



# CASINO

**CASINO PROJECT**

**WILDLIFE MITIGATION AND MONITORING PLAN**

*Version 1.2*

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## ABBREVIATIONS

Abbreviation	Definition
BACI	Before-After-Control-Impact
CMC	Casino Mining Corporation
COSEWIC	Committee on the Status of Endangered Species in Canada
COPC	Constituents of Potential Concern
GPS	Global Positioning System
EPP	Environmental Protection Plan
LSA	Local Study Area
LSCFN	Little Salmon/Carmacks First Nation
NMP	Northern Mountain Population of Woodland Caribou
Project	The Casino Project
PDA	Potential Disturbance Area
RRC	Renewable Resource Council
RSA	Regional Study Area
SARA	<i>Species at Risk Act</i>
SFN	Selkirk First Nation
TBD	To be decided
TMF	Tailings Management Facility
VC	Valued Component
WMMP	Wildlife Mitigation and Monitoring Plan
YESAB	Yukon Environmental and Socio-economic Assessment Board
YG	Yukon Government
ZOI	Zone of Influence



## 1 - INTRODUCTION

Casino Mining Corporation (CMC) is proposing to develop the Casino Project (the Project), a copper-molybdenum-gold mine at their Casino Mine property located at latitude 62°44' N and longitude 138°50' W, approximately 300 km northwest of Whitehorse, Yukon. The proposed Project will have a mine life of 34 years comprised of four phases: construction (4 years), operation (22 years), closure and decommissioning (3 years), and post closure (5 years). The Project includes the following primary components:

- Mine site — including open pit; stockpiles for low grade ore, gold ore, topsoil and overburden; a plant site; heap leach facility;
- Tailings management facility;
- Extension and upgrade of the Freegold Road (previously referred to as the Casino Trail). The Freegold Road will be upgraded and extended to connect the Casino mine site to Carmacks, Yukon area. The existing 70 km of the Freegold Road will require upgrading and route adjustments to meet design standards. The final road will be approximately 200 km long and maintained as an all-season gravel road suitable for ore and fuel transport;
- Construction and operation of a new airstrip; and
- Access road and water pipeline to the Yukon River.

Project components and activities will interact with and potentially affect wildlife by:

- Removing available habitat by land clearing and reducing adjacent habitat effectiveness because of sensory disturbances;
- Creating filters (semi-permeable barrier) or barriers to wildlife movement because of sensory disturbance or physical barriers created by mine infrastructure;
- Increasing mortality risk due to vehicle collisions, or increased harvest, or death as a result of defence of life or property; and
- Reducing quality of health of individual animals that may be attracted to the tailings management facility during operations or at closure.

The purpose of the Wildlife Mitigation and Monitoring Plan (WMMP) is to minimize effects to wildlife and wildlife habitat, monitor the results of mitigation to ensure effectiveness, and adaptively manage for any unanticipated effects given the final Project footprint and description as provided to the Yukon Environmental and Socio-economic Assessment Board (YESAB). The plan is intended to ensure that wildlife continue to use habitat in areas adjacent to the Project footprint and within the broader area, as well as reduce potential Project-related injury or mortality, while accounting for operational requirements and human health and safety requirements. The WMMP provides guidance to protect and limit disturbances to wildlife and wildlife habitat from Project activities.

Mitigation of Project effects on wildlife and avoidance of key habitat features were considered in the Project design and in preparation of the Project description and effects assessment. Wildlife management, monitoring, and/or protection plans from similar mining projects in the Yukon (e.g. Eagle Gold Project, Wolverine Mine, Minto Mine, Bellekeno Mine) were reviewed to provide details on mitigations and monitoring that has been implemented in the Yukon and to determine the effectiveness of those actions. This document does not provide detailed methods (i.e., study designs), cost estimates, or schedules. It is anticipated that further details will be developed in continued discussion with the management agencies, Renewable Resource Councils (RRCs), working groups established to monitor Project effects, and other interested parties.

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## 1.1 REGULATORY AND MANAGEMENT CONTEXT

The following legislation and regulations may be relevant to the management and conservation of wildlife in the Project area, and in some circumstances may supersede the commitments made in this plan.

### 1.1.1 Federal Government

#### Yukon Act (2002)

The Yukon Act (2003) gives authority to the Yukon Legislature to make laws in relation to the conservation of wildlife and its habitat within Yukon Territory, other than in a federal conservation area. This Act prohibits the Yukon government from making laws that limit subsistence hunting by aboriginal people on lands where Final Agreements are not in effect. Where Final Agreements are in effect, such as the Project area, the Yukon government has the legislative authority to regulate all hunting, and must conform to the provisions of First Nation Final Agreements when addressing subsistence harvesting.

#### Yukon Environment and Socio-economic Assessment Act (YESAA)

YESAA gives authority and rules to the Yukon Environment and Socio-economic Assessment Board to administer the assessment process that applies to all lands within Yukon. It was called for in Chapter 12 of the Yukon First Nations Final Agreements and came into effect in 2003.

#### Migratory Birds Convention Act (1994) (MBCA)

MBCA and its regulations provide protection for migratory birds, their eggs, their nests, and their habitats, and regulate the hunting of migratory game birds. The MBCA and its regulations prohibit the incidental take of migratory birds, their eggs, or active nests. Hunting regulations can be updated annually. Proposed regulatory amendments in the Yukon are publicly reviewed by the Yukon Fish and Wildlife Management Board and recommended to the federal Minister of Environment.

#### Species at Risk Act (SARA)

SARA implements in part Canada's obligations under the United Nations *Convention of Biological Diversity*. It provides for the legal protection of wildlife species and the conservation of their biological diversity. The Act prevents wildlife species in Canada from disappearing, provides for the recovery of wildlife species that are extirpated (no longer exist in the wild in Canada), endangered or threatened as a result of human activity, and manages species of special concern to prevent them from becoming endangered or threatened. Within the Act, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), an independent body of experts, is responsible for identifying and assessing wildlife species considered at risk, which may then qualify for legal protection and recovery under SARA. Once listed under SARA, species plans are legal requirements to secure the necessary actions for species recovery and management. The only species at risk in the Project area with an existing management plan is the Northern Mountain Population of caribou (which includes the Klaza caribou herd).

#### Canadian Wildlife Act

The Canadian Wildlife Act allows for the creation, management and protection of wildlife areas to preserve habitats, and to permit wildlife research and interpretive activities. There are no such protected areas in the LSCFN and SFN traditional territories.



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## Convention on Wetlands (Ramsar, Iran, 1971)

RAMSAR commits the federal government to maintain the ecological character of wetlands of international significance and to plan for the sustainable use of all wetlands. The Federal Wetlands Policy was established in 1991 in response to RAMSAR. The policy provides goals, guiding principles and strategies for conserving wetlands on federal lands and those significant to Canadians. There are no wetlands of interest in the LSCFN and SFN traditional territories.

### 1.1.2 Yukon Government

#### Environment Act

The Yukon's Environment Act and regulations provide for the protection of land, water, and air. It applies on lands throughout the Yukon, including private property, Crown lands, lands within municipal boundaries, and First Nation settlement lands where the First Nation has not developed equivalent laws. This Act is primarily used for regulations related to air quality, waste, recycling, spills and contaminated sites, and not wildlife. However, the act provides for natural resource planning and management, including wildlife, and conservation easements for conserving and enhancing wildlife habitats. There are currently no regulations for the protection of wildlife and habitats under this act.

#### Yukon Wildlife Act (2002)

The Wildlife Act (2002) defines "wildlife" as any vertebrate animal of any species or type that is wild by nature, and includes wildlife in captivity, but does not include fish. This Act provides rules for hunting and trapping, outfitting and guiding, licensing, enforcement, and habitat protection. It also gives authority to make various regulations. Regulations include prescribing specially protected wildlife and measures to protect, prescribing areas to be wildlife sanctuaries and measures for management, methods of hunting and trapping wildlife, licensing and permitting conditions, zoning the Yukon to administer the Act, and the submission of harvest information. The Act is typically emended every 10–20 years while regulations can be updated annually. The four Habitat Protection Areas in the LSCFN and SFN traditional territories are administered under this Act.

### 1.1.3 Little Salmon/Carmacks First Nation (LSCFN) and Selkirk First Nation (SFN) Governments

LSCFN and SFN were established in 1997 through Settlement Legislation in Canada and the Yukon that gives effect to their final agreements. LSCFN and SFN are responsible for their settlement lands and resource management on these lands. Under their Self-Government Agreements, LSCFN and SFN have the legislative powers to manage, administer and control the rights or benefits of persons enrolled under their final agreements. SFN has established a Constitution for the purpose of protection of its settlement lands and resources, and governing the rights of its citizens on these lands. LSCFN has not established legislation for the management and administration of settlement lands and wildlife.

### 1.1.4 Carmacks (CRRC) and Selkirk (SRRC) Renewable Resources Councils

The Councils were established in 1997 pursuant to Section 16.6.0 of Little Salmon/Carmacks and Selkirk First Nations Final Agreements as instruments of public government for local renewable resource management in their respective traditional territories. The Councils can make recommendations to the affected Minister, the affected First Nation, the Yukon Fish and Wildlife Management Board, and the Salmon Sub-Committee on any matters related to the conservation of fish and wildlife, and on forest resource management on settlement and non-settlement lands. Governments (Yukon and First Nations) are required to make available to the Councils

information in their possession reasonably required by the Councils to carry out their functions. The Councils may establish bylaws under the Wildlife Act (2002) for the management of furbearers, although they have not yet done so. The Councils do not have powers in areas where traditional territories overlap until such time as the resolution of overlapping claims is resolved according to Schedule B of Chapter 2 of First Nation Final Agreements.

### 1.1.5 Management Plans

#### *Community-Based Fish and Wildlife Work Plan for the Little Salmon/Carmacks First Nation Traditional Territory 2012–2017 (Little Salmon/Carmacks Fish and Wildlife Planning Team 2011)*

This work plan addresses issues related to fish and wildlife populations, habitat, harvest and information gaps in the Little Salmon/Carmacks Traditional Territory. LSCFN, CRRC and the Yukon government developed this plan. Its purpose is to coordinate the efforts of the parties to address local concerns about fish and wildlife in the LSCFN traditional territory for the period 2012–2017. This plan provides management actions for a number of wildlife populations, including the Klaza caribou herd. Access and enforcement themes are integrated through each section of the plan.

#### *Selkirk First Nation May Gatherings*

Each year in May, the SFN and Yukon government meet to review their cooperative management actions for fish and wildlife, discuss new and pressing issues, and update their management actions for the coming year. This activity serves the purpose of a fish and wildlife work plan with annual updates.

#### *Management Plan for the Northern Mountain Population of Woodland Caribou (*Rangifer tarandus caribou*) in Canada (Environment Canada 2012)*

The Northern Mountain population (NMP) of woodland caribou was assessed by COSEWIC in 2002 and listed under SARA as a species of “special concern” in 2005. The purpose of this plan is to summarize the threats facing Northern Mountain caribou, set out management goals and objectives, and recommend a series of recovery measures for consideration by the responsible authorities for the management of the population’s 36 herds. The goal of the plan is to prevent the NMP from becoming threatened or endangered by engaging responsible agencies to carefully manage the NMP and their habitat. The plan is focused on achieving the following goals that are re-evaluated on a 5-year basis:

- NMP herds are maintained or recovered, and populations operate within the natural range of variability;
- The ecological integrity of key habitats and ecosystems required by the NMP are maintained; and
- First Nations, local communities, government agencies and other interested parties are meaningfully involved in the stewardship of the NMP and its habitats.

The objectives and recommended recovery measures are based on a set of principles developed by the Northern Mountain Caribou Steering Committee and Technical Working Group. Recommended management objectives for the NMP are:

- Objective 1: Determine herd status and trends over time.
- Objective 2: Manage harvest for sustainable use.
- Objective 5: Identify and assess the quality, quantity and distribution of important habitats for the population.
- Objective 6: Manage and conserve important habitats to support caribou herds.

Of particular relevance to the Casino Project’s effects assessment is management objective 7:

- Objective 7: Promote conservation of the NMP through environmental and cumulative effects assessments.

*Yukon Fish and Wildlife Woodland Caribou Management Decision Guidelines (July 1996)*

These interim guidelines (no update or final guidelines are known to exist) were developed by a caribou management team from the Yukon government. The guidelines were intended to provide a framework for consistent departmental input and responses to management plans and programs. Among many guidelines related to harvest, of particular relevance to the Casino Project is guideline no. 16 (habitat), stating:

- *Management experience in North America has shown that virtually any type of development activity that increases access for hunters results in a herd decline. Hunter access must be very carefully controlled, particularly where roads bisect caribou winter range.*

The WMMP should also be considered in association with the following Project-specific environmental management plans:

- **Road Use Plan** — includes details about road management, access controls, monitoring of use.
- **Waste and Hazardous Materials Management Plan** — may include details on handling kitchen waste that, if mishandled, could attract problem wildlife to the site.
- **Spill Contingency Management Plan** — provides background planning and operational procedures for spills response to minimize exposure of wildlife to deleterious substances.
- **Sediment and Erosion Control Management Plan** — provide details on what types of erosion and sedimentation control measures will be used and where and when they will be applied.
- **Invasive Species Management Plan** — summarizes the management and monitoring proposed to prevent the introduction and propagation of invasive plant species.
- **Air Quality Management Plan** — may include guidelines related to reducing noise, dust, and emission levels that would ultimately reduce the Project's zone of influence (ZOI) on adjacent habitat use by wildlife.
- **Air Quality and Fugitive Dust Deposition Monitoring Program** in the Environmental Monitoring, Surveillance and Reporting Plan provides a link to fugitive dust and potential effects on wildlife forage.
- **Progressive Reclamation Effectiveness Monitoring Program** in the Environmental Monitoring, Surveillance and Reporting Plan provides a link to Project footprint and wildlife habitat reclamation.
- **Water Quality Monitoring** in the Environmental Monitoring, Surveillance and Reporting Plan, summarizing water quality monitoring of potential contact waters for waterfowl.

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## 2 - WMMP REPORTING

Once the Casino Project is permitted and all necessary licences are acquired, CMC will report annually on Project mitigation and monitoring activities, which will generally include the following key pieces of information:

- A summary of Project activities;
- Description of updates to relevant wildlife and bird baseline information — either collected by CMC or other inventories/research known to CMC;
- A review of annual monitoring results relative to levels of natural variability in the region (as described in the baseline report and new knowledge gained through successive annual reporting);
- A presentation of the analyses of wildlife distribution and abundance in relation to Project facilities;
- A description of stakeholder involvement (e.g., Governments, RRCs);
- Summary of key monitoring initiatives, as deemed necessary; and
- A discussion of proposed changes to mitigation and monitoring plans as necessary.

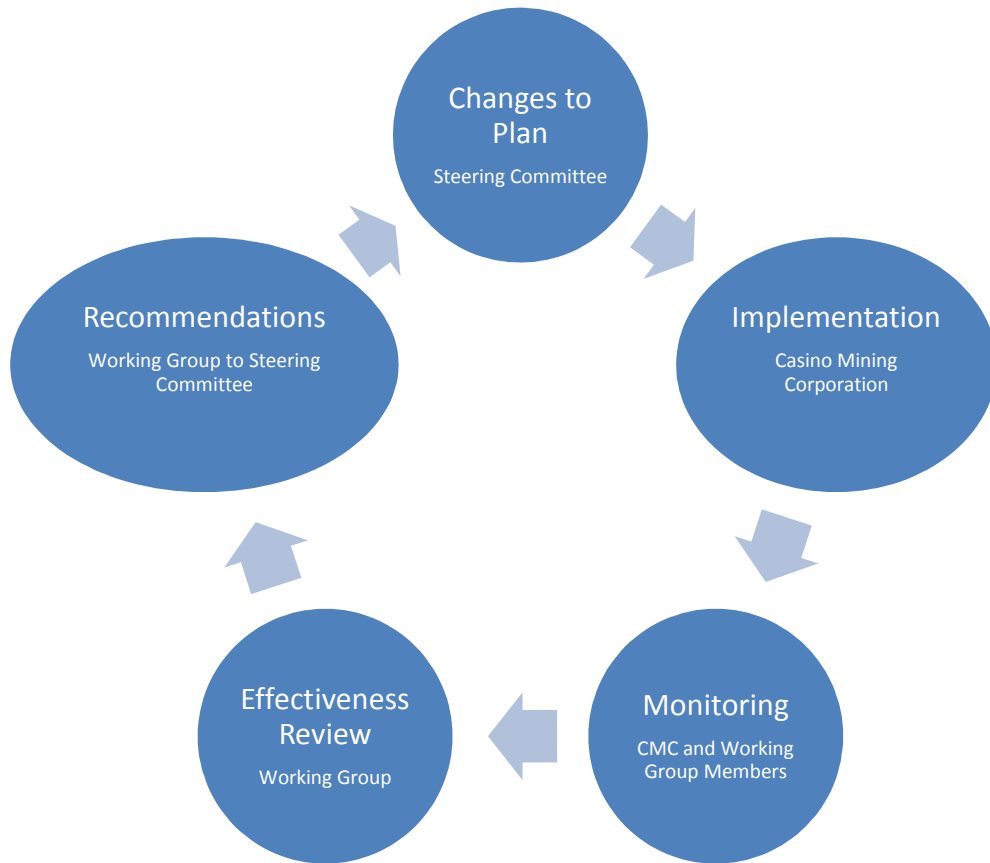
CMC will review the results of annual monitoring every three to five years and include in a detailed report the following information:

- An examination of trends in variability of wildlife distribution and abundance relative to natural trends;
- An analysis of measured wildlife responses to Project-related disturbances, including habitat use and measures of barriers/filters to wildlife movement;
- A description of how Project effects monitoring contributes to cumulative effects monitoring in the region;
- Detailed analyses of other variables as identified in individual monitoring programs as the Project evolves; and
- Description of changes to monitoring programs, statistical procedures, and proposed changes to mitigation activities to adaptively manage for unforeseen effects.

### 2.1 ADAPTIVE MANAGEMENT AND PLAN UPDATES

The WMMP will be updated periodically to include management reviews, incident investigations, regulatory changes, or other Project-related changes. The WMMP will also be updated as new methods or technologies become available. Mitigation and monitoring strategies for Species at Risk will be updated to maintain consistency with status reports, recovery strategies, action plans, or management plans that may become available during the life of the Project. The wildlife mitigation and monitoring measures will likely evolve during the life of the Project as a result of new resource discoveries, a better understanding of local wildlife behaviours, improved scientific techniques, stakeholder values, and to adapt to natural variability in wildlife distribution and abundance.

To address environmental and Project changes through time, an adaptive management approach is adopted for this mitigation and monitoring plan. It is anticipated that the plan will evolve and be adjusted to incorporate practical and workable solutions to minimize Project effects on wildlife and support regional wildlife research and management initiatives. The changes may be a result of inadequacies in the sampling methods or from increased awareness of environmental personnel, regulators, First Nations, or other public concerns. An adaptive approach means that increasing monitoring or changes to the monitoring program can occur if unanticipated adverse effects are detected, to further understand effects, or to change mitigation practices. Concomitantly, if no effects are detected over a reasonable time period, some mitigation and monitoring tasks may be removed from the program so that the resources may be applied elsewhere. To facilitate adaptive management and react to changing environmental and Project conditions, a process needs to be established to ensure regular review of the WMMP that includes regular and transparent reporting (Figure 2.1-1).



**Figure 2.1-1 Schematic of the Adaptive Wildlife Mitigation and Monitoring Process**

### 3 - CASINO MINING CORPORATION'S COMMITMENTS

CMC is committed to working with governments and stakeholders to ensure that wildlife populations remain healthy and can successfully coexist with the Project through construction, operation and closure phases of the mine. The WMMP is the primary management tool to achieve this. CMC will provide the necessary human, material, and financial resources to implement and maintain the WMMP. CMC has the capacity and authority to implement mitigation and monitoring actions and plans; however, CMC will not make decisions regarding wildlife management (e.g. harvest levels). Nonetheless, CMC is committed to actively supporting regional wildlife management initiatives.

#### 3.1 WILDLIFE WORKING GROUP

CMC will establish a Wildlife Working Group (the working group) — the role of which is to act as an advisory body to support ongoing cooperation and communication, as well as to review and provide advice on all aspects of the WMMP, including:

- Develop and finalize the WMMP Program;
- Implement the WMMP Program;
- Monitor reports and results;
- Assess Project effects and effects predictions for wildlife;
- Assess effectiveness of mitigation measures; and
- Develop action plans for implementation of appropriate mitigation measures.

The working group may make recommendations to CMC and government agencies with wildlife management responsibilities on any aspects of the WMMP program or for the adoption of mitigation measures which are technically and economically feasible. It is expected that the working group would consist of a number of members including members from affected First Nations (particularly Selkirk First Nation and Little Salmon/Carmacks First Nation), CMC, Yukon Government, and Environment Canada. Other members can be considered as appropriate or necessary. The role of the working group is not intended to either duplicate or affect the regulating authorities or stakeholder responsibilities for wildlife management of participating members.

To keep the working group on task and focused on their roles and responsibilities, a draft Terms of Reference (TOR) can be developed that could address the following points:

- Purpose, objectives and duties
  - Partially identified in this WMMP
- Establishment
  - Working group time frame and meeting frequency
  - Working group membership and reporting structure
    - Assuming the key parties such as the LSCFN, SFN and Yukon governments, CRRC, SRRC, and possibly the federal government.
  - Working group chair and chair duties
- Communications, proceedings and recommendations
  - Identify obligations of the parties to provide information to the working group

- External communications protocol
- Working group recommendations — what is done with them (CMC will be obligated to respond to recommendations related directly to possible mine effects)
- Decision-making process
- Funding and expenses

### 3.2 WILDLIFE SPECIALISTS

The monitoring program established by CMC requires the input of specialists to carry out many of the wildlife surveys and studies required to monitor Project effects. Throughout the life of the Project, CMC will endeavor to hire qualified personnel to conduct these studies. As much as possible, CMC will insist on inclusion/participation of local experts/individuals in the execution of these surveys and studies.

### 3.3 INCORPORATION OF TRADITIONAL KNOWLEDGE

The monitoring program established by CMC requires the input and knowledge of First Nation hunters, trappers, and land users to design, conduct and review results of some of the surveys and studies required for monitoring. Throughout the life of the Project, CMC will endeavor to consult with knowledgeable individuals to conduct these studies. As much as possible, CMC will include participation of local experts/individuals in the conduct of the surveys and studies.

## 4 - MITIGATION FRAMEWORK

CMC recognizes that there will be disturbances and effects on wildlife and wildlife habitat as a result of the construction, operation, and closure of the Project. To reduce or eliminate potential Project effects on wildlife and wildlife habitat, CMC commits to a number of mitigation actions, some of which are general and apply to all Project phases, some that are specific to Project phases, some that are temporal and apply only at certain times of year or in certain years when wildlife are present, and some that are specific to identified sensitive habitat features. Sensitive habitat features are mineral licks, active den sites, wetlands, bat roosts, and re-used nest sites (e.g., cliff nests, stick nests or swallow colonies). CMC expects that some of the mitigation actions will be modified through the life of the Project as more information becomes available about the effectiveness of the mitigation and wildlife and habitat/vegetation response to Project-related disturbances. To inform CMC, Project regulators, and stakeholders about mitigation effectiveness and Project effects, the mitigation framework is supported by a Project effects monitoring framework described in Section 5.

Mitigation actions that are more general in nature and are applicable to the Project design phase or during all Project phases, throughout the year, are described in Section 4.1 (Project Design and General Mitigation). Mitigation actions that are most relevant to reducing the effects of construction activities (Section 4.2), operations (Section 4.3), and closure and post-closure (Section 4.4) are described in the appropriate sections. Species-specific mitigation is mentioned separately where warranted.

### 4.1 PROJECT DESIGN AND GENERAL MITIGATION

The construction footprint of the Project will have residual effects on wildlife and wildlife habitat because there will be long-term habitat removal, and sensory stimuli during the construction, operation, and closure and decommissioning phases will disturb wildlife. There are several elements that were considered in the Project design that will help to mitigate some of those effects, which are described below.

#### 4.1.1 Minimize Project Footprint and Sensory Disturbance

To minimize loss of habitat, the Project footprint (~23.5 km<sup>2</sup>) is designed to be as small as possible. Examples of considerations made to minimize the Project footprint are further described in the Project description (YESAB Project Proposal, Section 4).

- To minimize disturbance to wildlife and wildlife habitat where Project design allows, Project infrastructure will be constructed outside of identified sensitive habitat features, and areas with sensitive habitat or vegetation (e.g., rare plant locations).
  - The number of gravel pits/borrow pits in Klaza caribou winter habitat will be minimized to the extent possible.
  - Visual and auditory construction disturbances near animals will be minimized to the extent possible.
  - Mineral licks will be avoided (two mineral licks were identified during baseline studies that are outside of the PDA).
  - Disturbance near active or re-used den sites will be minimized to the extent possible during the denning period (October to May).



- CMC recognizes that a section of the Freegold Road extension will be in late-winter habitat for the Klaza Caribou Herd. Further species-specific mitigation measures will be incorporated to accommodate the potential disturbances associated with the road footprint and sensory disturbances.

#### 4.1.2 Minimize Barriers and/or Filters to Wildlife Movement

CMC will commit to the following measures to minimize barriers and/or filters to wildlife movement:

- Design and build roads with a low profile embankment that will reduce the potential for the road to filter, or act as a barrier, to wildlife movement.
- Construct the water pipeline so that it does not impede wildlife movement.
  - Design considerations for the pipeline could include the following components:
    - Raised sections of the pipeline will allow for wildlife movement under the pipeline. Using moose as a precedent, pipeline clearance (i.e., distance from ground to bottom of pipeline will be a minimum of 180 cm every 400 to 700 m (depending on terrain; Dunne and Quinn 2009) for minimum section lengths of 10 m (i.e., 10 m long section of the pipeline will be raised).
    - Pipeline crossing structures (made of vegetated fill or soil) may be constructed in high density crossing/movement areas or areas where the pipeline cannot be raised or buried completely.
  - Further baseline studies to determine high probability wildlife crossing areas (e.g., trail surveys, snow track surveys, camera surveys) along the proposed pipeline route prior to construction.
- Equipment laydown will not be placed in an area of known wildlife movement or areas of wildlife concentration (e.g., mineral licks).
  - No-clearing buffer zones will be established around riparian areas to minimize disturbance to movement corridors (see Sediment and Erosion Control Management Plan).
- Access roads will be designed to avoid blind spots and reduce potential for wildlife collisions.
  - Speed limits will be posted and enforced on all facility roads and on the CMC managed portion of the Freegold Road.
  - Signage will be posted in high collision risk areas (e.g., blind or obstructed turns or hills, water crossings).
  - Where embankments may pose a barrier or filter to wildlife movement, (e.g., > 2 m high and steep slope in areas of known wildlife movement), wildlife crossings will be constructed with the following characteristics:
    - 10 to 100 m in length
    - The embankment has a gradual grade (e.g., 5 horizontal to 1 vertical, compared to a standard 2:1 or 3:1)
    - Surfaces will be relatively smooth, compacted, and constructed of finer fill material (crushed rock minus 100 mm) to prevent leg entrapment
    - Crossing areas will be placed in areas of greater wildlife movement based on observational data and caribou collar data
    - Truck operators will be made aware of all high-use wildlife crossing areas and will be required to report any wildlife observations

### 4.1.3 Minimize Wildlife Incidents and Mortality Risk

CMC will conduct the following to minimize wildlife incidents and mortality risks:

- Design mine buildings to discourage use by animals:
  - Skirt all buildings and stair landings to the ground.
- Design mine buildings to prevent human-wildlife conflicts:
  - Avoid blind spots where possible around buildings.
  - Provide windows where practical on all exits.
- Design roads with clear lines of sight in areas of high wildlife interaction potential.
- Support YG Environment and affected First Nations wildlife harvest management initiatives in the Project area.

### 4.1.4 Wildlife Awareness and Sensitivity Training

Project personnel (employee and contractor) awareness programs will help to mitigate potential effects on wildlife by increasing personnel awareness of CMC's commitment to wildlife and habitat protection in the Project area. Personnel will receive an orientation on basic wildlife ecology relevant to the Project. Those personnel that are road users will receive training specifically focused on wildlife use of the road corridor, potential wildlife mortality risks, and road and traffic operation procedures that are established to mitigate effects on wildlife. Project personnel will be expected to comply with the direction provided by mine management and there will be enforcement of Project-specific wildlife provisions.

CMC commits to incorporating a wildlife awareness component to the on-site employee orientation program. The wildlife awareness component will include a presentation on the importance of wildlife protection around the Project and in the region. Training components will include:

- Introduction to regional wildlife and wildlife issues.
- Wildlife have the right-of-way policy.
- Bear awareness, garbage management and review of CMC's Waste and Hazardous Materials Management Plan.
- No feeding or harassing wildlife policy.
- Wildlife encounter directives.
- Incidental wildlife observation protocol.
- Awareness training regarding the importance of avoiding known and reporting new mineral licks, nest sites, and other sensitive habitat features.
- Road driving directives: speed limits, driving at winter, expected areas of wildlife occurrences.
- Wildlife reporting requirements.
- Notification of enforcement measures (e.g., tracking truck speeds through sensitive areas).

## 4.2 CONSTRUCTION MITIGATION

Construction is likely the most disruptive Project phase for wildlife and wildlife habitat. Wildlife habitat is actively removed (e.g. mine, temporary camps, road, and borrow site construction), more humans will be present in the area, and large, noisy equipment will be required to construct and haul Project infrastructure — a level of activity that will be unprecedented in the area. Construction mitigation actions aim to reduce or remove potential effects to wildlife and wildlife habitat during this time, and will include:

- Not putting construction camps inside identified Klaza caribou late-winter range.
- Whenever practical and not causing a human safety issue, implement a stop work policy when wildlife in the area may be endangered (i.e., risk of physical injury or death) by the work being carried out.
- Avoid construction in sensitive habitats and/or during sensitive times, which will include:
  - Avoidance of new clearing during the breeding bird nesting season (1 May to 31 July in Yukon), or conducting nest surveys immediately prior to clearing activities.
  - Late-winter (1 February to 30 April) is considered the most sensitive time for caribou and moose. For caribou, this generally means avoiding the initiation of new construction activities during this period between km 98 and km 130 on the Freegold Road extension.
  - Sensitive habitat features (e.g., mineral licks, raptor nests, dens, and bat roosts) identified during pre-clearing surveys will be addressed on a case-by-case basis.
  - Avoiding blasting within 500 m of sensitive habitat features (e.g., mineral licks, raptor nests, dens, and bat roosts) when wildlife are likely to be present, which will include:
    - Dens — active or re-used dens will be avoided from October through to May, where they are known to occur. This would include grizzly and black bears, wolverine, coyotes, and foxes.
    - Mineral licks — two mineral licks were identified during baseline studies that will be considered in construction monitoring (locations are not available for public distribution).
    - Raptor nests — any known raptor nests within the PDA will be avoided where possible, and nest management plans may be developed for specific nests.
- If clearing must occur during the bird nesting season, CMC commits to conducting active migratory bird nest surveys prior to clearing.
  - Survey methods will follow best practices implemented to date for other Yukon projects. Some aspects of those surveys included:
    - Survey teams are led by qualified individuals.
    - Surveys extend beyond the Project footprint the distance of the identified setbacks, where suitable habitat exists.
    - A no-disturbance buffer around active nests is established until chicks have fledged or the nest is determined to have been predated or abandoned. Recommended setback distances are listed in Table 4.2-1. Other set-back distance guidelines may be considered should they be made publicly available.
    - A 7-day window for clearing activities to be completed once the survey is conducted (if no nests are found).
    - Communication of survey results and overview of protected nests with clearing contractors or on-site construction supervisor.
    - Updates provided as part of the annual reporting to the working group.
  - Pre-clearing surveys will also include assessing for potential bat roosts.

- If bat roosts are detected, site-specific avoidance measures and a mitigation plan will be developed.

**Table 4.2-1. Recommended Setback Distances for Construction Activity near Bird Nests**

Species Group	Recommended Setback Distances (m)	Exceptions/Comments
Ground and tree-nesting birds	10	
Cliff-nesting and large stick-nesting raptors	500	Develop nest-specific management plans for potentially disturbed nests. Includes short-eared owl and common nighthawk.

Sensory disturbances that reduce habitat effectiveness within a Zone of Influence (ZOI) can only be partially mitigated. Caribou, moose, bears, and other wildlife will find some Project activities disturbing, and the degree to which animals will adapt or habituate to those disturbances is not known. Mitigation measures that will minimize the likelihood of reduced habitat effectiveness for wildlife include limiting sensory disturbances where possible throughout the year. This will be realized by developing a blasting program to minimize effects on wildlife including, but not limited to, the restriction of blasting when caribou or other sensitive wildlife (e.g. nesting raptors) may be present.

#### 4.3 OPERATION MITIGATION

The operations phase is the longest Project phase, with regular mining activities occurring throughout the life of the Project. During this phase, the following mitigation measures will be implemented:

- To avoid unnecessary disturbances to wildlife, there will be no stopping or loitering in sensitive wildlife areas or during sensitive wildlife periods:
  - No stopping areas will have signs posted along Project roads (similar to “No Stopping, Avalanche Zone” road signs). These signs will be posted along road sections identified in the Project Proposal, or as deemed appropriate by the working group where sensitive wildlife areas have been identified.
  - Identification of and the reasons for no stopping zones as part of the employee education program (Section 4.1).
- To reduce the Project-related effects on mortality risk, wildlife near misses and collisions will be investigated to determine the root cause and identify corrective actions:
  - Near misses are when wildlife mortality could have occurred if immediate corrective actions were not taken.
  - Investigations will follow a standard procedure of employee interviews, scene investigation, recording time, date, incident details.
  - Corrective actions will be identified and are specific to the situation (e.g., reduce speed, improved lighting, roadside vegetation clearing).
- Minimize fugitive dust dispersal by using dust suppression methods, and thereby minimizing the Project’s zone of influence.
- CMC acknowledges the potential for an increase in the number of predators as a result of human activity in the area. To minimize the potential for increasing densities of bird nest predators (e.g., foxes, gulls), CMC will:

- Implement strict waste management procedures as outlined in the Waste Management Plan. Audits will be carried out periodically to assess the effectiveness of waste management practices.
- Conduct regular surveillance of Project facilities and waste disposal sites to ensure that predator control measures are effective.
- Incorporating Best Management Practices for food, waste and fuel management into the design on the Project. CMC has developed a Waste and Hazardous Materials Management Plan to ensure proper waste management practices are implemented. These practices may include:
  - Storing and incinerating garbage in an enclosed area surrounded by electric fencing. The gate will remain closed at all times.
  - Installing a stack scrubber in all kitchen vents to reduce food odour during cooking.
  - Storing all food and waste inside buildings or within an enclosed, bear proof area, unless field crews are working remotely. Field crew lunches will be sealed in airtight containers and all garbage will be packed out and properly disposed of.
  - Burning all food and kitchen waste in an incinerator.
  - Adding lime and dirt to latrines on a regular basis to reduce odour.
  - Storing all fuel in airtight containers in areas inaccessible to bears (i.e., fuel shed or fenced enclosure).
  - Training all workers in wildlife management protocols, including garbage management, bear encounter protocols (Section 4.1.4)

#### 4.3.1 Road Operations and Access Management

CMC is aware that public access to the road may lead to unanticipated indirect effects on wildlife from collisions and harvest. To address that concern, CMC has developed a Road Use Plan, the key elements with respect to mitigating effects on wildlife include:

- No public access (access by permit only)
  - Chartered aircraft transportation to and from the Project site will be provided for Project staff.
- Controlled, gated, manned access (located at the new bridge over Big Creek — or as otherwise agreed).

Key elements of the Road Use Plan for wildlife include the following commitments – details of which are discussed elsewhere in this document:

- “No Hunting” in game management zones along access road (continuation of existing hunting ban in some areas, extended to include entire length of access corridor).
- Special management provisions for Klaza caribou that include long-term and increased active monitoring (currently underway), and other measures as agreed (Section 5).
- Identification of ‘wildlife crossing’ areas along route, that may include active monitoring (Section 4.1.2), snow clearing berm management in late-winter, travel speed reductions and restrictions as defined and agreed in the management plan.

To mitigate the Project’s direct effects on wildlife as a result of road operations by Project personnel, CMC commits to the following actions:

- Implement a “Wildlife have the Right-of-Way” policy to avoid potential collision or unnecessary disturbances to wildlife:

- 
- Vehicle operators will be vigilant and watch for wildlife near roads, and take all reasonable actions to avoid wildlife collisions.
  - Traffic will stop when wildlife are observed on the road.
  - To allow small groups (<10) or individual wildlife standing on the road to move off the road unalarmed, trucks will stop for 15 minutes, then proceed slowly (<20 km/hr) if wildlife have not moved within that 15 minute period.
  - Implement compulsory speed limits through late winter caribou habitat to reduce the potential for wildlife collision and to reduce sensory disturbances along the road:
    - The speed limit will be established based on safe stopping distances and line of sight in areas of potential caribou encounters.
  - Direct operators to include wildlife reports in their radio communications:
    - Truck-to-truck communication reporting wildlife presence by kilometer (e.g. “*two caribou north of road at kilometer 97*”) will keep operators informed of potential hazard areas.
  - Manage snow clearing so that caribou and other wildlife can easily cross the road without being deterred by steep and high snow banks:
    - Snow banks will be kept less than 1 metre high.
  - If wildlife mortality were to occur as a direct result of Project-related collisions, increased traffic controls will be implemented. Timing and duration of increased controls is dependent on wildlife presence.
  - CMC will have a wildlife monitor patrolling the road when there is a high likelihood of wildlife encounters and there is a risk of collision:
    - High likelihood of encounters can be based on increasing frequency of wildlife sightings.
    - During years of high interaction with the road, caribou numbers in the vicinity of the road will be re-evaluated on an every second day basis using light vehicles, aerial surveys, collar data, or other technologies available for the monitoring effort.
  - Removal of carcasses from transportation corridors to discourage further collisions (e.g., scavengers on road).

An operational decision tree matrix for drivers dealing with wildlife sightings near roads is provided in Figure 2.1-1.

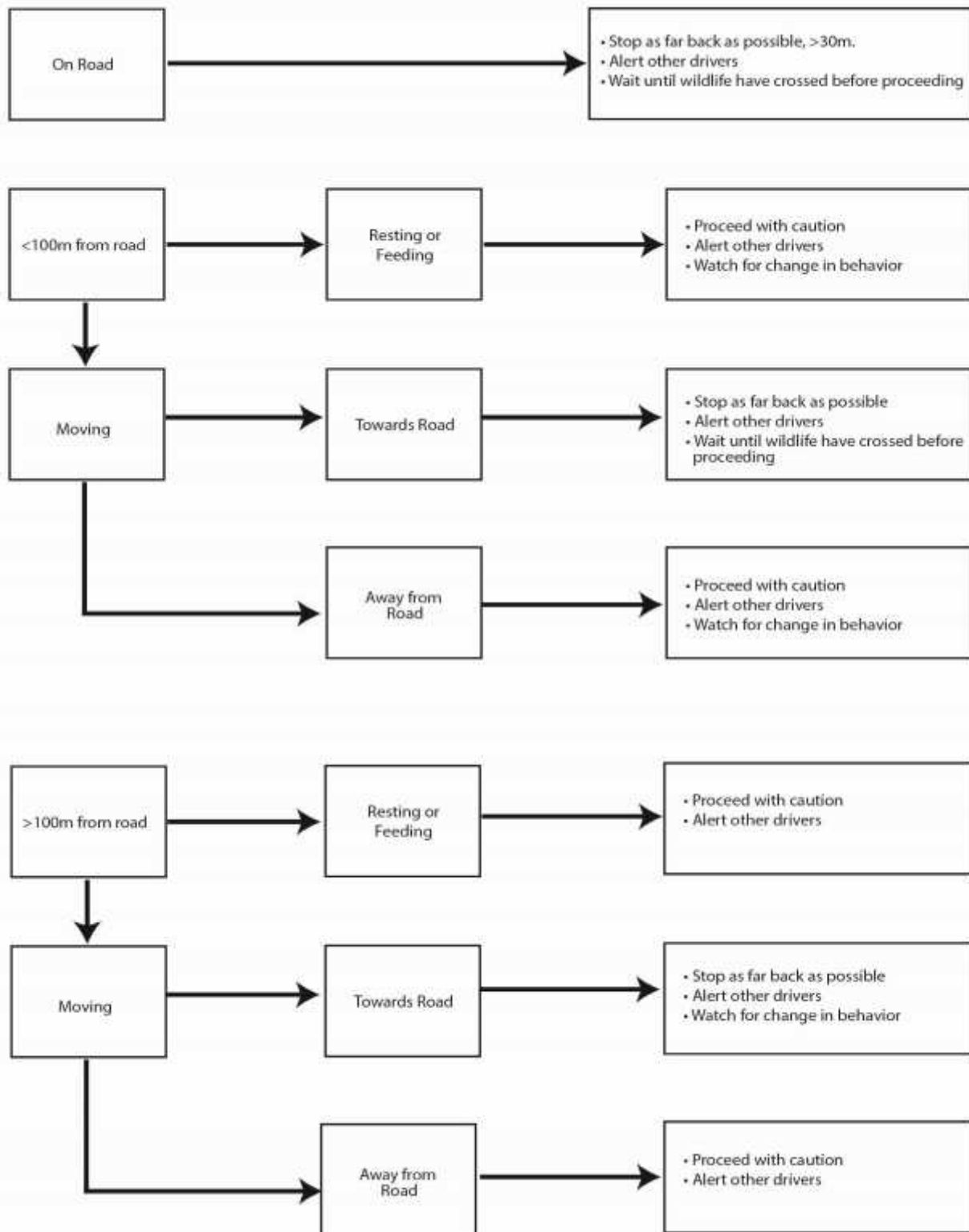


Figure 4.3-1 Wildlife and Road Operation Decision Matrix

## 4.3.2 Problem Wildlife Management

The goal of problem wildlife management is to reduce the potential for wildlife-human interactions at the Project. A problem wildlife protocol will help to ensure employee safety and minimize potential mortality due to threats to life or property. CMC will implement a problem wildlife protocol that includes:

- Employees will be required to report wildlife sightings near Project facilities.
- Warning signs will be posted in areas of frequent wildlife encounters on a seasonal basis or otherwise as required.
- Area closures will be used until proper control measures are in place or have been activated.
- If wildlife becomes a concern, Yukon Conservation Officer Services will be contacted for advice on appropriate actions.
- With prior approval of local Conservation Officer(s), adverse conditioning actions will be applied to problem wildlife to reverse habituation behaviours.
- CMC will identify appropriate personnel to monitor, manage and evaluate human-wildlife conflicts.

The decision matrix for managing CMC's response to problem wildlife is presented in Table 4.3-1.

**Table 4.3-1. Problem Wildlife Encounter Management Matrix**

Type of interaction	CMC Management Response					
	Monitor	Post warning	Area closure	Contact Conservation Officer Services	Hazing actions*	Relocate*
Animal sighting reported	•					
Animal showing normal feeding behaviour	•	•				
Animal reacting defensively	•	•	•			
Animal tolerates human disturbance and ignores people and facilities	•	•	•			
Animal shows repeated interest in people and facilities that will likely lead to habituation	•	•	•	•	•	
Animal is clearly habituated to humans and facility	•	•	•	•	•	•
Animal displays aggressive behaviour and is an immediate threat to human safety			•	•		•

\* Hazing and relocation actions to be conducted only in accordance with advice from Conservation Officer Services.

## 4.3.3 TMF Wildlife Management

CMC expects that there will be some waterfowl and wildlife exposure to water in the Tailings Management Facility (TMF) during the Project's operation phase. It is not economically feasible, nor is it necessarily desirable to restrict all wildlife access to the TMF area when risks to animal health and mortality are relatively low — depending on constituents of potential concern (COPCs), ingestion rates, animal residency times, and individual health conditions. There is little evidence to predict what level of effect exposure to water in the TMF may have on wildlife, or the ultimate result of that exposure. Therefore, depending on animal responses to the TMF, the



following mitigation options may be considered to control wildlife presence at the TMF if deemed by CMC and/or regulators to be necessary:

- CMC will use wildlife deterrence measures in portions of the TMF that are identified as high risk areas to wildlife health.
- Deterrence measures can include wildlife fencing to keep wildlife out, scare crows, cannons, or any other proven methods at the time the risk is identified.

#### 4.3.4 Cliff-nesting Raptor Mitigation

The Project area has cliff-nesting raptors that are known to breed in the PDA, and although the assessment concluded that the Project will have no population-level impacts, the potential to disturb and disrupt individuals is possible and proper mitigation procedures will be implemented to minimize unforeseen effects. General mitigation measures applied in all areas of the Project footprint will mitigate effects to cliff-nesting raptors. Additionally, nest-specific management plans will be developed for any cliff nests identified within 500 m of the PDA. Where possible, a site-specific no-disturbance or no stopping buffer (approximately 500 m) will be used for both Project personnel and equipment around the nests during the nesting period (1 April to 31 August for raptors).

#### 4.4 CLOSURE AND POST CLOSURE

CMC expects that after Project operations are complete and mine facilities are decommissioned that mitigation for wildlife will be passive, and will include the following:

- As directed in the Road Use Plan, the Freegold Road extension will be decommissioned such that passage of vehicles will not be possible. Following decommissioning, no further mitigation activities for wildlife are expected to be implemented.
- As detailed in the closure plan, the TMF will include the construction of a wetland, creating a large littoral zone and wetland habitat where no wetlands currently exist. It is expected that wetland-associated wildlife will be attracted to and use the area after the mine has closed and the wetland has become established. There are no toxicological effects expected from use of the wetland and no further mitigation for wildlife is expected; however, if water quality monitoring results exceed acceptable standards, wildlife monitoring in the vicinity of TMF will be conducted.

## 5 - MONITORING FRAMEWORK

Monitoring effects on wildlife must be relevant to the Project and to the possible effects which the Project will have on the environment. The Casino Project's monitoring framework will inform adaptive management measures that can be effectively applied. The objectives of the monitoring framework are to:

- Develop a comprehensive and integrated environmental monitoring program.
- Incorporate an ecosystem-based approach for monitoring and management of Project related environmental effects.
- Integrate traditional knowledge, when possible and available, into the development and implementation of the environmental monitoring programs.
- Include the meaningful participation of stakeholders in all aspects of the environmental monitoring program in all phases of the development, including the decommissioning and reclamation.
- Report in an effective and timely manner on the environmental monitoring program and its results in ways that are meaningful to stakeholders.

Monitoring efforts will focus on a variety of spatial and temporal scales, depending on the focal species. Most local monitoring efforts will focus studies at the scale of the Project footprint (e.g. wildlife mortality monitoring), while others will focus on larger scales to adequately quantify and/or qualify effects (e.g. wildlife distribution).

### 5.1 MONITORING PRINCIPLES

The monitoring framework is based on the following principles:

- Monitor and verify potential effects related to the Project
- Ensure monitoring efforts are able to detect natural and Project-related changes to the environment.
- Monitor and evaluate the effectiveness of mitigation measures
- Identify unanticipated effects
- Monitor effects where predictions were based on weak data
- Provide an early warning of undesirable change in the environment
- Inform adaptive management measures

### 5.2 MONITORING FRAMEWORK OVERVIEW

The monitoring framework is based on three categories of study related to monitoring and follow-up of Project-related effects (adapted from Voisy's Bay EEM 2006):

1. **Baseline Research** — background studies intended to establish need for, or parameters of, an environmental effects management program. Research studies could address issues such as natural variability of a measurable parameter or monitoring target, or examine the nature, extent, or duration of a potential Project-focal species interaction.
2. **Surveillance** — programs to produce information about the pattern of occurrence of focal species.
3. **Monitoring** — programs to address and quantify effects mechanisms between Project activities and components of the receiving environment.

Table 5.2-1 defines the key considerations for each monitoring plan component. Monitoring is focused on measureable parameters of indicators. Monitoring will occur on and in areas adjacent to the Project footprint (Facilities Monitoring), and focal species monitoring will occur within the Regional Study Area (Focal Species

Monitoring). If stakeholders are interested or concerned about broader regional-level wildlife issues, a collaborative approach and participation by CMC can be considered for monitoring outside of the RSA.

**Table 5.2-1. Monitoring Framework Overview**

<b>VC</b>	Valued Component (e.g., Wildlife, Birds, Vegetation)
<b>Indicator</b>	The species or relevant feature selected to represent the VC (e.g., caribou)
<b>Monitoring category</b>	One of three categories – Research, Surveillance, Monitoring
<b>Design</b>	e.g., Before-After-Control-Impact (BACI), Opportunistic
<b>Measurable parameter</b>	A quantifiable feature used to assess potential effects on an indicator (e.g., movement)
<b>Key project interactions</b>	Identification of key project features that result in residual effects on the Indicator and Measurable Parameter (e.g., Freegold Road extension as a filter to caribou (Indicator) movement (Measurable Parameter))
<b>Goal</b>	Statement of the expected residual effect of the Project (e.g., the Project will have a not significant effect on caribou movements across Project infrastructure)
<b>Objective</b>	Evaluate a potential response specific to the mine and operations (e.g., evaluate movement patterns of caribou as they approach or cross the road)
<b>Threshold</b>	Early warning indicator (note: usually about an order of magnitude lower than the significance criteria used in the effects assessment)
<b>Scope of monitoring work</b>	<p>Brief overview of key components of a monitoring program including note of temporal and spatial scale, frequency, and duration. It will also indicate if the monitoring is to occur in relation to direct project effects relative to day-to-day operations (facility-specific), or is intended to address broader-scale effects on a focal species:</p> <ul style="list-style-type: none"> <li>• <b>PDA/Facility-specific</b> monitoring will be a regularly occurring task for the on-site environmental staff focusing on wildlife interactions with Project infrastructure and facilities.</li> <li>• <b>Focal species</b> monitoring generally will occur at a broader scale with an emphasis on focal species abundance and distribution within the broader Project area, including monitoring of wildlife response to Project-related disturbances and predicted impacts and wildlife distribution in a broader Regional Study Area.</li> </ul>
<b>Agency/partner participation</b>	Identification of agencies or key partners in the monitoring programs (e.g., YG Environment, RRCs)
<b>Mitigation measures</b>	A list of measures used to reduce or remove project related effects (e.g., project design elements, adjustments to operations)
<b>Project Terms and Conditions</b>	Indicates the Project Terms and Conditions (to be determined) that are being addressed by this monitoring plan component

### 5.3 PDA/FACILITY-SPECIFIC MONITORING

Project facilities, structures, and the Freegold Road extension (facilities within the PDA) pose potential risks to wildlife and obstacles to wildlife movement. The Project facilities will be monitored on a frequent basis to determine whether effects are occurring and if mitigation is adequate. Project components that will be monitored for wildlife effects include the following:

- The Freegold Road extension and other site roads for road traffic interaction and snow bank management.
- Traffic volume on all Project roads will be monitored to determine if volumes are exceeding expected levels.
- Access to the Freegold Road extension will be monitored to determine how many non-Project-related, but permitted people are accessing the road (e.g. First Nations, placer miners, trappers).
- The Yukon River water pipeline to determine if it is acting as a barrier to wildlife movement and effectiveness of mitigation actions.
- The Tailings Management Facility (TMF) to determine wildlife attraction, an assessment of the risks if wildlife are using it, and need for deterrence measures (if required).
- Project buildings as a potential haven for nest predators and problem wildlife.
- Waste management facilities as a potential attractant of problem wildlife.

PDA/Facility-specific monitoring will be conducted by CMC's on-site environmental management staff, wildlife monitors, and specialists as required. The on-site staff will be familiar with the Project's effects assessment and Project conditions related to wildlife, commitments made to mitigate effects on wildlife, and understand the adaptive management process used to manage responses to mitigation actions.

Results of PDA/Facility monitoring will be reported annually within the WMMP monitoring report. Successive reports will include a review of previous years' data to detect trends in wildlife occurrences and results of mitigation actions. Key features of the annual PDA/Facility monitoring report will include the following activities (Table 5.3-1):

- Project footprint monitoring — measures of the area(s) physically disturbed for construction and operations. Comparisons will be made between the planned footprint in the Project description and the actual footprint mapped using a GPS.
- Project activity — a summary of human presence (e.g., man days), general traffic statistics, construction activities, blasting activities, etc.
- Summary of a wildlife sightings log as an indication of wildlife presence in the immediate Project area. Data includes location, date, time, species, activity, etc.
- Summary of wildlife mitigation activities, including results of active migratory bird nest surveys (if required), deterrence actions, problem wildlife kills, etc.
- Summary of vehicle/wildlife collisions and results of investigations and corrective actions taken.
- Summary of non-Project related activities in the Project area (e.g., other land users, placer miners).
- Summary of regulator consultation for dealing with on-site wildlife issues.

There are no toxicological effects expected from use of the wetland and no further mitigation for wildlife is expected; however, if water quality monitoring results exceed acceptable standards, then wildlife monitoring in the vicinity of TMF will be triggered and additional mitigation measures will be implemented.

**Table 5.3-1 Summary of PDA/Facility-Specific Monitoring Programs by Project Phase**

<b>PDA/Facility Monitoring</b>	<b>Construction</b>	<b>Operations</b>	<b>Closure/ Post-closure</b>
<b>Footprint assessment</b> — measure the evolving Project footprint and compare the area prediction in the Project description	Annual	Annual	As needed to monitor reclamation
<b>Building assessment</b> — observe use of buildings for use by nest predators, nesting structures, or as a haven for potential problem wildlife.	Monthly	Monthly	n/a
<b>Road monitoring</b> — Reported observations of wildlife along the road, report on mitigations required. Report on follow-up investigations to wildlife-vehicle collisions and management actions. Report on traffic volumes and public access.	Ongoing	Ongoing	Ongoing to decommissioning of road
<b>Nest monitoring</b>			
Raptor nests adjacent to PDA	As required when adjacent nest sites are occupied	As required when adjacent nest sites are occupied	n/a
Active migratory bird nest surveys – survey areas that must be cleared 01 May to 31 July	As required prior to disturbance	n/a	n/a
<b>Incidental human activity reporting</b> — record of non-Project-related human activity in project area that may have interacted with wildlife. Data includes location, date, time, type of activity, number of people.	Ongoing	Ongoing	To coincide with TMF monitoring as required post-closure
<b>Incidental wildlife reporting</b> — Observation sheets placed throughout Project facilities encouraging personnel to record wildlife sightings. Data includes location, date, time, species, activity, etc.	Ongoing	Ongoing	To coincide with TMF monitoring as required post-closure
<b>Waste area/TMF monitoring</b> — Observations of wildlife use and mitigation actions taken to deter wildlife use.	Weekly	Weekly	To coincide with TMF monitoring as required post-closure
<b>Exotic invasive plant species</b> — Monitor methods used to reduce potential, and observations within PDA through life of Project.	Monitor washing of trucks and equipment prior to entering RSA	Annual botany surveys in PDA	As needed to monitor reclamation success

## 5.4 INDICATOR MONITORING PROGRAM

Monitoring will continue to be conducted to enhance baseline information, as a surveillance of occurrence in the Project area, and as ongoing monitoring efforts to validate Project effect predictions. General monitoring will enhance broader knowledge on multiple effects or species. The findings of the general monitoring may trigger additional focal species/effect monitoring if the results suggest an effect that exceeds the Project effect predictions or documents an unanticipated effect. Focal species/effect monitoring will refine the knowledge of the animals or issues in the local or regional study areas. The focal monitoring will assist with adaptive effects management, if needed, but will also increase knowledge base of human effects on wildlife in Yukon. The following will be included in focal species/effect monitoring (Sections 5.4.2 to 5.4.7):

- Plant invasive species — presence within and immediately adjacent to Project footprint
- Metals in plant tissue — an indicator of potential effects on animal health
- Cliff-nesting raptors — occupancy and productivity

- Klaza caribou herd — distribution and habitat use in the Project area (10 km radius of mine and road)
- Moose — distribution and habitat use in the Project area (10 km radius of mine and road)
- Grizzly bear, black bear, wolverine and wolf dens — activities relative to distance from the PDA
- Collared pika — continued presence in the Project area

Table summaries of suggested monitoring programs are provided below.

#### 5.4.1 General Monitoring

To ensure that Project effects on all wildlife species are minimized, CMC will monitor and annually review the amount of direct habitat loss resulting from the Project footprint (Table 5.4-1). CMC will also track incidental observations of wildlife made by truck drivers and all Project personnel within and adjacent to the Project footprint, as well as all Project-related mortalities (Table 5.4-2 and Table 5.4-3). CMC will monitor wildlife use of known sensitive habitat features; and additional sensitive habitat features may be identified during the construction phase (Table 5.4-4).

**Table 5.4-1 Wildlife Monitoring: Direct Habitat Loss**

<b>Indicator</b>	All species
<b>Monitoring category</b>	Surveillance
<b>Design type</b>	Footprint survey
<b>Measurable parameter</b>	Project footprint
<b>Key project interactions</b>	Direct habitat loss within the footprint of the Project (either temporary or permanent)
<b>Objective</b>	Quantify direct habitat loss in the Project footprint
<b>Threshold</b>	Habitat loss limited to the amount identified in the Project description
<b>Scope of monitoring work</b>	<u>Local monitoring</u> : Measure area of Project disturbance on an annual basis using a GPS and GIS
<b>Agency/partner participation</b>	None required
<b>Project terms and conditions</b>	TBD

**Table 5.4-2 Wildlife Monitoring: Incidental Observations**

<b>Indicator</b>	All species
<b>Monitoring category</b>	Surveillance
<b>Design type</b>	Opportunistic
<b>Measurable parameter</b>	Wildlife presence in the Project area
<b>Key project interactions</b>	Wildlife using habitat adjacent to or within Project infrastructure
<b>Objective</b>	Track wildlife observations within and adjacent to the Project footprint
<b>Threshold</b>	None
<b>Scope of monitoring work</b>	<u>Local monitoring</u> : Log of wildlife observations within the RSA
<b>Agency/partner participation</b>	None required
<b>Project terms and conditions</b>	TBD

**Table 5.4-3 Wildlife Monitoring: Project-Related Mortality**

<b>Indicator</b>	All species
<b>Monitoring category</b>	Surveillance
<b>Design type</b>	Opportunistic
<b>Measurable parameter</b>	Wildlife mortality
<b>Key project interactions</b>	Wildlife mortality due to Project activities or infrastructure
<b>Objective</b>	Track Project-related mortality within and adjacent to the Project footprint
<b>Threshold</b>	Project-related caribou or moose mortalities will be reviewed to determine if further action is needed. Other species dealt with on a species-by-species basis.
<b>Scope of monitoring work</b>	<u>Local monitoring</u> : Record of near misses, collisions, and all other observed wildlife mortalities within the RSA
<b>Agency/partner participation</b>	None required
<b>Project terms and conditions</b>	TBD

**Table 5.4-4 Wildlife Monitoring: Sensitive Habitat Features**

<b>Indicator</b>	Habitat features: mineral licks, den sites, wetlands, bat roosts and reused bird nest sites
<b>Monitoring category</b>	Surveillance
<b>Design type</b>	Focussed surveys
<b>Measurable parameter</b>	Use of habitat features within the LSA
<b>Key project interactions</b>	The Project has the potential to affect animal use of habitat features within the LSA
<b>Objective</b>	Document use of habitat features within the LSA
<b>Threshold</b>	None
<b>Scope of monitoring work</b>	<u>Local monitoring</u> : Quantify the use of habitat features that could be affected by the Project within the LSA
<b>Agency/partner participation</b>	None required
<b>Project terms and conditions</b>	TBD

## 5.4.2 Vegetation

Vegetation will be monitored during Project construction, operation, and closure. Monitoring will occur every five years and will focus on invasive species and vegetation health in the vicinity of the Project and at control sites within the RSA for comparison.

Invasive species monitoring will occur within the Project footprint and adjacent habitats to ensure that no invasive species are introduced to the environment by the Project. Surveys for invasive plants will be conducted every five years, and additional surveys may be triggered by observations of plant invasive species. If any invasive species are found, these will be destroyed and, if the pathway of entry can be determined, changes will be made to reduce the possibility of further introduction of invasive species. See Table 5.4-5 and the Invasive Species Management Plan (Appendix A.22D) for more details on invasive species monitoring.

Vegetation health monitoring will be conducted through permanent monitoring plots in a variety of habitat types (minimum two plots per habitat type) near Project infrastructure and in control areas within the RSA. Plots in the vicinity of the Project infrastructure will be situated at varying distances from infrastructure to determine the extent of air quality impacts (the exact distance will be determined by the air quality monitoring program). Within each of the plots, species composition will be documented, and the percent cover of each species will be estimated.

Lichen and willow samples will be collected adjacent to the plots and sent to accredited laboratories for chemical analysis (Table 5.4-6).

**Table 5.4-5 Vegetation Monitoring: Invasive Species**

<b>Indicator</b>	Plant invasive species
<b>Monitoring category</b>	Surveillance
<b>Design type</b>	Footprint and adjacent habitat surveys
<b>Measurable parameter</b>	Occurrence of plant invasive species
<b>Key project interactions</b>	Introduction of plant invasive species (unnatural forage)
<b>Goal</b>	The Project will not introduce invasive plant species to the RSA
<b>Objective</b>	To quantify the occurrence of plant invasive species
<b>Threshold</b>	No introduction of plant invasive species as a result of Project activities
<b>Scope of monitoring work</b>	<u>Local monitoring</u> : Surveillance of Project footprint and adjacent habitat, at minimum, surveys to be conducted every 5 years or triggered by observations of plant invasive species
<b>Agency/partner participation</b>	None required
<b>Project terms and conditions</b>	TBD

**Table 5.4-6 Vegetation Monitoring: Vegetation Health**

<b>Indicator</b>	Vegetation Health
<b>Monitoring category</b>	Surveillance and Monitoring
<b>Design type</b>	Before-After-Control-Impact (BACI)
<b>Measurable parameter</b>	Vegetation class composition, biomass, and contaminant levels in lichen and willows
<b>Key project interactions</b>	Effluent, dust, and air emissions released into the environment have the potential to impact vegetation health. Dust and other contaminants may affect the survival of plant species (leading to changes in plant composition and biomass) and if contaminants are absorbed by plants then they may be ingested by wildlife or humans, which may have an effect on the health of individuals.
<b>Goal</b>	The Project will have a not significant effect on metal uptake in vegetation
<b>Objective</b>	Quantify through continued monitoring throughout the duration of the Project: - metals levels in lichen (caribou forage) - metals levels in willow (moose forage)
<b>Threshold</b>	Project activities resulting in >10% change in vegetation accumulation of contaminants in lichen and willow beyond acceptable threshold levels for wildlife and human health
<b>Scope of monitoring work</b>	<u>Regional monitoring</u> : Assess baseline vegetation class composition and contaminant levels in lichen and willow and re-assess every 5 years. Air quality monitoring program led by CMC.
<b>Agency/partner participation</b>	None required
<b>Project terms and conditions</b>	TBD

### 5.4.3 Birds

One monitoring program for birds will be implemented by CMC over the course of the construction, operation, closure, and post-closure phases to increase the available baseline data, to detect possible changes to cliff-



nesting raptors in the RSA, to assess the magnitude of these changes, and to determine whether these changes are naturally occurring variations or Project-related impacts.

Monitoring of cliff-nesting raptors (peregrine falcon, gyrfalcon, and golden eagle) will occur on an annual basis within the RSA to quantify occupancy and ensure that the Project is having a not significant effect on cliff-nesting raptors. This may involve up to four aerial surveys annually — one early in the nesting period, and one just before fledging for each species, and one for each of occupancy and productivity. Survey results for nests in close proximity to the PDA will be compared with results from other portions of the RSA and with baseline findings to determine whether the Project is affecting cliff-nesting species (Table 5.4-7).

**Table 5.4-7 Cliff-nesting Raptors: Occupancy and Productivity**

<b>Indicator</b>	Cliff-nesting raptors
<b>Monitoring category</b>	Baseline Research and Surveillance
<b>Design type</b>	Baseline research; Before-After-Control-Impact (BACI)
<b>Measurable parameter</b>	Occupancy and productivity
<b>Key project interactions</b>	Sensory disturbances generated from various Project activities
<b>Goal</b>	The Project will have a not significant effect on cliff-nesting raptor occupancy and productivity
<b>Objective</b>	To quantify cliff nesting raptor occupancy and productivity within the RSA
<b>Threshold</b>	Less than a 10% difference in near-site and far-site occupancy and productivity averaged over three consecutive years
<b>Scope of monitoring work</b>	<u>Local monitoring</u> : Annual territory surveys to determine occupancy and productivity of cliff-nesting raptors (total of four surveys – early and late season occupancy and early and late season productivity).
<b>Agency/partner participation</b>	<u>Local monitoring</u> : CMC, YG Environment
<b>Project terms and conditions</b>	TBD

#### 5.4.4 Caribou

The Project interacts with the Klaza and Forty-mile caribou herds, and most importantly with late-winter habitat for the Klaza herd, and may present an increased risk of mortality (direct and indirect), and facilities may act as a barrier or filter to caribou movement. Project-related mortality on caribou will be tracked along with other wildlife species as part of the general wildlife monitoring (Table 5.4-3).

Monitoring of caribou habitat use will involve two monitoring objectives: the first assessing indirect habitat loss (resulting from sensory disturbances) and the second looking at caribou distribution within the RSA. Monitoring of both indirect habitat loss and habitat use during the late-winter season will occur at the local level by tracking incidental observations of caribou by Project employees, and at the regional level through aerial surveys. Long-term distribution patterns will also be identified by a YG-sponsored caribou satellite collaring program(s), but collared caribou do not represent the distribution of the entire Klaza caribou herd. Table 5.4-8 provides further details on the monitoring of indirect habitat loss and habitat use during the late-winter season. Monitoring will focus on aerial surveys during construction and initial years of operation to document occurrence, while local monitoring will continue throughout the life of the Project. Collar data from the YG-sponsored caribou satellite collaring program will inform regional late-winter distribution patterns. Additionally, periodic consultation will be conducted with local RRCs to provide information on the relative abundance of caribou in and around the RSA.

**Table 5.4-8 Caribou Monitoring: Indirect Habitat Loss and Habitat Use During Late-Winter**

<b>Indicator</b>	Caribou
<b>Monitoring category</b>	Baseline Research, Monitoring, and Surveillance
<b>Design type</b>	Observational (aerial surveys) and opportunistic
<b>Measurable parameter</b>	Distribution within RSA and late-winter habitat use
<b>Key project interactions</b>	Indirect habitat loss from Project activities that create sensory disturbances and/or temporarily reduce the effectiveness (usefulness) of habitats adjacent to the Project footprint, resulting in changed distribution.
<b>Goal</b>	The Project will have a not significant effect on distribution of caribou in the late winter (caribou use of late winter habitat was observed in baseline studies)
<b>Objective</b>	Evaluate trends in moose distribution in the ZOI and within late-winter habitat
<b>Threshold</b>	Caribou occurrence within the ZOI equivalent to the prediction made in the Project impact assessment
<b>Scope of monitoring work</b>	<p><u>Local monitoring</u>: Continuous log of caribou observations from CMC personnel to document occurrence near Project facilities.</p> <p><u>Regional monitoring</u>: An annual aerial survey within a 10 km radius of Project infrastructure (as per 2013 late-winter survey; Figure 4.1, Appendix 12-A) will be implemented to document relative abundance and distribution of caribou relative to Project infrastructure. These surveys will be conducted during the first 3–5 years of road operation. Long-term distribution patterns as identified by a YG-sponsored caribou satellite collaring program. Collar data will inform regional late-winter habitat distribution.</p>
<b>Agency/partner participation</b>	<u>Local monitoring</u> : CMC, RRCs; <u>Regional monitoring</u> : CMC, YG Environment
<b>Project terms and conditions</b>	TBD

Additionally, caribou monitoring will include a program looking at Project effects on caribou movement within the Zone of Influence (ZOI). Specifically, the program will monitor the effects of road infrastructure and operations on caribou movements through seasonal track surveys for the first 3–5 years of operation in key late-winter habitat, and remote motion-sensing cameras set up at select trails that cross or approach the road. If deemed necessary, additional monitoring of caribou movements could involve having wildlife monitors visit sections of the road that interact with caribou late-winter habitat on a regular basis (e.g., twice weekly) to document recent use (to determine if caribou are crossing the transportation infrastructure), and/or having wildlife monitors drive Project roads once a month to count the number of caribou in the area.

**Table 5.4-9 Caribou Monitoring: Movement**

<b>Indicator</b>	Caribou
<b>Monitoring category</b>	Baseline research and Surveillance
<b>Design type</b>	Observational
<b>Measurable parameter</b>	Movement in the ZOI
<b>Key project interactions</b>	Freegold Road structure and operations may be a filter of or barrier to movement of caribou through the RSA
<b>Goal</b>	The Project will have a not significant effect on caribou movements across Project infrastructure
<b>Objective</b>	Evaluate movement patterns of caribou as they approach or cross the road and other Project infrastructure
<b>Threshold</b>	Less than 10% deflection of approaches to road and infrastructure
<b>Scope of monitoring work</b>	<p><u>Local monitoring</u>: Seasonal caribou track surveys in key movement areas where existing trails were detected within the ZOI. These can be ground-based (snow machine) to observe movement during late winter. These surveys will be conducted during the first 3–5 years of road operation. Trail monitoring using remote motion-sensing cameras and documenting fresh tracks at select trails that cross or approach the road.</p> <p><u>Regional monitoring</u>: Long-term movement patterns as identified by a YG-sponsored caribou satellite collaring program. This is a longer-term approach that requires analyses at a regional scale. These analyses are expected to be conducted by YG Environment.</p>
<b>Agency/partner participation</b>	<u>Local monitoring</u> : CMC; <u>Regional monitoring</u> : YG Environment
<b>Project terms and conditions</b>	TBD

#### 5.4.5 Moose

The Project interacts with moose, most importantly with late-winter habitat, and may result in an increased risk of mortality (direct and indirect), and facilities may act as a barrier or filter to moose movement. Project-related mortality on moose will be tracked along with other wildlife species as part of the general wildlife monitoring (Table 5.4-3).

Monitoring of moose habitat use will involve two monitoring objectives: the first assessing indirect habitat loss (resulting from sensory disturbances) and the second looking at moose distribution within the RSA. Monitoring of both indirect habitat loss and habitat use during the late-winter season will occur at the local level by tracking incidental observations of moose by Project employees, and at the regional level through aerial surveys. See Table 5.4-10 for further details on the monitoring of indirect habitat loss and habitat use during the late-winter season. Monitoring will focus on aerial surveys during construction and initial years of operation to document occurrence, while local monitoring will continue throughout the life of the Project. Additionally, periodic consultation will be conducted with local RRCs to provide information on the relative abundance of moose in and around the RSA.

**Table 5.4-10 Moose Monitoring: Indirect Habitat Loss and Habitat Use During Late-Winter**

<b>Indicator</b>	Moose
<b>Monitoring category</b>	Baseline Research, Monitoring, and Surveillance
<b>Design type</b>	Observational (aerial surveys) and opportunistic
<b>Measurable parameter</b>	Distribution within RSA and late-winter habitat use
<b>Key project interactions</b>	Indirect habitat loss from Project activities that create sensory disturbances and/or temporarily reduce the effectiveness (usefulness) of habitats adjacent to the Project footprint, resulting in changed distribution.
<b>Goal</b>	The Project will have a not significant effect on distribution of moose in the late winter (Moose to use late winter habitat as was observed in baseline studies)
<b>Objective</b>	Evaluate trends in moose distribution in the ZOI and within late-winter habitat
<b>Threshold</b>	Moose occurrence within the ZOI equivalent to the prediction made in the Project impact assessment (50% fewer within 300 m of PDA)
<b>Scope of monitoring work</b>	<u>Local monitoring</u> : Continuous log of moose observations from CMC personnel to document occurrence near Project facilities. <u>Regional monitoring</u> : An annual aerial survey within a 10 km radius of Project infrastructure (as per 2013 late-winter survey, including near the mineral licks; Figure 4.1, Appendix 12-A) will be implemented to document relative abundance and distribution of moose relative to Project infrastructure. These surveys will be conducted during the first 3–5 years of road operation.
<b>Agency/partner participation</b>	<u>Local monitoring</u> : CMC personnel, RRCs <u>Regional monitoring</u> : CMC, YG Environment
<b>Project terms and conditions</b>	TBD

**Table 5.4-11 Moose Monitoring: Movement**

<b>Indicator</b>	Moose
<b>Monitoring category</b>	Baseline research and Surveillance
<b>Design type</b>	Observational
<b>Measurable parameter</b>	Movement in the ZOI
<b>Key project interactions</b>	Freegold Road structure and operations may be a filter of or barrier to moose movement through the Regional Study Area
<b>Goal</b>	The Project will have a not significant effect on moose movements across Project infrastructure
<b>Objective</b>	Evaluate movement patterns of moose as they approach or cross the road and other Project infrastructure
<b>Threshold</b>	Less than 10% deflection of approaches to road and infrastructure
<b>Scope of monitoring work</b>	<u>Local monitoring</u> : Seasonal moose track surveys in key movement areas where existing trails were detected within the ZOI. These can be ground-based (snow machine) to observe movement during late winter. These surveys will be conducted during the first 3–5 years of road operation. Trail monitoring using remote motion-sensing cameras and documenting fresh tracks at select trails that cross or approach the road.
<b>Agency/partner participation</b>	<u>Local monitoring</u> : CMC
<b>Project terms and conditions</b>	TBD

## 5.4.6 Den Sites

Dens are sensitive features that warrant monitoring. Although bears only re-use dens occasionally, they more often re-use denning areas. Wolves are known to re-use dens and denning areas for generations. Wolverine natal dens may get used during subsequent years, or may occur in similar areas. Consequently, monitoring efforts will aim to identify and maintain these areas throughout the life of the Project.

**Table 5.4-12 Den Monitoring: Habitat and Use**

<b>Indicator</b>	Grizzly bear, black bear, wolverine, and wolves
<b>Monitoring category</b>	Baseline research and Surveillance
<b>Design type</b>	Observational (aerial surveys) and opportunistic
<b>Measurable parameter</b>	Dens within 5 km of PDA
<b>Key project interactions</b>	Project footprint in known denning habitats
<b>Goal</b>	The Project will have a not significant effect on den sites
<b>Objective</b>	Allow carnivores to den undisturbed within the RSA
<b>Threshold</b>	Not a quantifiable threshold
<b>Scope of monitoring work</b>	<u>Local monitoring</u> : Aerial surveys within first 3-5 years of operation, of known den sites within a 5 km radius of the PDA, opportunistic documentation of other den sites. <u>Regional monitoring</u> : Maintain/add to long-term regional den site database in cooperation with YG Environment and support any regional programs targeting bears or wolves.
<b>Agency/partner participation</b>	<u>Local monitoring</u> : CMC, RRCs, YG Environment; <u>Regional monitoring</u> : YG Environment
<b>Project terms and conditions</b>	TBD

## 5.4.7 Collared Pika

Collared pika are present within the Project area — primarily located near the mine site in alpine felseneer habitats. The Project interacts with suitable pika habitat near the proposed mine site. Monitoring of pika will involve one monitoring objective: to assess pika presence within 1 km of the PDA. Monitoring will occur at the local level by conducting presence/ not detected surveys for the first 3–5 years of operation.

**Table 5.4-13 Collared Pika Monitoring: Presence**

<b>Indicator</b>	Collared pika
<b>Monitoring category</b>	Baseline Research and Surveillance
<b>Design type</b>	Observational (ground-based surveys) and opportunistic
<b>Measurable parameter</b>	Pika presence within 1 km of PDA
<b>Key project interactions</b>	Project footprint in suitable pika habitats
<b>Goal</b>	The Project will have a not significant effect on pika presence
<b>Objective</b>	Allow pika to use suitable habitat undisturbed
<b>Threshold</b>	Not a quantifiable threshold
<b>Scope of monitoring work</b>	<u>Local monitoring</u> : Ground-based surveys within first 3-5 years of operation, of suitable habitat within a 1 km radius of the PDA, opportunistic documentation of other sightings.
<b>Agency/partner participation</b>	<u>Local monitoring</u> : CMC
<b>Project terms and conditions</b>	TBD

## 6 - WILDLIFE RESEARCH SUPPORT

CMC recognizes that there are information and knowledge gaps about wildlife, vegetation, habitat, and industrial disturbance that are not addressed by the Project-specific mitigation actions and monitoring program identified in this document. There may be broader wildlife and terrestrial environmental science needs to help improve mining mitigation, First Nations knowledge, or general regional knowledge gaps. Although the information may not be specific to the Casino Project, CMC recognizes the need to develop partnerships to improve regional ecological knowledge that will help to improve understanding and future decision making.

## 7 - REFERENCES

- Dunne, B.M. and M.S. Quinn. 2009. Effectiveness of above-ground pipeline mitigation for moose (*Alces alces*) and other large mammals. *Biological Conservation* 142:332–343.
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