	Management Plan (Environment Canada 2015a)
Western Toad	<i>Anaxyrus boreas</i>	Blue	Special Concern	Management Plan (ECCC 2016b)

n/a = not applicable

The WMMP focuses on reducing the risk of direct and indirect wildlife mortality, mitigating the potential for human-wildlife conflicts, and limiting the level of disturbance to wildlife and wildlife habitat as a result of Project activities or infrastructure. Minimizing disturbance will prioritize staged management measures in order to reduce impacts to sensitive areas or periods. These measures include avoiding sensitive timing windows where practicable, use of pre-clearing surveys, and/or reducing or limiting on-site activities to include only essential activities, where practicable.

## 1.2 PERFORMANCE OBJECTIVES

The WMMP considers VCs that were identified for the environmental effects assessment during the EA process. The WMMP outlines management and mitigation measures as well as monitoring programs directed toward limiting adverse effects resulting from the Project's activities on these select wildlife species and their habitat. Performance objectives of the WMMP include the following:

- Reducing the occurrence of wildlife incidents and mortalities resulting from mine activities with an annual target of zero animal mortalities;
- Reducing the occurrence of human-wildlife interactions with an annual target of less than five grizzly bear interactions requiring deterrence;
- Reducing the loss of wildlife habitat resulting from Project activities with a target of less habitat lost than assessed in the EAC Application/EIS;

- Reduce, mitigate or avoid impacts to species at risk or of special concern under the *Species at Risk Act* (2002b) with successful reproduction from any buffered nests, roosts or dens (with consideration of depredation events);
- Manage activities to limit disruption to bird nests, mammal dens, and ungulates during calving periods throughout Project development to comply with legislative requirements; and
- Implement a wildlife monitoring program for wildlife incidents and sightings along the northern portion of the Omineca Resource Access Road (ORAR; where AuRico is the sole industrial user).

## 2. PLANNING

### 2.1 ROLES AND RESPONSIBILITIES

#### 2.1.1 Human Resources

AuRico's Executive Management Team will allocate the appropriate human resources to the EMPs for the Project. AuRico's Board of Directors has a Technical and Sustainability Committee to assist the Board in overseeing related initiatives and the proper implementation of applicable policies. The Committee periodically reviews sustainability-related policies, programs, and performance.

The roles and responsibilities for personnel are listed below and address the need for on-site personnel to communicate ultimately to the Executive Management Team on sustainability management at the Project. The responsibilities will enable effective management of environmental, commitments, and early warning and response to environmental issues, compliance with regulatory and policy requirements, and the evaluation and revision of environmental performance. The responsibilities are ultimately aimed at demonstrating diligence and transparency in AuRico's environmental and sustainability management.

Based on the current construction and operations phases workforce envisaged for the Project, the following is the proposed organizational structure and responsibilities. It should be noted that refinement and confirmation of the organizational structure will emerge as the project progresses. The organizational arrangement of the personnel responsible for environmental-related aspects is as follows:

- Chief Executive Officer (CEO);
- Chief Operating Officer (COO);
- General Manager;
- Front Line Supervisors;
- Environmental Manager;
- Environmental Technicians;
- Environmental Assistants;

- Aboriginal Group Monitors; and
- Employees and Contractors.

#### 2.1.1.1 *Chief Executive Officer*

The Chief Executive Officer (CEO) will carry the ultimate responsibility for environmental and sustainability management, both in terms of statutory compliance as well as corporate citizenship, and will direct, instruct, and approve the implementation of such management policy on site.

#### 2.1.1.2 *Chief Operating Officer*

The Chief Operating Officer (COO) will ensure that the resources required for developing, applying, and monitoring an effective EMP are available. In this respect, the COO will maintain a reporting-function relationship with the Director Environment and the General Manager.

#### 2.1.1.3 *General Manager*

The on-site General Manager will carry the accountability for the Project's environmental performance, as one of a portfolio of management responsibilities. The General Manager will instruct and approve the on-site systems and resources, by delegation to appropriate line-function personnel and with the support and advice of Mine management and supervision for planning, oversight, monitoring, and reporting.

#### 2.1.1.4 *Management and Supervisors*

Management and Supervisors will have the functional responsibility for all matters related to day-to-day environmental management and will ultimately report to the General Manager. They will interact via a supporting role with relevant on-site personnel that have specified environmental management responsibilities.

Management and Supervisors will maintain a scheduled and systematic approach to monitoring of environmental performance and follow approved EMPs and conditions, and include compiling, reviewing, and seeking approval from the General Manager, Environmental Manager (or delegate) for environmental management method statements and work instructions.

#### 2.1.1.5 *Environmental Manager*

The Environmental Manager will have the functional responsibility for environmental management matters at the Project and will provide reporting-function accountability to the General Manager. The Environmental Manager will interact with and direct on-site Environmental Technicians and Assistants to fulfill environmental management responsibilities and tasks and ensure contractors are compliant with EMP requirements. This includes ensuring programs and procedures to fulfill the EMPs are designed, implemented and reported on for internal sustainability and external permit or regulatory commitments. The Environmental Manager will be responsible for communications with government and community, including First Nations groups.

#### 2.1.1.6 *Environmental Specialists and Technicians*

Environmental Specialists and Technicians will be responsible for implementing the various EMPs and permit monitoring measures for the Project. They will be under the direction of and will be accountable to the Environmental Manager. The Environmental Specialists and Technicians will complete the day-to-day tasks to fulfill EMP obligations, sample collection, on-site monitoring and reporting. This includes performing environmental monitoring roles during Construction and Operations. Environmental Technicians will complete tasks as directed to support responsibilities of the Environmental Specialists and Environmental Manager.

#### 2.1.1.7 *Aboriginal Group Monitors*

In accordance with KUG EA Conditions (2017), AuRico must provide opportunities for one full time position of an Aboriginal Monitor from each of the Aboriginal Groups (Tsay Keh Dene, Kwadacha, and Takla) to the satisfaction of BC EAO during Construction and Operations. Each Aboriginal Monitor reports information directly to their respective Aboriginal Group and is subject to safety requirements established by AuRico, and receives direction for the activities to monitor from the respective Aboriginal Group. AuRico must:

- Provide documents required by the EA Certificate to the Aboriginal Monitors for review consistent with the review timelines identified in the conditions requiring the documents in addition to the other parties identified in each condition requiring documents;
- Provide training opportunities for Aboriginal Monitors so that the Aboriginal Monitors have the ability to support effective participation in monitoring activities; and
- Provide opportunities for the Aboriginal Monitor to conduct environmental monitoring for the Project.

Further details of the role of the Aboriginal Monitor are included in the Terms of Engagement for the Aboriginal Monitors.

#### 2.1.1.8 *Employees and Contractors*

An environmental orientation will be developed for AuRico personnel and contractors involved in the Project and will include EMP actions specific to the activities in which they will be involved. A key component of this orientation is a clear explanation of each individual's role and responsibility in the environmental management of the Project.

#### Contractors' Personnel

Contractors that undertake aspects of the Project will be required to meet the prescribed environmental performance standards set by AuRico's EMPs. Contractors will require designated personnel to ensure compliance. Such personnel will typically provide an environmental oversight role for activities associated with the particular contract being carried out; in addition to other duties and responsibilities. AuRico's Management, Supervisors and Environmental Manager will interact closely with the contractor's personnel to identify the environmental requirements. The Contractor's representative(s) will be responsible for ensuring compliance with the environmental requirements

including undertaking regular inspections, recording and reporting on inspection findings, initiating corrective actions for non-compliance, and maintaining an acceptable level of training and awareness among the contractor's personnel.

### **2.1.2 Qualified Professional**

AuRico will retain various qualified professionals to conduct various aspects of the Project's environmental monitoring as specified in various EMPs. A qualified professional is a person who has training, experience and expertise in a discipline relevant to the field of practice set out in the condition or regulation, and who is registered with the appropriate professional organization, is acting under that organization's code of ethics and is subject to disciplinary action by that organization.

### **2.1.3 Independent Environmental Monitor**

In accordance with the KUG EA Conditions (2017), AuRico will retain the services of a Qualified Professional to act as an Independent Environmental Monitor (IEM). AuRico will retain the IEM throughout all Project phases. The IEM will:

- Observe and record for, and report to, the BC EAO on compliance with the Certificate; and
- Provide information to BC EAO, BC MEMPR, BC MOE, BC MFLNRORD, and Aboriginal Groups, as directed by BC EAO.

When providing information or reports to BC EAO, the IEM must not provide such information or reports to AuRico in advance of providing such information or reports to BC EAO.

Details on the role and responsibilities of the IEM are provided in the Terms of Engagement for the IEM.

### **2.1.4 Environmental Monitoring Committee**

In accordance with the KUG EA Conditions (2017), AuRico must establish and maintain an environmental monitoring committee (EMC) for all phases of the Project.

AuRico must invite participation from Aboriginal Groups, BC MOE, BC MEMPR, BC MFLNRORD, BC EAO, and other agencies where relevant to particular topics being discussed. The purpose of the EMC is to facilitate information sharing and provide advice to AuRico on the ongoing development of the Project and mitigation measures in a coordinated and collaborative manner.

Further details on the role of the EMC are included in the Terms of Reference for the EMC.

### **2.1.5 Material Resources**

The implementation of EMPs requires material resources to be allocated for particular actions and procedures. AuRico's Environmental Policy provides for material resources via the mandates contained in the responsibilities for key personnel. Material resources in the form of salaries, equipment, facilities and consumables will be provided for implementing EMPs. Furthermore, budgets, facilities, and materials will be provided for the training of personnel who have the responsibility of meeting environmental performance targets and fulfilling the EMPs.

## 2.2 COMPLIANCE OBLIGATIONS

### 2.2.1 Legislation and Regulations

This section provides an overview of the relevant regulatory framework and requirements for wildlife.

### 2.2.2 Wildlife Legislation

The British Columbia Ministry of Forests, Lands and Natural Resource Operations (BC MFLNRORD) Omineca Region manages wildlife at the Project site. The Pacific/Yukon Region of Environment and Climate Change Canada (ECCC) is the federal agency responsible for wildlife and species at risk in the area. Legislation, regulations and policies pertaining to the protection of wildlife and wildlife habitat are enforced under both federal and provincial legislation, as listed in Table 2.2-1.

**Table 2.2-1. Summary of Applicable Legislation for Wildlife, Kemess Underground Project**

Name	Year	Type	Level of Government or Industry	Description
<i>Migratory Birds Convention Act</i>	1994	Act	Federal	This Act prohibits the killing of migratory birds or depositing harmful substances in areas frequented by migratory birds, and also protects their eggs and nests.
<i>Species at Risk Act (SARA)</i>	2002	Act	Federal	This Act offers legal protection and conservation of wildlife species in Canada. Species are identified as special concern, endangered, threatened, and extirpated; species are managed for conservation and/or recovery. The Act prohibits the identified wildlife from being harmed or harassed and the residence (nest or den) of the species from being damaged or destroyed. SARA applies to federal lands, unless the identified species is also protected under the <i>Migratory Birds Convention Act</i> ; SARA would then apply to both federal and provincial lands.
<i>Environmental Protection Act</i>	1999	Act	Federal	The Act aims at preventing pollution and protecting the environment (including wildlife) and human health from the effects of deleterious substances. The act uses an ecosystem based approach and recognizes the relationship between land, air, water, wildlife, and human activities.
<i>Wildlife Act</i>	1996	Act	Provincial	Multiple sections protect wildlife by outlining rules in regards to hunting, taking, trapping, wounding, and/or killing wildlife. Specifically, Section 34 of the Act protects birds, eggs, and occupied nests from possession, molestation, injury, or destruction.
<i>Water Act</i>	1996	Act	Provincial	This Act ensures that water quality, fish and wildlife habitat, and the rights of license users are not compromised.
<i>Forest and Range Practices Act (FRPA)</i>	2002	Act	Provincial	Wildlife Habitat Areas (WHAs) are designated by MFLNRORD and are associated with the Identified Wildlife Management Strategy under the provisions of the <i>Forest and Range Practices Act (2004)</i> . There are no WHAs within the RSA. The Government Actions Regulation, from the <i>Forest and Range Practices Act (2004)</i> , outline the authority for establishing Ungulate Winter Ranges (UWRs). There is a mountain goat UWR (U-7-030) within the LSA.

(continued)

**Table 2.2-1. Summary of Applicable Legislation for Wildlife, Kemess Underground Project (completed)**

Name	Year	Type	Level of Government or Industry	Description
Management Unit Regulation	2012	Regulation	Provincial	British Columbia is divided into 225 Wildlife Management Units (WMUs). The RSAs overlap within the WMUs 6-18, 7-37, 7-38, 7-39, 7-40 and 7-41.
Order-Mountain Goat Ungulate Winter Range U-7-030, Mackenzie Forest District (B.C. Reg. 582/2004)	2016	Regulation	Provincial	Requirements for ungulate winter ranges for Mackenzie Forest District. The order outlines winter habitat requirements from winter ranges and special habitat requirements that are not provided in Government Action Regulation or another enactment.
<i>Canadian Environmental Assessment Act, 2012 (2012)</i>	2012	Act	Federal	Contains provisions related to the effects of any changes to the environment on physical and cultural heritage or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.
<i>BC Environmental Management Act (2003)</i>	2003	Act	Provincial	Describes overall direction on how wastes are to be managed, and its Schedule of Reportable Levels for Certain Substances (B.C. Reg. 376/2008) identifies the substances and their minimum reportable level for spills.

### 2.2.3 Provincial EA Certificate and Federal EA Decision Conditions

The text below is primarily taken directly from the provincial certificate conditions. References to the “updated plan” refer to this document, the WMMP.

#### 2.2.3.1 Provincial EA Certificate Conditions

The provincial EA certificate conditions related to the WMMP are listed below. These are specific to condition #25, Wildlife Management and Monitoring Plan.

- The Holder must retain a Qualified Professional to update the Wildlife Management and Monitoring Plan. The updated plan must be developed in consultation with BC MEMPR, BC MFLNRORD, ECCC, and Aboriginal Groups.

The updated plan must include at a minimum:

- a. The means by which the mitigation measures listed in Table 15.6-23 of the Application will be implemented;
- b. Mitigation for species at risk individuals, residences, including hibernacula and other important habitats as determined by a Qualified Professional;
- c. Mitigation for noise associated with blasting that may affect wildlife;



- d. The following specific mitigations:
- i. directed/focused lighting rather than broad area lighting and shielding lights to minimize stray light. Lighting in non-essential areas must be used only when necessary for safety of employees;
  - ii. maintaining buffers from sensitive wildlife areas as determined by a Qualified Professional which must be consistent with A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia (2014, or as replaced or updated from time to time), or specified in BC MFLNRORD approved Ungulate Winter Range General Wildlife Measures;
  - iii. except for safety or spill related emergencies, follow disturbance related BC MFLNRORD approved Ungulate Winter Range General Wildlife Measures and disturbance related measures identified in A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia (2014, or as replaced or updated from time to time);
  - iv. Using guidance provided in Environmental Assessment Standard Guidance for the Western Toad, ECCC/Canadian Wildlife Service (ECCC 2016a), and in consultation with ECCC for any updates to guidance:
    - The means by which pre-clearing surveys of western toads will be conducted by a Qualified Professional;
    - No-disturbance buffers around any identified breeding habitats for western toads found during pre-construction surveys; and
  - v. Mitigation measures to reduce adverse effects to wildlife cause by increased traffic on Project roads (including the Northern Section of the ORAR).

#### Migratory Birds and Bats Mitigation and Monitoring

The plan must include at least the following:

- a. Mitigations consistent with the recommended mitigation, management and monitoring practices identified in the Bat Best Management Practices for Bats in BC (Holroyd and Craig 2016, or as replaced or updated from time to time);
- b. The means by which pre-clearing surveys will be conducted for:
  - i. raptors, and migratory birds by a Qualified Professional; and
  - ii. bats by a Qualified Professional to determine the distribution of suitable bat roosting habitat relative to Project infrastructure and activities;
- c. offsets for the potential loss of observed bat roosting habitat by installation of bat boxes or artificial roost trees as per Best Management Practices for Bats in BC (Holroyd and Craig 2016, or as replaced or updated from time to time), in suitable locations as determined by a Qualified Professional;
- d. Installation of alternate lighting to reduce attractants to bats from Project infrastructure if a Qualified Professional determines lighting is an attractant to bats based on bat observations near infrastructure;

- e. A scientifically sound approach for monitoring of migratory birds and avian species at risk in wetland areas associated with the discharge pipeline corridor south of the ORAR and the Kemess Lake Valley Infrastructure area, where point count surveys have not previously been conducted that includes:
  - i. A list of existing standards to be followed during monitoring, including RISC standards for inventory and survey methods of Forest and Grassland Birds (including recommendations for survey frequency and timing), as well as other species-specific survey and inventory methods accepted by ECCC where applicable for species that are often not detected using RISC standards; and
  - ii. Descriptions of how surveys will be carried out by a Qualified Professional in a manner that protects and avoids harming, killing or disturbing migratory birds or destroying or taking their nests or eggs. All surveys must be conducted in accordance with ECCC's Avoidance Guidelines (<http://www.ec.gc.ca/paom-itmb/>) and in consultation with regional ECCC;
- f. Protection of active nest sites by species specific buffers in accordance with General Nesting Periods of Migratory Birds in Canada (ECCC 2017b, or as replaced or updated from time to time), with a minimum 30 m buffer if evidence of nesting behaviour is observed and avoiding clearing outside of the reduced risk window as identified in the Region 7 Omineca – Reduced Risk Windows for Fish and Wildlife (Ministry of Water, Land and Air Protection 2004; or as replaced or updated from time to time) is not possible as determined by the Holder;
- g. Bi-weekly nest surveys of infrastructure potentially used by barn swallows for nesting, during the breeding season. A species-specific buffer must be employed around all probable or actual nest sites that are detected during pre-clearing point count surveys or on infrastructure. These nests must be monitored until the young have fledged or the nest is abandoned. The minimum buffer distance of 30 metres must be utilized wherever practicable as determined by a Qualified Professional; and
- h. Requirement to record the exact buffer distance employed for any nest sites and report the outcome of the nesting attempt in annual reporting.

#### Alpine and Sub-alpine Species Mitigation and Monitoring Plan

The plan must include at a minimum:

- The means by which field surveys to identify important habitat areas for Hoary Marmot, Ptarmigan species and Short-eared Owl by a Qualified Professional must be conducted prior to commencement of Construction in areas that a Qualified Professional determines may impact these species;
- The means by which pre-clearing surveys for Short-eared Owl must be conducted in advance of any clearing conducted in areas identified as suitable nesting habitat between March 1 and September 15. If Short-eared Owl nests or evidence of nesting is observed then appropriate buffers as determined by a Qualified Professional will be used in order to minimize disturbance and avoid loss of the nest; and

- Mitigation measures to reduce effects of habitat loss, habitat alteration and sensory disturbance from Project infrastructure and activities in alpine and sub-alpine habitat where Hoary Marmot, Ptarmigan species and Short-eared Owl may reside as determined by a Qualified Professional.

#### Omineca Resource Access Road (ORAR) Environmental Monitoring and Management Plan

The plan must include at a minimum:

- The means by which the mitigations specific to the use of the ORAR listed in Section 4.2 of Appendix 15-C of the Application will be implemented;
- Mitigation measures to reduce roadside vegetation attractants to moose along the Northern Section of the ORAR, including but not limited to removal of early seral stage vegetation that provides moose forage;
- Mitigation to manage snowbanks on the Northern Section of the ORAR, to provide escape pathways (i.e., gaps) to allow wildlife to exit the plowed roads and mitigation measures to reduce predator access points into important caribou habitat areas as determined by a Qualified Professional;
- Monitoring of road dust on wildlife habitat on the Northern Section of the ORAR and adaptive management of road dust; and
- During all phases of the Project, the Holder must, at the request of and within a reasonable timeframe specified by BC EAO or BC MFLNRORD attend meetings and participate in initiatives to inform environmental management and monitoring along the ORAR, including but not limited to in relation to transportation related wildlife effects along the ORAR. The Holder must also implement measures identified by such initiatives where a Qualified Professional determines that the initiatives or measures will reduce the effects on wildlife from the Holder's use of the ORAR.

#### Caribou Management and Monitoring Plan

The plan must be, and demonstrate how it is, informed by:

- The data in Herd Boundary Refinement for the Chase, Spatsizi, and Frog Caribou Herds in North-central British Columbia (Sittler et al. 2015); and
- A review of mitigation measures used by other industries and in other geographic areas, for caribou, their effectiveness, and how they might be applicable to potential Project impacts on caribou as determined by a Qualified Professional.

The plan must include at a minimum:

- Mitigation to restrictions on caribou movement caused by the Project in the area of subsidence delineated in the Certified Project Description and other potential areas of movement, identified by a Qualified Professional in the wildlife local study area;
- Measures to monitor caribou movement in the areas that a Qualified Professional determines could be impacted by the Project;

- Identify opportunities to enhance caribou habitat through reclamation;
- The means by which the Holder will, through road decommissioning and restoration, close off access to, and reduce opportunities for movement of, caribou predators in the area covered by mineral tenures held by the Holder;
- During all phases of the Project, the Holder must, at the request of and within a timeframe specified by BC EAO or BC MFLNRORD, participate in mitigation and monitoring initiatives that may be developed by provincial or federal agencies to understand and mitigate risks to caribou and its habitat in the caribou regional study area. These initiatives may include but are not limited to surveying and habitat modelling, collaring of caribou, predator studies, restoration or improvement of habitat and access control; and
- Monitoring of the effectiveness of mitigation measures that must include monitoring of wildlife ramps over the water discharge line and other movement corridors with cameras.

Throughout all phases of the Project the Holder must:

- Record wildlife observations and mortalities; and
- Reporting information must be tabulated and submitted to Omineca BC MFLNRORD and Aboriginal Groups on an annual basis.

#### 2.2.3.2 Federal EA Decision Conditions

The federal EA certificate conditions related to the WMMP are listed below. These are specific to conditions #4 and #6.

##### Migratory Birds (Condition #4)

- (Condition #4.1) The Proponent shall carry out Designated Project activities in a manner that protects migratory birds and avoids harming, killing, or disturbing migratory birds or disturbing, or taking their nests or eggs. In this regard, the Proponent shall take into account Environment and Climate Change Canada's *Avoidance Guidelines*. The Proponent's actions in applying the *Avoidance Guidelines* shall be in compliance with the *Migratory Birds Convention Act* (1994) and with the *Species at Risk Act* (2002b).
- (Condition #4.2) The Proponent shall deter migratory birds from accessing the tailings storage facility and seepage ponds until water quality is not harmful to migratory birds.
- (Condition #4.3) The Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, a follow-up program to determine the effectiveness of the mitigation measures to avoid harm to migratory birds, their eggs, and nests, including the mitigation measures used to comply with conditions 4.1 and 4.2. The Proponent shall implement the follow-up program from the start of construction to the end of decommissioning.

##### Current Use of Lands and Resources for Traditional Purposes

- (Condition #6.1) The Proponent shall install and maintain, during construction and operation, ramps every 100 to 300 metres over the discharge line between the tailings storage facility and Attichika Creek to provide passage for moose (*Alces alces*), woodland caribou (*Rangifer*

*tarandus caribou*), grizzly bear (*Ursus arctos*), and furbearers. The Proponent shall identify the locations of ramps in consultation with Indigenous groups and relevant authorities.

- (Condition #6.2) The Proponent shall create and maintain, during construction and operation, escape pathways along all access roads associated with the Designated Project, including the northern section of the Omineca Resource Access Road, to allow ungulates to exit the plowed roads. The Proponent shall identify the locations of escape pathways in consultation with Indigenous groups and relevant authorities.
- (Condition #6.3) The Proponent shall, from the start of construction to the end of decommissioning, remove carrion within 24 hours of its discovery by the Proponent from all access roads associated with the Designated Project, including the northern section of the Omineca Resource Access Road.
- (Condition #6.4) The Proponent shall prohibit employees and contractors associated with the Designated Project from fishing, hunting, trapping within the Project Area, unless an employee or a contractor is provided access by the Proponent for traditional purposes or for exercising Aboriginal rights, to the extent that such access is safe.
- (Condition #6.5) The Proponent shall, prior to construction and in consultation with Indigenous groups and relevant authorities, conduct pre-clearing surveys to identify Western toad (*Anaxyrus boreas*) breeding habitat, and shall implement measures to mitigate the loss of Western toad (*Anaxyrus boreas*) breeding habitat caused by the Designated Project.
- (Condition #6.6) The Proponent shall conduct pre-clearing surveys to determine the distribution of little brown myotis (*Myotis lucifugus*) and Northern myotis (*Myotis septentrionalis*), and establish, in consultation with Indigenous groups and relevant authorities, buffer zones around active hibernacula and active roosts.
- (Condition #6.7) The Proponent shall install, prior to construction, and maintain, during construction and operation, roosting structures to offset any loss of little brown myotis (*Myotis lucifugus*) and Northern myotis (*Myotis septentrionalis*) roosting habitat.
- (Condition #6.8) The Proponent shall develop and implement a follow-up program to monitor the little brown myotis (*Myotis lucifugus*) and Northern myotis (*Myotis septentrionalis*) usage of buffer zones and roosting structures to determine the effectiveness of the mitigation measures during construction and operation.
- (Condition #6.9) The Proponent shall, in consultation with Indigenous groups, undertake progressive reclamation of the habitats disturbed by the Designated Project. The Proponent shall use native species when undertaking that progressive reclamation.
- (Condition #6.10) The Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, a follow-up program to verify the accuracy of the environmental assessment as it pertains to the presence of hoary marmot (*Marmota caligata*), white-tailed ptarmigan (*Lagopus leucura*), and short-eared owl (*Asio flammeus*) within the subsidence zone identified by the Proponent during the environmental assessment and within a buffer area of 250 metres along the limits of that subsidence zone. The Proponent shall implement the follow-up program during construction and operation.
- (Condition #6.11) The Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, a follow-up program to verify the accuracy of the

environmental assessment as it pertains to the effects of changes caused by the Designated Project to the Chase herd of Southern mountain caribou (*Rangifer tarandus caribou*) and the Thutade herd of Northern mountain caribou (*Rangifer tarandus caribou*) on caribou hunting activities for traditional purposes and to determine the effectiveness of the mitigation measures. The Proponent shall implement the follow-up program from the start of construction to the end of decommissioning. As part of the follow-up program, the Proponent shall:

- monitor, during construction and the first three years of operation, the use by moose (*Alces alces*), woodland caribou (*Rangifer tarandus caribou*), grizzly bear (*Ursus arctos*), and furbearers of the ramps referred to in condition 6.1 and of the escape pathways referred to in condition 6.2; and
- monitor mortality of wildlife on all access roads associated with the Designated Project, including the northern section of the Omineca Resource Access Road.

#### 2.2.4 Permit Requirements

AuRico Metals will obtain any permits that may be required under the BC *Wildlife Act* (1996b) for activities such as relocation of inactive raptor nests and handling of amphibians.

#### 2.2.5 Guidelines and Best Management Practices

Standards and best practices are guiding statements that allow development to occur in a way that will avoid, limit, or mitigate effects on aquatic and riparian habitats, water quality and quantity, fish and wildlife species, and public safety and property. Standards are defined as a regulatory requirement that must be followed or achieved in the design and completion of developments (BC MWLAP 2004a). Best management practices are recommended methods or techniques that should be followed to increase the likelihood that standards are met and effects are mitigated; Table 2.2-2 identifies reference documents used to inform the mitigation measures included in the WMMP.

**Table 2.2-2. Summary of Applicable Guidelines for Wildlife, Kemess Underground Project**

Name	Year	Type	Level of Government or Industry	Description
Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in BC	2014	Guideline	Provincial	Guideline to maintain amphibian and reptile populations in areas of development.
Best Management Practices for Raptor Conservation during Urban and Rural Land Development in BC	2013	Guideline	Provincial	Guidelines to maintain raptors and raptor habitat in areas of development.
British Columbia Grizzly Bear Conservation Strategy	1995	Guideline	Provincial	Guidelines to preserve the diversity and abundance of grizzly bear and the ecosystems on which they depend throughout British Columbia, improve the management of grizzly bears and their interactions with humans, to increase public knowledge and involvement in grizzly bear management, and increase international cooperation in management and research.

(continued)

**Table 2.2-2. Summary of Applicable Guidelines for Wildlife, Kemess Underground Project (continued)**

Name	Year	Type	Level of Government or Industry	Description
British Columbia Wildlife Habitat Rating Standards	1999	Guideline	Provincial	Guidelines to the standardised approach for developing wildlife habitat capability and suitability mapping based on provincial ecological map products.
Canadian Biodiversity Strategy	1995	Guideline	Federal	Guidelines to promote the understanding of Canada's unique biodiversity, conservation of said biodiversity, and the sustainable use of Canada's biological resources.
Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia	2014	Guideline	Provincial	Guidelines to mitigating impacts to wildlife and wildlife habitat from industrial development in the North Area (Peace, Omineca and Skeena regions), British Columbia.
Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in BC	2014	Guideline	Provincial	Guideline to maintain environmental values in areas of development.
Environmental Mitigation Policy for British Columbia	2014	Guideline	Provincial	Guideline that provides direction for proponents (among others) on environmental mitigation specific to the mitigation hierarchy that will result in better environmental outcomes.
Furbearer Management Guidelines - Wolverine <i>Gulo gulo</i>	2003	Guideline	Provincial	Guideline (primarily for professional trappers) on principles to consider in the sustainable management of wolverine.
Management Plan for the Mountain Goat in British Columbia	2010	Guideline	Provincial	Guideline to maintain viable, healthy and productive populations of mountain goats throughout their native range in British Columbia, specifically (1) to effectively maintain suitable, connected mountain goat habitat; (2) to mitigate threats to mountain goats; and (3) to ensure opportunities for non-consumptive and consumptive use of mountain goats are sustainable.
Environmental Best Management Practices for Urban and Rural Land Development: Special Wildlife and Species at Risk	2004	Guideline	Provincial	Guideline to protecting species wildlife and species at risk in areas of development.
Recovery Strategy for the Woodland Caribou, Southern Mountain population in Canada	2014	Recovery Strategy	Federal	Sets overall population targets for southern mountain caribou, and partially defines the critical habitat that is necessary to achieve the population and distribution objectives.
Riparian Management Area Guidebook	1995	Guideline	Provincial	Guideline for forestry activity in riparian areas.

(continued)

**Table 2.2-2. Summary of Applicable Guidelines for Wildlife, Kemess Underground Project (continued)**

Name	Year	Type	Level of Government or Industry	Description
Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006	2006	Guideline	Industry	Guideline to maintain or enhance avian populations in areas of electric power networks.
Guidelines for Minimizing Impacts from Mining Exploration on Wildlife and Habitat	2008	Guideline	Provincial	Provides guidelines to avoid, minimize, and mitigate adverse impacts to wildlife in both planning and implementation of mining exploration activities.
Canadian Council of Ministers of the Environment (CCME)	1999-2001	Guideline	Federal	The CCME provides Canadian water quality and sediment quality guidelines for the protection of aquatic life, soil guidelines for the protection of environmental and human health and tissue residue guidelines for the protection of wildlife that consume aquatic biota.
BC Water Quality Guidelines (WQG; Approved and Working)	2006, 2015	Guideline	Provincial	Water quality criteria are defined as maximum or minimum physical, chemical or biological characteristics of water, biota, or sediment and are applicable province-wide. The guidelines are intended to prevent detrimental effects on water quality or aquatic life, under specified environmental conditions and include guidelines for the protection of wildlife from the effects of chemicals in drinking water supply and from tissue residues of chemicals in wildlife diet for bioaccumulative compounds (e.g., mercury, selenium).
Best Management Practices Guidelines for Bats in British Columbia. Chapter 2: Mine Developments and Inactive Mine Habitats (Holroyd and Craig 2016)	2016	Guideline	Provincial	Guidelines for best management practices for bats and their habitats, as well as for research and inventories of bats.
Environment and Climate Change Canada Standard Guidance for Environmental Assessments: Western Toad ( <i>Anaxyrus boreas</i> )	2016	Guideline	Federal	Provides recommendations on how to assess and mitigate Western Toad, as part of the environmental assessment process.
Management Plan for the Northern Mountain Population of Woodland Caribou ( <i>Rangifer tarandus caribou</i> ) in Canada	2012	Management Plan	Federal	Conservation objectives to guide development of herd-specific plans and prevent northern mountain caribou from becoming threatened or endangered
Management plan for the Western Toad ( <i>Anaxyrus boreus</i> ) in British Columbia	2014	Management Plan	Provincial	Management objectives and approaches for maintaining self-sustaining populations of western toads in BC

(continued)



**Table 2.2-2. Summary of Applicable Guidelines for Wildlife, Kemess Underground Project (completed)**

Name	Year	Type	Level of Government or Industry	Description
Recovery Strategy for the Woodland Caribou, Southern Mountain population ( <i>Rangifer tarandus caribou</i> ) in Canada	2014	Recovery Strategy	Federal	Environment Canada's <i>Species at Risk Act</i> Recovery Strategy Series
Management Plan for the Rusty Blackbird ( <i>Euphagus carolinus</i> ) in Canada	2015	Management Plan	Federal	Conservation measures to stop the decline of rusty blackbirds in the short term and increase the population in the long term
Recovery Strategy for Little Brown Myotis ( <i>Myotis lucifugus</i> ), Northern Myotis ( <i>Myotis septentrionalis</i> ), and Tri-coloured Bat ( <i>Perimyotis subflavus</i> ) in Canada [Proposed]	2015	Recovery Strategy	Federal	Environment Canada's <i>Species at Risk Act</i> Recovery Strategy Series
Management Plan for the Short-eared Owl ( <i>Asio flammeus</i> ) in Canada [Proposed]	2016	Management Plan	Federal	Management strategies for stabilizing or increasing short-eared owl population trends in the short-term and ensuring positive growth in the long term
Management Plan for the Western Toad ( <i>Anaxyrus boreas</i> ) in Canada [Proposed]	2016	Management Plan	Federal	Management strategies and measures for achieving stable or increasing western toad populations in Canada
Recovery Strategy for the Common Nighthawk ( <i>Chordeiles minor</i> ) in Canada	2016	Recovery Strategy	Federal	Environment Canada's <i>Species at Risk Act</i> Recovery Strategy Series
Recovery Strategy for the Olive-sided Flycatcher ( <i>Contopus cooperi</i> ) in Canada	2016	Recovery Strategy	Federal	Environment Canada's <i>Species at Risk Act</i> Recovery Strategy Series

### 3. SUPPORT

#### 3.1 TRAINING AND AWARENESS

All new employees and contractors on site are subject to a mandatory site orientation, a component of which promotes environmental stewardship, and outlines the wildlife management expectations. This program is supported by standard operating procedures (SOPs), standard reporting forms, information sheets, posters, and signage. The wildlife management topics covered in the orientation program will include:

- bear awareness instructional video;
- outline of the Kemess Bear Management policy to promote an understanding of the site's Human-Bear Conflict Prevention strategies;
- map of the Bear Free Zone;

- advocating a zero tolerance policy for employees, contractors and suppliers feeding or harassing wildlife;
- prohibition of hunting, trapping and fishing by employees, contractors and suppliers while at the Kemess site and while commuting to and from the site;
- wildlife VC information brochure;
- incidental reporting procedures;
- refuse disposal procedures;
- review of speed limits on mine roads and the ORAR and priority to give wildlife the right of way along Project roads and the highway when safe to do so;
- pilot education regarding the negative effects of over-flights on wildlife species;
- reporting requirements if wildlife-vehicle collisions occur either along mine roads or the ORAR; and
- incidental observation reporting of recreational use of the northern portion of the ORAR during the winter.

### **3.2 INTERNAL AND EXTERNAL COMMUNICATION**

Internal communication will occur through a variety of methods depending on the urgency of the information being shared. Urgent communications, such as bears within infrastructure areas, will occur via radio and/or phone. Wildlife safety issues and updates will be included during morning toolbox meetings. Similarly, urgent external communication with BC MFLNRORD will occur through phone calls and/or email correspondence. The results of wildlife reporting will be communicated externally on an annual basis through the production of an annual report. AuRico will participate in meetings and initiatives requested by BC EAO and BC MFLNRORD as necessary.

### **3.3 SUPPORTING DOCUMENTATION**

AuRico already has existing documentation and plans that are used on site. These include:

- Human-Bear Conflict Prevention Plan (Bear Scare Ltd. 2005);
- Map of Bear Free Zone 2015;
- Task Procedure K0504 – Refuse Disposal on Active Dumps;
- Task Procedure K0502 – Bear Management; and
- Task Procedure K0090 – Bear Management Procedure.

Additional documents and plans may be produced and implemented in support of this Plan that may include standard operating procedures and environmental sensitivities maps.

## 4. IMPLEMENTATION

This section identifies mitigation measures that are proposed to avoid or mitigate effects of the Project on wildlife. The management and monitoring of wildlife will take an adaptive approach. Management measures implemented will be reviewed periodically and updated based upon initial outcomes and on current BMPs and methods.

The following potential Project effects were evaluated for wildlife in the EAC Application:

- habitat loss and alteration;
- sensory disturbance;
- disruption of wildlife movement patterns;
- direct mortality;
- indirect mortality;
- attraction to the Project due to attractants; and
- health effects due to chemical hazards.

Mitigation measures to address these potential effects are outlined in the following sections.

### 4.1 GENERAL APPROACH

This WMMP is applicable to Construction, Operations, Closure, and Post-closure phase activities.

### 4.2 ENVIRONMENTAL PROTECTION MEASURES

The following wildlife management and mitigation measures are currently in place at the Kemess South Mine and will continue to be actively enforced throughout the life of the Project:

- prohibition of hunting, trapping or fishing on the Project by Kemess employees, Kemess contractors and suppliers and members of the public;
- public access restriction to operating mine property;
- Human-Bear Conflict Prevention Plan (Bear Scare Ltd. 2005);
- zero tolerance policy for employees feeding wildlife;
- maximum speed limits are posted and enforced on roads on the KS property;
- implementation of a wildlife right-of-way on roads at all times unless it is unsafe to do so;
- prohibition of the harassment of wildlife by Kemess employees, and Kemess contractors and suppliers;
- refuse disposal in accordance with the *Refuse Disposal on Active Dumps* and *Bear Management* procedures; and
- roadway seeding with seed mixes that are less attractive to wildlife.

These measures, policies, and procedures will be reviewed periodically and updated when required, such as in response to wildlife incidents. They will also integrate with the Project's proposed wildlife mitigation measures outlined below.

#### 4.2.1 General Management Measures

##### 4.2.1.1 Road and Traffic Management

Wildlife-vehicle interactions can be limited through road design, maintenance activities and modification to driving behaviour. This will include adhering to speed limits, giving wildlife the right-of-way, and communicating wildlife sightings. Travel outside of daylight hours will be undertaken with caution, and personnel will be educated to recognize that dawn, dusk and during the night are periods of high wildlife activity.

The following mitigation measures will be implemented.

- As part of standard training, all Project personnel will receive instruction on the rules associated with driving on mine site roads, the risks to wildlife and the actions that they should take to reduce the chance of collisions with wildlife, including caution when driving at dawn, dusk, and at night, the locations of wildlife crossings or where wildlife have repeatedly been observed, and the locations where any wildlife collisions have occurred;
- Road maintenance of mine roads will avoid the use of salt, where practicable;
- Gaps in snow banks will be plowed to allow escape pathways for wildlife on access roads;
- Speed limits will be posted along the mine roads; vehicles will also be directed to adhere to open road speed limits for the ORAR. Road signs will be installed along mine roads to alert drivers to speed limits and wildlife-sensitive areas such as known migration routes and seasonal feeding areas;
- Tunnels and/or culverts may be installed where crossing points are identified, where practicable, which will provide for safe passage under the road for small mammals and western toads; and
- AuRico may conduct avalanche control measures as per the *Snow Avalanche Safety Measures for Kemess Mines Inc.* Avalanche control may be conducted at the Johanson Lake avalanche area on the ORAR, approximately 390 km north of Mackenzie by road. If avalanche control is required in these areas, incidental observations of mountain goats during avalanche control procedures will be recorded to provide information on the locations of goats in relation to avalanche terrain. Mitigation measures will be implemented, such as delaying avalanche blasting until goats have moved out of the area or deterring mountain goats using a helicopter or sirens, provided that safety to the Project and Project personnel is not being compromised. AuRico or their contractors will apply for and be issued any necessary permits from BC MFLNRORD prior to conducting any deterrence activities for mountain goats.

### Wildlife Collision Protocol

Wildlife-vehicle collisions will be managed according to the following:

- Collisions between Project vehicles and wildlife will be documented and will include information on the location of the collisions, including the Project access roads and the ORAR;
- Wildlife species that will be recorded include, but are not limited to, caribou, moose, mountain goat, grizzly and black bear, furbearers, and deer;
- Personnel and drivers will be instructed to report any wildlife-vehicle collision to site AuRico environmental staff;
- Carrion will be removed within 24 hours of its discovery on access roads and the northern section of the ORAR;
- The Fish and Wildlife Branch of FLNRORD (1-877-855-3222) will be contacted for guidance on how to manage animals involved in non-fatal collisions and how to dispose properly of wildlife carcasses;
- In the event of an animal requiring euthanasia, a veterinarian will be contacted and provincial guidance regarding euthanasia of wild animals will be followed (CVBC 2015); and
- The Environmental Manager will be responsible for training, providing a reporting system, and reporting collisions to appropriate government officials.

### Management to Reduce Wildlife Use of Roads

To reduce wildlife use of mine site roads, the following mitigation measures will be implemented.

- Vegetation management will be implemented to minimize palatable plant species, particularly moose forage species (e.g., clover and red osier dogwood; (BC MFLNRO 2014)). Vegetation along roadway edges will be minimized to increase visibility of wildlife to drivers (e.g., a cleared buffer zone of appropriate size) and to reduce abundance of naturally occurring forage species. Clearing will be site specific to provide a balance between low vegetation and maintaining high value and sensitive habitat. Vegetation maintenance activities (e.g., brush-cutting) will be conducted as appropriate to reduce herbivore use of vegetation within corridor areas where concerns exist for wildlife-vehicle collisions and high-quality browse is present (e.g., willow, birch). These activities will be conducted in early spring or fall to limit attractiveness to herbivores such as moose and deer (Rea et al. 2010) and avoid effects to migratory birds. Pre-clearing surveys will be used if vegetation management needs to occur during the sensitive time period for migratory birds due to observations of deer or moose browsing on road-side vegetation.
- Carrion will be removed from roads to limit attracting wildlife to the road, thereby reducing the risk of conflicts between vehicles and wildlife.

### Omineca Resource Access Road (ORAR) Mitigation and Management

Specific management and mitigation measures that will be implemented along the northern portion of the ORAR (where AuRico is the sole industrial user) include the following:

- Gaps in snow banks along the ORAR will be plowed to target every 500 m on alternating sides for extended straight sections of the ORAR to provide escape options for wildlife, where practicable. In addition, gaps will be provided on the outside of bends and/or corners where practicable (Heatherington, Teske, and Forbes 1989);
- Incidental observations of wildlife will be recorded to allow identification of areas along the ORAR that appear to be associated with higher wildlife activity, i.e., areas that may warrant additional mitigation measures, such as reduced speeds;
- Incidental observation of wildlife will include observations of wolves that may use the ORAR as a movement corridor;
- Locations along the ORAR identified as having a higher likelihood for vehicle collisions with wildlife based on repeated observations of incidents will be managed adaptively (e.g., through signage, education, and speed limits);
- The amount and nature of traffic use by AuRico or contractors for the Project on the northern portion of the ORAR will be monitored;
- In the winter, pullouts will be narrow so that it makes it difficult for trucks with snowmobile trailers to turn around;
- Large areas that snowmobilers could use as a parking and backcountry access location will not be created;
- Snowmobile parking at pull out locations will be discouraged by posting signs;
- Steep snowbanks will be created to make it more difficult for snowmobile access, particularly in areas adjacent to proposed or existing UWRs (with the caveat that mitigation of direct mortality will take precedence over indirect mortality, and that breaks in the snowbanks will be provided to enable wildlife to escape should they occur on the road); and
- Incidental observations of winter recreation use will be recorded.

#### 4.2.1.2 *Access Management*

The need for better access management is one of the key issues identified in the Mackenzie LRMP (BC ILMB 2000). To mitigate for the potential effects of increased access to the Project site and a potential increase in hunting of wildlife, the following management and mitigation measures will be implemented:

- restricting access to mine site roads and only permitting traffic that is required for the Project;
- the main entrance to Kemess is gated to prohibit entry by non-authorized vehicles;

- the Pine Road access to the Central Cirque area will be restricted and signage in place prohibiting entry by non-authorized vehicles;
- the gate and security measures will control access and address the mobility of snow machines, all-terrain vehicles (ATVs), and the ability of persons on foot to circumnavigate security structures;
- implement and enforce a no hunting, trapping, or fishing policy for personnel and contractors on the Project site;
- company policy that will prohibit the possession of personal firearms or other hunting weapons by personnel and contractors within the Project area; and
- during Operations and/or at Closure, deactivate all non-essential roads if long-term Post-closure monitoring access is not required.

#### 4.2.1.3 *Noise and Light Management*

To limit any disturbance of wildlife by traffic noise and operation noise (e.g., blasting, haul trucks, and conveyor), noise management measures will be implemented with the objective to limit ambient noise levels during all phases of the Project. The following noise management and mitigation measures will be implemented:

- vehicles will be maintained according to manufacturer's recommendations;
- speed limits will be imposed and enforced;
- mufflers will be installed on diesel-powered vehicles and maintained according to manufacturer's recommendations;
- pre-determined flight paths will be used by helicopters and fixed wing aircraft, that will have a vertical buffer distance as outlined by the BC MFLNRORD (2014; generally 400 m), where possible, from sensitive habitats and known areas of wildlife use (see Section 4.2.1.5);
- helicopters will follow, where feasible, lateral buffer distances from sensitive habitats and known areas of wildlife use, as outlined by the BC MFLNRORD (2014); and
- pilot education regarding the negative effects of over-flights on wildlife species and the importance of maintaining a minimum prescribed altitude, when possible, above wildlife species and identified sensitive habitat areas.

To limit any disturbance of wildlife due to light, the following light management measures will be implemented during all phases of the Project:

- stray light will be limited by either shielding lights or using directed/focused lighting rather than broad area lighting on new infrastructure; and
- lighting in non-essential areas will be used only when necessary for the safety of employees.

#### 4.2.1.4 *Dust Management*

Dust from mobile equipment and vehicular traffic will be managed with water as a dust suppressant on mine site roads. Roadway dust suppression efforts will be supplemented with posted and enforced speed limits. A dust monitoring station will be implemented along the northern section of the ORAR, placed near ungulate winter range. Dust management and monitoring strategies are provided in the Air Quality Management Plan. Should water be deemed insufficient to control dust, then additional dust control measures/products may be investigated.

#### 4.2.1.5 *Aircraft Management*

To limit disturbance to sensitive wildlife species such as mountain goats, aerial support, including helicopter access, will be directed along controlled routes or flight paths. However, limited helicopter access is anticipated during construction and operations. Specific flight paths will be determined before Construction commences and will be followed, unless topography, unfavourable weather, and/or safety require pilots to fly within wildlife buffers. Locations of these flight paths and the reasons they must be used will be communicated to workers involved in aviation support. Pilots will be required to follow flight paths wherever feasible, and the Environmental Manager, or designate, will regularly communicate and review with the pilots the location of environmentally sensitive areas.

The Province of BC provides guidance on helicopter activities in and near mountain goat habitat (BC MOE 2010). Mountain goat mitigation measures related to aircraft and helicopters include:

- maintaining a 2 km horizontal setback from the UWR unless determined by the pilot that a smaller setback is required for safety purposes (Figure 4.2-1; BC MFLNRO 2014);
- maintaining 400 m vertical separation between helicopters and mountain goat habitat, caribou winter range and caribou calving areas, weather permitting (BC MFLNRO 2014);
- directing pilots to avoid and not fly towards, hover near, or land near mountain goats, particularly during critical periods of the year such as kidding and winter; and
- selecting flight paths to access camps and construction areas that will limit potential disturbance to goats; provide to all pilots established flight paths.

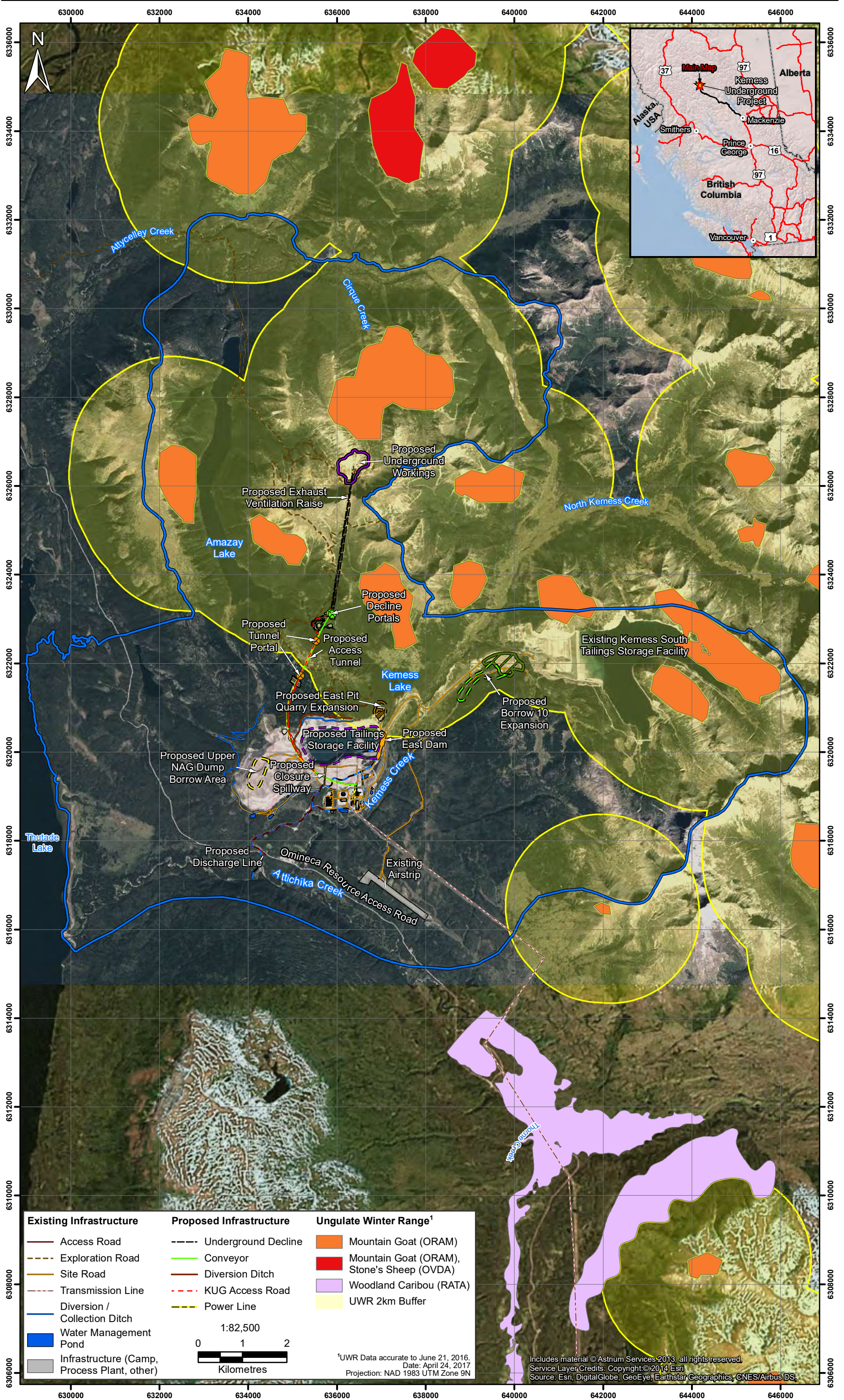
Prior to take-off and landing of fixed wing airplanes there will also be a scan to confirm that no large mammals or flocks of birds are on the runway. Pilots will confirm that the runway is clear of large mammals and birds prior to using it.

#### 4.2.1.6 *Infrastructure and Waste Management and Bear Response*

Infrastructure (buildings and the transmission line) will be constructed and managed in such a way as to limit the attractiveness and risk of injury to wildlife. In addition, wastes will be managed in the camp to limit the attraction of bears and a bear response plan will be in place to monitor for and respond to bears attracted to the site.



Figure 4.2-1  
Mountain Goat Ungulate Winter Range with 2 km Buffers



Design mitigation for wildlife will include:

- The above-ground power line and associated transmission structures will be designed to limit strikes and electrocutions, following guidelines for bird protection (APLIC 2012).
- The creation of roadside pools that are attractive as western toad breeding habitat will be avoided. Drainage ditches will be constructed that promote free drainage and avoids creating areas of standing water.
- The water quality of the tailings storage facility and seepage ponds will be monitored according to the mine site Water Management Plan. If relevant wildlife water quality guidelines are exceeded then deterrent measures will be implemented if waterbirds are within these areas and additional mitigation appropriate for other potentially affected species, e.g., western toad, will be implemented based on guidance from a Qualified Professional.

Buildings will be designed and maintained to exclude wildlife ingress wherever possible, such as:

- Sealing holes or using one-way exit devices (e.g. bat cone) if wildlife is found inside of buildings (Community Bat Programs of BC 2015);
- skirting buildings to deter wildlife from entering under buildings; and
- constructing additional structures (e.g., electric fencing) to exclude wildlife from areas that may be attractants to wildlife, such as waste management facilities. Wildlife exclusion fencing will be maintained in working order when people are present on site.

Various waste products that will be produced during the Construction and Operations phases of the Project include kitchen, petroleum, and sewage. Wildlife species, particularly grizzly bear and furbearers, may be attracted to sites if these waste products are not properly managed. Mitigation and monitoring to limit attractants will include the following measures:

- dispose of refuse in accordance with the Waste Management Plan and the Human-Bear Conflict Prevention Plan (Bear Scare Ltd. 2005);
- incinerate kitchen wastes in a timely manner;
- store recyclable wastes and chemicals in wildlife-proof containers/facilities;
- store attractants and wastes (garbage, food waste) at temporary (construction) and permanent site infrastructure in bear-proof storage containers. Bear-proof containers must be tightly secured at all times;
- conduct regular road and camp cleanups to remove hazardous substances, wires, or loose materials that could endanger wildlife, and arrange proper storage and disposal of hazardous wastes;
- remove waste from collection sites regularly, incinerate in an approved incinerator or store in wildlife-proof areas and wildlife-proof buildings until incineration or transportation off site;

- dispose of waste which should not be incinerated at an approved disposal site as soon as possible;
- prevent wildlife from entering landfills, incinerators and sewage treatment facilities, where possible, using appropriate wildlife exclusion techniques;
- maintain a 'bear-free' zone around camp and plant areas, with special attention to areas frequented by human foot traffic and adjacent the kitchen; and
- follow the Environmental Spill Emergency Plan, and the Hazardous Materials Handling Plan.

### Bear-Human Conflict Prevention

A designated zone (i.e., Bear Free Zone [BFZ]) surrounds the existing camp, security, and plant facilities and is considered restricted to bears so that bear-human conflicts can be avoided. It is the responsibility of all persons at Kemess to report all bear observations within this Bear Free Zone. Kemess Security actively patrol the BFZ and apply non-lethal deterrents to bears found within the designated boundaries, with particular emphasis on areas frequented by pedestrian traffic and adjacent to the kitchen. Kemess Security staff will be provided with a Non-Lethal Bear Management refresher course for applying non-lethal deterrents. In addition to existing approaches, bear management guidelines may be established to promote consistent and effective control actions are used by all responders in all types of bear complaints and bear-human conflict situations.

Employee orientation programs will communicate the hazards and implications of habituating bears resulting from watching and photographing them.

In addition to the above, mitigation and management directives provided during personnel education (Section 3.1) will be applied during Project activities (e.g., no littering, no feeding wildlife).

As per Section 5.1.1.7, Incidental Wildlife and Wildlife Incident Monitoring, observations of wildlife at or near Project infrastructure will be recorded and delivered to the Environmental Manager. As per Section 5.1.1.6, Building, Infrastructure, and Waste Management Monitoring, if it is noted that wildlife are accessing the site, then a response plan will be developed to limit ingress of wildlife to Project facilities. If either of these monitoring programs record observations of bears repeatedly in or near the camps, then a response plan will be prepared to limit bear access to the site. This response plan may include (but is not limited to), in order of preference, several options for management activities, including:

- evaluate if waste management activities are successful, and update if necessary;
- evaluate if building exclusion measures, such as skirting, is successful and update if necessary;
- evaluate if exclusion measures (fencing) at waste management facilities are successful and update if necessary;
- involve a third-party audit of waste and attractant management, camp hardening, education measures for staff, and other facets of the operation which may be attracting bears, or not excluding them sufficiently; and

- if the observations of bears continue, despite these measures, then additional measures may be required, as per the third-party audit. These measures may include additional fencing or measures to exclude bears from the kitchens, accommodations blocks, and other facilities that may attract bears.

#### 4.2.1.7 *Wildlife Movement Management*

The Project will be designed, constructed and managed to promote wildlife movement through the Project site using the following measures:

- In areas where the KUG TSF Discharge Waterline is not buried or otherwise could become an obstacle to wildlife crossing, ramps will be created every 100 to 300 m o at a grade of 25% where practicable (4 m run to a 1 m rise) to facilitate movement over it for medium and large mammals. Determining the locations of these ramps will be a collaborative exercise with AuRico, BC MFLNRORD, and the TKN and will take into account appropriate datasets such as caribou collar data (Sittler, McNay, and Giguere 2015);
- ramps will be constructed using available materials from site including rocks, coarse woody material, and soil/overburden. Ramps will be vegetated with species consistent with the Reclamation and Closure Plan;
- managing snowbank heights and providing gaps on Project roads, including the northern section of the Omineca Resource Access Road (where AuRico is the sole industrial user), to provide escape pathways to allow wildlife to exit the plowed road;
- speed limits are posted and enforced on the mine site's existing and future access roads;
- allowing wildlife to have the right-of-way at all times when encountered by vehicles on Project roads unless unsafe to do so;
- signage will be provided along Project roads in high-value wildlife areas or known wildlife travel corridors to warn vehicle operators of the potential to encounter wildlife;
- mine site roadside vegetation will be cut low at wildlife crossings along roads to enhance visibility of animals;
- creating and maintaining road culverts to facilitate wildlife movement/habitat connectivity and fish passage; and
- progressive reclamation activities will be undertaken and designed to remove barrier and accommodate movement.

#### 4.2.2 **Additional Baseline Surveys**

Additional baseline data collection surveys, described below, will occur prior to construction. These surveys are not the same as pre-clearing surveys which are described in Section 4.2.3.2 Sensitive Features and Time Periods Management. Pre-construction surveys will inform where pre-clearing surveys may be needed if they occur by identifying high quality habitat and the occurrence of species in the field. Associated follow-up monitoring programs are described in Section 5.1.2.

#### 4.2.2.1 *Migratory Bird Surveys*

Additional migratory bird surveys will occur prior to construction in the wetland areas associated with the KUG TSF Discharge Waterline corridor south of the ORAR and the Kemess Lake Valley Infrastructure area (Figure 4.2-2). Surveys will be conducted according to the following standards:

- Point counts for forest and grassland songbirds, including olive-sided flycatcher and rusty blackbird (RIC 1999);
- Unlimited radius point count and active nest counts for swallows (RIC 1998b);
- Surveys for common nighthawk following the Canadian Nightjar Survey Protocol 2018 (WildResearch, Bird Studies Canada, and ECCC 2018).

Methodologies that will be followed for these surveys are non-intrusive search methods and a low intensity disturbance which are considered a lower risk activity by ECCC (ECCC 2017c) therefore meeting ECCC Avoidance Guidance (ECCC 2017a).

#### 4.2.2.2 *Alpine Species Surveys*

Pre-construction surveys will occur under the direction of a Qualified Professional to inform final citing of the road to the exhaust ventilation raise and will identify any additional mitigation measures protective of alpine species that should be implemented to limit Project effects and have not yet been identified.

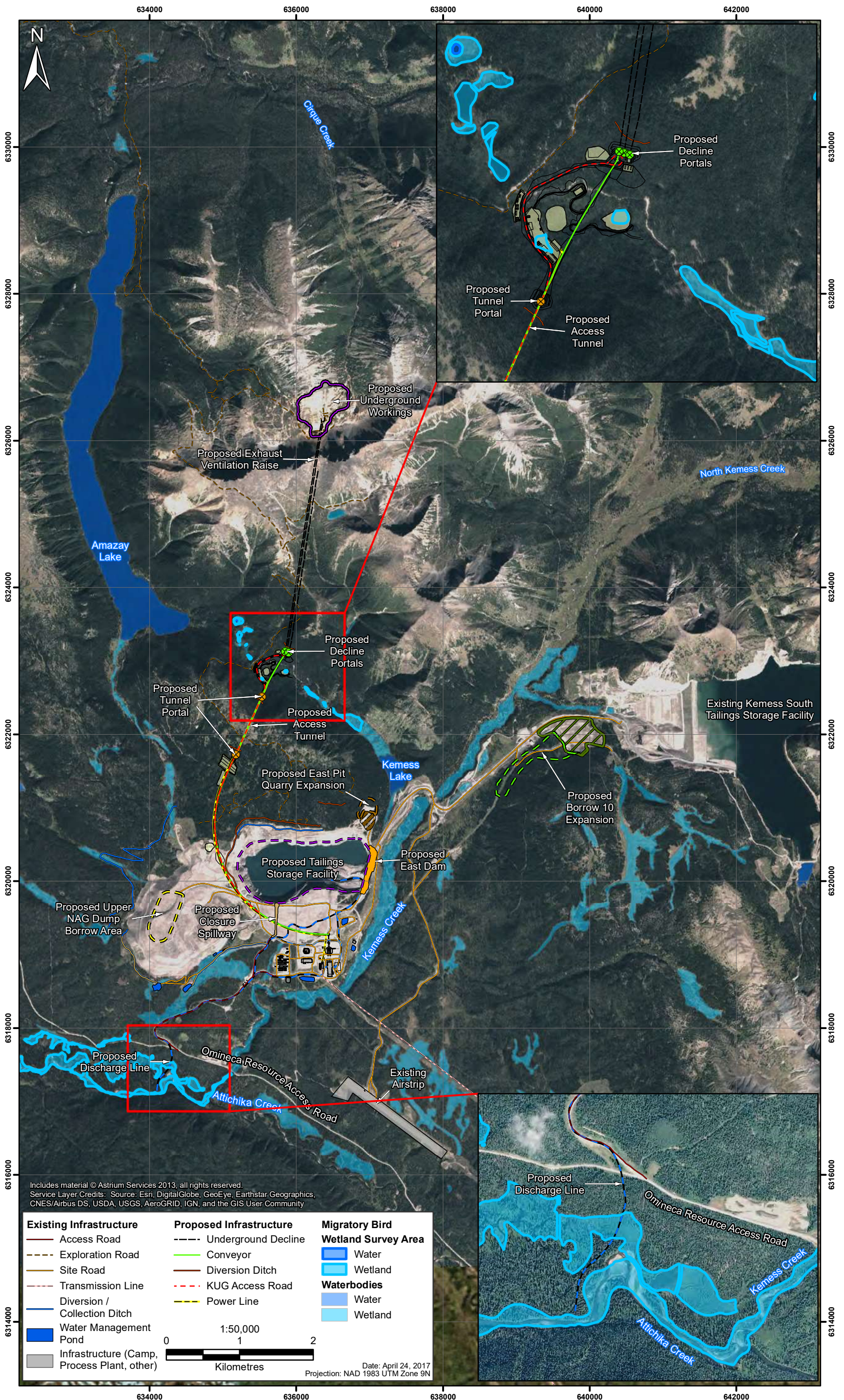
#### Hoary Marmot

Pre-construction surveys for active hoary marmot dens will occur within the subsidence zone and within the 250 m buffer area. Surveys will be conducted according to provincial methodology for relative abundance and sign sampling (RIC 1998a). Locations suitable as potential translocation sites will also be identified in the event they are required. If active dens are found within the subsidence zone then additional mitigation such as a marmot translocation will be considered in consultation with BC MFLRNO and TKN. If active dens are found within the 250 m buffer zone they will be monitored.

#### Short-eared Owl and Ptarmigan

Additional surveys will be conducted under the direction of a Qualified Professional in the subsidence area, the 250 m buffer of the subsidence area, the access road to the exhaust ventilation raise, and the 50 m buffer of the access road to the exhaust ventilation raise. These surveys will focus on rating the habitat value of these areas for short-eared owl and ptarmigan nesting and foraging. Ratings will be linked to the relevant Terrestrial Ecosystem Mapping (TEM) polygons for the area. Surveys will be conducted according to the provincial methodology for foot surveys and ground nest searches (RIC 2001b). These surveys will inform the final route of the access road to the exhaust ventilation raise so that higher value short-eared owl and ptarmigan habitat is avoided as technically feasible for road construction and safety.

Figure 4.2-2  
Migratory Bird Wetland Survey Areas



### 4.2.3 Construction Management

#### 4.2.3.1 *Blasting Management*

Surface blasting will primarily occur during the start of the Construction phase associated with the construction of the portals, the development of the East Pit Quarry to supply construction materials, and during the Operations phase at the East Pit Quarry for the KUG TSF East Dam building material. When possible, blasting will avoid the sensitive time periods (BC MOE 2014a) identified in Table 4.2-1. In instances when these time periods are not avoided the following mitigation will be implemented:

- Blasting mats or other appropriate mitigation will be used to reduce noise and possible projectiles if flyrock is an issue;
- A siren may be used to warn wildlife and personnel of an expected blast;
- If caribou are present within 500 m of the blast site, no surface blasting will occur during the caribou calving period (May 15 to June 30) (FPAC 2009);
- There will be a surface blasting restriction from sunrise to 4 hours after sunrise to mitigate effects to migratory birds during the breeding season (April 15 to August 15); and
- A visual inspection, with the use of binoculars, of the area surrounding the blast will occur and if any large mammals are seen, blasting will be suspended until the animal has shown movement away from the blast site and is no longer in view. These inspections will be conducted by personnel with experience in detection of large mammals.

#### 4.2.3.2 *Sensitive Features and Time Periods Management*

Where feasible, Project vegetation clearing and ground disturbance activities that may disturb wildlife will be avoided during sensitive periods (Table 4.2-1). If avoidance is not possible, pre-clearing surveys will be conducted to identify features that must be avoided and appropriate buffers will be set up around sensitive areas during the Construction phase. FLNRORD will be contacted if critical Project activities will occur within recommended buffers of active roosts, dens or nests to determine if additional monitoring is required. Critical Project activities include construction activities required to maintain Project scheduling and are related to construction of the access road, building the portals that will allow for the development of the underground mine, and installation of the water discharge pipeline.

No vegetation removal will occur within 500 m of the Ungulate Winter Range (UWR-7-030) polygons near the Project (BC MOE 2016) and no access roads are within this distance (BC MFLNRO 2014). As such, there is no sensitive period that needs to be avoided for mountain goats as no activities will occur within the 500 m buffer of the UWR.

**Table 4.2-1. Wildlife VC Sensitive Periods**

VC	Sensitive Period	Season/Life Requisite/ Habitat Feature	Summary of Mitigation	Minimum Buffer of Sensitive Feature during Sensitive Period	Legislation and Guidelines
Furbearers	February to September	Active Dens	<ul style="list-style-type: none"> <li>• Avoid clearing high-quality forested denning habitat during February to September (low elevation older growth forests and alpine and sub-alpine wolverine habitat);</li> <li>• Conduct pre-clearing surveys to identify and avoid active den sites if clearing occurs in high-quality denning habitat during February to September; and</li> <li>• Maintain buffer around any identified active dens.</li> </ul>	50 m	Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia (BC MOE 2014a)
Bats	May to September	Active Maternal Roosts	<ul style="list-style-type: none"> <li>• Avoid clearing high-quality maternal roosting habitat during May to September;</li> <li>• Conduct pre-clearing surveys to identify and avoid maternal roost sites if clearing occurs during May to September; and</li> <li>• Maintain buffer around any identified active roost trees.</li> </ul>	100 m	A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, BC (BC MFLNRO 2014) Best Management Practices Guidelines for Bats in BC (Holroyd and Craig 2016)
Raptors	Year Round for inactive stick nests; March to August for tree clearing; February 28 to September 15 for short-eared owl habitat	Nesting/ Fledging	<ul style="list-style-type: none"> <li>• Relocation of osprey nest near declines in the Kemess Lake Valley;</li> <li>• Monitoring program to determine use of osprey nest site during construction;</li> <li>• Avoid clearing trees during March to August; or pre-clearing surveys for raptor nests if clearing occurs from March to August in order to identify and avoid nests; and</li> <li>• Avoid ground disturbance from February 28 to September 15 in short-eared owl habitat; or pre-clearing surveys for short-eared owl nests to identify and avoid them.</li> </ul>	200 m (Osprey) 500 m (Short-eared Owl)	BC <i>Wildlife Act</i> Section 34 (1996b): protects the nests of ospreys year round Wildlife Habitat Features – Summary of Management Guidelines – Northern Interior Forest Region (BC MWLAP 2004b) Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia (BC MOE 2013b) Region 7 Omineca – Reduced Risk Windows for Fish and Wildlife (MWLAP 2004)

(continued)



**Table 4.2-1. Wildlife VC Sensitive Periods (completed)**

VC	Sensitive Period	Season/Life Requisite/ Habitat Feature	Summary of Guideline Strategies	Minimum Buffer of Sensitive Feature during Sensitive Period	Legislation and Standards
Migratory Waterbirds	April 15 to August 15	Nesting/ Fledging	<ul style="list-style-type: none"> <li>• Avoid vegetation clearing during the bird breeding season (April 15 to August 15);</li> <li>• Conduct pre-clearing surveys to identify and avoid active nest sites if clearing occurs during April 15 to August 15; and</li> <li>• Maintain buffer around any active nests or nesting territories.</li> </ul>	100 m	<i>Migratory Bird Convention Act (1994)</i> <i>BC Wildlife Act</i> Section 34 (1996b): A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, BC (BC MFLNRO 2014) Region 7 Omineca – Reduced Risk Windows for Fish and Wildlife (MWLAP 2004)
Migratory Landbirds – Olive-sided Flycatcher	April 15 to August 15	Nesting/ fledging	<ul style="list-style-type: none"> <li>• Avoid vegetation clearing during the bird breeding season (April 15 to August 15);</li> <li>• Conduct point count surveys within seven days prior to vegetation clearing if clearing occurs during breeding season (April 15 to August 15); and</li> <li>• Maintain buffer around any active nests or nesting territories.</li> </ul>	30 m	<i>Migratory Birds Convention Act (1994)</i> <i>BC Wildlife Act</i> Section 34 (1996b) Region 7 Omineca – Reduced Risk Windows for Fish and Wildlife (MWLAP 2004)
Amphibians – Western Toad	May to August	Breeding Habitat	<ul style="list-style-type: none"> <li>• Avoid vegetation clearing near ponds from May to August;</li> <li>• Conduct pre-clearing surveys of ponds for evidence of western toad breeding if vegetation clearing occurs near ponds from May to August; and</li> <li>• Maintain a 30 m riparian buffer, and larger where possible, around waterbodies.</li> </ul>	30 m	<i>Species at Risk Act (2002b)</i> Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in BC (BC MWLAP 2012) A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, BC (BC MFLNRO 2014)

If construction activities occur during the sensitive timing window for wildlife VCs, an Environmental Technician, reporting to the Environmental Manager or designate, will be employed on site to identify sensitive wildlife features and implement appropriate measures to limit potential adverse effects to wildlife in these areas. Surveys will be under the direction of a Qualified Professional as appropriate. For each wildlife VC, there are time frames during which wildlife individuals will be more sensitive to disturbance (e.g., breeding). Table 4.2-1 summarizes key sensitive periods for wildlife VCs applicable to the Project, and highlights legislation or BMPs relevant to each VC. Monitoring related to any sensitive wildlife features detected during pre-clearing surveys is described in Sections 5.1.1.8 Den Monitoring, 5.1.1.9 Roost Monitoring and 5.1.1.10 Nest Monitoring.

### Pre-clearing Survey Methodology

#### Furbearers

If construction occurs in high quality marten denning habitat during the denning period (February until September), then pre-clearing surveys will be conducted prior to physical works (falling, excavation, etc.), with the best time occurring prior to leaf out (i.e., fall, winter and early spring). All actions regarding marten clearing management will be directed by a Qualified Professional. Pre-clearing surveys for wolverine dens will also occur if snow clearing and ground disturbance will occur in habitat areas that are suitable for wolverines e.g. alpine and sub-alpine areas.

Ground searches for furbearer dens will focus on detecting suitable tree dens, particularly in large diameter trees (>90 cm) with advanced decay and suitable entrance dimensions. If an active fisher or marten den is found, then a 50 m buffer will be set around the den while it is active. Pre-clearing surveys will include detailing the effort that the monitor has put into surveying (start and end times), as well as documenting information on furbearer observations including time and date of observation, species, physical condition, age, sex (if possible) and number of individuals. This information will be summarised into a daily wildlife monitoring log.

#### Raptors

If vegetation clearing of large trees occurs between March and August, pre-clearing surveys will occur. For tree-nesting raptors, surveys will be conducted by helicopter in the fall or early spring when deciduous trees lack their leaves and nests are easier to locate. Nest characteristics and its location will be used to identify the probable species that constructed inactive nests. If a nest is found but is inactive, then the Environmental Manager will contact BC MFLNRORD and remove or move the nest.

If an active raptor nest is found, then a species appropriate buffer (Table 4.2-1) will be established around the nest where only critical project activities will be conducted, such as movement of vehicles or supplies such that road construction can continue on the other side of the buffer. The buffer will be maintained until the bird has left the nest in the fall and the inactive nest will be removed or moved, in consultation with BC MFLNRORD. Nest monitoring is described in Section 5.1.1.8.

#### Short-eared Owl

The provincial protocol for foot surveys and ground nest searches will be followed for pre-clearing surveys for short-eared owl (RIC 2001a) if vegetation clearing or ground disturbance occurs between

March and August in short-eared owl habitat including alpine areas. Surveys will be conducted under the direction of a Qualified Professional. If an active nest is found it will be buffered by a maximum of 500 m (BC MOE 2013b) and the fate of the nest will be monitored. A minimum buffer of 200 m will be used as short-eared owls are considered species with a moderate ability to co-exist with human activities and this is the buffer size recommended for rural areas (BC MOE 2013b). If a buffer smaller than 200 m is contemplated FLNRO and ECCC will be contacted. If ground disturbance occurs within alpine areas, the data collected during the pre-construction surveys (Section 4.2.2.2) with regard to habitat suitability ratings will inform the areas to target for pre-clearing surveys. Nest monitoring is described in Section 5.1.1.8.

#### Migratory Waterbirds

If vegetation clearing occurs between April 15 and August 15, wetland-nesting waterfowl will be surveyed within 7 days under the direction of a Qualified Professional prior to clearing activities in areas surrounding wetlands. If waterfowl are found nesting in or near wetlands, work will be limited at the nest site and within a 100 m buffer, except for limited, critical project activities in the buffer zone. Nest monitoring is described in Section 5.1.1.8.

#### Migratory Landbirds

If vegetation clearing occurs between April 15 and August 15, landbird nesting territories and nests will be surveyed for on foot in forested areas within 7 days under the direction of a Qualified Professional prior to clearing activities. This sensitive time period is very conservative as 0 – 5% of migratory species are anticipated to arrive within the Local Study Area (assumed to be either nesting zone A5 and B6) prior to April 25 and only 0 – 5% of species associated with wetlands and forested areas remain until August 15 (ECCC 2017b). Field preparation will include creating maps that delineate the areas to be cleared and approximate 200 m grids to inform the location of point counts. Maps will include satellite imagery to give an indication of the vegetation cover as well as trails and access locations.

Unlimited point counts to detect grassland and forest associated birds as well as swallows (RIC 1999) will be used for the surveys. Point counts are a non-intrusive search method which is considered a lower risk activity by ECCC (ECCC 2017c). Points counts will be a minimum of 200 m apart and will occur between sunrise and four hours after sunrise. Transect spacing will be dependent on the habitat type being surveyed. Information about life history periods for the species anticipated to be present during the surveys will inform the anticipated bird presence and behaviour (e.g., early in the year resident birds such as the gray jay will potentially nest prior to the arrival of migratory species.) The different types of evidence or bird behaviour that indicate a nest is nearby will be documented. These include:

- a. actual nest found either with or without bird present;
- b. female flushed off a nest;
- c. bird displaying “broken-wing” behaviour (shorebirds) or defending nest (alarm call, acting aggressively to humans);
- d. bird seen flying with nesting material; and
- e. bird seen flying carrying food for young.

If a nest or evidence of nesting is found, the area will be buffered by an appropriate distance (Environment and Climate Change Canada 2016) with a minimum of 30 m (Table 4.2-1) and the area will be flagged but not the nest itself. If bird behaviour indicates territoriality and the potential presence of a nest, a buffer will be used around the detection location of the bird and associated appropriate habitat. Buffers size in this circumstance will take into account the uncertainty of the location of the nest. The area that is buffered will be avoided for vegetation clearing until the young have left the nest and the area. Halting disruptive activities around nests and using effective buffer zones until the young have naturally left the area surrounding the nest is an example of a lower risk activity (ECCC 2017c). Nest monitoring is described in Section 5.1.1.8.

#### Western Toad

No wetland loss is anticipated associated with the Project (EAC Application Chapter 13 Terrestrial Ecology). However, some wetland alteration may occur associated with construction of the KUG TSF Discharge Waterline. If construction of the KUG TSF Discharge Waterline occurs between May and August (Table 4.2-1), surveys under the direction of a Qualified Professional will occur prior to construction activities to determine if western toads are using the nearby wetlands for breeding.

Surveys will be conducted following RISC standards for systematic surveys for adults and larvae (RISC 1998b). Appropriate protocols will be followed to limit potential disease spread (ECCC 2016a). A minimum 30 m no-disturbance buffer will be established around any identified breeding habitats (Table 4.2-1) (BC MFLNRO 2014; BC MOE 2014b). Larger buffers will be considered (ECCC 2016a) if abundant breeding aggregations (BC MOE 2014b) are observed, i.e., abundance of hundreds to thousands of tadpoles. This is not anticipated as no western toad breeding was observed in the local study area during baseline studies (EAC Application Chapter 15 Wildlife).

#### 4.2.4 Closure and Post-Closure Management

Progressive reclamation activities will occur throughout Construction and Operation. However, more extensive reclamation activities will occur during Closure and Post-Closure. The following mitigation objectives will be included in reclamation activities and will be further developed in the Reclamation and Closure Plan:

- Enhance caribou habitat through reclamation including limiting the use of browse species that are forage for moose and deer;
- Use native species when conducting progressive reclamation;
- Reduce access of caribou predators through road decommissioning and restoration, and closing access to roads and ROWs;
- Further enhance caribou habitat by decommissioning and restoring exploration roads that are no longer required on AuRico's tenures, concurrently with construction and operations of the KUG Project; and
- Inspections of re-vegetated areas to evaluate the success of vegetation prescriptions and restoration objectives with identification of additional mitigation actions if required (see Joint *Mines Act/Environmental Management Act* Permits Application Chapter 4 Reclamation Planning and Effective Mine Closure).

During Post-Closure, access to the mine site will continue to be restricted from the public. Signage will be posted indicating access restrictions. Project infrastructure will continue to be decommissioned when no longer in use or required and reclamation works will occur.

### **4.3 EMERGENCY PREPAREDNESS AND RESPONSE**

#### **4.3.1 Wildlife Encounters and Incursions**

All dangerous encounters with wildlife will be reported to security. Security will complete a Wildlife Incident Report, which will be sent to the environment and safety departments, and designated authorities notified as required. Problem wildlife may be evaluated by AuRico environment staff and corrective measures implemented in consultation with the Ministry of Environment, BC Conservation Officer Service, as appropriate. Kemess Mine will work with the conservation officer service to remove or destroy grizzly bears, as determined by the conservation officer service. The decision to dispatch, either non-lethally or lethally will be made only by the Conservation Officer (Task Procedure K0502: Bear Management).

## **5. MONITORING**

This section describes the monitoring plans to evaluate the predictions made in the EAC Application about potential effects of the Project on wildlife in the regional study area (RSA) and to evaluate the effectiveness of mitigation and management actions at the site. Monitoring activities described below will occur during Construction and Operation. This section also discusses quality assurance and quality control, nonconformity and corrective actions and incident identification.

### **5.1 MONITORING, MEASUREMENT, ANALYSIS, AND EVALUATION**

This section includes the two monitoring programs for wildlife: 1) to monitor wildlife activity and interaction with the Project to better understand Project-related effects on wildlife, which can result in an immediate adaptive management response (e.g., corrective actions), and 2) to assess the predicted effects of the Project on wildlife and evaluate the effectiveness of mitigation and management activities, which will further inform adaptive management at an operational level.

#### **5.1.1 Wildlife Monitoring Program**

The wildlife monitoring program is conducted to monitor wildlife activity and interactions with the Project to document potential Project related effects on wildlife, and to provide timely information that can be used to trigger corrective actions at the Project site (and support adaptive management at an operational level). There are twelve proposed components to the monitoring program:

1. road and traffic monitoring;
2. access monitoring;
3. dust monitoring;

4. aircraft monitoring;
5. pre-clearing survey monitoring;
6. building, infrastructure and waste management monitoring;
7. incidental wildlife and wildlife incident monitoring;
8. den monitoring;
9. roost monitoring;
10. nest monitoring; and
11. wildlife movement monitoring, conducted using two programs:
  - a. camera monitoring, and
  - b. snow track monitoring.

#### 5.1.1.1 *Road and Traffic Monitoring*

Drivers will be required to report incidental observations of wildlife and wildlife collisions/mortalities along the mine roads and the ORAR. The location along the road and species will be recorded and monthly mortalities will be summarized to identify conflict “hot-spots,” which may then be used as part of adaptive management to further mitigate conflicts between road users and wildlife (e.g., through increased signage, further driver education, and enforcement of speed limits).

Any encounter with wildlife (including observations or interactions) will also be required to be reported and records kept. The radio will be used to alert other operators when there is wildlife in the area and to travel with caution. These records will provide a basis for identifying locations of higher risk for wildlife-vehicle collisions, and for developing appropriate mitigation strategies for those areas. If a large number of wildlife (e.g., woodland caribou) are present on or adjacent to the road, a reduced speed limit or temporary road closure may be instigated at the discretion of the Environmental Manager in consultation with the Mine Manager.

Monitoring to reduce wildlife-vehicle interactions includes the following:

- A reporting system for wildlife-vehicle interactions and wildlife-road structure interactions (e.g., moose regularly observed on a particular segment of the road) will be created;
- Location, species, date, and type of wildlife-vehicle interactions will be reviewed annually to identify any areas with higher frequencies of interactions;
- Personnel will be trained on reporting procedures for wildlife observations and interactions through the personnel education and training program (Section 3.1); and
- Completion of an incident report form if an incident is observed or occurs (see Sections 5.4 and 6.1.3), and follow up by Health and Safety working with the environmental staff, for the safety of Project personnel and wildlife. Incidents will be reviewed and mitigation measures adapted as necessary to reduce the incidence of wildlife-vehicle interactions (e.g., through increased signage, further driver education, enforcement of speed limits).

#### 5.1.1.2 Access Monitoring

As described in Section 4.2.1.2, the main entrance to Kemess Mine is gated to prohibit entry by non-authorized vehicles. If unauthorized use, including hunting, is observed along the access road or anywhere within the Project area, it will be reported immediately to security. The Environmental Manager will in turn report hunting activities involving the access road to provincial authorities.

#### 5.1.1.3 Dust Monitoring

Results from the dust monitoring stations along the northern section of the ORAR will be reported. Please refer to the Air Quality Management Plan for details.

#### 5.1.1.4 Aircraft Monitoring

Pilots will be asked to report incidental observations of large mammals (e.g., goats, grizzly bears, wolf packs) as part of the incidental wildlife reporting program. Any instances of flights being delayed for landing or take-off due to the presence of large mammals will also be recorded. If pilots have to enter the 2 km buffer area of the UWR the reason for doing so will be documented.

#### 5.1.1.5 Pre-clearing Survey Monitoring

If vegetation clearing or ground-disturbance activities occur during the sensitive timing windows for wildlife VCs (see Table 4.2-1), an Environmental Technician, reporting to the Environmental Manager, will be employed on site to identify sensitive wildlife features and habitat and implement appropriate measures to limit potential adverse effects to wildlife in these areas. For each wildlife VC, there are time frames during which wildlife individuals will be more sensitive to disturbance (e.g., breeding). Table 4.2-1 summarizes key sensitive periods for wildlife VCs applicable to the Project, and highlights legislation or BMPs relevant to each VC. The results of the pre-clearing surveys will be recorded.

#### 5.1.1.6 Building, Infrastructure, and Waste Management Monitoring

Environmental staff will monitor Project infrastructure and waste handling and management, as follows:

- Bi-weekly visual inspections of the outside of Project infrastructure, including underground components, for observations of wildlife interacting with buildings or evidence of use (e.g., bird nesting materials in vents, scratching or chewing of building materials, bat activities and evidence of roosting, evidence of digging beneath buildings or skirting) and adaptively managed if necessary (e.g., improve building skirting, install bird spikes to deter bird nesting);
- Visual inspections of infrastructure will include bi-weekly (every other week) surveys for barn swallow during their breeding season (April 15 to August 15);
- Raptor nesting activity will be monitored as part of regular transmission line surveys for standard maintenance purposes and managed adaptively;

- In the event that wildlife are accessing Project infrastructure where BMPs to prevent access have already been implemented, a response plan to limit access by the wildlife species will be developed. This could involve measures such as improvements to building skirting or installation of deterrents (e.g., bird spikes), depending on the species accessing the infrastructure;
- Visual inspections will be completed of waste handling and management practices at camps (e.g., kitchen and domestic wastes) and waste storage facilities (i.e., incinerator and burn pits) to check for compliance with the Waste Management Plan;
- If wastes or other wildlife attractants are found to be misdirected or mismanaged, the Environmental Technicians will immediately inform the supervisor and the wastes/attractants will be moved to an appropriate secure location as soon as possible to prevent attraction of wildlife; and
- If wildlife are observed attempting to access or are successful in accessing waste storage facilities, alternative methods to secure wastes and wildlife attractants will be evaluated and then applied as appropriate.

Personnel will also be encouraged to report incidental observations of issues related to camps or waste management. Incidental observations will be reported and recorded continuously, while periodic monitoring of camp infrastructure will begin with construction and conducted regularly until camp structures are decommissioned with a planned period of every 2 weeks. Frequency may decline with time if no wildlife encounters are recorded, but frequency will not be less than seasonal inspections.

Any incidents where wildlife has been observed to interact directly with waste or observations of habituated wildlife (particularly bears and wolverine) will be reported to AuRico environment staff who may notify appropriate regulatory agencies and authorities, if required. Problem wildlife may be evaluated by AuRico environment staff and corrective measures implemented in consultation with the Ministry of Environment, BC Conservation Officer Service, as appropriate. If smaller problem wildlife are required to be trapped, BC MFLNRORD will be contacted for the required permits.

#### 5.1.1.7 *Incidental Wildlife and Wildlife Incident Monitoring*

Bear safety training will be provided to Project personnel as part of site orientation. AuRico has an extensive and successful wildlife monitoring and management system in place for the existing KS facility. Specific personnel will be provided with training to monitor and respond to bear encounters. Other wildlife will be avoided and allowed to move unhindered. Wildlife feeding will not be permitted under any circumstances. Wildlife fatalities from traffic incidents or other events will be reported to the Mine Environmental/H&S Manager who will in turn track such information and make recommendations to prevent further occurrences. It is the responsibility of all employees to report all bears observed within the Bear-Free Zone and all dangerous encounters with wildlife to Security, or designate. Security, or designate, will complete a Wildlife Incident Report and provide the report to the Environment Department.

On-site wildlife observations, sightings and incidences will be recorded on tracking forms that will be distributed to designated locations within the Project area. Incidental observations, mortality



events, and interactions with Project infrastructure will be recorded throughout the Construction and Operations phases of the Project. The wildlife log forms will document the following:

- date;
- time;
- observer;
- species;
- number/sex/age of species (if known);
- activity;
- location;
- comments; and
- photo.

Incidental wildlife observations and wildlife incidents will be reported to Security, or designate, and documented. A wildlife log will be kept by Security, or designate, for select wildlife species occurrences. A 'Wildlife Sightings' e-mail distribution list will be re-established, and will include the environment department, safety department, and potentially others. All sightings reported through this system will be documented and tracked.

Results from on-site wildlife monitoring will be used to identify potential opportunities for adaptive management. In conjunction with the monitoring program results, the evaluation of mitigation measures applied to manage wildlife will help determine if prescribed measures are achieving performance objectives.

#### 5.1.1.8 *Den Monitoring*

Should clearing of vegetation occur within the sensitive (denning) season for furbearers, then pre-clearing surveys will be conducted (Section 5.1.1.5). If any active dens are found, then appropriate buffers (minimum 50 m) will be set up surrounding the dens. To determine when young have left active dens, dens will be visited on a bi-weekly basis. The area can be cleared prior to the end of the sensitive period if the den is:

- Empty = den empty, no young in area, no signs of predation (assuming there have been observations of young in the den previously); or
- Depredated = den disturbed and evidence of predation.

The buffer used around the den and the outcome of the fate of the young will be documented. If critical Project activities occur within a den buffer, FLNRO will be consulted to determine if additional monitoring will be required.

#### 5.1.1.9 *Nest Monitoring*

Should clearing of vegetation occur within the sensitive (nesting) season for birds, then pre-clearing surveys will be conducted (Section 5.1.1.5). If any birds nests are found, then appropriate buffers (minimum 30 m) will be set up surrounding the nests. To determine when young birds have left active nests, nests will be visited on a bi-weekly basis. Re-located raptors nests will also be monitored bi-weekly. If the actual nest was not found then the area will remain buffered and

avoided until the end of the sensitive period (Table 4.2-1). The area can be cleared prior to the end of the sensitive period if the nest stage is:

- Fledged = nest empty, no young in area, no signs predation (assuming there have been observations of eggs and nestlings/young in the nest previously);
- Depredated = nest disturbed, egg/nestling fragments; or
- Abandoned = eggs cold, nestlings dead.

The buffer used around the nest and the outcome of the nesting attempt will be documented for both active nests identified during pre-clearing surveys and any re-located raptor nests. Monitoring of re-located raptor nests will occur for three years. If after three years the re-located nest has not been used or breeding has been unsuccessful adaptive management will be used to determine how to proceed with different mitigation. If critical Project activities occur within a nest buffer, FLNRO will be consulted to determine if additional monitoring will be required.

#### 5.1.1.10 *Wildlife Movement Monitoring*

The movement of large mammals, primarily moose, caribou, and black bear, will be monitored using three methodologies; cameras, snow track surveys, and observations by employees. Camera monitoring and employee observations will be used to determine the use of the wildlife ramps over the KUG TSF Discharge Waterline as well as in areas where wildlife may be funneled due to linear barriers. Snow track surveys will be used to monitor the use of escape gaps created in snowbanks along roads.

#### Camera Monitoring

##### KUG TSF Discharge Waterline Monitoring

One camera will be positioned along the lowermost portion (Attichika wetland) of the KUG TSF Discharge Waterline to monitor the use of the area by wildlife by taking motion-triggered photos. Photos will be downloaded at least twice a year and reviewed to identify and summarize the number of times the area is used by wildlife, the species and number of individuals detected, and the date of observations. Additional information will be gathered from employee observations of wildlife presence and movement along the remainder of the waterline route, which occurs along the existing minesite access road.

##### Movement Funnel Monitoring

The KUG TSF Discharge Waterline, KUG Access Road and conveyor will create barriers to movement with different degrees of permeability. Wildlife may follow these linear features until they find a gap. These gaps may become areas where wildlife are funneled. To determine if wildlife are being funnelled through these potential gap areas four remote cameras will be set up at the following monitoring locations: the higher elevation area between the two tunnel portals, in the saddle area where the conveyor will be elevated above ground level, north of the decline portal, and on the north and west sides of the subsidence area. The north and west sides of the subsidence area had the highest rated caribou suitability and capability habitat (EAC Application Chapter 15 Wildlife). Photos will be downloaded at least twice a year and reviewed to identify and summarize

the number of times the potential funnel area is used by wildlife, the species and number of individuals detected, and the date of observations.

### Snow Track Monitoring

#### Winter Escape Pathways Monitoring

During winter months when snow accumulation has created banks greater than 1 m in height and wildlife escape gaps are plowed at regular intervals, the use of these gaps will be monitored on a monthly basis as well as incidentally. Monthly surveys will occur preferentially within 24 hours following a fresh snow fall and will avoid conditions when snowfall and/or winds are heavy/strong (RISC 1999). A technician will drive the access road and the northern section of the ORAR and record any wildlife tracks that are seen within the escape gaps. Tracks will be recorded minimally according to the following groups, ungulates, wolf, small furbearer, and to species if possible.

### **5.1.2 Follow-up Monitoring Programs**

The follow-up monitoring program is designed to gauge the accuracy of the original impact predictions and to evaluate the effectiveness of mitigation measures. These activities will ultimately inform adaptive management at an operational level (e.g., adjustments to activity periods; employee education, etc.).

#### *5.1.2.1 Migratory Birds*

Effectiveness monitoring is not anticipated to be required associated with conducting vegetation clearing during the sensitive time period for migratory birds as no migratory birds will be in the area during this time. However, if the sensitive time period cannot be avoided and pre-clearing surveys are conducted then data will be collected that includes the timing of the pre-clearing survey, methodology, area surveyed, species detected, mitigation measures, e.g., buffers, required and implemented, and the outcome of the nests/territories that are buffered, i.e., abandoned, depredated, or successful fledging of young.

If any barn swallow nests are found associated with infrastructure the same information as described above will also be documented and included in the annual report.

If the mine site Water Management Plan monitoring indicates exceedances of wildlife aquatic guidelines in the KUG tailings storage facility or seepage ponds, the deterrent measures either used or prepared for use as necessary to deter migratory birds from these areas will be reported on as well as the outcome of the use of the deterrents.

#### *5.1.2.2 Alpine Species*

Any active marmot dens found during pre-construction surveys within the subsidence area or the 250 m buffer of it will be monitored through operations. Monitoring will be conducted according to provincial methodology for relative abundance and sign sampling (RIC 1998a). Monitoring may be constrained in area to where it is safe for people to access near the subsidence area. However, if no active dens are found during pre-construction surveys this monitoring will not occur.

The area of habitat potentially influenced by subsidence, subsidence buffer, exhaust ventilation raise, and associated access road will be calculated through a GIS exercise during each year there is construction and/or subsidence in the area and compared to the EAC Application predictions of habitat loss and alteration as well as to the TEM rated habitats from pre-construction surveys to verify the predictions. The amount of habitat loss will also be compared to the size of ptarmigan and short-eared owl territories to provide context for the relative scale of the loss.

## 5.2 QUALITY ASSURANCE/QUALITY CONTROL

Accurate species identification for reporting incidental wildlife observations, wildlife interactions, and wildlife incidents will be facilitated by providing a wildlife VC information brochure to employees during their training sessions. Photos of species will also be taken in instances when the employee is uncertain of the species identification. These photos will be reviewed by a Qualified Professional to confirm the species. Excel spreadsheet templates with drop down menus will be created to facilitate data entry and reduce inconsistencies associated with typographical errors. QA/QC protocols will be developed such that data entered by one person is checked by a different person prior to reporting.

## 5.3 INCIDENT IDENTIFICATION

Wildlife incidents and interactions will be recorded and summarized according to the following definitions:

- Wildlife incident: any events that occur that require active deterrence, wildlife mortality, injury to humans or damage to infrastructure due to wildlife; and
- Wildlife interactions: all other events where there is an interaction between wildlife and people or infrastructure but there is no harm to wildlife, no wildlife mortality and no injury to people or damage to infrastructure.

## 6. CARIBOU MITIGATION AND MONITORING

Caribou habitat modelling indicates that the Project infrastructure and activities within the Local Study Area will interact primarily with the Thutade herd (Sittler, McNay, and Giguere 2015) considered part of the Northern Mountain Caribou population and listed under Schedule 1 of SARA as Special Concern. Project activities south of the Local Study Area may affect the Chase and Wolverine herds considered part of the Southern Mountain Caribou population in the recovery strategy (Environment Canada 2014) and listed under Schedule 1 of SARA as Threatened and considered part of the Northern Mountain Caribou population by COSEWIC (COSEWIC 2014). Habitat modeling indicates that the Project will interact with caribou habitat, primarily in the following areas:

- the subsidence area falls within modelled high elevation winter range (ERM 2015; Sittler, McNay, and Giguere 2015) and high and moderately rated high elevation spring and summer habitat (ERM 2015);
- the Access Corridor falls within modelled calving/summer and post-rut habitat (Sittler, McNay, and Giguere 2015) and high and moderately rated summer habitat (ERM 2015);

- the KUG TSF Discharge Waterline fall within modelled low elevation winter range (Sittler, McNay, and Giguere 2015) high and moderately rated summer and winter habitat (ERM 2015);
- most of the northern portion of the ORAR falls outside of modelled habitat areas for the Thutade herd (Sittler, McNay, and Giguere 2015) but within the Chase herd boundary (Environment Canada 2014); and
- one communication tower falls within high elevation summer and winter habitat for northern mountain caribou, one tower falls within high elevation summer and winter habitat for the Wolverine herd and two communication towers fall within high elevation summer and winter habitat for the Chase herd (Environment Canada 2014).

Mitigation and monitoring for caribou is informed by provincial and federal guidance in the following documents:

- Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia (BC MFLNRO 2014);
- Management Plan for the Northern Mountain Population of Woodland Caribou (*Rangifer tarandus caribou*) in Canada (Environment Canada 2012a);
- Recovery Strategy for the Woodland Caribou, Southern Mountain population in Canada (Environment Canada 2014);
- South Peace Northern Caribou: Standardized Industry Management Practices (BC FLNRO and BC MOE 2016) ; and
- Guidance for the Development of Caribou Mitigation and Monitoring Plans for South Peace Northern Caribou (BC MOE 2013a).

## 6.1 MITIGATION

General environmental protection measures currently in place at the Kemess South Mine that will continue to be actively enforced and that benefit caribou include:

- prohibition of hunting, trapping or fishing on the Project by Kemess employees, Kemess contractors and suppliers and members of the public;
- public access restriction to operating mine property;
- zero tolerance policy for employees feeding wildlife;
- maximum speed limits are posted and enforced on roads on the KS property;
- implementation of a wildlife right-of-way on roads at all times unless it is unsafe to do so;
- prohibition of the harassment of wildlife by Kemess employees, and Kemess contractors and suppliers; and
- roadway seeding with seed mixes that are less attractive to wildlife.

A review of the effectiveness of mitigation measures for caribou is provided in Appendix A. Additional mitigation beneficial to caribou is listed below.

### 6.1.1 Road and Traffic Management

Caribou-vehicle interactions can be limited through road design, maintenance activities and modification to driving behaviour. This will include adhering to speed limits, giving caribou the right-of-way, and communicating caribou sightings. Travel outside of daylight hours will be undertaken with caution, and personnel will be educated to recognize that dawn, dusk and during the night are periods of high caribou activity. Road and traffic management will be implemented to adhere to the principle of avoiding increased mortality risk for caribou (BC FLNRO and MOE 2016).

The following mitigation measures will be implemented.

- As part of standard training, all Project personnel will receive instruction on the rules associated with driving on mine site roads, the risks to caribou and the actions that they should take to reduce the chance of collisions with caribou, including caution when driving at dawn, dusk, and at night, the locations of caribou crossings or where caribou have repeatedly been observed, and the locations where any caribou collisions have occurred;
- Road maintenance of mine roads will avoid the use of salt, where practicable;
- Gaps in snow banks will be plowed to allow escape pathways for caribou on access roads; and
- Speed limits will be posted along the mine roads; vehicles will also be directed to adhere to open road speed limits for the ORAR. Road signs will be installed along mine roads to alert drivers to speed limits and caribou-sensitive areas such as known migration routes and seasonal feeding areas.

#### Caribou Collision Protocol

Caribou-vehicle collisions will be managed according to the following:

- Collisions between Project vehicles and caribou will be documented and will include information on the location of the collisions, including the Project access roads and the ORAR;
- Personnel and drivers will be instructed to report any caribou-vehicle collision to site AuRico environmental staff;
- The Fish and Wildlife Branch of FLNRORD (1-877-855-3222) will be contacted for guidance on how to manage caribou involved in non-fatal collisions and how to dispose properly of caribou carcasses;
- In the event of a caribou requiring euthanasia, a veterinarian will be contacted and provincial guidance regarding euthanasia of wild animals will be followed (CVBC 2015); and
- The Environmental Manager will be responsible for training, providing a reporting system, and reporting collisions to appropriate government officials.

### Management to Reduce Caribou Use of Roads

To reduce caribou use of mine site roads while also taking into account the principle of avoiding increased forage for other prey species, i.e., deer and moose (BC FLNRO and MOE 2016), the following mitigation measures will be implemented.

- Vegetation management will be implemented to minimize palatable plant species, particularly moose forage species (e.g., clover and red osier dogwood; BC MFLNRO 2014). Vegetation along roadway edges will be minimized to increase visibility of wildlife to drivers (e.g., a cleared buffer zone of appropriate size) and to reduce abundance of naturally occurring forage species. Clearing will be site specific to provide a balance between low vegetation and maintaining high value and sensitive habitat. Vegetation maintenance activities (e.g., brush-cutting) will be conducted as appropriate to reduce herbivore use of vegetation within corridor areas where concerns exist for caribou-vehicle collisions and high-quality browse is present (e.g., willow, birch). These activities will be conducted in early spring or fall to limit attractiveness to herbivores such as moose and deer (Rea et al. 2010) and avoid effects to migratory birds. Pre-clearing surveys will be used if vegetation management needs to occur during the sensitive time period for migratory birds due to observations of deer or moose browsing on road-side vegetation.

### Omineca Resource Access Road (ORAR) Mitigation and Management

Specific management and mitigation measures that will be implemented along the northern portion of the ORAR (where AuRico is the sole industrial user) include the following:

- Gaps in snow banks along the ORAR will be plowed to target every 500 m on alternating sides for extended straight sections of the ORAR to provide escape options for caribou, where practicable. In addition, gaps will be provided on the outside of bends and/or corners where practicable (Heatherington, Teske, and Forbes 1989);
- Incidental observations of caribou will be recorded to allow identification of areas along the ORAR that appear to be associated with higher wildlife activity, i.e., areas that may warrant additional mitigation measures, such as reduced speeds;
- Incidental observation of wildlife will include observations of wolves that may use the ORAR as a movement corridor;
- Locations along the ORAR identified as having a higher likelihood for vehicle collisions with wildlife based on repeated observations of incidents will be managed adaptively (e.g., through signage, education, and speed limits). Caribou collar data from Sittler et al. (2015) will be used to identify areas of higher use along the ORAR;
- The amount and nature of traffic use by AuRico or contractors for the Project on the northern portion of the ORAR will be monitored;
- In the winter, pullouts will be narrow so that it makes it difficult for trucks with snowmobile trailers to turn around;
- Large areas that snowmobilers could use as a parking and backcountry access location will not be created;

- Snowmobile parking at pull out locations will be discouraged by posting signs;
- Steep snowbanks will be created to make it more difficult for snowmobile access, particularly in areas adjacent to proposed or existing UWRs (with the caveat that mitigation of direct mortality will take precedence over indirect mortality, and that breaks in the snowbanks will be provided to enable wildlife to escape should they occur on the road); and
- Incidental observations of winter recreation use will be recorded.

### 6.1.2 Access Management

The need for better access management is one of the key issues identified in the Mackenzie LRMP (BC ILMB 2000). Access management is also relevant to the principle of avoiding increased mortality risk for caribou (BC FLNRO and MOE 2016). To mitigate for the potential effects of increased access to the Project site and a potential increase in hunting of caribou, the following management and mitigation measures will be implemented:

- restricting access to mine site roads and only permitting traffic that is required for the Project;
- the main entrance to Kemess is gated to prohibit entry by non-authorized vehicles;
- the Pine Road access to the Central Cirque area will be restricted and signage in place prohibiting entry by non-authorized vehicles;
- the gate and security measures will control access and address the mobility of snow machines, all-terrain vehicles (ATVs), and the ability of persons on foot to circumnavigate security structures;
- implement and enforce a no hunting, trapping, or fishing policy for personnel and contractors on the Project site;
- company policy that will prohibit the possession of personal firearms or other hunting weapons by personnel and contractors within the Project area; and
- during Operations and/or at Closure, deactivate all non-essential roads if long-term Post-closure monitoring access is not required.

### 6.1.3 Noise and Light Management

To limit any disturbance of caribou by traffic noise and operation noise (e.g., blasting, haul trucks, and conveyor), noise management measures will be implemented with the objective to limit ambient noise levels during all phases of the Project. The following noise management and mitigation measures will be implemented:

- vehicles will be maintained according to manufacturer's recommendations;
- speed limits will be imposed and enforced;
- mufflers will be installed on diesel-powered vehicles and maintained according to manufacturer's recommendations;



- pre-determined flight paths will be used by helicopters and fixed wing aircraft, that will have a vertical buffer distance as outlined by the BC MFLNRORD (2014; generally 400 m), where possible, from sensitive habitats and known areas of wildlife use;
- helicopters will follow, where feasible, lateral buffer distances from sensitive habitats and known areas of wildlife use, as outlined by the BC MFLNRORD (2014); and
- pilot education regarding the negative effects of over-flights on wildlife species and the importance of maintaining a minimum prescribed altitude, when possible, above caribou and identified sensitive habitat areas.

To limit any disturbance of caribou due to light, the following light management measures will be implemented during all phases of the Project:

- stray light will be limited by either shielding lights or using directed/focused lighting rather than broad area lighting on new infrastructure; and
- lighting in non-essential areas will be used only when necessary for the safety of employees.

#### **6.1.4 Dust Management**

Dust from mobile equipment and vehicular traffic will be managed with water as a dust suppressant on mine site roads. Roadway dust suppression efforts will be supplemented with posted and enforced speed limits. A dust monitoring station will be implemented along the northern section of the ORAR, placed near ungulate winter range. Dust management and monitoring strategies are provided in the Air Quality Management Plan. Should water be deemed insufficient to control dust, then additional dust control measures/products may be investigated.

#### **6.1.5 Aircraft Management**

##### *6.1.5.1 Site Management*

To limit disturbance to caribou, aerial support, including helicopter access, will be directed along controlled routes or flight paths. However, limited helicopter access is anticipated during construction and operations. Specific flight paths will be determined before Construction commences and will be followed, unless topography, unfavourable weather, and/or safety require pilots to fly within wildlife buffers. Locations of these flight paths and the reasons they must be used will be communicated to workers involved in aviation support. Pilots will be required to follow flight paths wherever feasible, and the Environmental Manager, or designate, will regularly communicate and review with the pilots the location of environmentally sensitive areas.

Caribou mitigation measures related to aircraft and helicopters include:

- maintaining 400 m vertical separation between helicopters and caribou winter range and caribou calving areas, weather permitting (BC MFLNRO 2014);
- directing pilots to avoid and not fly towards, hover near, or land near caribou, particularly during critical periods of the year such as calving and winter; and

- selecting flight paths to access camps and construction areas that will limit potential disturbance to caribou; provide to all pilots established flight paths.

Prior to take-off and landing of fixed wing airplanes there will also be a scan to confirm that no caribou are on the runway. Pilots will confirm that the runway is clear of caribou prior to using it.

#### 6.1.5.2 *Communication Tower Access Management*

The following mitigation measures will be implemented by helicopters when accessing communication towers:

- use topographic barriers to separate helicopters from caribou;
- remain below caribou if possible;
- avoid flying directly towards, hovering near, or landing near caribou;
- maintain a 400 m vertical separation between helicopters and caribou winter range, weather permitting (BC MFLNRO 2014);
- prioritize helicopter access to tower sites during low risk caribou windows (BC MFLNRO 2014):
  - low risk: July 16 to September 14; and
  - caution: September 15 to January 14;
- avoid tower sites between January 15 and July 15 to minimize disturbance to caribou, if possible.

#### 6.1.6 **Caribou Movement Management**

The Project will be designed, constructed and managed to promote caribou movement through the Project site. Caribou movement management relates to the principle of maintaining connectivity between ranges (BC FLNRO and MOE 2016) and the following measures will be implemented:

- In areas where the KUG TSF Discharge Waterline is not buried or otherwise could become an obstacle to caribou crossing, ramps will be created every 100 to 300 m at a grade of 25% where practicable (4 m run to a 1 m rise) to facilitate movement. Determining the locations of these ramps will be a collaborative exercise with AuRico, BC MFLNRORD, and the TKN and will take into account appropriate datasets such as caribou collar data (Sittler, McNay, and Giguere 2015);
- ramps will be constructed using available materials from site including rocks, coarse woody material, and soil/overburden. Ramps will be vegetated with species consistent with the Reclamation and Closure Plan;
- managing snowbank heights and providing gaps on Project roads, including the northern section of the Omineca Resource Access Road (where AuRico is the sole industrial user), to provide escape pathways to allow caribou to exit the plowed road;
- speed limits are posted and enforced on the mine site's existing and future access roads;
- allowing caribou to have the right-of-way at all times when encountered by vehicles on Project roads unless unsafe to do so;

- signage will be provided along Project roads in high-value caribou areas or known caribou travel corridors to warn vehicle operators of the potential to encounter wildlife;
- mine site roadside vegetation will be cut low at caribou crossings along roads to enhance visibility of caribou; and
- progressive reclamation activities will be undertaken and designed to remove barrier and accommodate movement.

### 6.1.7 Blasting Management

Surface blasting will primarily occur during the start of the Construction phase associated with the construction of the portals, the development of the East Pit Quarry to supply construction materials, and during the Operations phase at the East Pit Quarry for the KUG TSF East Dam building material. When possible, blasting will avoid the sensitive time periods (BC MOE 2014a) identified in Table 4.2-1. In instances when these time periods are not avoided the following mitigation will be implemented:

- Blasting mats or other appropriate mitigation will be used to reduce noise and possible projectiles if flyrock is an issue;
- A siren may be used to warn caribou and personnel of an expected blast;
- If caribou are present within 500 m of the blast site, no surface blasting will occur during the caribou calving period (May 15 to June 30) (FPAC 2009); and
- A visual inspection, with the use of binoculars, of the area surrounding the blast will occur and if any caribou are seen, blasting will be suspended until the caribou has shown movement away from the blast site and is no longer in view. These inspections will be conducted by personnel with experience in detection of large mammals.

### 6.1.8 Closure and Post-Closure Management

Progressive reclamation activities will occur throughout Construction and Operation. However, more extensive reclamation activities will occur during Closure and Post-Closure. The following mitigation objectives will be included in reclamation activities and will be further developed in the Reclamation and Closure Plan:

- Enhance caribou habitat through reclamation including limiting the use of browse species that are forage for moose and deer;
- Use native species when conducting progressive reclamation;
- Reduce access of caribou predators through road and linear corridor decommissioning and restoration, and closing access to roads and ROWs;
- Further enhance caribou habitat by decommissioning and restoring exploration roads that are no longer required on AuRico's tenures, concurrently with construction and operations of the KUG Project; and
- Inspections of re-vegetated areas to evaluate the success of vegetation prescriptions and restoration objectives with identification of additional mitigation actions if required.

During Post-Closure, access to the mine site will continue to be restricted from the public. Signage will be posted indicating access restrictions. Project infrastructure will continue to be decommissioned when no longer in use or required and reclamation works will occur.

## 6.2 MONITORING

### 6.2.1 Road and Traffic Monitoring

Drivers will be required to report incidental observations of caribou and caribou collisions/mortalities along the mine roads and the ORAR. The location along the road and species will be recorded and monthly mortalities will be summarized to identify conflict “hot-spots,” which may then be used as part of adaptive management to further mitigate conflicts between road users and caribou (e.g., through increased signage, further driver education, and enforcement of speed limits).

Any encounter with wildlife (including observations or interactions) will also be required to be reported and records kept. The radio will be used to alert other operators when there are caribou in the area and to travel with caution. These records will provide a basis for identifying locations of higher risk for caribou-vehicle collisions, and for developing appropriate mitigation strategies for those areas. If a large number of caribou are present on or adjacent to the road, a reduced speed limit or temporary road closure may be instigated at the discretion of the Environmental Manager in consultation with the Mine Manager.

Monitoring to reduce caribou-vehicle interactions includes the following:

- A reporting system for caribou-vehicle interactions and caribou-road structure interactions (e.g., caribou regularly observed on a particular segment of the road) will be created;
- Location, species, date, and type of caribou-vehicle interactions will be reviewed annually to identify any areas with higher frequencies of interactions;
- Personnel will be trained on reporting procedures for caribou observations and interactions through the personnel education and training program (Section 3.1); and
- Completion of an incident report form if an incident is observed or occurs (see Sections 5.4 and 6.1.3), and follow up by Health and Safety working with the environmental staff, for the safety of Project personnel and wildlife. Incidents will be reviewed and mitigation measures adapted as necessary to reduce the incidence of caribou-vehicle interactions (e.g., through increased signage, further driver education, enforcement of speed limits).

### 6.2.2 Access Monitoring

The main entrance to Kemess Mine is gated to prohibit entry by non-authorized vehicles. If unauthorized use, including hunting, is observed along the access road or anywhere within the Project area, it will be reported immediately to security. The Environmental Manager will in turn report hunting activities involving the access road to provincial authorities.

### 6.2.3 Dust Monitoring

Results from the dust monitoring stations along the northern section of the ORAR will be reported. Please refer to the Air Quality Management Plan for details.

### 6.2.4 Aircraft Monitoring

Pilots will be asked to report incidental observations of caribou as part of the incidental wildlife reporting program. Any instances of flights being delayed for landing or take-off due to the presence of caribou will also be recorded.

### 6.2.5 Wildlife Movement Monitoring

The movement of caribou will be monitored using three methodologies; cameras, snow track surveys, and observations by employees. Camera monitoring and employee observations will be used to determine the use of the ramps over the KUG TSF Discharge Waterline as well as in areas where caribou may be funneled due to linear barriers. Snow track surveys will be used to monitor the use of escape gaps created in snowbanks along roads.

#### 6.2.5.1 Camera Monitoring

Three habitat modelling sources, capability (Ardea 2015), suitability (ERM 2015) and Sittler et al. (2015) data were combined to identify areas for camera monitoring (Figures 6.2-1 and 6.2-2).

#### KUG TSF Discharge Waterline Monitoring

One camera will be positioned along the lowermost portion (Attichika wetland) of the KUG TSF Discharge Waterline to monitor the use of the area by caribou by taking motion-triggered photos (Figure 6.2-1). Photos will be downloaded at least twice a year and reviewed to identify and summarize the number of times the area is used by caribou, the number of individuals detected, and the date of observations. Additional information will be gathered from employee observations of caribou presence and movement along the remainder of the waterline route, which occurs along the existing minesite access road.

#### Movement Funnel Monitoring

The KUG TSF Discharge Waterline, KUG Access Road and conveyor, and subsidence area will create barriers to movement with different degrees of permeability. Caribou may follow linear features until they find a gap. These gaps may become areas where caribou are funneled. Monitoring locations are specific to areas where potential funnelling of animals may occur around Project infrastructure and may have a higher occurrence of caribou due to their habitat value (Figure 6.2-2). Monitoring of caribou movement in association with the subsidence area as both prior to the development of the subsidence area and afterwards will be used to inform potential options for mitigating restrictions to movement. It is currently unknown whether these areas are used for movements and whether or not the subsidence area will restrict movements.

Figure 6.2-1

High Quality Caribou Spring and Summer Habitat Areas and Proposed Monitoring Locations Associated with the Access Corridor

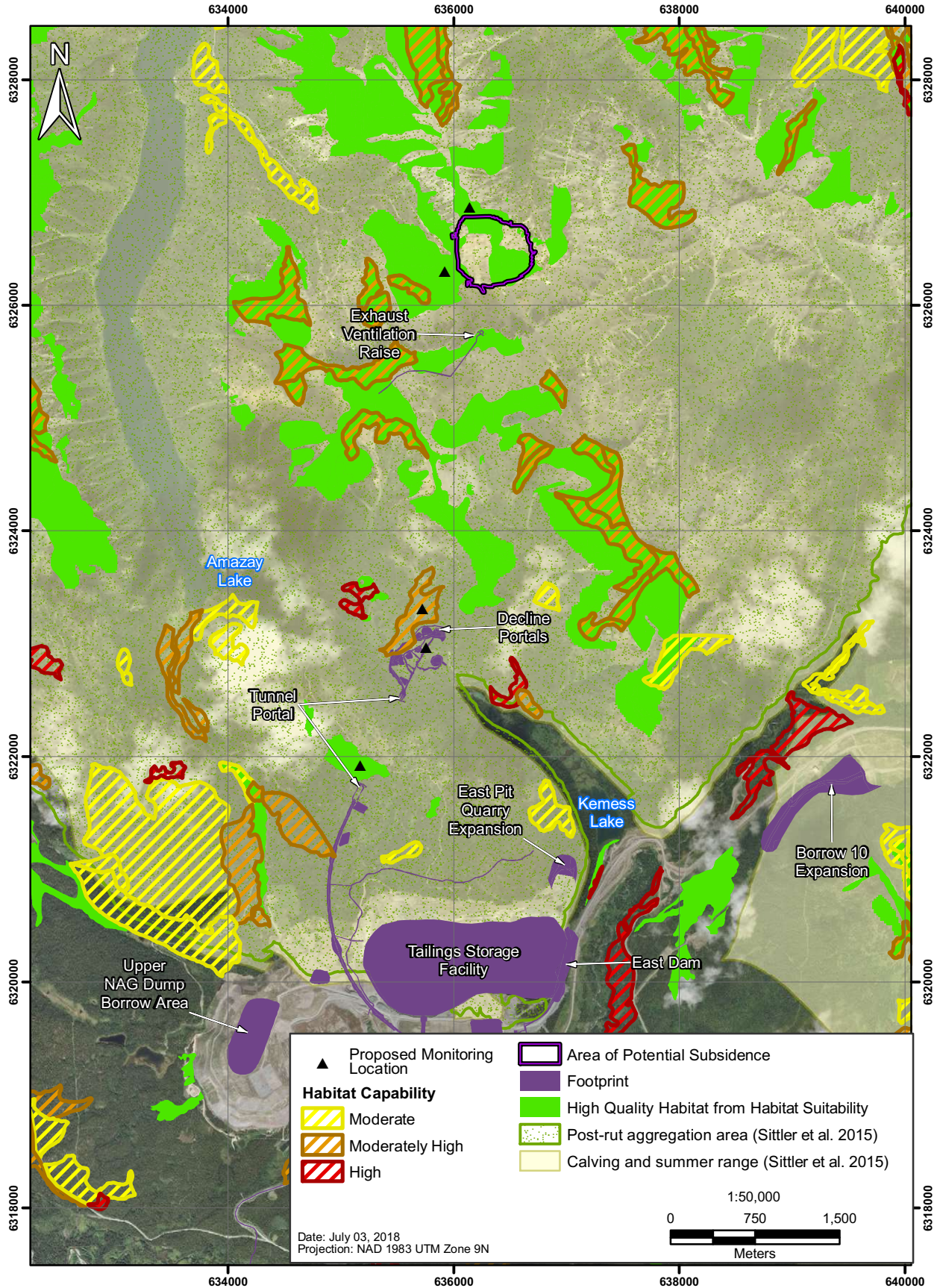
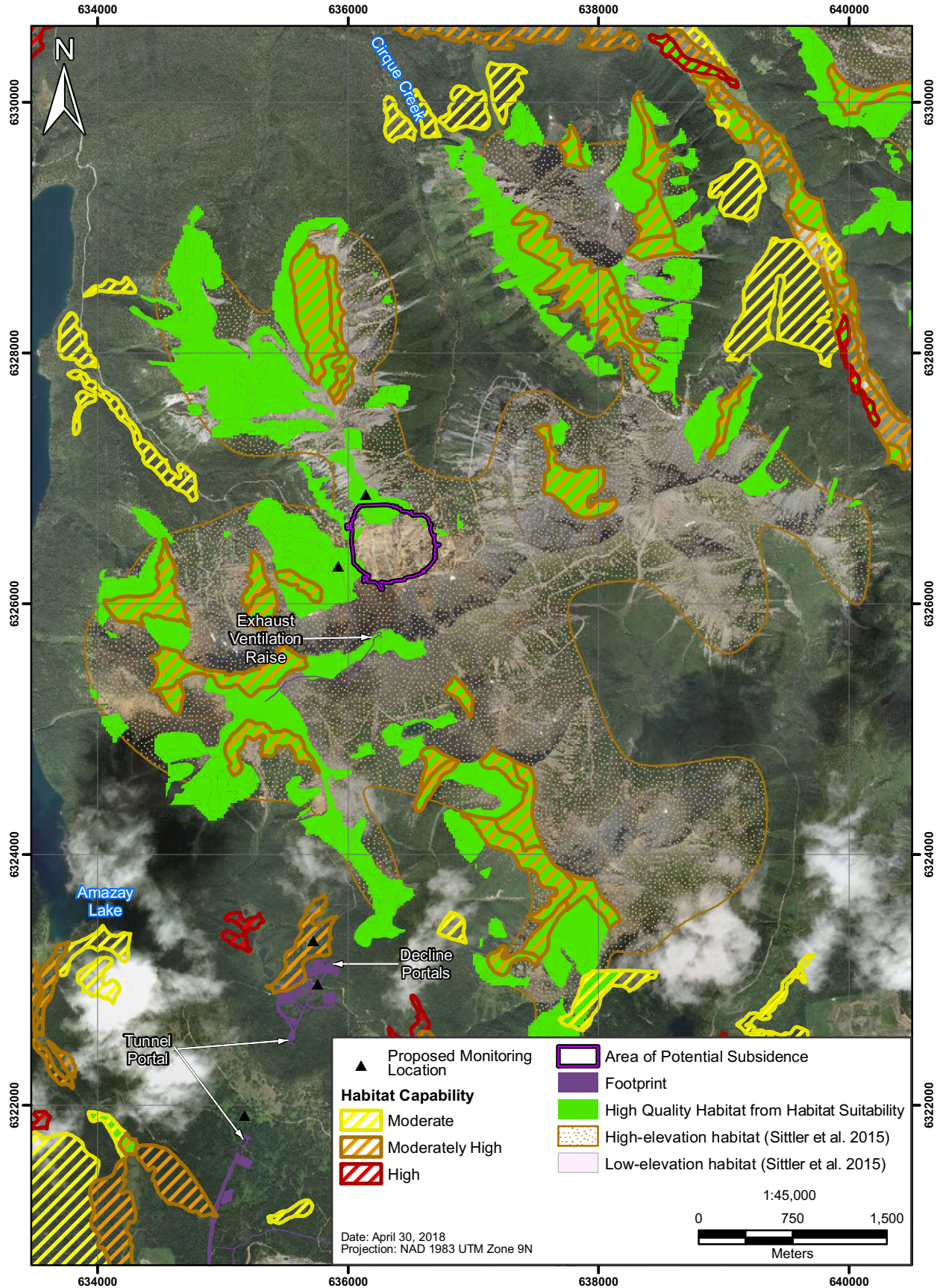


Figure 6.2-2

High Quality Caribou Winter Habitat Areas and Proposed Monitoring Locations Associated with the Subsidence Area



Photos will be downloaded at least twice a year and reviewed to identify and summarize the number of times the potential funnel area is used by caribou, the number of individuals detected, and the date of observations.

#### Winter Escape Pathways Monitoring

During winter months when snow accumulation has created banks greater than 1 m in height and wildlife escape gaps are plowed at regular intervals, the use of these gaps will be monitored on a monthly basis as well as incidentally. Monthly surveys will occur preferentially within 24 hours following a fresh snow fall and will avoid conditions when snowfall and/or winds are heavy/strong (RISC 1999). A technician will drive the access road and the northern section of the ORAR and record any caribou tracks that are seen within the escape gaps.

### 6.2.6 Follow-up Monitoring Program

There are several monitoring components for caribou to evaluate the effectiveness of mitigation and management measures, including:

- The effectiveness for mitigation related to caribou movement will be monitored through the Wildlife Movement Monitoring.
- The effectiveness of mitigation to prevent mortalities will be monitored through reporting of wildlife interactions and incidents including instances of delaying blasting and flights due to the presence of caribou.
- Potential effects to the Chase and Wolverine herds will be managed and monitored as described in Sections 6.1.1 Road and Traffic Management, 6.2.1 Road and Traffic Monitoring, 6.1.4 Dust Management, 6.2.3 Dust Monitoring, and 6.1.5.2 Communication Tower Access Management.
- The effect of habitat loss for the Thutade herd will be evaluated by calculating direct habitat loss relative to its value as identified in the EAC Application and the modelled habitat polygons provided by (Sittler, McNay, and Giguere 2015).

## 6.3 EVALUATION AND ADAPTIVE MANAGEMENT

### 6.3.1 Measurable Triggers

Triggers that will be used to prompt a re-evaluation of mitigation and monitoring activities for caribou will include the following:

- Any caribou incident that results in injury or death of a caribou;
- Exceeding predicted caribou habitat loss, particularly in high elevation areas;
- Monitoring data showing caribou being funnelled through gaps in linear barriers; and
- New studies of the Thutade herd being published.



### 6.3.2 Caribou Mitigation and Monitoring Revisions

Revisions will be made to caribou mitigation and monitoring activities when the triggers identified above occur and different mitigation and monitoring is warranted. Policy, guidelines, and legislation relevant to caribou management in BC will also be reviewed every two years to determine if different caribou mitigation and monitoring should be included based on the new information available.

## 7. BAT MITIGATION AND MONITORING

The bat species at risk detected during baseline surveys are listed in Table 7-1.

**Table 7-1. Bat Species at Risk Detected during Baseline Surveys**

Bat Species	Common Name	BC Provincial Conservation Status (from BC CDC)	COSEWIC Status	Species at Risk Schedule 1 Status
<i>Lasiurus borealis</i>	Eastern Red Bat	Red	Not listed	Not listed
<i>Myotis lucifugus</i>	Little Brown Myotis	Yellow	Endangered	Endangered
<i>Myotis septentrionalis</i>	Northern Myotis	Blue	Endangered	Endangered

Mitigation and monitoring for bats is informed by provincial and federal guidance in the following documents:

- Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia (BC MFLNRO 2014);
- Best Management Practices Guidelines for Bats in British Columbia. Chapter 2: Mine Developments and Inactive Mine Habitats (Holroyd and Craig 2016); and
- Recovery Strategy for Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), and Tri-coloured Bat (*Perimyotis subflavus*) in Canada [Proposed].

### 7.1 MITIGATION

#### 7.1.1 Additional Baseline Surveys

Additional baseline surveys for bats will be conducted under the direction of a Qualified Professional within infrastructure areas and the 150 dB modelled area and/or 300 m radius area surrounding the blasting locations for the openings of the tunnel portal. These surveys will have the objective of identifying structural stage 6 or 7 trees that could be used as roosting habitat. Visual and acoustic monitoring surveys (Holroyd and Craig 2016) will also occur if the surveys occur within the time period when bats are anticipated to be present. Terrestrial ecosystem mapping and other imagery will be used to identify forested areas that may have mature trees. These areas will be surveyed by foot along transect lines following methodology for ground level roost assessment of tree (J. Collins (ed.) 2016). These surveys will identify any potential maternal roosting trees so that they can be avoided during the

sensitive period of May 15 to September 30. The potential loss of observed roosting habitat will be offset, prior to construction, by the installation of bat boxes or artificial roost trees in suitable locations (Holroyd and Craig 2016). The bat boxes or artificial roost trees will be installed during the winter and prior to the arrival of bats at site.

Surveyors will follow appropriate decontamination protocols (CWHC 2015; Holroyd and Craig 2016) prior to arrival on site to reduce the potential spread of white-nose syndrome. Photographic documentation of the habitats surveyed will be conducted to support the conclusions of the survey findings with regard to suitability of habitat for bats (Holroyd and Craig 2016).

### **7.1.2 Sensitive Bat Features and Time Period**

If clearing of mature forest occurs between May and September 30, then pre-clearing surveys will be conducted under the direction of a Qualified Professional to determine if any potential bat roosts identified during additional baseline surveys are active. Surveys will follow RIC standards for acoustic detections (RISC 1998a) to determine the presence of little brown myotis and northern myotis. Surveyors will follow appropriate decontamination protocols prior to arrival on site to reduce the potential spread of white-nose syndrome (Holroyd and Craig 2016). If active maternal roosts are detected, then construction will not proceed within a 100 to 300 m buffer (depending on the type of infrastructure development) (Holroyd and Craig 2016) until the end of the sensitive period or bats are no longer using the roost.

### **7.1.3 Incidental Observations**

Wildlife monitoring will include reporting incidental observations of bats using Project infrastructure. If bat observations near infrastructure indicate that lighting is an attractant, then a Qualified Professional will determine what species is being attracted, if the attraction is detrimental and if so, the type of alternative lighting to install to reduce attraction. Little brown myotis are expected to benefit from the increased foraging opportunities near lights whereas northern myotis is not anticipated to forage at lights due to their slower flight pattern (Environment Canada 2015b).

Bi-weekly visual inspections of the outside of Project infrastructure will occur, including underground components, for observations of bats interacting with buildings or evidence of use (e.g., bat activities and evidence of roosting) and adaptively managed if necessary (e.g., covering vents with mesh to prevent bats from entering).

## **7.2 MONITORING**

### **7.2.1 Roost Monitoring**

Should clearing of vegetation occur within the sensitive (roosting) season for bats, then pre-clearing surveys will be conducted. If any active roosts are found, then appropriate buffers (minimum 100 m) will be set up surrounding the roosts. To determine when roosts are no longer they will be visited on a bi-weekly basis. The area can be cleared prior to the end of the sensitive period if the roost is no longer being used. The buffer used around the roost will be documented. If critical Project activities occur within a roost buffer, FLNRO will be consulted to determine if additional monitoring will be required.

## 7.2.2 Follow-up Monitoring Program

If pre-construction surveys detect potential bat roosting habitat within the new infrastructure areas or within a 300 m radius area of the blasting locations (BC MFLNRO 2014) for the openings of the North and South Access Tunnel Portal or the Decline Portal, then roosting habitat alternatives, e.g., bat boxes or artificial roost trees, will be installed as compensation for the lost habitat.

If bat boxes are needed for compensation of roosting habitat, they will be monitored annually for three years using RISC standards for acoustic monitoring (RISC 1998a) to determine use. If after three years in one location they are not being used by bats then they will be relocated to another potentially suitable location. Artificial roosting trees will be considered as alternative mitigation if the follow-up program indicates that bat boxes are not being colonized. Monitoring will continue until use of bat boxes or artificial roosting trees is confirmed.

Monitoring the use of roosting trees identified during the pre-construction surveys within 300 m radius of the blasting locations for the openings of the North and South Access Tunnel Portal and the Decline Portal will occur during the Construction period when surface blasting will occur using RISC standards for acoustic monitoring (RISC 1998a). This monitoring will occur only if blasting occurs during the sensitive bat period. Results of this monitoring will be reported annually.

## 8. REPORTING AND RECORD KEEPING

### 8.1 REPORTING

#### 8.1.1 Annual Reporting

An annual Wildlife Management and Monitoring Program report will be submitted to The Kemess Underground Environmental Monitoring Committee, including Omineca, BC MFLNRORD and the TKN. Contents of the WMMP report will include results from monitoring programs outlined in Section 5.1.

#### 8.1.2 Internal Reporting

Measures taken to protect certain species of wildlife and/or wildlife habitat throughout the Project phases will be documented internally. This information will be communicated to the government agencies as required and may include the following:

- summary of wildlife monitoring results;
- summaries of environmental protection measures applied over the past year;
- methods, results, and discussion;
- evaluation of the effectiveness of the environmental protection measures taken; and
- evaluation of the effectiveness of the WMMP and relevant procedures.

#### 8.1.2.1 *Wildlife Logs*

Incidental wildlife observations and wildlife incidents will be reported to Security, or designate, and documented. A wildlife log will be kept by Security, or designate, for select wildlife species occurrences. A 'Wildlife Sightings' e-mail distribution list will be re-established, and will include the environment department, safety department, and potentially others. All sightings reported through this system will be documented and tracked.

It is the responsibility of all employees to report all bears observed within the Bear-Free Zone and all dangerous encounters with wildlife to Security, or designate. Security, or designate, will complete a Bear Incident Report and provide the report to the Environment Department.

#### 8.1.2.2 *Incident Reporting*

Incident reporting will include vehicle collisions with wildlife, encounters with wildlife, aerial observations from pilots, and wildlife interactions with Project infrastructure and waste handling systems. In addition, any mortality and/or encounters during vegetation clearing surveys, or other mortality events, will be recorded.

## 8.2 RECORD KEEPING

### 8.2.1 Data

Monitoring results will be recorded on paper forms, transferred to Excel files, and reported on annually.

### 8.2.2 Incident Response Records

The Environmental Manager will be responsible for the implementation of the WMMP. The Environmental Manager will be responsible for maintaining documentation pertaining to the management and/or monitoring activities as well as reporting to applicable agencies as required.

## 9. EVALUATION AND ADAPTIVE MANAGEMENT

Annual reports will summarize the annual monitoring results and identify any modifications to the mitigation measures included in the WMMP based on the data that is collected. The WMMP report will serve as the mechanism to document wildlife activity relative to the Project and corrective actions to reduce risk to wildlife and personnel associated with incidental observations, describe the implementation of mitigation measures as proposed in the EAC Application, evaluate their effectiveness, and discuss any adaptive management measures implemented/incorporated at the operational level, as required. Please refer to Sections 4-7 for details on the proposed mitigation and monitoring programs. See Section 9.1 for corrective action indications/thresholds and required actions.

## 9.1 CORRECTIVE ACTION

Indications and/or thresholds of the need for corrective actions, additional control measures and adaptive management may include:

- monitoring data showing animals being funnelled through gaps in linear barriers;
- employees and contractors not following speed limits;
- employees and contractors not following prohibitions regarding hunting, trapping and fishing;
- employees and contractors not adhering to zero tolerance policy for feeding or harassing wildlife;
- employees and contractors not adhering to exclusion areas within avian nest buffers;
- issues raised by on-site staff, regulators, or local communities;
- exceeding the target of zero animal mortalities per year;
- any grizzly bear incident requiring deterrence;
- exceeding predicted habitat loss; and
- den, nest, and roost monitoring indicating the buffers were insufficient for successful reproduction (with consideration of depredation events).

Warnings will be issued to employees and contractors who do not follow the wildlife prohibitions outlined in this Plan. Corrective actions will be implemented as determined by the Environmental Manager in collaboration with the General Manager. Evidence of wildlife interacting with the site in unplanned and un-predicted ways will be reported to the Environmental Manager, managed adaptively and reported to regulators.

Corrective actions will be situation-specific and developed by a QEP. If the implemented corrective action does not alleviate the indication/threshold/incident, then additional measures will be implemented until thresholds are no longer exceeded.

## 10. PLAN REVISION

The WMMP will be revised when monitoring data identifies any additional mitigation measures that should be implemented and/or new guidelines or legislation outlining relevant mitigation measures are published or updated.

### 10.1 NOTIFICATION AND CONSULTATION REQUIRED UPON PLAN REVISION

The Kemess Underground Environmental Monitoring Committee, including BC MFLNRORD, ECCC, and TKN, will be notified and consulted about revisions to the WMMP.

## 11. QUALIFIED PROFESSIONALS

Under the direction of AuRico Metals Inc., a team of consultants have supported preparation of this management plan. This management plan has been prepared and reviewed by, or under the direct supervision of, the following qualified professionals:

Prepared by:

<original signed by>

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Leslie Bol, M.Sc., R.P.Bio.  
ERM

Reviewed by:

<original signed by>

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Greg Sharam, Ph.D.  
ERM

## REFERENCES

1994. *Migratory Birds Convention Act*, SC. C. 22.
- 1996a. *Mines Act*, RSBC. C. 293.
- 1996b. *Wildlife Act*, RSBC. C. 488.
- 2002a. *Forest and Range Practices Act*, SBC. C. 69.
- 2002b. *Species at Risk Act*, SC. C. 29.
2003. *Environmental Management Act*, C. 53.
2004. *Forest and Range Practices Act, Government Actions Regulation*, SBC 582/2004. C. 69.
2012. *Canadian Environmental Assessment Act, 2012*, SC. C. 19. s. 52.
- Alberta, G. o. 2011. *A Woodland Caribou Policy for Alberta*.
- Alberta Woodland Caribou Recovery Team. 2005. *Alberta woodland caribou recovery plan 2004/2005-2013-2014*. Alberta Species at Risk Recovery Plan No. 4. Alberta Sustainable Resources Development, Fish and Wildlife Division.: Edmonton, AB.
- Antoniuk, T. M., E. H. Dzus, and J. Nishi. 2015. *A Methodological Framework For Caribou Action Planning In Support Of The Canadian Boreal Forest Agreement*. Prepared for The Science Committee and the National Working Group on Goals 2 and 3 of the Canadian Boreal Forest Agreement.
- APLIC. 2012. *Suggested practices for avian protection on power lines: The state of the art in 2012*. Edison Electric Institute, Avian Power Line Interaction Committee, and the California Energy Commission: Washington, DC and Sacramento, CA.
- Ardea. 2015. *Kemess Underground Project: Wildlife and Wildlife Habitat Baseline Report*. Report Prepared for AuRico Metals Inc. by Ardea Biological Consulting Ltd.: Smithers, BC.
- AXYS Environmental Consulting Ltd. 1995. *A Compendium of Physical Access Control Measures for Roads and Other Rights-of-Way*. A Component of the Access Management Initiative: Northeastern, British Columbia.
- Bayne, E., H. Lankau, and J. Tigner. 2011. *Ecologically-based criteria to assess the impact and recovery of seismic lines: The importance of width, regeneration, and seismic density*. 192. 98 p. Environmental Studies Research Funds Canada: Edmonton, AB.
- BC FLNRO and MOE. 2016. *South Peace Northern Caribou: Standardized Industry Management Practices*. BC Ministry of Forests, Lands and Natural Resource Operations and BC Ministry of Environment: Prince George, BC.
- BC ILMB. 2000. *Mackenzie Land and Resource Management Plan*. British Columbia: Integrated Land Management Bureau. [https://www.for.gov.bc.ca/tasb/slrp/lrmp/princegeorge/mackenzie/plan/files/lrmp/Mackenzie\\_LRMP\\_Feb2001.pdf](https://www.for.gov.bc.ca/tasb/slrp/lrmp/princegeorge/mackenzie/plan/files/lrmp/Mackenzie_LRMP_Feb2001.pdf) (accessed July 2015).

- BC MFLNRO. 2014. *A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia (Interim Guidance)*. Prepared for Ministry of Forests, Lands, and Natural Resource Operations North Area by A. Roberts, Ecological Consulting Smithers, BC.
- BC MOE. 2010. *Management Plan for the Mountain Goat (*Oreamnos americanus*) in British Columbia. Prepared by the Mountain Goat Management Team.*
- BC MOE. 2013a. *Guidance for the Development of Caribou Mitigation and Monitoring Plans for South Peace Northern Caribou* BC Ministry of Environment: Victoria, BC.
- BC MOE. 2013b. *Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia (2013)*. British Columbia Ministry of Environment: Victoria, BC.
- BC MOE. 2014a. *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia*. British Columbia Ministry of Environment: Victoria, BC.
- BC MOE. 2014b. *Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia (2014)*. British Columbia Ministry of Environment: Victoria, BC.
- BC MOE. 2016. *Order - Mountain Goat Ungulate Winter Range #U-7-030: Mackenzie Forest District*. Presented at BC Ministry of Environment.
- BC MOE and MRLNRO. 2017. *Boreal Caribou Recovery Implementation Plan (draft)*. BC Ministry of Environment and Ministry of Forests, Lands, and Natural Resource Operations.
- BC MWLAP. 2004a. *Standards and best practices for instream works*. British Columbia Ministry of Water, Land and Air Protection, Ecosystems Standards and Planning, Biodiversity Branch.
- BC MWLAP. 2004b. *Wildlife Habitat Features Summary of Management Guidelines: Northern Interior Forest Region. Draft*. Victoria, BC.
- Bear Scare Ltd. 2005. *Human-bear Conflict Prevention Plan*. Prepared for Northgate Minerals Corporation Kemess Mines Ltd.: Edmonton, AB.
- Bentham, P., and B. Coupal. 2015. *Habitat restoration as a key conservation level for woodland caribou: A review of restoration programs and key learnings from Alberta*. Rangifer 35 Special Issue, 23.
- Caribou Landscape Management Association (CLMA) and Forest Products Association of Canada (FPAC). 2007. *Audit of Operating Practices and Mitigation Measures Employed within Woodland Caribou Ranges*. Prepared for CLMA and FPAC by P. Bentham of Golder Associates: Edmonton, AB.
- Caribou Landscape Management Association (CLMA) and Forest Products Association of Canada (FPAC). 2009. *Woodland Caribou Recovery - Audit of Operating Practices and Mitigation Measures Employed within Woodland Caribou Ranges*. Prepared for CLMA and FPAC by P. Bentham of Golder Associates: Edmonton, AB.
- Caribou Range Restoration Project (CRRP). 2007. *Permanent Sample Plot Manual for the Caribou Range Restoration Project in Alberta, March 23, 2007*. Draft Unpublished Document.
- Community Bat Programs of BC. 2015. *Got Bats? 7 Steps to Managing Bats in Buildings*.



- COSEWIC. 2014. *COSEWIC assessment and status report on the Caribou Rangifer tarandus, Northern Mountain population, Central Mountain population and Southern Mountain population in Canada*. Committee on the Status of Endangered Wildlife in Canada: Ottawa, ON.
- Courbin, N., D.Fortin, C.Dussault, and R.Courtois. 2009. Landscape management for woodland caribou: The protection of forest blocks influences wolf-caribou co-occurrence. *Landscape Ecology*, 24 (10): 1375 – 88.
- Courtois, R., J.-P. Ouellet, L. Breton, A. Gingras, and C. Dussault., 2007. Effects of forest disturbance on density, space use, and mortality of woodland caribou. *Ecoscience*, 14: 491-98.
- CVBC. 2015. *Animal Welfare Committee Euthanasia Guidelines*. Presented at College of Veterinarians of British Columbia.
- CWHC. 2015. *Western Canada White Nose Syndrome Transmission Prevention*. Presented at Canadian Wildlife Health Cooperative
- DeMars, C. and K. Benesh. 2016. *Testing Functional Restoration of Linear Features within Boreal Boreal Caribou Range*. BC Oil and Gas Research and Innovation Society
- Dickie, M., R. Serrouya, C. DeMars, J. Cranston, and S. Boutin. 2017. Evaluating Functional Recovery of Habitat for Threatened Woodland Caribou. *Ecosphere*, 8 (9): e01936.10.1002/ecs2.1936.
- Dyer, S. J., J. P. O'Neill, S. M. Wasel, and S. Boutin. 2002. Quantifying barrier effects of roads and seismic lines on movements of female woodland caribou in northeastern Alberta. *Canadian Journal of Zoology*, 80 (5): 839-45.
- ECCC. 2016a. *Environment and Climate Change Canada Standard Guidance for Environmental Assessments: Western Toad (Anaxyrus boreas)*. Environment and Climate Change Canada and Canadian Wildlife Service: Ottawa, ON.
- ECCC. 2016b. *Management Plan for the Western Toad (Anaxyrus boreas) in Canada [Proposed]*. Environment and Climate Change Canada: Ottawa.
- ECCC. 2017a. *Avoiding harm to migratory birds*.
- ECCC. 2017b. *General Nesting Periods of Migratory Birds*.
- ECCC. 2017c. *Migratory birds: technical information on risk factors*.
- Enbridge Pipelines (Athabasca) Inc. 2010. *Waupisoo Pipeline Project: 2010 Green Area Post-Construction Reclamation Assessment*. Submitted to Alberta Sustainable Resource Development: Alberta.
- Environment and Climate Change Canada. 2016. *Avoidance Guidelines*. [http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=8D910CAC-1#\\_03\\_1\\_1](http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=8D910CAC-1#_03_1_1) (accessed April 2016).
- Environment Canada. 2012a. *Management Plan for the Northern Mountain Population of Woodland Caribou (Rangifer tarandus caribou) in Canada. Species at Risk Act Management Plan Series*. Environment Canada: Ottawa, ON.
- Environment Canada. 2012b. *Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada. Species at Risk Act Recovery Strategy Series*. Environment Canada: Ottawa, Ontario.

- Environment Canada. 2014. *Recovery Strategy for the Woodland Caribou, Southern Mountain population (Rangifer tarandus caribou) in Canada. Species at Risk Act Recovery Strategy Series*. Environment Canada: Ottawa, ON.
- Environment Canada. 2015a. *Management Plan for the Rusty Blackbird (Euphagus carolinus) in Canada*. Environment Canada: Ottawa, ON.
- Environment Canada. 2015b. *Recovery Strategy for Little Brown Myotis (Myotis lucifugus), Northern Myotis (Myotis septentrionalis), and Tri-coloured Bat (Perimyotis subflavus) in Canada [Proposed]*. Species at Risk Recovery Strategy Series. Environment Canada: Ottawa, ON.
- Environment Canada. 2016a. *Recovery Strategy for the Common Nighthawk (Chordeiles minor) in Canada*. Environment Canada: Ottawa, ON.
- Environment Canada. 2016b. *Recovery Strategy for the Olive-sided Flycatcher (Contopus cooperi) in Canada*. Environment Canada: Ottawa, ON.
- Eos Research & Consulting Ltd. 2009. *Review of Access Management Strategies and Tools*. Prepared for Foothills Landscape Management Forum: North Vancouver, BC.
- ERM. 2015. *Kemess Underground Project: Wildlife Habitat Suitability Modelling Report*. Prepared for AuRico Metals Inc. by ERM Consultants Canada Ltd.: Vancouver, BC.
- Finnegan, L., K. E. Pigeon, J. Cranston, M. Hebblewhite, M. Musiani, L. Neufeld, F. Schmiegelow, J. Duval, and G. B. Stenhouse. 2018. Natural Regeneration on Seismic Lines Influences Movement Behaviour of Wolves and Grizzly Bears. *Plos One*, 13 (4): e0195480.
- Fortin, D., R. Courtois, P. Etcheverry, C. Dussault, and A. Gingras. 2008. Winter selection of landscapes by woodland caribou: behavioural response to geographical gradients in habitat attributes. *Journal of Applied Ecology*, 45: 1392-400.
- FPAC. 2009. *Woodland Caribou Recovery - Audit of Operating Practices and Mitigation Measures Employed within Woodland Caribou Ranges*. Forest Products Association of Canada and the Caribou Landscape Management Association.
- Golder. 2007. *Doris North Gold Mine Project: Wildlife Mitigation and Monitoring Program 2006 Annual Report*. Prepared for Mirimar Hope Bay Ltd. by Golder Associates Ltd.: North Vancouver, BC.
- Golder. 2009. *Doris North Gold Mine Project: Wildlife Mitigation and Monitoring Program 2008 Annual Report*. Prepared for Mirimar Hope Bay Ltd. by Golder Associates Ltd.: North Vancouver, BC.
- Golder. 2015. *Boreal Caribou Habitat Restoration Operational Toolkit for British Columbia*. Golder Associates Ltd.: Calgary, AB.
- Golder Associates. 2012. *Closure Objectives and Associated Closure Costs for the Planned New Liberty Gold Mine, as at May 2012*. Report No. 10612898. Aureus Minine Inc.
- Hawkes, V. C. 2011. *Early successional wildlife monitoring on reclamation plots in the Athabasca Oil Sands region*. Paper presented at British Columbia Mine Reclamation Symposium, Lake Louise, Alberta.
- Heatherington, A., I. Teske, and R. Forbes. 1989. *An Investigation of Moose Winter Habitat, Elaho Watershed*.

- Holroyd, S. L. and V. J. Craig. 2016. *Best Management Practices Guidelines for Bats in British Columbia - Chapter 2: Mine Developments and Inactive Mine Habitats*. BC Ministry of Environment: Victoria, BC.
- Hunt, L. M. and M. Hupf. 2014. The effectiveness of road closures and deactivations at reducing traffic: A case of resource roads used for recreational activities in Ontario, Canada. *The Forestry Chronicle*, 90 (5): 670-77.
- J. Collins (ed.). 2016. *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd ed.)*. London: The Bat Conservation Trust.
- Jalkotzy, M. G., P. I. Ross, and M. D. Nasserden. 1997. *The Effects of Linear Developments on Wildlife: A Review of Selected Scientific Literature*. Prepared for the Canadian Association of Petroleum Producers by Arc Wildlife Services Ltd.: Calgary, AB.
- James, A. R. C. and A. K. Stuart-Smith. 2000. Distribution of caribou and wolves in relation to linear corridors. *J Wildl Manag*, 64 (1): 154-59.
- Johnson, C. J., L. P. W. Ehlers, and D. R. Seip. 2015. Witnessing extinction - Cumulative impacts across landscapes and the future loss of an evolutionarily significant unit of woodland caribou in Canada. *Biological Conservation*, 186: 176-86.
- Latham, A. D. M., C. Latham, M.S. Boyce and S. Boutin. 2011. Movement responses by wolves to industrial linear features and their effect on woodland caribou in northeastern Alberta. *Ecological Applications*, 21 (8): 2854 - 65.
- Manitoba Boreal Woodland Caribou Management Committee (MBWCMC). 2015. *Conserving a Boreal Icon, Manitoba's Boreal Woodland Caribou Recovery Strategy*. Manitoba Conservation and Water Stewardship. : Winnipeg, MB.
- Mumma, M. A., M. P. Gillingham, C. J. Johnson, and K. L. Parker. 2017. Understanding Predation Risk and Individuals Variation in Risk Avoidance for Threatened Boreal Caribou. *Ecology and Evolution*, 2017: 1-12.
- MWLAP. 2004. *Region 7 Omineca - Reduced Risk Timing Windows for Fish and Wildlife: Standarads and Best Practices for Instream Works*. Ministry of Water, Land and Air Protection.
- MWLAP. 2012. *Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in BC*. BC Ministry of Water, Land and Air Protection: Nanaimo, BC.
- O'Brien, D., M. Manseau, A. Fall, and M.-J. Fortin. 2006. Testing the importance of spatial configuration of winter habitat for woodland caribou: an application of graph theory. *Biological Conservation*, 130: 70-83.
- Oberg, P. R. 2001. Responses of mountain caribou to linear features in a west-central Alberta landscape. M.Sc. diss., University of Alberta.
- Osko, T. and M. Glasgow. 2010. *Removing the Wellsite Footprint: Recommended Practicies for Construction and Reclamation of Wellsites on Upland Forests in Boreal Alberta*. Department of Biological Sciences, University of Alberta: Edmonton, Alberta.

- Polfus, J. L., M. Hebblewhite, and K. Heinemeyer. 2011. Identifying indirect habitat loss and avoidance of human infrastructure by northern mountain woodland caribou. *Biological Conservation*, 144: 2637-46.
- Pyper, M., J. Nishi, and L. McNeil. 2014. *Linear Feature Restoration in Caribou Habitat: A Summary of Current Practices and a Roadmap for Future Programs*. Canada's Oil Sands Innovation Alliance: Calgary, AB.
- Rea, R. V., K. N. Child, D. P. Spata, and D. MacDonald. 2010. Road and Rail Side Vegetation Management Implications of Habitat Use by Moose Relative to Brush Cutting Season. *Environmental Management*, 46: 101-09.
- RIC. 1998a. *Inventory Methods for Pikas and Sciurids: Pikas, Marmots, Woodchuck, Chipmunks & Squirrels. Standards for Components of British Columbia's Biodiversity No.29*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystem Task Force, Resources Information Committee: Victoria, BC.
- RIC. 1998b. *Inventory Methods for Swallows and Swifts. Standards for Components of British Columbia's Biodiversity No. 16*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystem Task Force, Resources Information Committee: Victoria, BC.
- RIC. 1999. *Inventory Methods for Forest and Grassland Songbirds. Standards for Components of British Columbia's Biodiversity No.15. Version 2*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for Terrestrial Ecosystem Task Force, Resources Inventory Committee (RIC): Victoria, BC.
- RIC. 2001a. *Inventory Methods for Raptors. Standards for Components of British Columbia's Biodiversity No. 11*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystem Task Force, Resources Information Committee: Victoria, BC.
- RIC. 2001b. *Inventory Methods for Raptors: Standards for Components of British Columbia's Biodiversity No. 11. Version 2.0*. Prepared by Ministry of Environment, Lands and Parks Resources Inventory Branch for the Terrestrial Ecosystems Task Force Resources Inventory Committee (RIC): Victoria, BC.
- RISC. 1998a. *Inventory Methods for Bats. Standards for Components of British Columbia's Biodiversity No. 20*. Prepared by Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystem Task Force, Resources Information Committee (RIC): Victoria, BC.
- RISC. 1998b. *Inventory Methods for Pond-breeding Amphibians and Painted Turtle*. No. 37. Ministry of Environment, Lands and Parks Resources Inventory Branch for the Terrestrial Ecosystems Task Force Resources Inventory Committee Victoria, BC.
- RISC. 1999. *Inventory Methods for Medium-sized Terrestrial Carnivores: Coyote, Red Fox, Lynx, Bobcat, Wolverine, Fisher & Badger*. Standards for Components of British Columbia's Biodiversity No.25. Prepared by Ministry of Environment, Lands and Parks Resources Inventory Branch for the Terrestrial Ecosystems Task Force Resources Inventory Committee: Victoria, BC.
- Robinson, C., P.N. Duinker, and K. F. Beazley. 2010. A conceptual framework for understanding, assessing, and mitigating ecological effects of forest roads. *Environmental Review*, 18: 61-86.

- Saskatchewan Ministry of Environment. 2013. *Conservation Strategy for Boreal Woodland Caribou (Rangifer tarandus caribou) in Saskatchewan*. September 2015. Saskatchewan Ministry of Environment. Fish and Wildlife Technical Report: Saskatchewan.
- Schaefer, J. A. 2003. Long-term range recession and the persistence of caribou in the taiga. *Conservation Biology*, 17 (5): 1435-39.
- Seip, D. R., C. J. Johnson, and G. S. Watts. 2007. Displacement of mountain caribou from winter habitat by snowmobiles. *Journal of Wildlife Management*, 71: 1539-1544.
- Serrouya, R., B. N. McLellan, H. v. Oort, G. Mowat, and S. Boutin. 2017. Experimental Moose Reduction Lowers Wolf Density and Stops Decline of Endangered Caribou. *PeerJ*, 5 (e3736; DOI 10.7717/peerj.3736): 28.
- Sherrington, P. M. 2003. Measuring boreal forest fragmentation change in response to seismic line, wellsite and road revegetation with scanned false-colour infrared aerial photography. . MGIS diss., University of Calgary, AB.
- Sittler, K. S., R. S. McNay, and L. Giguere. 2015. *Herd Boundary Refinement for the Chase, Spatsizi, and Frog Caribou Herds in North-central British Columbia*. Final Report 2012-2015 - HCTF Project #7-394. Wildlife Infometrics Inc. Report No. 499. Wildlife Infometrics Inc.: Mackenzie, BC.
- Smith, K. G., E. J. Ficht, D. Hobson, T. C. Sorensen, and D. Hervieux. 2000. Winter distribution of woodland caribou in relation to clear-cut logging in west-central Alberta. *Canadian Journal of Zoology*, 78: 1433-40.
- Switalski, A. T. and C. R. Nelson. 2011. Efficacy of road removal for restoring wildlife habitat: Black bear in the Northern Rocky Mountains, USA. *Biological Conservation*, 144 (11): 2666-73.
- Thorpe, N. 2015. *Review of Post-2010 Literature on Human Effects on Barren-ground Caribou: Focus on Traditional Knowledge, Western Science and Caribou Protection Measures*. Prepared for the Nunavut Wildlife Management Board by Trailmark Systems Inc.: Victoria, BC.
- US Fish and Wildlife. 2012. Approval of Negative Declaration and Withdrawal of Large Municipal Waste Combustors State Plan for Designated Facilities and Pollutants: Illinois. . *Federal Register*, 77 (105): 32075-80.
- WildResearch, Bird Studies Canada, and ECCC. 2018. *Canadian Nightjar Survey Protocol*.

# *Appendix A*

## *Effectiveness of Proposed Caribou Mitigation*

## APPENDIX A. EFFECTIVENESS OF PROPOSED CARIBOU MITIGATION

In many parts of Canada and Alaska, caribou protection measures have been used by industry and public groups to limit potential effects on caribou and their habitat (Thorpe 2015). High-level strategies are in place at both national and provincial levels (Alberta Woodland Caribou Recovery Team 2005; Alberta 2011; Environment Canada 2012b; Saskatchewan Ministry of Environment 2013) MBWCMC 2015 (Alberta 2011; Environment Canada 2012b; Saskatchewan Ministry of Environment 2013; MBWCMC 2015). Regulators also require project-specific mitigation and management measures that take the form of operational guidelines and conditions attached to land use permits. These mitigation and management measures are based on best management practices, goals and policies based on the federal or provincial management plans, on scientific reports and professional opinion. However, there has been little formal monitoring to evaluate the effectiveness of mitigation and management measures to determine their value in achieving caribou recovery goals (CLMA and FPAC 2009; Antoniuk, Dzus, and Nishi 2015). The Caribou Landscape Management Association (CLMA) and the Forest Products Association of Canada (FPAC) commissioned an *Audit of Operating Practices and Mitigation Measures Employed within Woodland Caribou Ranges, 2007* (CLMA and FPAC 2009), key findings of which were summarized in a technical report (CLMA and FPAC 2009). This audit was conducted specifically for forestry; however, the findings of the audit provide insight about the effectiveness of best management practices and mitigation measures for woodland caribou.

The mitigation effectiveness as rated in CLMA and FPAC (2009) was compared against mitigation being implemented at KUG (Table A-1). Where applicable, other studies that support the effectiveness or relevance of these management and mitigation measures for woodland and/or barren ground caribou are also referenced. All of the mitigation being implemented for KUG was rated as having high or moderate effectiveness, with one exception. All caribou specific mitigation is included in Table A-1 as well as additional mitigation included in CLMA and FPAC (2009) but not explicitly stated as caribou mitigation in the KUG EIS/Application.

Jalkotzy, Ross, and Nasserden (1997) reported that one of the primary sources of disturbance for wildlife was human activities associated with development corridors. As such, controlling the creation and use of such corridors is one of the most powerful tools available to reduce effects on wildlife. Effectiveness of access management measures depends on suitable placement (e.g., placed to prevent detouring around an access management point), enforcement, and public education of the intent of the access management (AXYS Environmental Consulting Ltd. 1995). Subjective expert ratings suggest that the effectiveness of most physical access management measures (e.g., berms, excavations, rollback, visual screening) varies considerably between negligible and high effectiveness in managing human access (Golder 2007). Physical access management measures can provide short-term solutions to manage access and allow for natural regeneration (Golder 2009). Strategic placement of barricades or gates that take advantage of natural barriers (cliffs, wide rivers) can maximize effectiveness and prevent road users from skirting around barriers (Robinson, P.N. Duinker, and Beazley 2010).

Human access on open and closed (i.e., gated, barriered and re-contoured) roads was monitored using remote cameras (Switalski and Nelson 2011). That study reported that the frequency of

detection of humans on closed roads was significantly lower than on open roads, but not significantly different among road closure types. The monitoring results also indicated significantly higher levels of hiding cover and lower line-of-sight distances on barriered and re-contoured roads compared to open roads (Switalski and Nelson 2011). A similar study investigated the effectiveness of different approaches (i.e., year-round closure, seasonal closure, deactivation, and deactivation and closure) at limiting motorized vehicle traffic on unpaved roads designed to support forestry operations (i.e., resource roads) (Hunt and Hupf 2014). Research has demonstrated that closure and/or deactivation approaches significantly reduced traffic on resource roads (about 78%), with year-round closure being the least effective, whereas seasonal (i.e., hunting) closure being among the most effective approach and it did not depend on road quality (Hunt and Hupf 2014).

A number of mitigation measures can limit barriers to movement. When creating ramps or installing culverts to aid in wildlife movement, one of the most important factors for effective use of crossing structures has been found to be the placement of structures where wildlife movement routes naturally occur (Jalkotzy, Ross, and Nasserden 1997). Limiting the width of access corridors/ROWs as well as shared/common use of such corridors has been found to be effective (CLMA and FPAC Jalkotzy, Ross, and Nasserden 1997; 2009; Antoniuk, Dzus, and Nishi 2015). In addition, a common conclusion from many boreal caribou studies is that large areas of continuous, relatively undisturbed caribou habitat are preferred to landscape areas that are more disturbed (by either natural agents or, more particularly, human activity) (Smith et al. 2000; Schaefer 2003; O'Brien 2006; Courtois 2007; Fortin 2008).

With regard to re-vegetation/reclamation of access corridors and ROWs, a number of researchers have identified this practice as having high effectiveness. The US Forest Service (2001) (US Fish and Wildlife 2012) suggests that a return to old-growth forest habitat characteristics with shade-tolerant understory vegetation could hasten the conservation of these sites to suitable caribou habitat. In addition, natural recovery of conventional seismic lines to functioning mountain caribou habitat was identified to occur within 20 years following disturbance in west-central Alberta (Oberg 2001). In some cases, restoration efforts have failed when ATVs destroyed seedlings after planting (Enbridge Pipelines (Athabasca) Inc. 2010). Despite this, once linear features have regenerated to a pole sapling or young forest structural stage, they no longer facilitate ATV access (Sherrington 2003).

In recent years, research has focused on the effectiveness of ecological restoration versus functional restoration. The goal of ecological restoration is to facilitate natural regeneration of disturbed areas to a state that resembles adjacent habitats and ultimately returns to a functional state that existed prior to the disturbance. The limitation of ecological restoration is that habitat in many caribou ranges may take decades to recover, which may not support the sustainability of caribou in the near term, particularly those herds that are currently facing extirpation (BC MOE and MRLNRO 2017). Alternatively, functional restoration has been proposed as a mechanism to support caribou recovery in the near term (Pyper, Nishi, and McNeil 2014; Golder 2015), while enabling ecological restoration over the long term. The goal of functional restoration is to ultimately reduce habitat fragmentation, movement efficiency of predators, and visibility for predators by treating linear features with various obstructions that might be typically encountered in intact forested landscapes. Functional restoration requires significant modification and intervention on the part of wildlife managers and industrial proponents alike to effectively mitigate and reduce the use of linear features by predators to access caribou range. Some of the functional restoration tools available that have shown some



success include mounding, ripping, roll back and coarse woody material, tree felling, summer planting, and winter planting (for details see Pyper et al. 2014). Numerous studies, particularly in the boreal caribou ranges in Alberta, are testing other treatments, such as tree bending, line blocking, fencing, bar mounding, and angle slicing (for details see Pyper et al. 2014). Some of these treatments are also showing promise. What is emerging is that a combination of various treatments combined with planting may support both short (functional) and long term (ecological) restoration objectives (BC MOE and FLNRO 2017; Golder 2015; Pyper et al. 2014). Pilot studies for functional restoration are also underway in BC (DeMars and Benesh 2016). Although specific to boreal caribou, it is anticipated that the lessons learned from these studies will be broadly applicable to forested ranges of mountain woodland caribou. As a result, AuRico will implement best practices in an adaptive manner based on the results of these studies in Alberta and BC.

Although restoration ecology specific to caribou habitat is a relatively new science, some key initiatives have identified important lessons learned related to oil and gas development and the forestry industry in caribou range. Initiatives have focused on access management as well as limiting growth and establishment of plant species favourable to prey species such as moose and deer (CRRP 2007), (Osko and Glasgow 2010). Blocking line-of-sight has been implemented through land use guidelines as a tool aimed at mitigating increased risk of predation in the short-term, while longer term goals of re-vegetation of lines of sight are achieved.

While there has been some effort to assess wildlife use of regenerating seismic lines (Bayne, Lankau, and Tigner 2011) and reclaimed areas in the Athabasca oil sands region (Hawkes 2011), few researchers have assessed caribou responses to habitat recovery. A pilot study in the Little Smoky caribou range measured effects of re-vegetating linear disturbances on wildlife use and mobility (Golder 2009). Data were collected for a group of predators (i.e., cougar, wolf, coyote, lynx, grizzly and black bears) and prey (i.e., moose, deer and caribou). Results of the pilot study indicated that naturally re-vegetated seismic lines (i.e., minimum 1.5 m vegetation regrowth) were preferred by both predator and prey species compared with control lines (i.e., vegetation regrowth of 0.5 m or less). The study also found that the control (disturbed) lines with minimal vegetation were used primarily for travel (i.e., both predators and prey species were constantly moving as opposed to standing or foraging). In addition, human use was almost exclusive to the control lines.

More recent studies have corroborated these findings. Dickie et al. (Dickie et al. 2017) found that wolves selected linear features with shorter vegetation and traveled faster on linear features with shorter, sparser vegetation and increased vegetation variability. Travel speeds were reduced by up to 1.7 km/hr when vegetation was higher than 0.50 m, but at least 30% of a linear feature required vegetation exceeding 4 m to slow movement rates similar to those in forested areas. Similarly, Finnegan et al. (Finnegan et al. 2018) found that wolves moved towards seismic lines with lower vegetation and traveled faster near seismic lines with vegetation < 0.7 m. During winter, however, wolves moved towards seismic lines irrespective of vegetation height, suggesting that access to areas frequented by ungulate prey was more important than movement efficiency. In fact, habitat modeling indicates that adult female caribou survival (Mumma et al. 2017) and caribou density (Serrouya et al. 2017) are strongly influenced by the spatial overlap between caribou with moose and wolf distributions, and secondarily by movement efficiency, and that linear features are the mechanisms that facilitate overlaps in distribution between caribou and wolves that may ultimately

limit caribou recovery. Collectively, these studies suggest focusing functional restoration activities on linear features with vegetation < 1 m and/or those linear features that currently enable access by wolves to preferred caribou habitat, particularly core ranges.

The review of mitigation measures for caribou indicated that little analysis has been conducted to quantify effectiveness of mitigation but that qualitative ratings of effectiveness exist. Research to date on caribou has primarily focused on the potential effects that need to be taken into account when conducting environmental assessments and mitigating for new development projects, such as habitat loss and alteration, indirect mortality and access management, direct mortality, barriers to movement, employee education, and avoidance of important habitat areas. Additional mitigation has been added to the WMMP based on this review, including specifying the importance of recording incidental sightings of wolves. Many other highly and moderately effective mitigation measures related to the use of existing infrastructure were also outlined as KUG has limited any new industrial footprint and linear development by utilizing the existing Kemess South infrastructure and developing an underground mine.

**Table A-1. Effectiveness of Mitigation and Management Measures for Woodland Caribou**

Potential Effect/Issue	KUG Mitigation	CLMA & FPAC (2009) Rated Mitigation Measure being Implemented at KUG	FPAC Effectiveness Rating	Other References that Recommend or Evaluate this Mitigation Measure
Access Management Indirect Mortality Barrier to Movement	Access Management Plan – road access already exists for Kemess South	Use of Existing Access	High	Antoniuk, Dzus, and Nishi (2015), AXYS Environmental Consulting Ltd. (1995), BC FLNRO and MOE (2016), Golder (2007), Hunt and Hupf (2014), Jalkotzy, Ross, and Nasserden (1997), Robinson, P.N. Duinker, and Beazley (2010), Switalski and Nelson (2011), BC MFLNRO (2014)
	Use of existing Kemess South infrastructure - utility corridors already exist	Use of Shared/Common Access and Utility Corridors	High	US Fish and Wildlife (2012), BC FLNRO and MOE (2016), Jalkotzy, Ross, and Nasserden (1997), Oberg (2001), Enbridge Pipelines (Athabasca) Inc. (2010), AXYS Environmental Consulting Ltd. (1995), Hunt and Hupf (2014), Golder (2009), Golder Associates (2012), Sherrington (2003), Bentham (2015), BC MFLNRO (2014)
	Reclamation and Closure Plan	Operators/Developers should seek opportunities to reclaim and/or reforest access and right of ways no longer required for operations. Access on recovered areas to be blocked to discourage access and encourage recovery.	High	Robinson, P.N. Duinker, and Beazley (2010), Enbridge Pipelines (Athabasca) Inc. (2010)
	Access Management Plan - An existing gatehouse, located at the entrance to the Project, and security check-in will be used to control and record access people to the site. The public is not allowed to access the mine site.	Central access corridors to be monitored or have manned gate/security in place, during periods of high activity.	High	Antoniuk, Dzus, and Nishi (2015), BC FLNRO and MOE (2016), Jalkotzy, Ross, and Nasserden (1997), James and Stuart-Smith (2000), Dyer et al. (2002), Polfus, Hebblewhite, and Heinemeyer (2011), (Latham 2011), Johnson, Ehlers, and Seip (2015)
	Above-ground ROW width in Access Corridor has been limited with all components running parallel	Total width of access ROWs to be limited during routing, planning, construction, and reclamation.	Moderate	
	Use of existing Kemess South infrastructure	Locate camps in close proximity to construction sites to reduce traffic. Consider shared transportation.	Moderate	

*(continued)*

**Table A-1. Effectiveness of Mitigation and Management Measures for Woodland Caribou (continued)**

Potential Effect/Issue	KUG Mitigation	CLMA & FPAC (2009) Rated Mitigation Measure being Implemented at KUG	FPAC Effectiveness Rating	Other References that Recommend or Evaluate this Mitigation Measure
Barrier to Movement	Breaks in snowbanks will be created along ploughed Project roads, particularly at bends. Appropriate provisions will be made along Project roads to facilitate wildlife movement without risk of collisions Creating ramps over the proposed KUG TSF Discharge Waterline in order to facilitate movement over them. Creating and maintaining road culverts that facilitate wildlife movement/habitat connectivity.	Windrows or snow-berms should alternate from side to side or have gaps large enough for wildlife passage approximately every 300 m in order to allow for caribou movement across access right-of-ways.	Moderate	Antoniuk, Dzus, and Nishi (2015), BC FLNRO and MOE (2016), Jalkotzy, Ross, and Nasserden (1997)
	Apply reduced speed limit restrictions on traffic along the Kemess Access Road and the Proposed Discharge Line road that affect potential movement corridors	Implementation of speed zones and signage in areas of potential caribou-vehicle collisions.	Low	
Timing of Activities	No surface activities will occur within high elevation winter range and known calving areas.	Whatever the season, operations should be scheduled to avoid known key habitat features at key times.	High	Jalkotzy, Ross, and Nasserden (1997), BC MFLNRO (2014), BC FLNRO and MOE (2016)
Habitat Loss and Alteration	Use of existing Kemess South infrastructure	Limit amount of cumulative disturbance through integrated land-use plans and area operating agreements and shared/coordinated access.	High	BC FLNRO and MOE (2016), Smith et al. (2000), Schaefer (2003), O'Brien (2006), Courtois (Courtois 2007), Fortin (2008), Antoniuk, Dzus and Nishi (2015)
	Use of existing Kemess South infrastructure	Reduce amount of duplicated activity through sharing of infrastructure and services, where reasonable (e.g., sharing camps, RoWs, utilities, maintenance equipment).	High	Antoniuk, Dzus, and Nishi (2015), Jalkotzy, Ross, and Nasserden (1997)

*(continued)*

**Table A-1. Effectiveness of Mitigation and Management Measures for Woodland Caribou (continued)**

Potential Effect/Issue	KUG Mitigation	CLMA & FPAC (2009) Rated Mitigation Measure being Implemented at KUG	FPAC Effectiveness Rating	Other References that Recommend or Evaluate this Mitigation Measure
Habitat Loss and Alteration	No surface activities will occur within high elevation winter range and known calving areas.	Locate roads and development activities in the least desirable caribou habitat, in proximity to existing access routes.	High	(Environment Canada 2012a, 2014)
	KUG will be an underground mine instead of an open pit limiting habitat loss and alteration.	Area required for operations should be as small as practical.	High	
	No wetland loss is anticipated associated with KUG. Riparian areas within the Project footprint will be managed according to the recommended management zone setbacks and work practices provided in the <i>Mines Act</i> (1996a) and <i>Forest and Range Practices Act</i> (2002a).	Avoid disruption of key habitat features such as using variable setbacks to buffer large and small lakes and lake complexes.	High	BC MFLNRO (2014)
	Vegetation used for reclamation will prioritize species that are not used as forage by moose and deer.	Vegetation control (i.e., shrubs) to decrease food for primary prey (moose, deer) and increase food for caribou (e.g., lichen protection, planting).	Moderate	Courbin (2009), CRRP (2007), Osko and Glasgow (2010), BC MFLNRO (2014)
Increased Awareness and limiting Human-Caused Caribou Mortality	Educating employees to assess and adaptively manage driving activities during crepuscular hours (i.e., dawn and dusk), which are periods of high wildlife activity. Locations of wildlife along Project roads will be communicated.	Participation in a caribou awareness education session for employees and contract supervisors working in key caribou habitat on a permanent or long-term contract basis. Typically, awareness sessions are linked to ongoing caribou monitoring through the use of employee-based caribou sighting programs.	High	Jalkotzy, Ross, and Nasserden (1997)

(continued)

**Table A-1. Effectiveness of Mitigation and Management Measures for Woodland Caribou (completed)**

Potential Effect/Issue	KUG Mitigation	CLMA & FPAC (2009) Rated Mitigation Measure being Implemented at KUG	FPAC Effectiveness Rating	Other References that Recommend or Evaluate this Mitigation Measure
Increased Awareness and limiting Human-Caused Caribou Mortality	Prohibition of hunting and trapping by employees. Personal firearms will be prohibited from the Project site. Monitoring of recreational use of the northern portion of the ORAR in winter.	Employee and contractor restrictions when working in caribou areas, which include prohibition of: <ul style="list-style-type: none"> <li>• Firearms and bows (except for authorized safety purposes);</li> <li>• Pets;</li> <li>• Personal snowmobiles, ATVs, and other motorized recreational vehicles; and</li> <li>• Speeding on roads.</li> </ul>	High	BC FLNRO and MOE (2016), Caribou Landscape Management Association (CLMA) and Forest Products Association of Canada (FPAC) (2007), Seip, Johnson, and Watts (2007), BC MFLNRO (2014)
Increased Awareness and limiting Human-Caused Caribou Mortality	On-site training will also extend to contractors	Education on woodland caribou extended to contractors, local schools, communities, residents, and organizations, where appropriate.	Moderate	Jalkotzy, Ross, and Nasserden (1997)
	No surface activities will occur within high elevation winter range and known calving areas.	No new permanent access development within caribou core habitats. Strive to conduct operations using minimal access.	High	Antoniuk, Dzus, and Nishi (2015)
	Use of existing Kemess South infrastructure	Concentrate activities spatially and temporally (e.g., situate activities within 100 m of existing access; adopt sequential development strategy).	Moderate	Antoniuk, Dzus, and Nishi (2015)