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A.12 – WILDLIFE

A.12.1 INTRODUCTION

Wildlife are defined as terrestrial mammals and birds. The Project will interact with wildlife through potential effects to individuals, populations and their habitats. Wildlife are important because of their value to local people who rely on wildlife as a subsistence and economic resource, and for their intrinsic value as a symbol of wilderness and a healthy ecosystem. Potential effects of the Project on wildlife are primarily: loss of available habitat due to the Project footprint; reduced habitat effectiveness from sensory disturbance; and mortality due to collisions with vehicles, problem animal kills and increased hunter access.

Effects to wildlife were assessed in Section 12 of the Project Proposal, the assessment focused on Project effects related to wildlife populations and habitat that have a reasonable likelihood of occurring. The assessment of the Project's potential effects focussed on a number of wildlife Key Indicators (KIs), including the Klaza caribou herd, moose, grizzly bear, collared pika, cliff-nesting raptors, bird species at risk, and waterfowl. When Project effects could not be completely mitigated, potential residual effects were described and the potential for cumulative effects considered.

On January 27, 2015, the Executive Committee requested that Casino Mining Corporation (CMC) provide supplementary information to the proposed Casino Project (YESAB Project No. 2014-0002) to enable the Executive Committee to commence Screening. The Executive Committee considered comments from various First Nations, Decision Bodies and regulators on the adequacy of the Project Proposal in the preparation of the Adequacy Review Report (ARR). Casino Mining Corporation is providing this Supplementary Information Report (SIR) to comply with the Executive Committee's ARR; CMC anticipates that the information in the SIR and Proposal, when considered together, is adequate to commence Screening.

The Executive Committee has 61 requests related to information presented in Section 12 (Wildlife) of the Project Proposal submitted on January 3, 2014. These requests are outlined in Table A.12.1-1. Some responses require detailed technical information, data, and figures, and may be provided in Appendices outlined in Table A.12.1-1.

The Wildlife Management and Mitigation Plan has been updated from that submitted in the Proposal (Appendix 23A) based on comments received from reviewers in the adequacy review process, and the updated plan is provided in Appendix A.12A. The WMMP provided herein is a preliminary plan, and will be updated in conjunction with the Wildlife Working Group, and as required under the *Quartz Mining Act* and *Waters Act*.

Table A.12.1-1 Requests for Supplementary Information Related to Wildlife

Request #	Request for Supplementary Information	Response Section
R314	The correct references for each place in Section 12 that this error text appears.	Section A.12.2.1.1
R315	Discussion on the effects to wildlife for caribou, wood bison, and Dall sheep, related to predator-prey systems affected by the Freegold Road, airstrip and airstrip access road, through all project phases. This discussion should: a. use the most current data and information available; b. include changes to population dynamics; and c. include areas of wildlife concentration, such as mineral licks.	Section A.12.3.1.1 Appendix A.12A Wildlife Mitigation and Monitoring Plan
R316	Describe how wildlife crossing areas will be implemented. Details should include: a. the schedule and methods for data collection and analysis	Section A.12.3.2.1

Request #	Request for Supplementary Information	Response Section
	regarding the determination of high use wildlife crossing areas along the access roads; and b. how crossing areas may change seasonally and annually.	Appendix A.12A Wildlife Mitigation and Monitoring Plan
R317	Detail on road maintenance activities (e.g. road salt, road margin vegetation management for wildlife, etc.), and other mitigations (such as reducing the frequency of traffic, having periods of time with no traffic, etc.), with a particular emphasis on key wildlife areas. This discussion should include rationale for the effectiveness of mitigations.	Section A.12.3.3.1 Appendix A.22E Road Use Plan Appendix A.12A Wildlife Mitigation and Monitoring Plan
R318	Wildlife monitoring and adaptive response strategies.	Section A.12.3.3.2 Appendix A.12A Wildlife Mitigation and Monitoring Plan
R319	Alternative mitigation measures to reduce or eliminate negative effects on wildlife in the event that the Proponent does not have full legal authority to operate and manage the road.	A.12.3.3.3 Appendix A.22E Road Use Plan Appendix A.12A Wildlife Mitigation and Monitoring Plan
R320	Further discussion on the potential indirect effects to wildlife from harvesting.	Section A.12.3.3.4 Appendix A.12B Wildlife Baseline Report
R321	A discussion of noise associated with the Project in relation to the habitat suitability model using the most recent reference materials available. This discussion should include consideration of noise from all Project activities.	Section A.12.4.1.1
R322	A discussion of objectives for evaluating model assumptions for caribou disturbance, monitoring movement and potential changes in predation, and setting adaptive management thresholds to support actions which may mitigate adverse effects.	Section A.12.4.1.2 Appendix A.12A Wildlife Mitigation and Monitoring Plan
R323	A discussion of potential Project effects to the Fortymile caribou herd supported by available data.	Section A.12.4.1.3
R324	Discussion of the development of the RSF model, including all inputs. Consideration should be given to concerns raised by the Government of Yukon.	Section A.12.4.1.4
R325	Discuss how the RSF model: a. reflects the distribution of high quality habitat across the Klaza caribou herd's range; and b. accounts for the variability in caribou distribution based on environmental facts and among years.	Section A.12.4.1.5
R326	Discussion of the potential bias in the estimated winter range.	Section A.12.4.1.6

Request #	Request for Supplementary Information	Response Section
		Appendix A.12B Wildlife Baseline Report
R327	Winter range map or maps that are representative of caribou use since the late 1980s.	Section A.12.4.1.7 Appendix A.12B Wildlife Baseline Report
R328	An evaluation of the Klaza caribou herd use of the local study area during summer, using the most recent GPS radio-collar data provided by the Government of Yukon.	Section A.12.4.1.8 Appendix A.12B Wildlife Baseline Report
R329	A discussion of how the Project may affect (e.g. fire suppression) the Dawson Range's fire regime and its corresponding implications to caribou and caribou habitat.	Section A.12.4.1.9
R330	Population survey data and demographic models for moose to determine sensitivity to change from potential additional predation or hunting pressure.	Section A.12.4.2.1
R331	Moose harvest data by sex, including an estimate of First Nations harvest, as well as a population model and sensitivity analysis.	Section A.12.4.2.2 Appendix A.12B Wildlife Baseline Report
R332	Mitigation measures for displacement/mortality of moose near roads.	Section A.12.4.2.3 Appendix A.12A Wildlife Mitigation and Monitoring Plan
R333	Detailed design of the pipeline with rationale. If a final design cannot be selected at this stage, please provide detailed design alternatives, and include the potential effects associated with each. In the event that design has not been finalized, please provide the schedule and methods for moose monitoring efforts to inform development of the pipeline.	Section A.12.4.2.4 Appendix A.12A Wildlife Mitigation and Monitoring Plan Appendix A.12B Wildlife Baseline Report
R334	A discussion of and rationale for the selected model. This discussion should include: a. rationale for the ratings assigned to the subalpine and low boreal zones, as well as the selection of north-facing slopes, which considers the comments made by the Government of Yukon; and b. an explanation of Figure 4.3 in the Wildlife Baseline Report showing habitat quality class, which includes statistical support for each of the bars.	Section A.12.4.2.5 Appendix A.12C Moose Late Winter Habitat Suitability Report
R335	A discussion of and rationale for a 300 m zone of influence. This discussion should consider increasing the zone to at least 500 m.	Section A.12.4.2.6 Appendix A.12C Moose Late Winter Habitat Suitability Report
R336	Detail on baselines survey efforts, including den surveys, and including routes taken.	Section A.12.4.3.1 Appendix A.12B Wildlife

Request #	Request for Supplementary Information	Response Section
		Baseline Report
R337	Additional data (one year minimum) on bear den presence and distribution within the project area.	Section A.12.4.3.2
R338	Discussion regarding the dates provided by the Government of Yukon for grizzly bear denning and how these dates may affect or be affected by project activities.	Section A.12.4.3.3
R339	Details on the Habitat Suitability and Habitat Effectiveness models, including: a. additional clarification on why habitat types were rated as presented; for example, alpine habitat is rated as 'low' (0) value in the spring. For bears, alpine has high habitat value in spring; b. clarification on traffic projections; c. clarification on the dates used to define the different seasons in the HE model; d. clarification on the coefficients used to develop the HE model; and e. clarification on disturbance events considered in the development of the models.	Section A.12.4.3.4 Appendix A.12B Wildlife Baseline Report
R340	Details on the Security Areas model, including: a. rationale (including reference if possible) for the selection of the 2300 m asl as the threshold for available security areas, as opposed to 1900 m asl; b. clarification on traffic projections; and c. clarification on disturbance events considered in the development of the model.	Section A.12.4.3.5 Appendix A.12B Wildlife Baseline Report
R341	A discussion of and rationale for the use of a qualitative assessment, as opposed to quantitative, for grizzly bear mortality.	Section A.12.4.3.6
R342	Clarification of and rationale for the grizzly bear density estimate for the area.	Section A.12.4.3.7
R343	More information on Table 8.1 of the grizzly bear effects assessment, including: a. proportion of males and females harvested; b. a discussion of how the numbers relate to the population estimate; and c. a discussion of the population-level effects of direct mortality.	Section A.12.4.3.8
R344	A discussion on the mortality estimate from the mine site, Freegold Road, and airstrip and airstrip access road. Discussion should include: a. conflict kills and road kills; b. consideration of high traffic roads vs. low traffic trails and different traffic types; c. assumptions used for mortality risk assessment related to the Freegold Road and mine site; and d. clarification of and rationale for the quota identified for annual allowable human- caused mortality.	Section A.12.4.3.9 Appendix A.12A Wildlife Mitigation and Monitoring Plan
R345	Collared pika colony occupancy data to accurately predict species' current abundance and distribution. If occupancy data is unavailable,	Section A.12.4.4.1 Appendix A.12B Wildlife

Request #	Request for Supplementary Information	Response Section
	proposed methods for collecting such data prior to habitat alteration.	Baseline Report
R346	A habitat suitability model and related analyses, which identifies potential denning habitat of wolverines in the local study area and regional study area.	Section A.12.4.5.1 Appendix A.12B Wildlife Baseline Report
R347	A risk assessment for wolverines which considers the habitat suitability model. The assessment should identify potential effects to natal and maternal den sites and proposed measures for avoiding disturbance of females with kits.	Section A.12.4.5.2 Appendix A.12A Wildlife Mitigation and Monitoring Plan Appendix A.22A Waste and Hazardous Materials Management Plan
R348	Areas of use by the little brown myotis within the LSA and RSA, particularly for roosting and foraging.	Section A.12.4.6.1 Appendix A.12B Wildlife Baseline Report
R349	If baseline data is unavailable, proposed mitigation and monitoring efforts for the species.	Section A.12.4.6.2 Appendix A.12A Wildlife Mitigation and Monitoring Plan Appendix A.12B Wildlife Baseline Report
R350	Baseline information for Dall sheep or, if unavailable, proposed mitigation and monitoring measures, particularly in relation to the Freegold Road.	Section A.12.4.7.1 Appendix A.12B Wildlife Baseline Report
R351	Discussion of alpine breeders as key indicator species, which considers their associated priority for conservation and the project's potential effects on this group.	Section A.12.5.1.1
R352	The location of alpine meadows in the local study area and regional study area.	Section A.12.5.1.2
R353	The results of baseline surveys for short-eared owl, horned grebe, and common nighthawk pre-construction surveys (i.e. dusk call playback surveys) and a description of plans for mitigation and monitoring of potential adverse effects cause by the Project.	Section A.12.5.2.1
R354	Additional detail on the mortality risk to birds including identifying areas of highest risk.	Section A.12.5.3.1 Appendix A.12A Wildlife Mitigation and Monitoring Plan
R355	Details on the rusty blackbird model. Details should include model inputs and assumptions and indicate whether and how it accounts for small wetlands.	Section A.12.5.4.1

Request #	Request for Supplementary Information	Response Section
R356	Discussion regarding the models for olive-sided flycatcher and short-eared owl, including categorization of high quality habitat types. Consideration should be given to an expanded model for the short-eared owl and olive-sided flycatcher.	Section A.12.5.4.2
R357	A map showing observation sites and potential breeding locations for horned grebes within the project footprint.	Section A.12.5.4.3
R358	Rationale behind decreasing habitat quality ratings one class, as opposed to two in some cases.	Section A.12.5.5.1
R359	Proposed mitigations for effects of chronic noise on bird species.	Section A.12.5.5.2
R360	Discussion of and rationale for buffer sizes around active bird nests.	Section A.12.5.5.3 Appendix A.12A Wildlife Mitigation and Monitoring Plan
R361	Confirmation on whether the cliff-nesting raptor survey involved re-visiting previously documented nests.	Section A.12.5.6.1
R362	A figure showing the aerial route followed during cliff-nesting raptor surveys within the local study area and regional study area.	Section A.12.5.6.2
R363	Rationale for the size of the proposed buffers around cliff-nesting raptor nests.	Section A.12.5.7.1 Appendix A.12A Wildlife Mitigation and Monitoring Plan
R364	Methods used to identify wetlands, including open-water wetlands and small ponds.	Section A.12.5.8.1
R365	Information displaying the locations of these wetlands and ponds, and their distribution across the LSA.	Section A.12.5.8.2
R366	Discussion of potential effects to these wetlands and ponds, and any associated mitigations.	Section A.12.5.8.3 Appendix A.12A Wildlife Mitigation and Monitoring Plan
R367	An effects assessment of the TMF wetlands, as they relate to waterfowl.	Section A.12.5.9.1 Appendix A.12A Wildlife Mitigation and Monitoring Plan
R368	Monitoring and mitigations to prevent waterfowl from utilizing the TMF wetlands and other mine water bodies (events pond, pit lake, etc.). Details should include effectiveness of proposed mitigations.	Section A.12.5.9.2 Appendix A.12A Wildlife Mitigation and Monitoring Plan
R369	Clarification on the meanings of “unacceptable levels of trace metals” and “limited effects” in relation to waterfowl, and rationale for the statement that despite unacceptable levels of trace metals shown by	Section A.12.5.9.3

Request #	Request for Supplementary Information	Response Section
	water quality monitoring, resulting effects to waterfowl will be limited.	
R370	Rationale for how water quality mitigation measures alone will address concerns around waterfowl exposure to elevated levels of trace metals.	Section A.12.5.9.4 Appendix A.12A Wildlife Mitigation and Monitoring Plan Appendix A.7B Water Quality Model Report
R371	Clarification as to whether Figure 8.2 in Section 12B refers to only passerine bird species or to upland birds in general.	Section A.12.5.10.1
R372	The potential effects of climate change on key indicator species over the life of the Project.	Section A.12.6.1.1
R373	Discussion of monitoring and adaptive management measures to be implemented to detect and mitigate potential effects of the Project in the context of climate change.	Section A.12.6.1.2 Appendix A.12A Wildlife Mitigation and Monitoring Plan
R374	Details on the timing, spatial boundaries, frequency, and general methods of monitoring surveys for caribou, moose, carnivore dens, pika colonies, obligate alpine breeders, waterfowl, and bird species at risk.	Section A.12.7.1.1 Appendix A.12A Wildlife Mitigation and Monitoring Plan

Notes:

1. Request # refers to the assigned identification number in the YESAB Adequacy Review Report January 27, 2015 Prepared by Executive Committee Yukon Environmental and Socio-economic Assessment Board
2. Response refers to the location of CMC's response to the YESAB request for supplementary information.

A.12.2 REFERENCES

A.12.2.1.1 R314

R314. The correct references for each place in Section 12 that this error text appears.

The error references can be replaced as follows:

- Pages 12-3, 12-6 and 12-53: replace error references with the text "Wildlife Baseline Report".
- Page 12-20: replace error references with the text "Appendix 23A".
- Pages 12-23, 12-26 and 12-27: replace error references with the text "Appendix 12A".
- Page 12-56: replace error references with the text "Wildlife Mitigation and Monitoring Plan".
- Also, references to Appendix 12C should refer to Appendix 23A (Wildlife Mitigation and Monitoring Plan). Note that the Appendix 23A has been updated by Appendix A.12A.

A.12.3 FREEGOLD ROAD AND OTHER ACCESS ROADS

A.12.3.1 Population Dynamics

A.12.3.1.1 R315

R315. Discussion on the effects to wildlife for caribou, wood bison, and Dall sheep, related to predator-prey systems affected by the Freegold Road, airstrip and airstrip access road, through all project phases. This discussion should:

- a. use the most current data and information available;**
- b. include changes to population dynamics; and**
- c. include areas of wildlife concentration, such as mineral licks.**

As noted in the Proposal (Appendix 12A Wildlife Baseline Report), and summarized in Table 12.1-2 (Species Known or Likely to Occur in the Project Area, but not Included as Key Indicators), the Project will not interact with Dall's sheep or wood bison populations. As such, there is no issue of potential increased predation or mortality on wood bison and Dall's sheep related to the Freegold Road extension.

Dall's sheep occur in alpine habitats within the RSA, but the PDA does not lie within any known sheep range. A potential interaction with sheep may be the increase in aircraft flying into the Mine Site. Sheep respond to aircraft noise by being vigilant, resulting in less time spent foraging and resting (Laberge Environmental Services 2002). To mitigate this potential effect, CMC will adopt the guidelines outlined in Flying in Sheep Country: How to Minimize Disturbance from Aircraft (Laberge Environmental Services 2002). Habitat loss, both direct and indirect, for sheep in the RSA will likely not occur as a result of the Project. There are no mechanisms for direct Project-related sheep mortality. If effects to sheep in the region are detected (by way of regional, government-led surveys and/or Project footprint monitoring), Project effects to sheep will be re-evaluated and adaptive management measures may be implemented if deemed necessary.

Caribou populations may experience higher predation rates indirectly from human disturbance via two mechanisms:

1. Landscape changes increase suitable habitat and the density of alternate prey species for local predators, which result in larger predator populations and, consequently, increased predation on caribou.
2. Predators, primarily wolves (Apps et al. 2013), use linear features (roads and trails) as corridors for foraging, resulting in higher caribou mortality closer to linear features.

The Project is not expected to increase numbers of alternate prey (moose and deer) as the project is not causing landscape level changes to habitat in the area. There will be changes to functional habitat due to sensory disturbance within a zone of influence, but limited physical changes to habitat that would cause an increase in the number of alternate prey. Forestry and agriculture are examples of industries that likely result in landscape-level changes that can cause increases in alternate prey population densities that could result in increased predator abundance.

Indirect mortality risk to caribou through increased predator-prey interaction was not considered in the mortality effects assessment. There is no known technique of quantifying the Project's effects on predator-prey dynamics and there is no strong evidence suggesting that the Project will have an effect on wolf access to caribou or moose in this area.

Some evaluation of predator-prey dynamics indicates that the upgrade to the existing Freegold Road and extension of the road would allow wolves to use roads and trails to travel more easily, increasing their foraging success and, consequently, increasing prey species mortality along a road. The advantage for wolves is primarily

realized in winter when the roads and trails provide easier movement because of packed snow or snow removal. However, there is currently a winter road along most of the proposed Freegold Road extension that is actively used from Big Creek to the confluence of Hayes Creek and Selwyn River. The existing winter use of the extension portion of the road includes travel to placer mines using snowmobiles and heavy equipment to mobilize equipment and deliver supplies for use during the mining season; the activities occur primarily during March or April when snow depth is greatest, as conditions of the required land use permits. The Wildlife Baseline Report (Appendix A.12B) describes wolves currently using the entire length of the existing Freegold Road and winter road to travel. The portion of the proposed road from the Selwyn River to the Mine Site is the only segment of road that is currently not used by humans during winter as a travel route. Additionally, the Project area is the northern edge of the Klaza Caribou Herd's range, so the road is unlikely to result in a significant change to wolf predation on the herd.

Monitoring predator access and efficiency is not considered in the Wildlife Mitigation and Monitoring Plan (Appendix A.12A). Should there be interest in this topic from the Wildlife Working Group; the topic may be addressed as multi-party supported research-level monitoring program.

A.12.3.2 Wildlife Crossing Areas

A.12.3.2.1 R316

R316. Describe how wildlife crossing areas will be implemented. Details should include:

- a. the schedule and methods for data collection and analysis regarding the determination of high use wildlife crossing areas along the access roads; and**
- b. how crossing areas may change seasonally and annually.**

Based on the baseline information collected to date, and mitigation and monitoring discussed in the WMMP, no further surveys specific to gathering additional information on wildlife crossing areas is proposed at this time. CMC will address potential barriers to movement through fixed project design features (e.g., road embankment construction considerations) and through measures such as driver awareness training, road signage, and other forms of communication.

Baseline work conducted to determine potential wildlife high-use areas along the road extension were described in the Wildlife Baseline Report. That information was based on observed tracks in snow, and analyses of several years of caribou collar re-location data. Based on the existing information, CMC expects caribou to interact mostly between km 107 to 129 and km 160 to 203 (mine site) of the Freegold Road extension during the winter season. While those sections of the road are expected to be the most active for wildlife encounters, CMC expects that other wildlife will interact with road infrastructure overlapping with seasonal habitats. Furthermore, CMC expects that wildlife populations will change their distribution and abundance within the region during the life of the Project (e.g. the Fortymile Caribou Herd) and CMC is prepared to adaptively manage potential effects on wildlife as they are identified through implementation of the WMMP.

Other than the broad sections of the Freegold Road extension described above, there are no specific spots in the project area known to be consistently used as "wildlife crossings." However, CMC's management of effects on movement to wildlife include mitigation by design of the road embankment, and the WMMP, including the following mitigation measures:

1. The road is designed, along most of the alignment, to avoid introducing barriers (e.g., steep and roughly-constructed embankments) that could block wildlife movement (WMMP Section 4.1.2);

2. Operational practices include communicating observations and providing specific measures to vehicle operations (WMMP Section 4.3.1, Figure 4.3-1);
3. Monitoring will evaluate the accuracy of impact predictions on movement (e.g., WMMP Table 5.4-9 Caribou Monitoring: Movement; Table 5.4-11 Moose Monitoring: Movement); and
4. Should monitoring reveal an unanticipated magnitude of impact, an adaptive management process to correct unanticipated effects is described in the WMMP's Section 2.1 (Adaptive Management and Plan Updates).

The Proposal assessed the effect of the proposed Freegold Road upgrade and extension on caribou movement in Section 12.3.3. Proposal Table 12.3-3 lists caribou herds in Yukon that currently interact with roads, and Proposal Section 12.3.3.2 describes the effect mechanisms and associated management issues of Yukon's existing roads through caribou ranges.

Monitoring and mitigation for wildlife crossings is detailed in the WMMP (Appendix A.12A), and includes minimizing barriers and/or filters to wildlife movement (Section 4.1.2), road operations and access management mitigations (Section 4.3.1) and monitoring 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 items such as 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).

A.12.3.3 Road Management

A.12.3.3.1 R317

R317. Detail on road maintenance activities (e.g. road salt, road margin vegetation management for wildlife, etc.), and other mitigations (such as reducing the frequency of traffic, having periods of time with no traffic, etc.), with a particular emphasis on key wildlife areas. This discussion should include rationale for the effectiveness of mitigations.

Details on road maintenance activities are presented in the Road Use Plan (Appendix A.22E), and mitigations applicable to road maintenance activities include the following:

- CMC recognizes that road salt may be an attractant to wildlife. If salt is used, there is the possibility for increased wildlife interaction with the road, and therefore extra vigilance by operators to avoid wildlife collisions and disturbance may be necessary.
- Vegetation will be managed primarily as a road safety measure with the objective of maintaining clear lines of sight where visibility is limited. Vegetation clearing will be avoided during the migratory bird nesting season.
- The potential effects and mitigation for the estimated traffic volumes and frequency identified in the Proposal were assessed as not significant. Traffic stoppages are advised when wildlife is known to be near the road and at risk of collision (e.g., as per the truck operator guidelines identified WMMP Figure 4.3-1). There are no other wildlife-related reasons for traffic stoppages to mitigate effects.
- The wildlife and bird baseline reports (Appendices 12A, 12B and A.12B) provide more detailed information on important habitats and habitat features for wildlife species in the region.

Mitigation measures as they relate to wildlife and maintenance of access roads are identified and detailed in sections 4.1 and 4.3. of the WMMP (Appendix A.12A). Examples of mitigation measures that will reduce the effect of road maintenance on wildlife include timing vegetation clearing to avoid destroying of bird nests, dust suppression to reduce the zone of influence and snow management to reduce barrier effects. Rationale for mitigation measures are provided in Section 12.3.2 of the Proposal, and species specific mitigation measures are provided in Sections 12.3.2, 12.3.3.4, 12.3.4.4, 12.3.5.4, 12.3.6.4, 12.3.7.4, 12.3.8.4 and 12.3.9.4 of the Proposal.

The monitoring framework explains how the effectiveness of the mitigation measures will be monitored (Section 5.1). For example, 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 items such as 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).

A.12.3.3.2 R318

R318. Wildlife monitoring and adaptive response strategies.

CMC is committed to the wildlife monitoring and adaptive response strategies outlined in the WMMP (Appendix A.12A). Monitoring effects on wildlife must be relevant to the Project and to the possible effects which the Project will have on the environment. The 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).

CMC will finalize the WMMP in conjunction with the proposed Wildlife Working Group, in preparation for submission in the Quartz Mining Licence Application, and will include wildlife monitoring and adaptive response strategies.

A.12.3.3.3 R319

R319. Alternative mitigation measures to reduce or eliminate negative effects on wildlife in the event that the Proponent does not have full legal authority to operate and manage the road.

As detailed in the response to RA18, a detailed Road Use Plan will be the outcome of further discussions with Little Salmon/Carmacks First Nation, Sellkirk First Nation and Yukon Government. CMC expect this to be a

regulatory requirement pursuant to the *Territorial Lands (Yukon) Act* and the Quartz Mining License. The Road Use Plan has been updated and is attached in Appendix A.22E. There are active discussions with Little Salmon Carmacks First Nation to determine an appropriate approach to authorizing use of that First Nation's settlement lands for the purposes of upgrading the existing Freegold Road. Therefore, CMC is confident that it will have full legal authority to operate and manage the proposed Freegold Road extension.

Presuming that wildlife harvest continues to be managed by harvest management authorities, the mitigation measures used to reduce or eliminate negative effects on wildlife are applicable regardless of CMC's full legal authority to operate and manage the road. Management of the access road and implementation of mitigation measures depends on the cooperation of CMC, First Nations and Yukon Government (YG). The legal authority for Casino to operate and manage the road is provided in detail in response to R19 in Section A.4.6.1.7.

CMC's Road Use Plan (Appendix A.22E) will be the primary tool by which the company will implement measures to ensure safety along the Freegold Road Extension. Some of the measures associated with the protection of wildlife identified in the Road Use Plan are components of the WMMP (Appendix A.12A). Both plans include monitoring and reporting requirements that allow adjustments to be made to the plans to ensure achievement of an appropriate level of safety and protection. Both plans have been prepared by CMC in preliminary form. Implementation of the Road Use Plan and WMMP, once finalized in consultation with SFN, LSCFN and YG and subject to YESAB recommendations, will become a commitment of CMC and an enforceable license requirement for the operators of the mine.

Additionally, as described in the WMMP (Section 3.1), a Terrestrial Ecosystem Working Group can be established 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 potential Project impacts 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. This group would be responsible for monitoring the implementation of the Road Use Plan as it relates to possible effects on wildlife, including any monitoring work conducted by the company or other agencies, and making recommendations to the governments on changes to the Road Use Plan as may be required to ensure the shared management objectives are met. Participation on the working group would be determined and agreed by the three governments and would include Casino Mining Corporation.

Other matters related to the use of the road, including access and safety issues, may arise. There likely will be a need for other meetings with different participants. An adaptive management approach to ensuring emerging issues can be addressed effectively is outlined in the Section 2.1 (Adaptive Management and Plan Updates) of the WMMP (Appendix A.12A).

A.12.3.3.4 R320

R320. Further discussion on the potential indirect effects to wildlife from harvesting.

The potential indirect Project effects on wildlife populations due to potential improved harvester access are not unique to the Casino Project. The Project is not expected to change hunting pressure in the region because of current harvest management regulations and the identified mitigation measures. All available moose harvest data were presented in the Wildlife Baseline Report (updated in Appendix A.12B). Four of the seven game management areas (GMAs) that overlap with the Project are currently closed to licensed harvest of moose. The GMAs west of the Selwyn River that interact primarily with the proposed mine site facilities are currently open to licensed hunters. Licensed harvesters will not be able to access the GMAs that are open to hunting from the road extension because the Project includes gating the Freegold Road at Big Creek which will mitigate the potential increased harvest. Access to the open GMAs from the Yukon River or from current airstrips in the area remains unchanged.

Managing the cumulative effect of increased wildlife harvest risk needs to have a multi-party approach that may include CMC, communities, and governments with harvest management responsibilities. CMC will support the Yukon Government Department of Environment and affected First Nations wildlife harvest management initiatives in the Project area but does not have the ability to manage the public's rights to hunt or the actions of other businesses (e.g., outfitting, trapping, mining) operating within the RSA — this responsibility falls to the governments that have legislation allowing them to manage hunting. If there is a conservation concern now or in the future, the Yukon Government and First Nations governments are responsible for harvest management.

A.12.4 EFFECTS ASSESSMENT FOR MAMMALS

A.12.4.1 Caribou

Seasonal range maps for caribou have been revised with new information and using an alternative method that incorporates time into an estimate of use to reduce bias. This information was used to update the caribou section in the updated Wildlife Baseline Report (Appendix A.12B). A full description of revised methods used to define the seasonal ranges is provided in the updated Wildlife Baseline Report (Appendix A.12B).

A.12.4.1.1 R321

R321. A discussion of noise associated with the Project in relation to the habitat suitability model using the most recent reference materials available. This discussion should include consideration of noise from all Project activities.

Noise modelling and potential wildlife displacement was considered in the effects assessment (Section 12 of the Proposal). Noise associated with project activity was considered a disturbance activity that could affect wildlife behaviour and distribution near Project facilities. All project disturbances and potential effects on wildlife were quantified within the various zones of influence used to quantify effects on wildlife. To quantify potential behavioural changes, habitat multipliers, or “downgrading” was applied to habitat within the zone of influence (Proposal Section 12.3.3 Caribou Effects Assessment). Habitats were considered “nil” (i.e., completely avoided) within the project footprint, with varying reduced habitat uses presumed correlated with distance from Project facilities. The justification for the size and response within a zone of influence, partly determined by noise, is provided in Proposal Section 12.3.3.2 (Potential Project Interactions with the Klaza Caribou Herd). All known relevant literature on caribou response to noise was considered in that section. Mitigation measures to reduce noise levels and, consequently, reduce sensory disturbance on wildlife are listed in Proposal Section 9, Table 9.4-4.

A.12.4.1.2 R322

R322. A discussion of objectives for evaluating model assumptions for caribou disturbance, monitoring movement and potential changes in predation, and setting adaptive management thresholds to support actions which may mitigate adverse effects.

The development of the model provided in the Proposal was described in the Baseline Report (Appendix 12A).

A new caribou habitat suitability model has been developed by Yukon Environment (currently in production). The model documentation will describe Klaza caribou winter habitat selection and will discuss the development of Yukon Environment's RSF model, including all inputs, and is being made available. The report can be requested from Yukon Environment, and CMC anticipates the model will provide useful information and objectives for evaluating model assumptions.

Management thresholds and mitigations for caribou disturbance are outlined in the WMMP provided in Appendix A.12A.

A.12.4.1.3 R323

R323. A discussion of potential Project effects to the Fortymile caribou herd supported by available data.

The Fortymile Caribou Herd is a migratory herd that started to reoccupy its winter range in Yukon in 2002. The herd was estimated at approximately 51,675 animals in 2010 (Alaska Department of Fish and Game 2011) and it is expected to grow in number and reoccupy more of its historic range in Yukon. The herd range extended to the area west of the Project during the winter of 2013/2014; an area not previously used since the early to mid-1900s. The herd may return to the area during the winter of 2014/2015 or in future years. It is unknown how the distribution of the Fortymile herd will change in the coming years. The Project occupies none of the Fortymile Caribou Herd's current range. If the herd continues to grow and expand its range, then the herd will likely spatially and temporally overlap with the Project during winters. The Project's interaction with the Fortymile caribou will likely result in a minor loss of winter habitat.

The recovery of the herd has required active management by both wildlife managers in Yukon and Alaska. Early in the recovery effort, people believed that the near extirpation of the Fortymile herd was mostly due to harvest. Long-term monitoring of caribou populations and traditional knowledge suggest that large migratory caribou herds naturally cycle between periods of population highs and lows (Gunn, Russell, and Eamer 2011). The decline of the Fortymile Caribou Herd was likely a normal example of a declining herd, but the additional adverse human caused effects related to the Klondike Gold Rush may have been the reason for the near extirpation of the herd.

CMC will track Fortymile caribou presence in the RSA through communication with Yukon Government Department of Environment (Yukon Environment). CMC will be a stakeholder in the conservation of the Fortymile Caribou Herd's winter habitat if the herd continues to expand its distribution into the Dawson Range. Measures identified in the Proposal for mitigating effects on the Klaza Caribou Herd will also apply to the Fortymile Caribou Herd.

A.12.4.1.4 R324

R324. Discussion of the development of the RSF model, including all inputs. Consideration should be given to concerns raised by the Government of Yukon.

The development of the model provided in the Proposal is described in the Baseline Report (Appendix 12A).

A new caribou habitat suitability model has been developed by Yukon Environment (currently in production). The model documentation will describe Klaza caribou winter habitat selection and will discuss the development of Yukon Environment's RSF model, including all inputs, and is being made available.

A.12.4.1.5 R325

R325. Discuss how the RSF model:

- a. reflects the distribution of high quality habitat across the Klaza caribou herd's range; and
- b. accounts for the variability in caribou distribution based on environmental facts and among years.

These details are provided in the Baseline Report provided in the Proposal (Appendix 12A). CMC presumes that the caribou habitat suitability model by Yukon Environment (currently in production) will address these comments. Upon completion, Yukon Environment has stated that this report will be available.

A.12.4.1.6 R326

R326. Discussion of the potential bias in the estimated winter range.

Seasonal range maps for caribou have been revised with new information and using an alternative method that incorporates time into an estimate of use to reduce bias. That information was used to update the caribou section in the updated Wildlife Baseline Report (Appendix A.12B), and informs an updated analyses of potential project effects on caribou provided in this report. A full description of revised methods used to define the seasonal ranges is provided in the updated Wildlife Baseline Report (Appendix A.12B). The updated Wildlife Baseline Report includes the new data provided by Yukon Environment documenting use of the local study area by the Klaza Caribou Herd in the summer.

A.12.4.1.7 R327

R327. Winter range map or maps that are representative of caribou use since the late 1980s.

Seasonal range maps for caribou have been revised with new information and using an alternative method that incorporates time into an estimate of use to reduce bias. This information has been used to update the caribou section in the updated Wildlife Baseline Report (Appendix A.12B). A full description of revised methods used to define the seasonal ranges is provided in the updated Wildlife Baseline Report (Appendix A.12B). Older data is incompatible with the modern GPS relocations for analyses; however, the older collar data is displayed on maps where appropriate.

A.12.4.1.8 R328

R328. An evaluation of the Klaza caribou herd use of the local study area during summer, using the most recent GPS radio-collar data provided by the Government of Yukon.

Caribou seasonal distribution maps have been updated to include new caribou collar relocations and the comments from the Government of Yukon. A discussion of the results is provided in the updated Wildlife Baseline Report (Appendix A.12B).

A.12.4.1.9 R329

R329. A discussion of how the Project may affect (e.g. fire suppression) the Dawson Range's fire regime and its corresponding implications to caribou and caribou habitat.

Caribou movement and habitat use is subject to stochastic and dynamic processes (e.g., fire) which increase uncertainty when predicting Project effects. Forecasting of these possible effects is complex and does not increase certainty in Project or cumulative effects predictions. Wildland fires will likely occur within the herd's range during the life of the Project. The caribou habitat model indicates that Klaza caribou avoid burned habitat during winter. The recovery of winter habitat and why caribou still use some burned areas remains unclear. The Klaza Caribou Herd's response to wildland fires is currently being studied by a graduate student, partly funded by CMC, and Yukon Environment. Caribou range use is not expected to change at the scale of the herd range (Dalerum et al. 2007), but wildland fires will likely cause a habitat selection response observable at a finer scale.

The Project will not influence the Dawson Range fire regime. CMC assumes the frequency and severity of fires will be within the range of what the area has experienced in the past; however, the likely scenario is that there will be increasingly active wildland fire management in the region if the Project becomes operational. CMC understands that Yukon Environment is conducting fire regime scenario-building for the Klaza caribou range. CMC will consider reasonable scenarios and interaction with Project effects if they are developed and made available for review.

A.12.4.2 Moose

A.12.4.2.1 R330

R330. Population survey data and demographic models for moose to determine sensitivity to change from potential additional predation or hunting pressure.

An analysis of moose population demographics and demographic modelling was not required to assess the effects of the Project on moose. Assessing sensitivity of moose populations to changes from additional predation or hunting pressure is directly related to population and harvest management responsibilities and is not directly relevant to an assessment of Project effects.

A.12.4.2.2 R331

R331. Moose harvest data by sex, including an estimate of First Nations harvest, as well as a population model and sensitivity analysis.

All available moose harvest data are presented in the Wildlife Baseline Report (Appendix A.12B). In Yukon, only male moose are harvested by licensed hunters. First Nation persons are able to harvest moose of both sexes and any age. First Nations harvest is not reported to the Government of Yukon and data are not publicly available; therefore, harvest data are incomplete. Any estimates of First Nations harvest would be conjectures and not defensible; consequently, the uncertainty of any model would be very large, making any model results questionable.

As stated in the response for R330, an analysis of moose population demographics and demographic modelling was not required to assess the effects of the Project on moose. Assessing sensitivity of moose populations to changes in additional predation or hunting pressure is directly related to population and harvest management responsibilities and is not directly relevant to an assessment of Project effects.

A.12.4.2.3 R332

R332. Mitigation measures for displacement/mortality of moose near roads.

Mitigation measures as they relate to wildlife and the access roads are detailed in the WMMP (Appendix A.12A), and includes minimizing barriers and/or filters to wildlife movement (Section 4.1.2), road operations and access

management mitigations (Section 4.3.1) and monitoring Project effects on wildlife movement within the Zone of Influence (ZOI). Mitigation measures to reduce moose mortality and displacement near roads are also listed in the WMMP (Appendix A.12A).

A.12.4.2.4 R333

R333. Detailed design of the pipeline with rationale. If a final design cannot be selected at this stage, please provide detailed design alternatives, and include the potential effects associated with each. In the event that design has not been finalized, please provide the schedule and methods for moose monitoring efforts to inform development of the pipeline.

The design for the fresh water pipeline from the Yukon River to the Casino mine site is still in the preliminary design phase and the Project engineers are working with the biologists to determine appropriate layout/design features to allow for wildlife passage. In general, the pipeline will be an above-ground insulated 36" or 40" diameter pipe that is 17.4 km long. This pipeline will have four or five booster stations. The design capacity of the freshwater collection system will be approximately 3,400 m³/hour.

During the summer of 2014, a wildlife assessment was conducted along the pipeline route documenting wildlife use in the area. The information from that assessment will be used to inform where the pipeline will be buried or raised to allow for wildlife passage. The details of that assessment are found in Section 16 of the Updated Wildlife Baseline Report (Appendix A.12B).

Monitoring action details regarding moose response to the water pipeline may be developed further following final engineering details of the pipeline and the result of the baseline work conducted in 2014. Monitoring will be conducted at the wildlife crossing locations to determine effectiveness. More specific monitoring actions and methods may be identified by the Wildlife Working Group. Sections 4.1.2 and 5.3 of the WMMP contain additional details (Appendix A.12A), including the following commitments:

- 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 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.
- Frequent monitoring of Project facilities to determine whether effects are occurring and if mitigation is adequate. Project components that will be monitored for wildlife effects include the Yukon River water pipeline to determine if it is acting as a barrier to wildlife movement and effectiveness of mitigation actions.

A.12.4.2.5 R334

R334. A discussion of and rationale for the selected model. This discussion should include:

- rationale for the ratings assigned to the subalpine and low boreal zones, as well as the selection of north-facing slopes, which considers the comments made by the Government of Yukon; and**
- an explanation of Figure 4.3 in the Wildlife Baseline Report showing habitat quality class, which includes statistical support for each of the bars.**

The moose winter habitat model has been updated to include new habitat information and the comments from Yukon Government. The updated model is provided in Appendix A.12C.

A.12.4.2.6 R335

R335. A discussion of and rationale for a 300 m zone of influence. This discussion should consider increasing the zone to at least 500 m.

The updated late-winter habitat model for moose has been used to quantify Project effects on moose using a 500 m zone of influence as suggested. The updated model is provided in Appendix A.12C.

A.12.4.3 Grizzly Bear

A.12.4.3.1 R336

R336. Detail on baselines survey efforts, including den surveys, and including routes taken.

Grizzly bear baseline survey effort and data summaries are provided in Section 8 of the Wildlife Baseline Report (Appendix A.12B).

A.12.4.3.2 R337

R337. Additional data (one year minimum) on bear den presence and distribution within the project area.

Three 1-day grizzly bear den surveys were conducted during the spring of 2012. Although these surveys were conducted during the optimal survey period for grizzly bear den emergence surveys (early April to late May), snow conditions (i.e. minimal snow) were not favorable for this type of survey method (Figure A.12.4-1).

The purpose of conducting den emergence surveys is to determine 1) the number of active grizzly bear dens in close proximity to the Project footprint; and 2) areas with suitable denning habitat. To accurately determine the number of active dens, good snow conditions (i.e. adequate snow cover) are required that allow for tracking bears back to the den site. Low snow conditions were again observed by EDI during the spring of 2013 and 2014 (Figure A.12.4-2). The Casino area receives relatively low snowfall, can be highly windswept and south facing slopes melt sooner than other areas. Low snow and wind swept slopes do not allow for accurate documentation of the number of active bear dens within the study area. Typical snow conditions in the area do not allow for den surveys to be conducted using this method (Farnell et al. 1991). No additional den surveys prior to construction are proposed for this reason.



Figure A.12.4-1 Snow conditions during the first grizzly bear den survey (April 20, 2012)



Figure A.12.4-2 Snow conditions typically observed during the early spring (February 24, 2014)

A.12.4.3.3 R338

R338. Discussion regarding the dates provided by the Government of Yukon for grizzly bear denning and how these dates may affect or be affected by project activities.

The denning season reported in Section 12.3.5 is correct, though we acknowledge that there is variation in the denning period. No changes to the effects assessment or WMMP will be required because of an extended denning period.

In support of the above conclusions, the following are excerpts from Yukon Environment's current grizzly bear species profile and COSEWIC's 2012 status report on grizzly bears.

"The denning period varies depending on the regional climate. Yukon bears spend six to seven months in their winter den from October through April. Grizzly Bears in Yellowstone National Park in Wyoming spend only five months in the den." (Yukon Environment n.d.)

"The most notable aspect of Grizzly Bear physiology, in the context of assigning status to the species, is the vulnerability presented by denning (hibernation or dormancy). Although Grizzly Bears in some areas do not den every year ... lack of food and harsh weather compel most bears to 'hibernate' during winter. This is not true hibernation, however, but a form of winter sleep with less metabolic depression and higher body temperature than seen in true hibernators. Duration of denning depends on the class of bear: pregnant females generally enter dens first and emerge last, and adult males usually spend the shortest time in a den The duration of den occupancy is related to latitude, with bears at higher latitudes entering dens earlier and remaining denned longer Grizzly Bears in Banff National Park spend, on average, about 4.5 months each year in dens In the Low Arctic tundra of Nunavut, average duration of den occupancy is 185 days (6.2 months) for males and 199 days (6.6 months) for females In Nunavut, Grizzly Bears hibernate from October or November to April or May; exact timing is weather-dependent Even at high latitudes, Grizzly Bears may be active well into December if weather permits In the far north there may be some recent changes in grizzly hibernation patterns, whereby bears are hibernating later in the year and emerging earlier (.... This may be due to the longer growing seasons experienced in the Arctic in recent years)" (COSEWIC 2012)

A.12.4.3.4 R339

R339. Details on the Habitat Suitability and Habitat Effectiveness models, including:

- a. additional clarification on why habitat types were rated as presented; for example, alpine habitat is rated as 'low' (0) value in the spring. For bears, alpine has high habitat value in spring;
- b. clarification on traffic projections;
- c. clarification on the dates used to define the different seasons in the HE model;
- d. clarification on the coefficients used to develop the HE model; and
- e. clarification on disturbance events considered in the development of the models.

Details on the grizzly bear habitat models are provided in Section 8.3 of the Wildlife Baseline Report (Appendix A.12B). And additional information in response to R339 is provided below.

Part a.

Justification for habitat ratings for each bioclimate zone is provided in Table 8.3 of the Wildlife Baseline Report (Appendix A.12B).

Part b.

In regards to the comments by YG with regards to traffic projections (YOR 2014-0002-252-1), section 12.3.5.2 of the Proposal states that “Traffic projections predict that the during construction phase, the average number of vehicles per day will be between four and 28. During operation, traffic projections estimate approximately 125 vehicles per day”. To clarify, traffic projections represent the number of ‘traffic events’ (i.e. the number of times a vehicle will travel the Freegold Road in one direction, not return trip). The actual number of estimated vehicle events per day is 136, not 125 as stated in the Proposal (i.e. 68 northbound and 68 southbound). More details on the traffic projections are provided in Table 4.3-5 (construction) and Table 4.4-5 (Operation) in the Proposal. The information provided in those tables is loads (i.e. only loaded trucks are counted), not vehicle passes.

Part c.

The dates used to define each season are provided in Section 8.3.1 of the Wildlife Baseline Report (Appendix A.12B).

Part d.

The dates used to define the coefficients used to develop the model are provided in Section 8.3.1 of the Wildlife Baseline Report (Appendix A.12B).

Part e.

Disturbance components of the habitat suitability model are provided in Section 8.3.1 of the Wildlife Baseline Report (Appendix A.12B).

A.12.4.3.5 R340

R340. Details on the Security Areas model, including:

- a. rationale (including reference if possible) for the selection of the 2300 m asl as the threshold for available security areas, as opposed to 1900 m asl;**
- b. clarification on traffic projections; and**
- c. clarification on disturbance events considered in the development of the model.**

Part a.

Methods used for the security areas model followed the methods outlined in Purves and Doering (1998) which used an elevational cut-off of 2,300 m as one of the criterion for defining the grizzly bear security areas. Although not stated in the report, no areas were removed from the security areas model because they were above the elevational cut-off of 2,300 m. The highest peak in the grizzly bear study area is Apex Mountain, at a height of 2,022 m.

Part b.

As discussed above, Section 12.3.5.2 of the Proposal states that “Traffic projections predict that the during construction phase, the average number of vehicles per day will be between four and 28. During operation, traffic projections estimate approximately 125 vehicles per day”. To clarify, traffic projections represent the number of ‘traffic events’ (i.e. the number of times a vehicle will travel the Freegold Road in one direction, not return trip). The actual number of estimated vehicle events per day is 136, not 125 as stated in the Proposal (i.e. 68 northbound and 68 southbound). More details on the traffic projections are provided in Table 4.3-5 (construction) and Table 4.4-5 (Operation) in the Proposal. It is important to note that the information provided in those tables is loads (i.e. only loaded trucks are counted), not vehicle passes.

Part c.

Disturbance events considered in the development of the model are provided in Section 8.3.2 of the Wildlife Baseline Report (Appendix A.12B).

A.12.4.3.6 R341

R341. A discussion of and rationale for the use of a qualitative assessment, as opposed to quantitative, for grizzly bear mortality.

Section 12.1.3.2 of the Project proposal describes the measurable parameters used to assess wildlife. Project effects on direct mortality risk is a qualitative discussion about likely mortality risk in the absence of detailed baseline information on current mortality (outside of licenced harvest) or predictive mortality tools. It is discussed in the context of likely interaction and risk from Project infrastructure and activities. Section 12.3.5.2 (Potential Project Interactions with Grizzly Bear: Mortality Risk) discusses the available information on grizzly bear mortality data. Section 12.3.5.3 (Effects Assessment Methods for Grizzly Bear: Mortality Risk) identifies quantitative thresholds for grizzly bear, and the methods consider the potential for the project to be an additive mortality risk. Given mitigation that CMC will implement to minimize interactions with grizzly bear, the conclusion is that the additive mortality risk will more than likely remain below sustainable harvest limits.

A.12.4.3.7 R342

R342. Clarification of and rationale for the grizzly bear density estimate for the area.

The grizzly bear density estimates for the area were provided by the Yukon Government. The Project lies mostly in the Klondike Plateau Ecoregion, with some sections of the Freegold Road in the Yukon Plateau Central Ecoregion. The Yukon Environment comment (YOR 2014-0002-252-1) states that the "...*density estimate for the area depends on the ecozone*". Both the Klondike Plateau Ecoregion and the Yukon Plateau Central Ecoregion lie within the Boreal Cordillera Ecozone.

A.12.4.3.8 R343

R343. More information on Table 8.1 of the grizzly bear effects assessment, including:

- a. proportion of males and females harvested;**
- b. a discussion of how the numbers relate to the population estimate; and**
- c. a discussion of the population-level effects of direct mortality.**

An analysis of grizzly bear population demographics and demographic modelling is not required to assess the effects of the Project on grizzly bears. Assessing sensitivity of grizzly bear populations to changes in hunting pressure on sex and age cohorts is directly related to population and harvest management responsibilities and is not directly relevant to an assessment of Project effects. As stated in Section 12.3.5.3 (Effects Assessment Methods for Grizzly Bear: Mortality Effects Methods), the harvest statistics are based on hunting restrictions that state that all cubs (bears less than three years old) and females with cubs are protected from hunting. In the last ten years of available harvest data, a total of 11 bears were taken in game management subzones 522–524 and 526 (Wildlife Baseline Report Appendix A.12B).

The grizzly bear effects assessment on mortality risk considers significance at the population level and is discussed in Section 12.3.5.2 of the Proposal (Potential Project Interactions with Grizzly Bear: Mortality Risk).

A.12.4.3.9 R344

- R344. A discussion on the mortality estimate from the mine site, Freegold Road, and airstrip and airstrip access road. Discussion should include:**
- a. conflict kills and road kills;**
 - b. consideration of high traffic roads vs. low traffic trails and different traffic types;**
 - c. assumptions used for mortality risk assessment related to the Freegold Road and mine site; and**
 - d. clarification of and rationale for the quota identified for annual allowable human-caused mortality.**

Part a.

A discussion on conflict kills and road kills was provided in Section 12.3.5.2 of the Proposal (Potential Project Interactions with Grizzly Bear: Mortality risk, pp 12-52). That section states "...*The greatest Project related mortality risk for bears is from human-bear conflicts and vehicle collisions. If bear mortality occurs from Project activities, it will be documented and an investigation will be undertaken to determine the cause of mortality and how it can be prevented in the future... Any industrial development in bear territory has the potential to increase mortality risk of bears, both grizzly and black bear. Mortality can occur as a result of human-bear conflict, from vehicle collisions, and from hunting. The survival of grizzly bears is often limited by human-caused mortality. Mattson and Merrill (2002) and Ross (2002) all suggested that human-caused mortality may be much more likely to cause extirpation than habitat loss. Even when high quality habitat is abundant, populations can still decline if harvest rates, including kills from defense of life or property, road kills and poaching, are cumulatively unsustainable (Merrill and Mattson 2003; Maraj 2007).*" Given mitigation that CMC will implement to minimize interactions with grizzly bear (summarized in the WMMP Appendix A.12A), the conclusion is that the additive mortality risk will more than likely remain below sustainable harvest limits.

Part b.

The effects of the traffic on grizzly bears, using traffic projections for the Freegold Road were considered in the assessment of Project effects on grizzly bear. Speed limits, posted signs at high wildlife crossing areas, and the improved visibility in the design of the Freegold Road will minimize mortality. Speed restrictions and lower traffic volumes on project roads around the mine site, make the potential for collisions with bears low compared to other public roads in the Yukon.

Part c.

Section 12.3.5.2 of the Proposal (Potential Project Interactions with Grizzly Bear: Mortality risk, pp 12-52) discusses project interactions with grizzly bear.

Part d.

The information used for the grizzly bear mortality assessment was the best available at the time. The annual allowable human-caused mortality quota of 6%, as cited in *Thresholds for Addressing Cumulative Effects on Terrestrial and Avian Wildlife in the Yukon* (AXYS 2001), was used throughout the grizzly bear mortality analysis. Yukon Government's suggested allowable mortality rate of 4% does not change the conclusion of 'not significant' on grizzly bear mortality risk.

A.12.4.4 Collared Pika

A.12.4.4.1 R345

R345. Collared pika colony occupancy data to accurately predict species' current abundance and distribution. If occupancy data is unavailable, proposed methods for collecting such data prior to habitat alteration.

Preliminary pika surveys were conducted in 2013 (summarized in the Appendix 12A) and additional surveys using methods consistent with the Government of Yukon monitoring protocol (Kukka et al. 2014) were conducted in 2014. The results of the 2014 surveys are presented in the updated Wildlife Baseline Report (Appendix A.12B).

A.12.4.5 Wolverine

A.12.4.5.1 R346

R346. A habitat suitability model and related analyses, which identifies potential denning habitat of wolverines in the local study area and regional study area.

Wolverine were not selected as key indicators for the Project due to their low density and wide home range movements in the Project area. Only one wolverine was observed during baseline studies although several wolverine tracks were observed along the Freegold Road extension and upgrade. Approximately six wolverines are harvested in trapping concessions that overlap the Project footprint each year. This information and a description of wolverine life history and likely denning characteristics were described in the Wildlife Baseline Report (Appendix A.12B). As wolverine was not included as a key indicator for the effects assessment a habitat suitability map and a map of denning habitat was not produced.

A.12.4.5.2 R347

R347. A risk assessment for wolverines which considers the habitat suitability model. The assessment should identify potential effects to natal and maternal den sites and proposed measures for avoiding disturbance of females with kits.

Potential Project effects on wolverine are inferable from effects on grizzly bear because of the similar type of interactions the two species will likely have with the Project. The ecology and biology of the wolverine and grizzly bear are different, but have some important similarities that result in comparable interactions with the Project. Grizzly bear were selected as a key indicator because they have been assessed and recommended as a species of "Special Concern" by COSEWIC, have a history of adverse interactions with humans, and have a low recruitment rate, so excessive mortality can affect population size. Furthermore, there are numerous studies documenting methods of assessing human effects on grizzly bear. By comparison, wolverine is currently under assessment by COSEWIC, and their status report will likely indicate that:

- The estimated number of wolverine in Canada is at least 10,000, of which 3,500 to 4,000 reside in the Yukon (35 to 40%).
- Densities in Canada vary to a maximum of 10 per 1000 km², the highest densities being those documented in the Yukon (10.75 per 1000 km² in south-central Yukon and 9.7 per 1000 km² in the Old Crow Flats).
- Wolverine numbers have been stable or increasing in their northern ranges for 15 years, and may be increasing in numbers and expanding their range in Manitoba and Ontario.

- Trappers and aboriginal knowledge holders in the Yukon report wolverine to be common.
- The Yukon trapper harvest ranges from 100 to 150 wolverine per year, and the harvests are not declining relative to trapping pressure.
- The primary threat to wolverine is harvest, but forestry, hydroelectric developments, oil and gas and mineral exploration and development, and transportation corridors contribute to permanent, temporary or functional habitat loss that may destabilize populations.

In addition, the Yukon Government allows a liberal harvesting regime for wolverine, a further indication that wolverine is not threatened in the Yukon. Given that information on effects of human disturbance and methods for assessing those effects are more developed and robust for grizzly bears, that grizzly bears appear to be more at risk, and that wolverine will have similar interactions with the Project as grizzly bears (i.e., scavenging for food), it was determined that grizzly bears would be suitable as a key indicator species. In other words, the similarities between grizzly bears and wolverine in the type of Project interactions, potential effects, and resultant mitigation measures means that the assessment of project effects and proposed mitigations for grizzly bears are suitable for assessing and mitigating effects on wolverine.

The effects assessment and mitigation for one species is able to be translated meaningfully to another species as effects mechanisms are similar within groups of species. Consequently, mitigation measures to reduce effects will apply to multiple species. Application of general mitigation measures for wildlife year-round (e.g., waste management) will mitigate most potential Project effects on wolverine (e.g., avoid attraction to mine site), thereby reducing the potential for human-wildlife conflict, as outlined in the Waste and Hazardous Materials Management Plan provided in Appendix A.22A and in the WMMP (Appendix A.12A). Both documents provide mitigation measures that aim to reduce Project effects and summarize monitoring that could trigger adaptive management if unanticipated effects are detected. The Waste and Hazardous Materials Management Plan (Appendix A.22A) includes year round waste management which will reduce attractants throughout all seasons. This plan will be implemented year round and includes a number of mitigations that will reduce the potential for attracting all wildlife, including grizzly bears and wolverine. Section 5.4.6 in the updated WMMP (Appendix A.12A) includes den site monitoring for wolverine. If it becomes apparent that mitigation specific to reducing encounters with wolverine are necessary, this can be readily accommodated through the adaptive management approach described in the WMMP.

A.12.4.6 Little Brown Myotis

The little brown myotis has been considered in the Project effects assessment, but not as a key indicator, as habitat loss was not the reason for the 'endangered' designation. The designation of little brown myotis and northern long-eared bat was changed to 'endangered' by COSEWIC in 2012 after an emergency assessment (COSEWIC 2014), and the species are now listed as 'endangered' on schedule 1 of the *Species at Risk Act*. The assessment and the species' designation are the result of a white-nose syndrome epizootic originating in eastern North America. The syndrome is a highly contagious fungal disease. Transmission occurs in hibernacula. It has spread quickly since being detected in North America and is expected to reach western North America in the next two decades. White-nose syndrome has devastating effects on exposed population of bats; more than 99% of some little brown bat populations in the northeastern United States have been lost solely because of the syndrome.

A.12.4.6.1 R348

R348 Areas of use by the little brown myotis within the LSA and RSA, particularly for roosting and foraging.

The Updated Baseline Report (Appendix A.12B) outlines potential bat distribution within the LSA. Surveys for the little brown myotis were conducted at the Project site during the summer of 2014 to document bat occurrence (Appendix A.12B). Surveys did not identify bats in the area.

A.12.4.6.2 R349

R349. If baseline data is unavailable, proposed mitigation and monitoring efforts for the species.

Baseline surveys were conducted in 2014, and surveys did not identify bats in the area (Appendix A.12B).

The updated WMMP (Appendix A.12A) includes mitigations to reduce potential Project effects on bats during the construction phase of the Project, and the WMMP will be finalized in conjunction with the Wildlife Working Group. If bat roosts are detected, site-specific avoidance measures and a mitigation plan will be developed, which could include the placement of bat boxes as a replacement for potentially disturbed roost structures. Any information collected and results of any surveys completed will be submitted (if bats are located) to the Yukon Conservation Data Centre.

A.12.4.7 Dall Sheep

A.12.4.7.1 R350

R350. Baseline information for Dall sheep or, if unavailable, proposed mitigation and monitoring measures, particularly in relation to the Freegold Road.

Baseline information for Dall's sheep is provided in Section 5 of the Wildlife Baseline Report (Appendix A.12B). There are no predicted project interactions, and no project-specific mitigation or monitoring is proposed.

A.12.5 EFFECTS ASSESSMENT FOR BIRDS

A.12.5.1 Alpine Bird Species at Risk

A.12.5.1.1 R351

R351. Discussion of alpine breeders as key indicator species, which considers their associated priority for conservation and the project's potential effects on this group.

Alpine vegetation units *per se* were not identified as high quality habitats for birds. There were no "obligate" alpine breeders identified in the Project baseline surveys. The most common observations in the alpine habitats are listed in Table 6.1 of the Bird Baseline Report (Appendix 12B).

All terrestrial wildlife and birds were considered candidates for a focused effects assessment. However, the determination of effects on all species likely to interact with the Project is unrealistic, and unlikely to provide information upon which to assess effects on wildlife as a whole. Therefore, several criteria were used which identified Key Indicators (KIs) to focus the wildlife effects assessment. The key criteria for selection of KIs included the following considerations (Proposal Section 12.1.3.1 Key Indicators):

- **Species and/or populations with a clear interaction with the Project footprint** — for example, seasonal ranges of the Klaza caribou herd clearly overlaps with the Freegold Road Extension and there is likely to be interaction with a substantial portion of the herd;

- **Species that are known to be sensitive to disturbance** — for example, grizzly bear have generally been regarded as being particularly sensitive to disturbance, and human interaction with grizzly bear are often detrimental to individual bears;
- **Habitat specialists** — for example, cliff-nesting raptors have established long-term residences at particularly defined habitat sites (i.e., cliffs) either within or near Project infrastructure;
- **Species that are culturally important** — for example, moose are important to local communities as a food source;
- **Species at Risk** — the Project's effects assessment must identify the adverse effects on species listed in SARA that are likely to occur in the Project area. Although several species have been listed with a status of Threatened or Special Concern by COSEWIC, many of the species have not been included on SARA Schedule 1. Regardless, for this assessment, the COSEWIC designation is regarded here as a SARA designation and listed species likely to occur in the Project area are considered as KIs in this assessment; and
- **Species identified in engagement meetings or otherwise documented as a concern** — for example, the Klaza caribou herd is included as a KI for wildlife because the Project footprint intersects the herd's range, and the herd is part of the Northern Mountain Population of Canada's woodland caribou population and potential interactions were identified in earlier Casino Trail reports (e.g., Casino Trail Project Advisor Committee 1985; and the Yukon Government Department of Environment has had concerns about the Project's effects on the caribou since studies began on the herd in response to the Casino trial development in the late 1980s).

Based on the criteria outlined above, the Project's effects assessment is focused on several KIs, including the Klaza caribou herd, moose, grizzly bear, collared pika, cliff-nesting raptors, passerine and bird species at risk and waterfowl. These species represent the likely range of potential Project effects on wildlife (Table 12.1-1 of the Proposal). Species that were not included as KIs were those who, while they may be found in the broader Project area, are unlikely to interact with the Project in substantial numbers (e.g., Dall's sheep, mule deer), are found only in very low densities and effects may be addressed by a species that is a KI (e.g., wolverine will be largely covered by the assessment on grizzly bears), were not species at risk, were not identified as of concern to stakeholders or regulators, or are generally numerous and not susceptible to anthropogenic disturbances (Table A.12.5-1).

Finally, a preliminary assessment (Table 12.3-29 of the Proposal) determined that a habitat assessment was suitable to assess impacts to passerine bird species as a group, and to four of the potential bird species at risk: horned grebe, short-eared owl, olive-sided flycatcher and rusty blackbird. Of the remaining species at risk, the preliminary assessment determined that peregrine falcon was better assessed based on known nest sites, since Project interactions are likely to have the highest effect at active nests and because the available topographic data is not detailed enough to pick up many of the habitats that cliff-nesting raptors are nesting on within the LSA. Common nighthawk and barn swallow are considered unlikely to interact with the Project given that the species have not been documented in the LSA, and that the study area is at the northern extent of both of their ranges. Bank swallow have been observed foraging in the Project area, but no nesting colonies have been located within the LSA. There is a possible colony located just outside the LSA; however, the colony is located more than 1 km from Project infrastructure and is unlikely to significantly interact with the Project. Additionally, the available habitat data for the LSA is not detailed enough to delineate suitable nesting habitats for bank swallow (gravel, silt, or clay banks along roadsides, gravel pits, lakes and rivers). Effects on bank swallow are best addressed through site-specific mitigation measures for the protection of any nesting colonies, if any are located within the LSA.

**Table A.12.5-1 Species Known or Likely to Occur in the Project Area, not Included as Key Indicators
(update to Table 12.1.3-2)**

Key Indicator	Species/ Population	Conservation Status	Potential Interaction with Project	Reason for Exclusion from Assessment
Dall's sheep	<i>Ovis dalli</i>	Not assessed, but assumed to be secure	Unlikely. Occurs in Project area, but PDA does not intersect sheep range.	No spatial or temporal overlap with the Project (Appendix 12A). While they may occur near site, there is expected to be little interaction with the Project, and are not considered further for effects assessment.
Wood bison	<i>Bison bison athabasca</i>	Listed as Threatened on Schedule 1 of SARA (2002)	Unlikely. The PDA does not intersect the current wood bison range.	No spatial or temporal overlap with the Project (Appendix 12A). While they may occur near site, there is expected to be little interaction with the Project, and are not considered further for effects assessment.
Wolverine	<i>Gulo gulo</i>	Assessed as Special Concern by COSEWIC (2003)	Occurs in the Project area. Distribution is unknown.	Low density and wide home range movements. Effects may be inferable from effects assessment on grizzly bears (e.g., security habitat). Application of general mitigation measures for wildlife year-round (e.g., waste management) will mitigate most potential Project effects on wolverine (e.g., avoid attraction to mine site). Distribution is likely prey-based rather than habitat-based.
Mule deer	<i>Odocoileus hemionus</i>	Not assessed, but assumed to be secure	Unlikely. May occur in the Project area.	Uncommon in the area, at the northern extent of range. Populations are not at risk
Black bear	<i>Ursus americanus</i>	Assessed as Not at Risk by COSEWIC (1999)	Occurs in the Project area. Distribution is assumed to include most habitat types.	Although there are habitat use differences, the assessment on grizzly bear includes overlapping issues and habitat. Mitigation included for grizzly bear should also mitigate Project effects on black bear.
Snowshoe hare	<i>Lepus americanus</i>	Not assessed, but assumed to be secure	Occurs in the Project area. Distribution is unknown.	Not a species at risk. Not raised as a valued component in stakeholder engagement meetings.
Canada lynx	<i>Lynx canadensis</i>	Assessed as Not at Risk by COSEWIC (2001)	Occurs in the Project area. Distribution is unknown	Not a Species at Risk. Project interaction is expected to be minimal. Species abundance is related more to prey (snowshoe hare) availability than to specific habitat requirements. There are little data with which to characterize baseline characteristics of a lynx "population" upon which to predict, or later to detect, population-changes due to Project effects.
Grey wolf	<i>Canis lupus</i>	Assessed as Not at Risk by COSEWIC (1999)	Occurs in the Project area. Assumed to be distributed across entire RSA.	Not a species at risk. Potential for increased mortality risk is addressed for mitigation related to reducing mortality risk for all wildlife.
Coyote	<i>Canis latrans</i>	Not assessed, but assumed to be secure	Assumed to occur in the Project area. Distribution is	Not a species at risk. Habitat effects on this species are addressed in quantification of general habitat loss.

Key Indicator	Species/ Population	Conservation Status	Potential Interaction with Project	Reason for Exclusion from Assessment
			unknown	
Red fox	<i>Vulpes vulpes</i>	Not assessed, but assumed to be secure	Likely. Assumed to occur in the Project area. Distribution is unknown	Species is adapted to many human disturbance factors. An effects assessment on this species would provide little to no knowledge about Project effects on the VC wildlife.
Porcupine	<i>Erethizone dorsatum</i>	Not assessed, but assumed to be secure	Occurs in Project area. Distribution is unknown	Not a species at risk. Habitat effects on this species are addressed in quantification of general habitat loss. There is limited existing information on human disturbance effects to porcupine.
Small mustelids	American marten (<i>Martes americanus</i>); weasels (<i>Mustella</i> spp.); American mink (<i>Neovison vison</i>).	Not assessed, but assumed to be secure	Likely. Occurs in the Project area. Distribution is unknown	Not species at risk. Habitat effects on this species are addressed in quantification of general habitat loss.
Aquatic mammals	Beaver (<i>Castor canadensis</i>); muskrat (<i>Ondatra zibethicus</i>); river otter (<i>Lontra canadensis</i>)	Not assessed, but assumed to be secure	Likely occurs in aquatic habitats in Project area.	Limited habitat within the PDA. Effects will be managed through mitigations for silt and erosion control and fish and aquatic resources.
Little brown myotis	<i>Myotis lucifugus</i>	Assessed as Endangered by COSEWIC (2014)	Likely interaction along wet areas along the Freegold Road. Interaction near mine site is assumed to be minimal because of unsuitable habitat.	This species is at risk because of White-nose Syndrome, not habitat loss. Surveys conducted at the mine site did not identify bats in the area.
Small mammals	Ground squirrel (<i>Spermophilus parryi</i>); red squirrel (<i>Tamiasciurus hudsonicus</i>); mice and voles	Not assessed, but assumed to be secure	Occurs in the Project area. Distribution is unknown	Not species at risk. Habitat effects on this species are addressed in quantification of general habitat loss.
Hoary marmot	<i>Marmota caligata</i>	Not assessed, but assumed to be secure	Distribution in the Project area is unknown.	Not a species at risk. Habitat effects on this species are addressed in quantification of general habitat loss.
Amphibians	Wood frog (<i>Lithobates sylvatica</i>)	Not listed	Limited distribution.	Limited habitat within the PDA, Effects will be managed through mitigations for silt and erosion control and fish and aquatic resources.
Terrestrial insects	Various	Various	Likely distributed throughout Project area. Distribution and abundance unknown.	No baseline data available. Management of aquatic resources will reduce adverse effects on breeding habitat.

A.12.5.1.2 R352

R352. The location of alpine meadows in the local study area and regional study area.

Alpine meadows, were not identified within the detailed ecological land classification study area (Section 11 Rare Plants and Vegetation Health), Appendix 11A (Vegetation Baseline Report), Table 3.1 (Ecosite Summary of the Project's LSA) of the Proposal.

A.12.5.2 Baseline Data for Species at Risk

A.12.5.2.1 R353

R353. The results of baseline surveys for short-eared owl, horned grebe, and common nighthawk pre-construction surveys (i.e. dusk call playback surveys) and a description of plans for mitigation and monitoring of potential adverse effects cause by the Project.

As discussed above, a preliminary assessment (Table 12.3-29 of the Proposal) determined that a habitat assessment was suitable to assess impacts to passerine bird species as a group, and to four of the potential bird species at risk: horned grebe, short-eared owl, olive-sided flycatcher and rusty blackbird. Of the remaining species at risk, the preliminary assessment determined that peregrine falcon was better assessed based on known nest sites since Project interactions are likely to have the highest effect at active nests and because the available topographic data is not detailed enough to pick up many of the habitats that cliff-nesting raptors are nesting on within the LSA. Common nighthawk and barn swallow are considered unlikely to interact with the Project given that the species have not been documented in the LSA, and that the study area is at the northern extent of both of their ranges.

Preliminary wildlife surveys for the Project were completed in the late 1980s by the Government of Yukon and various consultants. Recent work was initiated in 2006 and continued through 2014. The objectives of the wildlife studies were to summarize available wildlife information in the study area (abundance and distribution of key species); identify critical and sensitive habitats; and complete a baseline inventory of wildlife species to gain an understanding of regional wildlife ecology. Field studies for birds were conducted in 2010, 2011 and 2013, consisting of point count surveys for songbirds and other upland bird species, encounter transects, aerial surveys for cliff-nesting raptors, a stand-watch survey for short-eared owl, and collection of incidental sightings.

Baseline data for short-eared owl, horned grebe and upland birds (includes nighthawks) was provided in Appendix 12B.

As CMC has not identified areas with high likelihood of suitable habitat for common nighthawk and short-eared owl, CMC is not planning on conducting surveys specific for these species prior to clearing. If clearing were to occur during the active nesting season, then pre-clearing nest surveys will be undertaken.

A.12.5.3 Bird Mortality Risk

A.12.5.3.1 R354

R354. Additional detail on the mortality risk to birds including identifying areas of highest risk.

CMC acknowledges the Executive Committee's request for more information on the actual numbers used for the qualitative prediction of significance for mortality risk to birds. There are no specific numbers predicted for bird project-related mortality due to the mitigation measures suggested for multiple species in the WMMP (Appendix A.12A). CMC will use practical on-site applications of mitigations/deterrents to prevent harm to migratory birds, and will work to ensure compliance with Section 5.1 of the *Migratory Bird Convention Act* (MBCA). Areas of highest risk are likely associated with contact to project-related water, discussed further in R367.

A.12.5.4 Habitat Loss

A.12.5.4.1 R355

R355. Details on the rusty blackbird model. Details should include model inputs and assumptions and indicate whether and how it accounts for small wetlands.

An Ecological Land Classification (ELC) model was developed based on the BC Terrestrial Ecosystem Mapping inventory standard for 1:20,000 scale mapping (Appendix 11A). As outlined in the bird baseline report (Appendix 12B, Section 8 Habitat Modelling) 1:50,000 Canvec data and available high resolution imagery (approximately 0.5 m resolution) were used to supplement the ELC. Wetlands are identified in Figure 8.5 of Appendix 12B as habitat for rusty blackbird. Wetlands smaller than the high resolution imagery were not identified.

The WMMP (Appendix A.12A) identifies wetland habitats as sensitive habitat features and provides a 100 m setback of the Project footprint from wetlands, where possible. Riparian setbacks for mitigating effects are defined in the Sediment and Erosion Control Management Plan (Appendix A.22C) for the protection of fish habitat and water quality, and will benefit riparian vegetation and the wildlife that occupy the riparian areas. Monitoring actions will be implemented where the project has the potential to interact with wetland habitats; for example, the potential loss of wetland habitat in the Dip Creek area (WMMP, Appendix A.12A, Table 5.4-4 Wildlife Monitoring: Sensitive Habitat Features).

A.12.5.4.2 R356

R356. Discussion regarding the models for olive-sided flycatcher and short-eared owl, including categorization of high quality habitat types. Consideration should be given to an expanded model for the short-eared owl and olive-sided flycatcher.

The habitat models used for the effects assessment erred on the side of caution when identifying high quality habitat for both olive-sided flycatcher and short-eared owl. The habitat models recognize the potential presence of these species in a variety of habitats, and accordingly acknowledge all habitats as having potential (high, medium, low quality). Expanding the models to include broader habitat types would include a larger area, thus likely diluting the Project's potential effects on habitat when represented as percent effect on habitat (Section 12.3.7.5, Table 12.3-30). The model as presented is sufficient for determining the Project's effects assessment.

A.12.5.4.3 R357

R357. A map showing observation sites and potential breeding locations for horned grebes within the project footprint.

Baseline habitat quality for the horned grebe in the Casino Project LSA is provided in Figure 8.4 of the Bird Baseline Report (Appendix 12B). The map indicates that, at the scale of the map, all habitat within the LSA is rated as "Nil". The small size of many wetlands means that the map format is uninformative for the assessment of project effects at this stage, as very little habitat open water habitat exists in the area. For example, the horned grebe habitat model identifies that there is 0.27 km² of mapped suitable habitat in the LSA. As such, mitigation measures, regardless of quality of potential breeding locations, will include a minimum 100 m buffer maintained between Project infrastructure and any ponds or open-water wetlands wherever feasible given the terrain and other site-specific features. Ultimately, the identified habitat effects at the level of the LSA are not expected to result in significant effects to regional populations given the small size of the LSA in relation to the local ecoregions. Monitoring actions will be implemented where the Project has the potential to interact with wetland habitats, such as the creation of wetland habitat at the TMF or the loss of wetland habitat in the Dip Creek area.

A.12.5.5 Noise Effects

A.12.5.5.1 R358

R358. Rationale behind decreasing habitat quality ratings one class, as opposed to two in some cases.

There is limited empirical evidence to suggest a measurable change (Section 12.3.7.2 Potential Project Interactions with Passerine Species and Bird Species at Risk). Based on our review of the literature (summarized in section 12.3.7.2), we determined that decreasing habitat quality by one class — essentially a 33% reduction within 300 m — was a reasonable estimate of the effect.

A.12.5.5.2 R359

R359. Proposed mitigations for effects of chronic noise on bird species.

The Project will have persistent, chronic noise sources during the life of the Project (Section 9 Noise). The effects assessment on birds was conducted considering, among other disturbance features, noise within a zone of influence. It was acknowledged that there will be some reduced habitat quality within the zone of influence. This reduced habitat quality was considered 'not significant' within the bird regional assessment area.

A.12.5.5.3 R360

R360. Discussion of and rationale for buffer sizes around active bird nests.

The buffer distances presented in the WMMP Table 4.2-1 are CMC's recommended set-back distances based on the Yukon biologists' (the authors of the Wildlife Effects Assessment) experience using set-back distances for similar species in other Yukon operations. However, as stated in the WMMP, "*Other set-back distance guidelines may be considered should they be made publicly available.*"

A.12.5.6 Cliff-Nesting Raptor Survey

A.12.5.6.1 R361

R361. Confirmation on whether the cliff-nesting raptor survey involved re-visiting previously documented nests.

The survey methods for aerial surveys of cliff nesting raptors are described in Appendix 12B. Suitable habitats and locations of previously documented cliff nests were surveyed.

A.12.5.6.2 R362

R362. A figure showing the aerial route followed during cliff-nesting raptor surveys within the local study area and regional study area.

The locations of raptor nests were not published at the request of Yukon Environment, as nest sites must remain confidential to ensure protection of nesting raptors. A flight track from the survey would display the most likely cliff nesting raptor habitat in the project area and could be used to identify the location of many of the nests, hence is not provided. YESAB could request that Yukon Environment release the data for effects assessment purposes.

A.12.5.7 Cliff-Nesting Raptor Nest Sites

A.12.5.7.1 R363

R363. Rationale for the size of the proposed buffers around cliff-nesting raptor nests.

The rationale for a 500 m 'no disturbance' buffer was based on a review of protective buffer distances around cliff nesting raptor sites summarized in Section 12.3.8.2 (Potential Project Interactions with Cliff-Nesting Raptors). Based on that review, CMC is suggesting the 'no disturbance' buffer presented in the WMMP, summarized as follows.

- Nest-specific management plans will be developed for any cliff nests identified inside the PDA or within 500 m of the PDA.
- Wherever possible, a site-specific no disturbance, no stopping buffer of approximately 500 m will be implemented around active cliff-nesting raptor nests during the nesting period (1 April to 31 August for raptors). The selection of the setback is based on the risk of affecting nest occupancy and productivity.

A.12.5.8 Waterfowl – Presence of Wetlands

A.12.5.8.1 R364

R364. Methods used to identify wetlands, including open-water wetlands and small ponds.

As discussed in the response to R355, an Ecological Land Classification (ELC) model was developed based on the BC Terrestrial Ecosystem Mapping inventory standard for 1:20,000 scale mapping (Appendix 11A). The bird baseline report (Appendix 12B, Section 8) states that 1:50,000 Canvec data and available high resolution imagery (approximately 0.5 m resolution) were used to supplement the ELC. Wetlands are identified in Figure 8.5 of Appendix 12B as habitat for rusty blackbird. Wetlands smaller than the high resolution imagery were not identified.

A.12.5.8.2 R365

R365. Information displaying the locations of these wetlands and ponds, and their distribution across the LSA.

Wetlands in the LSA are identified in Figure 8.5 of the Bird Baseline Report (Appendix 12B) as high quality habitat for rusty blackbirds.

A.12.5.8.3 R366

R366. Discussion of potential effects to these wetlands and ponds, and any associated mitigations.

As detailed in the WMMP (Appendix A.12A), the RAMSAR Convention on Wetlands 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 in the project area that meet these criteria.

The WMMP identifies sensitive habitat features as mineral licks, active den sites, wetlands, bat roosts, and re-used nest sites. Monitoring for sensitive habitat features is detailed in the WMMP (Appendix A.12A Table 5.4-4 Wildlife Monitoring: Sensitive Habitat Features).

As described in the Project Description (12.3.7.6 Significance of Residual Effects for Passerines and Bird Species at Risk), to help mitigate some of the effects of potential loss of wetland habitat, a minimum 100 m buffer will be maintained between Project infrastructure and any ponds or open-water wetlands wherever feasible given the terrain and other site-specific features. Ultimately, the identified habitat effects at the level of the LSA are not expected to result in significant effects to regional populations given the small size of the LSA in relation to the local ecoregions. Wetlands will be avoided where possible.

A.12.5.9 Waterfowl – Mine Water Bodies

A.12.5.9.1 R367

R367. An effects assessment of the TMF wetlands, as they relate to waterfowl.

Section 12.3.9 (Waterfowl Effects Assessment) of the Project proposal considers the potential positive and negative effects of the TMF for waterfowl. Section 12.3.9.2 (Potential Project Interactions with Waterfowl) specifically identifies likely interaction with the TMF. That section includes a review of empirical results from similar facilities and details on mitigation with reference to the closure plan (Appendix 4A) are discussed in that section. 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. The water quality in the wetland is expected to meet or exceed aquatic water quality guidelines (see Section 7 and A.7), and as such will not impact any wildlife or birds that come into contact with the wetland. Additionally, studies are being conducted to confirm that contaminants will not be up taken into the wetland plants (see Section A.4), ensuring further protection of users of the TMF wetland.

CMC will use practical on-site applications of mitigations/deterrents to prevent migratory birds from contacting waters should they contain known harmful substances. This will be done to ensure compliance with Section 5.1 of the *Migratory Bird Convention Act* (MBCA). Those preliminary measures are identified in the WMMP (Appendix A.12A). CMC acknowledges that measures taken may need to be adapted through operations and closure. The adaptive management framework that allows for adjustments to mitigation measures is identified in Section 2.1 (Adaptive Management and Plan Updates) of the WMMP. Mitigation measures will be adapted should they not prove entirely effective. Through construction, operations and closure, CMC will comply with Section 5.1 of the MBCA.

A.12.5.9.2 R368

R368. Monitoring and mitigations to prevent waterfowl from utilizing the TMF wetlands and other mine water bodies (events pond, pit lake, etc.). Details should include effectiveness of proposed mitigations.

As detailed in the WMMP (Appendix A.12A), 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.

Monitoring of the TMF and open pit lake (throughout operations and post-closure) and open pit lake (post-closure) will be conducted as part of the PDA/Facility-Specific Monitoring, and will include determination of any wildlife attraction, an assessment of the risks if wildlife are using it, and the need for deterrence measures, if required. The facility-specific monitoring program is outlined in WMMP Table 5.3-1 Summary of PDA/Facility-Specific Monitoring Programs by Project Phase.

A.12.5.9.3 R369

R369. Clarification on the meanings of “unacceptable levels of trace metals” and “limited effects” in relation to waterfowl, and rationale for the statement that despite unacceptable levels of trace metals shown by water quality monitoring, resulting effects to waterfowl will be limited.

See response to R370.

A.12.5.9.4 R370

R370. Rationale for how water quality mitigation measures alone will address concerns around waterfowl exposure to elevated levels of trace metals.

As detailed in the WMMP (Appendix A.12A), 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.

During post-closure, when active mine operations have ceased, the water quality in the TMF is expected to improve substantially (see Appendix IV of the Water Quality Model Report, Appendix A.7B), as shown in Table A.12.5-2, and for most parameters, are below the CCME guidelines for the protection of aquatic life during the post-closure (years 35+) periods. As such, exposure of waterfowl to high concentrations of contaminants is expected to be limited to the operations period, at which point the mine will be active, and ongoing activities will naturally deter waterfowl from the area.

Table A.12.5-2 Predicted TMF Pond Water Quality Compared to CCME Guidelines

Water Quality Parameter	CCME Guideline	TMF Pond Water Quality (mg/L)		
		Operations	Initial TMF Pond Discharge	Long-Term
		(Year 15)	(Year 35)	(Year 120)
pH	6.5 - 9	6.1	6.9	6.9
Hardness	-	1,178	452	381
Sulphate (SO ₄)	309*	1,242	335	266
Fluoride (F)	0.12	2.1	0.65	0.63
Aluminum (Al)	0.005 if pH<6.5 0.1 if pH ≥6.5	2.9	0.096	0.12
Arsenic (As)	0.005	0.0066	0.0034	0.0037
Cadmium (Cd)	0.00006 to 0.00037 for H 30 to 290 mg/L; 0.00037 for H >290 mg/L	0.00064	0.00034	0.00016
Chromium (Cr)	0.0010 for Cr(VI) 0.0089 for Cr(III)	0.0026	0.00086	0.0011
Copper (Cu)	0.002 @ H < 90 mg/L 0.004 @ H > 180 mg/L	0.33	0.11	0.073
Iron (Fe)	0.3	0.0012	0.00022	0.00023
Lead (Pb)	0.001 to 0.007 (for H 60 to 180 mg/L)	0.0015	0.003	0.0025
Mercury (Hg)	0.000026	0.000011	0.000012	0.000015
Molybdenum (Mo)	0.073	0.37	0.085	0.066
Nickel (Ni)	0.025 @ H < 60 mg/L to 0.15 @ H > 180 mg/L	0.0080	0.0033	0.012
Selenium (Se)	0.001	0.015	0.0043	0.0043
Silver (Ag)	0.0001	0.000058	0.000036	0.000059
Thallium (Tl)	0.0008	0.00048	0.00012	0.000099
Uranium (U)	0.015	0.018	0.048	0.042
Zinc (Zn)	0.03	0.034	0.020	0.023

NOTES:

- * BC MOE Guideline for hardness between 76-180 mg/L
- Bold values indicate exceedances of CCME Guidelines.

A.12.5.10 Bird Baseline Clarification

A.12.5.10.1 R371

R371. Clarification as to whether Figure 8.2 [sic – ref 8.1] in Section 12B refers to only passerine bird species or to upland birds in general.

The caption for Figure 8.1 should read “Baseline habitat quality for upland bird species in the Casino Project LSA.”

A.12.6 CONSIDERATION OF CLIMATE CHANGE IN RELATION TO WILDLIFE

A.12.6.1.1 R372

R372. The potential effects of climate change on key indicator species over the life of the Project.

CMC acknowledges the examples of potential effects of climate change on terrestrial wildlife provided by SLR during the Adequacy Review stage of the Casino Project (YOR 2014-0002-238-1). The Climate Change Report submitted as part of the Proposal (Appendix 20A) reviews the climate changes expected in the central Yukon during the life of the Project. The changes that could have the greatest effects on terrestrial wildlife are increased temperature and precipitation. The document states that the region may experience general warming, milder winters, fewer extreme cold temperatures, and more precipitation.

The effects of climate change on terrestrial animal populations are uncertain because of the random nature of weather and the complex interactions among factors that affect animal populations. For example, caribou populations in Yukon respond to poor spring weather associated with the Pacific Decadal Oscillations (El Niño) with reduced calf survival (recruitment); however, the effect of climate on caribou recruitment is not simple, as it is dependent on the presence of predators (i.e., reduced effect in the absence of wolves; Hegel et al. 2010). Song sparrows have been documented showing behavioural plasticity to climate variability, but again the response is dependent on a number of complex factors (e.g., environmental conditions as juveniles and population density the year birds were born) that are difficult to track in wild populations (Wilson et al. 2007). The uncertainty in how climate changes will affect wildlife is the greatest perceived management risk to wild animal populations from climate change.

Most animal populations in the region will likely be robust to changes in temperature and precipitation that could occur within the life of the Project. Potential effects on animals would occur as an indirect result of climate change. Some animal species are exhibiting range shifts north into Yukon; for example, deer, cougars, and parasites. Cougars could result in increased mortality for caribou, as they are a common predator of caribou in southern British Columbia (Apps et al. 2013). Deer could bring diseases common in southern Canada into the region or increase predator density which could affect predation on other ungulates. Ectoparasites, such as ticks, have been documented expanding their range north because milder winter temperatures allow some ticks to survive winters (Lindgren et al. 2000). In Yukon, winter ticks may now be established, though at very low numbers, and ungulates are being monitored by the Government of Yukon.

The animals in the region most at risk from climate change is collared pika. The ecology and behaviour of collared pika means that they are more sensitive to climate driven changes in habitat availability (COSEWIC 2011). Sensitivity to climate variability is the primary reason for the collared pika's status as *Special Concern* (COSEWIC 2011). There is a potential for reduced pika abundance in the region; however, the risk remains unknown as there is considerable uncertainty when making predictions about the effect of climate on Yukon's pika population.

A.12.6.1.2 R373

R373. Discussion of monitoring and adaptive management measures to be implemented to detect and mitigate potential effects of the Project in the context of climate change.

No specific mitigation actions are suggested at this time to address climate change effects. As detailed in the WMMP (Appendix A.12A), to address environmental changes through time, an adaptive management approach is proposed. It is anticipated that the WMMP 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. 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 (i.e., climate change) and Project conditions, a process needs to be established to ensure regular review of the WMMP that includes regular and transparent reporting.

A.12.7 WILDLIFE MITIGATION AND MONITORING PLAN

A.12.7.1.1 R374

R374. Details on the timing, spatial boundaries, frequency, and general methods of monitoring surveys for caribou, moose, carnivore dens, pika colonies, obligate alpine breeders, waterfowl, and bird species at risk.

The updated Wildlife Mitigation and Monitoring Plan (WMMP) is provided in Appendix A.12A. The updated plan incorporates comments received from reviewers following submission of the Project Proposal on January 3, 2014 through the YESAB YOR. The purpose of the 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 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. The WMMP is considered a “living document” and CMC anticipates 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.