APPENDIX T

SPECIES AT RISK ALTERNATIVES ASSESSMENT

Supplemental Assessment of Alternatives Species at Risk

Springpole Gold Project

First Mining Gold Corp.

ONS2104

Prepared by:
WSP Canada Inc.

October 2024

Supplemental Assessment of Alternatives Species at Risk
Springpole Gold Project

Red Lake District, Northwest Ontario
Project #ONS2104

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%	percent
BMPs	Best Management Practices
CCP	Caribou Conservation Plan
CWSP	Central water storage pond
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
ESA	*Endangered Species Act*
FMG	First Mining Gold Corp.
FRI	Forest Resource Inventory
GHD	General Habitat Description
ha	Hectare
IRAR	Integrated Range Assessment Report
KDE+	Kernel density estimation
km	Kilometres
km^2	Square kilometres
kV	Kilovolt
LSA	Local Study Area
m	Metres
MECP	Ministry of the Environment Conservation and Parks
PDA	Project development area
Project	Springpole Gold Project
RMP	Range Management Policy
RSA	Regional Study Area
RSF	Resource Selection Function
RSPF	Resource Selection Probability Function
SAR	Species at Risk
sf	Simple features
WNS	White Nose Syndrome
ZOI	Zone of influence

1.0 INTRODUCTION

First Mining Gold Corp. (FMG) proposes to develop, operate, and eventually decommission and close an open pit gold and silver mine and ore process plant with supporting facilities known as the Springpole Gold Project (Project). The Project is located in a remote area of northwestern Ontario, approximately 110 kilometres (km) northeast of the Municipality of Red Lake and 145 km north of the Municipality of Sioux Lookout (Figure 1-1).

An Environmental Assessment (EA) pursuant to the *Canadian Environmental Assessment Act*, 2012 (SC 2012, c. 19, s. 52) and the *Ontario Environmental Assessment Act* (RSO 1990, c. E.18) is required to be completed for the Project. This report is one of a series of Technical Support Documents prepared by WSP Canada Inc. (WSP) on behalf of FMG to describe the predicted environmental effects of the Project.

1.1 Purpose and Objective

As part of the EA, FMG is conducting an alternatives assessment so that a reasonable range of feasible options are considered before determining the final Project design. An alternatives assessment is also required for the Project to fulfill the needs of the Environmental Impact Statement (EIS) Guidelines (Appendix B-1) and provincially approved Terms of Reference (Appendix B-3) for the Project. The alternatives assessment for the Project can be found in final EIS/EA Section 6.4.

The guidance document provided by the Ministry of the Environment, Conservation and Parks (MECP) (2021a) recommends that the proponent strive to demonstrate that reasonable alternatives per the *Endangered Species Act* (ESA) have been considered and fully evaluated, including an avoidance alternative that would not adversely affect Species at Risk (SAR) or their habitats. It is suggested that this occurs through identifying and documenting alternative methods in the EA document; this memo provides discussion specific to the alternatives assessment for provincially Threatened and Endangered SAR. The advice provided by the MECP (2021a) is primarily focused on Boreal Caribou, but it notes "non-caribou SAR." Therefore, Threatened and Endangered SAR considered in the EA Sections 6.13, 6.14, 6.15 and 6.16 are reflected below. All proposed activities occurring in SAR habitat must undergo an assessment to determine if the activity is likely to kill, harm or harass individuals—or damage or destroy habitat.

1.2 Project Overview

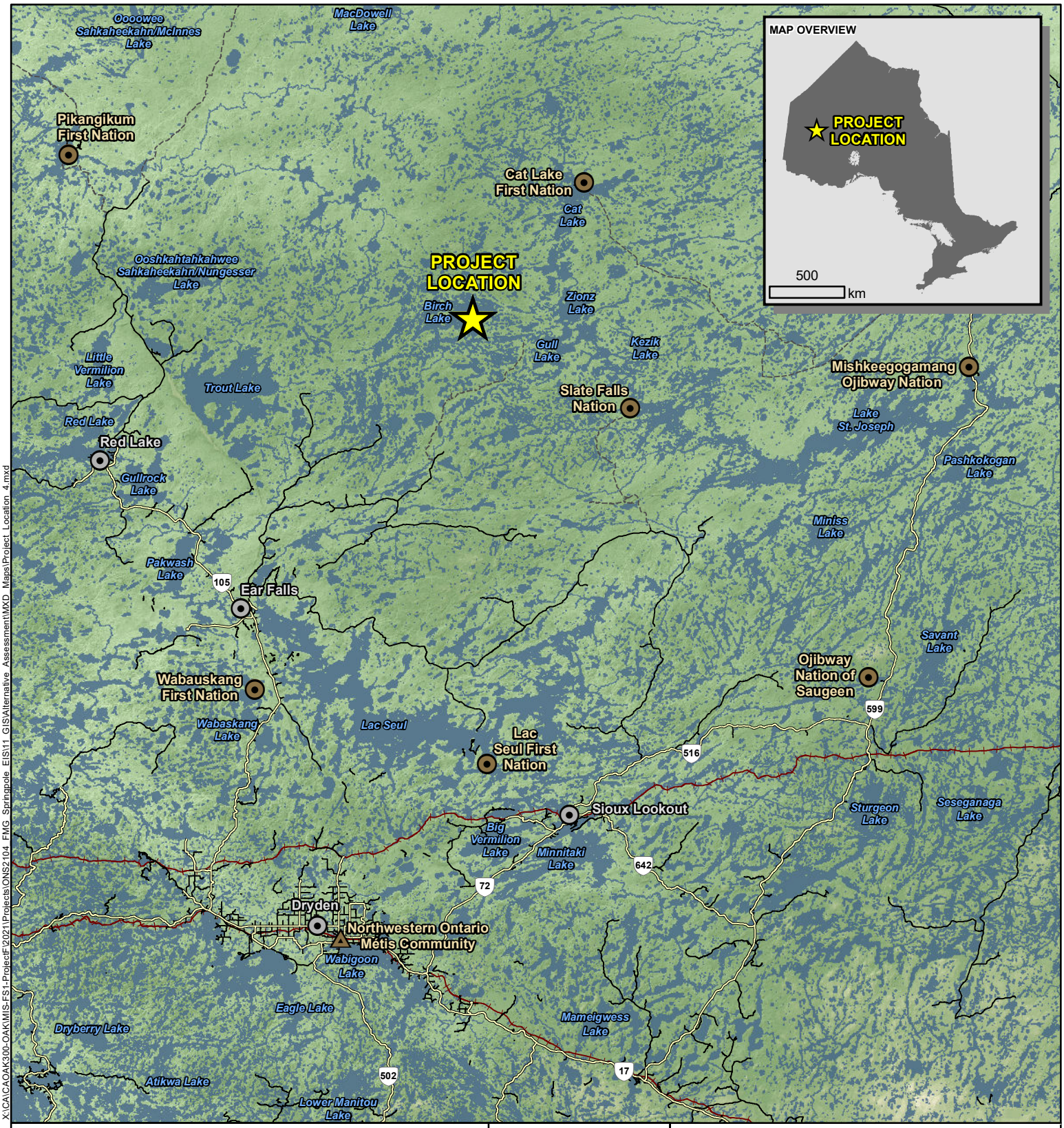
The Project is proposed to be mined as an open pit. To allow the development and safe operation of the open pit mine, dikes will be established to facilitate safe and controlled dewatering of the open pit basin. Ore from the open pit will be processed in an onsite process plant at approximately 30,000 tonnes per day. Tailings resulting from the processing of ore will be stored in a co-disposal facility. These are the key components of the Project:

- Open pit and related infrastructure;
- Dikes (west dike and east dike);
- Co-disposal facility for mine rock and tailings;
- Surficial soil stockpile;
- Ore stockpiles;
- Process plant and process plant complex;
- Site infrastructure;
- Water management and treatment facilities;

- Fish habitat development area;
- Accommodations complex;
- Aggregate operation(s);
- Transmission line; and
- Mine access road and co-located airstrip.

The Project is expected to be developed over a three-year construction phase (Year -3 to Year -1). A mine life of approximately 10 years (Year 1 to 10) is anticipated based on the extensive work carried out to define the Springpole ore body. Progressive reclamation will be carried out during operations, and final decommissioning and closure of the site will follow once operations cease. The primary decommissioning and closure period (i.e., active closure, Years 11 to 15 – five years in length) will be followed by a period of post-closure environmental monitoring (Years 16+).

The proposed site layout and infrastructure routing has been developed by means of a comprehensive assessment of feasible alternatives, guided in part by feedback received from consultation and engagement activities to date and the results of environmental baseline studies. The Project is planned and designed to provide flexibility for future design optimizations, avoid/minimize adverse environmental effects through careful configuration and use of best available technology economically achievable. With a mine site footprint of only 867 hectares (ha) and a total Project footprint of approximately 1,365 ha when considering the access road and transmission line, the Project is one of the smallest open pit mining projects in the Canadian gold sector for a mine of its production capacity.



LEGEND

- Project Location
- Town
- First Nation Reserve
- Northwestern Ontario Métis Community
- Highway
- Secondary Road
- Resource / Winter Road
- Railway

0 12.5 25 50 75 100 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.

Datum: NAD83
Projection: UTM Zone 15N

N W E S

First Mining Gold

WSP

SPRINGPOLE GOLD PROJECT

Project Location

PROJECT N°: ONS2104	**FIGURE: 1-1**
SCALE: 1:1,500,000	DATE: September 2024

2.0 IDENTIFIED SPECIES AT RISK AND LEGISLATIVE CONTEXT

Terrestrial and aquatic investigations were completed over multiple years and multiple seasons. Terrestrial SAR were identified in the applicable Local Study Area (LSA) and Regional Study Area (RSA; Figure 2-1) as described in the Terrestrial Baseline Report (WSP 2024).

Aquatic SAR have not been detected during baseline surveys for the Project. Lake Sturgeon (*Acipenser fulvescens*) is an aquatic SAR. The Ministry of Natural Resources (MNR) indicate that Lake Sturgeon have been documented in Birch Lake, the Birch River and Seagrave Lake by Cat Lake First Nation and Ear Falls community members, as well as by some tourist operators and a small commercial fishing operation from the 1970s (MNR personal communication 2021). The *Atlas of Lake Sturgeon Waters in Ontario* (Kerr 2002), which derives Lake Sturgeon distribution data from a variety of sources, including the provincial fisheries database of lakes and streams surveys and other fisheries assessment projects, identifies Birch Lake as one of nine lakes within the Red Lake District of Natural Resources district that contains Lake Sturgeon. Therefore, it can be assumed that Springpole Lake was used by Lake Sturgeon for travel to areas important to their life cycle in the past. They have remained undetected during the Springpole Project baseline fish community studies and the three cycles of broadscale monitoring (BsM) programs conducted by the Ministry between 2009 and 2019 in Birch Lake, or the BsM study carried out by WSP for the Project in 2022 in Springpole Lake. Addition studies, including eDNA (environmental DNA) study were completed in 2022 and 2023 to assess if Lake Sturgeon are moving through the system. To date, the baseline studies have not detected Lake Sturgeon.

This memo is focused on the assessment of alternatives for provincially threatened and endangered SAR:

- Boreal Caribou (*Rangifer tarandus*);
- Wolverine (*Gulo gulo*);
- Little Brown Myotis (*Myotis lucifugus*);
- Northern Myotis (*Myotis septentrionalis*);
- Eastern Whip-poor-will (*Antrostomus vociferus*);
- Lesser Yellowlegs (*Tringa flavipes*); and
- Short-eared Owl (*Asio flammeus*).

MECP may authorize damage to habitat or individuals by way of registration or permit. If a species is listed under the ESA as Extirpated, Endangered or Threatened, Section 9 of the ESA prohibits killing, harming, harassing, capturing, taking, possessing, collecting, buying, selling, leasing, trading or offering to buy, sell, lease or trade a member of the species. Section 10 of the ESA prohibits the damage or destruction of the habitat of all Endangered and Threatened species. Habitat is broadly characterized within the ESA as the area prescribed by regulation as the habitat of the species or an area on which the species depends directly or indirectly to carry on its life processes, including reproduction, rearing of young, hibernation, migration or feeding. Non-regulated habitat is further defined by the province for some species through species-specific General Habitat Descriptions. Species listed under Special Concern do not receive protection under Section 9 and Section 10 of the ESA.

2.1 Ontario's Policy Framework for Boreal Caribou Conservation

Section 11 of the ESA requires recovery strategies and government response statements to be prepared within prescribed timelines for species listed as Endangered or Threatened. In 2008, the publication, *Recovery Strategy for the Woodland Boreal Caribou (Rangifer tarandus Boreal Caribou) (Forest-dwelling,*

Boreal population) in Ontario (OWCRT 2008), was finalized. In response to the published recovery strategy, Ontario's Ministry of Natural Resources (governing ministry at the time) released the government's response statement, known as *Ontario's Woodland Boreal Caribou Conservation Plan* (CCP) (MNR 2009), in October 2009. The CCP outlines the government's goal for the recovery of Boreal Caribou, provides broad policy direction and identifies actions the Ontario government intends to take to conserve and recover Boreal Caribou in Ontario. It identifies ranges and prescribes the adoption of a Range Management Approach.

The Range Management Approach involves managing range-level cumulative disturbance, habitat amount and arrangement, and the ecological function of sub-range habitat features. *The Range Management Policy in Support of Woodland Caribou Conservation and Recovery* (RMP; MNRF 2014a) includes direction on integrating range conditions into activity review and assessment in the context of species and habitat protection under the ESA, which informs planning and decision making. It supports the preliminary screening phase and other elements of the ESA Submission Standards for Activity Review and 17(2)(c) Overall Benefit Permits (MNR 2012b).

The *Delineation of Woodland Caribou Range in Ontario* (MNRF 2014b) documents the delineation of 14 ranges (Continuous Distribution and the Delineation of the Discontinuous Distribution in Ontario). It includes a detailed description of the specific range boundaries. The *Integrated Assessment Protocol for Woodland Caribou Ranges in Ontario* (MNR 2013a) describes the process for conducting an Integrated Range Assessment and preparing an *Integrated Range Assessment Report* (IRAR). These reports document the data, analyses, interpretation and results, and they document the range conditions.

The *General Habitat Description for Woodland Caribou (Forest-dwelling boreal population) (Rangifer tarandus caribou)* (MNR 2013b) is a technical document that provides greater clarity on the area of habitat protected for Boreal Caribou based on the general habitat definition found in the ESA. It also indicates how the species' habitat has been categorized, as per the policy, *Categorizing and Protecting Habitat Under the Endangered Species Act* (MNR 2012b; MECP 2019a), and is based on the best scientific information available. The general habitat description (GHD) describes the entire range as habitat and categorizes the range into sub-range habitat features, including high-use areas, seasonal ranges and remaining areas within the range. Habitat categorization provides a framework for identifying which areas of habitat a species may tolerate changes to GHD categorization:

- Category 1 – Nursery areas, winter use areas, travel corridors;
- Category 2 – Seasonal ranges; and
- Category 3 – Remaining areas within the range.

The Project is located within the northern portion of the Churchill range and adjacent to the Berens and Kinloch ranges for Boreal Caribou (MNRF 2014c,d). The *Best Management Practices for Woodland Caribou in Ontario Series* describes techniques, methods or processes that can be applied to avoid or mitigate adverse effects, reduce threats to Boreal Caribou when planning or undertaking activities within a range and contribute to achieving the objective of the RMP. The *Best Management Practices for Mineral Exploration and Development Activities and Woodland Boreal Caribou in Ontario* (MECP 2020) is relevant to the Project.

2.2 Conservation Agreement for Boreal Caribou in Ontario

Canada and Ontario are acting on a shared commitment to Boreal Caribou conservation and recovery. The Agreement builds on Ontario's ongoing CCP and the federal Boreal Caribou action plan. The Agreement does not create any new legal powers or duties or alter the powers and duties established by the *Species at Risk Act*, the ESA or the *Crown Forest Sustainability Act*. This Agreement will support the implementation of

Conservation Measures, building on the base of existing management under Boreal Caribou Conservation Frameworks.

The following makes up Ontario's Boreal Caribou Conservation Framework:

- The ESA, CCP, RMP and GHD.
- The Forest Management Guide for Boreal Landscapes created under the *Crown Forest Sustainability Act*, which further includes the following:
    - Consideration of the IRAR and range condition;
    - Decision support tools (e.g., Ontario Landscape Tool), which used to assess and manage the amount and arrangement of Boreal Caribou habitat consistent with simulated ranges of natural variation; and
    - Managing Boreal Caribou sub-range habitat features (i.e., biophysical attributes such as calving areas).

The Canadian government commits to the following:

- Continue to implement the three pillars of the 2018 federal Action Plan for Boreal Caribou, including the assessment of critical habitat (biophysical attributes) and the maintenance of 65 percent (%) undisturbed habitat or show strong evidence of self-sustaining populations, validated by Environment and Climate Change Canada, from population data collected over an extended period of time.

2.3 2018 Federal Action Plan for Boreal Caribou (ECCC 2018)

Building on the Federal Recovery Strategy for Boreal Caribou (EC 2012), the federal government will continue to do its part to recover Boreal Caribou. It has developed the action plan to describe the federal government's contribution to the recovery efforts. It is a partial plan at this time since it does not address all the measures required by the *Species at Risk Act*. The *Species at Risk Act* requirements would be fulfilled as provinces and territories complete their range plans or similar documents, which can be adopted over time as subsequent action plans for the species.

400000 430000 460000 490000 520000 550000 580000 610000 640000 670000 700000 730000 760000 790000

5720000 5690000 5660000 5630000 5600000 5570000 5540000

BAT LAKE FIRST NATION

SLATE FALLS NATION

Mishkeegogamang First Nation

Red Lake

Ear Falls

Wabauskang First Nation

Lac Seul

Lac Seul First Nation

Asubpeechoseewagong Anishinabek First Nation

Sioux Lookout

Ojibway Nation of Saugeen

Arnstrong

P:\2021\Projects\ONS2104_FMG_Springpole_EIS\11_GIS\Terrestrial\Caribou\T2_Appendix\MXD_Maps\Spatial_Study_Areas_Delineation_3.mxd

LEGEND

- Proposed Mine Feature
- Local Study Area for Caribou
- Regional Study Area for Caribou
- Local Study Area for Bird/Bat
- Regional Study Area for Bird/Bat
- Local Study Area for Wolverine
- Regional Study Area for Wolverine
- Town
- First Nation Reserve
- Existing Road
- Existing Winter Road
- Existing Transmission Line
- Waterbody

NOTES:
- Topographic information extracted from LIO, NDMNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.

0 12.5 25 50 75 100 125 150 175 200 225 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

N W E S

First Mining Gold

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SPRINGPOLE GOLD PROJECT

Local and Regional Study Areas for SAR

PROJECT N°: ONS2104 | **FIGURE: 2-1**

SCALE: 1:1,000,000 | DATE: September 2024

3.0 SUMMARY OF ALTERNATIVES

This assessment broadly considers alternatives for the Project components as it relates to SAR habitat. This assessment differs from Section 4 (Alternatives Assessment) of the final EIS/EA, which provides consideration for both alternatives to the Proposed project and alternate methods of carrying out the proposed Project. The following alternatives to the Project were identified and are assessed in Section 4.4:

- Proceed with the Project in the near term as planned.
- Delay the Project until circumstances are more favourable.
- Abandon the Project (i.e., do nothing).

The MECP guidance document (2021a) requests consideration of a "do nothing" approach. Although the alternative of not proceeding and abandoning the Project (i.e., do nothing) does not meet the purpose of the Project or the questions in Section 4.1.1, it must be considered under the MECP policy for SAR. The do nothing alternative maintains the existing, baseline environmental conditions, and is used for comparison during the assessment of the alternative methods for the Project in Section 4.

The do nothing approach will always be preferred, as it does not impact SAR or their habitat. Still, the approach is not carried forward, as it does not meet the Project's primary purpose, which is to provide resources (gold) and economic benefit to the local, regional and Indigenous economies of northwestern Ontario. When evaluating alternatives, the preferred approach considers which alternative has less impacts on the SAR. Further requirements are stipulated by the MECP guidance document (2021a):

- Since the do nothing approach cannot be carried forward if the Project is to proceed, measures will have to be identified first to avoid any adverse effects, and in cases where there are no practicable or feasible alternatives, measures will need to be identified that minimize or mitigate the adverse effects (what will be implemented, when, where and how actions will be applied). Such measures may be general, site-specific or activity-specific.
- Proponents should describe the anticipated net effects after measures are applied. A discussion and comparison of the net effects for each alternative should be included (this is completed below via habitat impact areas).
- The advantages and disadvantages of each alternative method with respect to net effects on Boreal Caribou and Boreal Caribou habitat for the life cycle of the Project should be documented. The proponent should consider the potential need for ESA authorizations and associated costs when assessing advantages and disadvantages relating to each alternative. High costs associated with ESA permitting requirements may be disadvantageous to some proponents.
- Proponents should also describe how they plan to monitor the effectiveness of the impact management measures and the steps they plan to take should the impact management measures be found to be ineffective (Section 12).
- The preferred alternative is identified, and a detailed rationale is provided for selecting that alternative (this is provided in Section 4 of the final EIS/EA). The MECP (2021a) recognizes that the preferred alternative for the Project may not be the best alternative for SAR. The preferred alternatives in Section 4 were selected because they offered the best means of execution for the Project.

Open pit mining was assessed as the only feasible option for developing the ore body in the provincially approved Terms of Reference (Wood 2021). Open pit mining can occur only after dewatering a portion of the north basin of Springpole Lake, which requires the development of dikes to safely achieve this.

Section 4.6 of the final EIS/EA considers alternatives for dike placements. One of the Project's primary goals is minimizing the site surface area, while providing some flexibility for operational changes. The constraints posed by major site facilities, such as the open pit, co-disposal facility, process plant and ore stockpiles result in few viable alternatives for the siting of most of the other required components, given the preference to limit the overall site footprint and avoid waterbodies and watercourses, as practicable. As such, there are no alternative locations for many of the site buildings and facilities, and general infrastructure.

Various methods are theoretically available for liberating gold from gold-bearing ores, but only a limited number of alternatives are viable and proven commercially. Since the methods of gold harvest do not affect habitat loss, but their functional components do (e.g., tailings), only the functional components are considered.

Sections 3.1 to 3.10 provide a summary of the alternatives assessment completed for the Project, which is detailed in Section 4 of the final EIS/EA. The alternatives selected for the Project, provide the basis upon which the alternatives assessment for SAR has been completed (Section 4 of this document).

3.1 Site Access and Mine Access Road

The Project site is remote, and there is no permanent land access. The closest existing road to the site is the Wenasaga Road, which comes within approximately 18 km of the Project site. The Wenasaga Road is a publicly owned road used mostly for regional forestry activities. The Project site is accessible only by floatplane during the open water season and by ice road for a short period of time in the winter. An all-season access road is required to access the Project site and will connect to the existing regional road network. In addition, an airstrip would be co-located along the mine access road to transport personnel and equipment to the site less frequently. Development of the airstrip and the proposed helicopter pad would also support faster emergency response, which is important for a more remote operation. Co-locating the airstrip with the site mine access road will minimize additional footprint expansion and potential environmental effects.

The general design assumption for the mine access road was that waterbodies should be avoided, as feasible, a flatter topography and straight site lines are preferred for safety reasons, and a shorter distance is generally preferred, to minimize overall terrestrial disturbance (Section 4.19 of the final EIS/EA).

Four viable alternative routes for the mine access road were identified for detailed review (Figure 3-1):

- Alternative 1: northwest from the end of Wenasaga Road to the site;
- Alternative 3: northwest from Wenasaga Road, along the northern shore of Seagrave Lake to the western end of Springpole Lake and north to the site;
- Alternative 4: west option from a minor road off the Wenasaga Road; and
- Alternative 5: northwest from the end of the Wenasaga Road to the site, closer to the southeast arm of Springpole Lake.

A two-lane all-season gravel mine access road that connects to the regional road network will be the primary method of accessing the Project. A cleared corridor, 20 metres (m) wide, has been assumed, which is considered conservative. The mine access road will be decommissioned when no longer needed to support final reclamation, long-term management and environmental monitoring, assuming that the roads are no longer required to support any developments on site or local needs.

3.2 Power Supply and Transmission Line

Power will be required during all phases of the Project. The site is not currently connected to the provincial electrical grid, and the existing regional electrical grid has some capacity limitations. Two primary transmission lines cross, or are proposed to cross, the region: the existing E1C 115 kilovolt (kV) transmission line owned by Hydro One Networks Inc. (located approximately 26 km south of the site) and the Wataynikaneyap Power 230 kV transmission line (located approximately 73 km south of the site). Four power supply alternatives were identified: connection to the regional electrical grid, onsite diesel generation, wind turbines and solar panel farms. The preferred and selected alternative for power supply is a connection to the regional electrical grid and temporary onsite diesel generation, as this is the only alternative that can effectively service the primary power needs of the Project (Section 4.24 of the final EIS/EA).

Four alternative routes (Figure 3-2) were identified to connect the Project site to the Wataynikaneyap Power 230 kV transmission line (Section 4.25). All four alternatives are located near the preferred mine access road alternative and Wenasaga Road for the northern portion, which eases construction and helps limit the number of new infrastructure corridors:

- Alternative 1 follows primarily along the proposed mine access road to the E1C line, continuing parallel to the existing E1C line for the majority of the remaining length.
- Alternative 2 follows primarily along the proposed mine access road to the E1C line, parallelling the E1C line part way but diverting southeast to avoid Slate Falls Nation Reserve.
- Alternative 3 follows primarily along the proposed mine access road to the E1C line, parallelling the E1C line part way but diverting south and then east to avoid Slate Falls Nation Reserve near the Slate Falls Road.
- Alternative 4 follows primarily along the proposed mine access road part of the way to the E1C line, diverting southwest to avoid some of the classified habitat for Boreal Caribou crossed by the E1C line to continue near Slate Falls Road.

The transmission line is expected to be established within a 40 m wide corridor. Additional clearing of corridor width may be required at turning points or where pole anchors are needed, such as in poor ground conditions as well as for temporary laydown area(s) and access roads. Work such as vegetation clearing may also occur during the late summer and early fall on higher ground—in areas of good accessibility. The transmission line is expected to be constructed primarily in the winter from temporary winter roads, avoiding sensitive periods for wildlife. The incoming electrical power from the 230 kV transmission line will be stepped down in an onsite substation for site distribution.

Alternative 1 has been identified as the preferred and selected route. It has the advantage of having the greatest length adjacent to the existing E1C transmission line. Alternative 3 has the shortest overall length, but it was not selected based on consultation and engagement with Slate Falls Nation members, who prefer the potential to reinforce the existing power infrastructure to the community.

3.3 Mine Rock Storage Locations

Mine rock is the primary mineral waste that results from open pit mining at the Project. Apart from environmental siting constraints, the most critical aspect when selecting a suitable surface storage location for mine rock is the haul distance from the open pit. Two potential locations (Figure 3-3) were identified for the storage of mine rock that met the requirements of being practicable, financially realistic and economically viable: west of the open pit (Alternative 1; 371 ha) or east of Springpole Lake (Alternative 2; 470 ha).

Alternative 1 is the preferred and selected alternative, as it has a more compact overall site footprint and, therefore, it also provides efficiency by requiring less infrastructure, such as haul road length, and fewer mine trucks. It offers comparative environmental benefit by creating less disturbance, dust and emissions, and offering cost savings for the operation (Section 4.5 of the final EIS/EA) .

3.4 Tailings Storage Location

Tailings produced from ore processing within the process plant are proposed to be stored in an on-surface containment facility. Tailings can be transported a greater distance than mine rock and retain economic feasibility, so eight potential tailings storage locations were initially identified (Figure 3-4). Three potential tailings storage locations were identified as preferred alternatives (Alternatives 1, 2 and 4); however, Alternatives 1 and 2 are closer to the open pit for construction materials and the process plant for tailings transport. Alternative 1 was selected as the preferred alternative, as it maintains a minimum setback of 120 m from Springpole Lake and Birch Lake (Section 4.6 of the final EIS/EA).

3.5 Mine Rock and Tailings Storage Strategy

The mine rock and tailings storage methods (Section 4.7 of the final EIS/EA), technologies (Section 4.8 of the final EIS/EA) and strategy (Section 4.9 of the final EIS/EA) were evaluated separately in the final EIS/EA. These Project components are not evaluated in this document; rather, they are summarized here to explain their use, as the mine rock storage and tailings storage alternatives use the same areas (i.e., their impact areas are the same). The method selected for mine rock and storage methods is co-disposal (Alternative 1), as it provides the most compact Project footprint, the best mitigation for metal leaching and acid rock and operational ease. The tailings technology selected is a combination of Alternative 1 (conventional slurry tailings) and Alternative 2 (thickened tailings).

Approximately 78 million cubic megametres (Mm^3) of tailings will be produced by the process plant over the life of the mine. The preferred strategy is to produce two tailings streams to best manage the potential for acid generation from the tailings in the long term: a thickened non-acid generating tailings (80% by mass) and a conventional slurry potentially acid generating tailings (20% by mass.) By thickening 80% of the tailings and co-mingling the non-acid generating thickened tailings with mine rock, a relatively small portion (20% by mass) of conventional slurry tailings remain for management. The co-disposal facility will have a total surface area of approximately 380 ha and a final average height of approximately 77 m. An internal dike will separate the north and south cell. The north cell will store all potentially acid generating mine rock and non-acid generating thickened tailings. The south cell will store potentially acid generating conventional slurry tailings in a saturated state to mitigate acid generation.

3.6 Ore Stockpile Location

Ore stockpiles are necessary to allow the blending of different ores to optimize recovery, to allow mining to continue when the process plant is undergoing maintenance, and for processing to continue when mining is temporarily halted (e.g., during blasts or poor weather conditions). The open pit will produce three types of ore: high grade, mid grade and low grade. Two surface stockpiles are required: a high / midgrade ore stockpile and a low grade ore stockpile.

To minimize the Project's overall footprint, the fish habitat development area will store high / mid grade ore, which will be consumed at the end of operations. This location is adjacent to the process plant, providing operational efficiency and reduced haulage costs. Other high / mid grade ore locations would not provide equivalent environmental benefits; therefore, no alternative locations are proposed. This high / mid grade stockpile is confined to its location, so it is not evaluated below.

Two alternative locations for low grade ore storage were identified and deemed viable (Figure 3-5) for providing the needed footprint (Section 4.11 of the final EIS/EA). Alternative 1 is adjacent to and north of the process plant, and Alternative 2 is between the fish habitat development area and the mine access road. Ultimately, to take advantage of the best characteristics of both locations, smaller stockpiles at both Alternative 1 (placement of the low grade ore stockpile adjacent to the process plant) and Alternative 2 (placement of high/mid grade ore between the fish habitat development area and the mine access road) locations were selected.

3.7 Water Supply Location

A water supply is required for onsite uses, including process water, potable water and miscellaneous uses such as dust control and vehicle washing, as well as for the accommodations complex (potable water and other domestic uses). The Project proposes to re-use and recycle waters captured within the water management system to minimize requirements; however, freshwater will be required.

Three alternative sources were considered for the required Project water supply (Section 4.15 of the final EIS/EA):

- Alternative 1: Birch Lake;
- Alternative 2: Springpole Lake; and
- Alternative 3: groundwater wells.

Alternative 1, Birch Lake, is preferred, as it is closest to the process plant, the primary water user. This results in a shorter pipeline that is easier and less costly to build and operate (lower pumping and energy requirements). Vegetation clearing will be required to install a pipeline and access road to the intake location; however, the infrastructure will generally be within the footprint of the overall Project.

3.8 Site Water Management / Central Water Storage Pond

The primary objectives of the Project site water management system are to meet regulatory requirements for discharge and facilitate water recycling to limit freshwater requirements. A primary component of the integrated site water management system is the central water storage pond. The central water storage pond will act as the ultimate collection point for all contact water requiring treatment and provide make-up water to the process plant, as needed. Excess water will be pumped to the effluent treatment plant for treatment and subsequent discharge to the environment in accordance with applicable regulatory requirements. The requirements for water management are a function of natural topography and watersheds, mine site layout and specific water management requirements related to waters that come into contact with mining facilities. The central water storage pond location must be within a reasonable distance of the facilities it serves to collect contact water (e.g., to allow gravity drainage, where possible, and minimize pumping distance and head). Four alternative locations are potentially available for the central water storage pond Figure 3-6:

- Alternative W1: unnamed lake L-2 (12.7 ha);
- Alternative W2: unnamed lake L-19 (16.7 ha);
- Alternative W3: adjacent to the low grade ore stockpile (11.0 ha); and
- Alternative W4: adjacent to the mine access road and surficial soil stockpile (21.5 ha).

Alternative W1 is the preferred alternative for the central water storage pond location. It is central to the Project site for optimal efficiency and reduced environmental effects.

3.9 Treated Effluent Discharge Location

Even with the proposed internal water recycling, excess water in the integrated water management system will require discharge to the environment. The effluent will be treated to meet applicable federal and provincial effluent discharge requirements and protect the receiving water aquatic life. Alternative locations considered for the discharge of treated excess waters from the integrated water management system include locations in the following waterbodies:

- Alternative 1: Birch Lake;
- Alternative 2: north basin of Springpole Lake; and
- Alternative 3: southeast arm of Springpole Lake.

The preferred water discharge alternative is Alternative 3, which discharges to the southeast arm of Springpole Lake (Section 4.17 of the final EIS/EA). This location offers the greatest natural effluent mixing and attenuation, similar to a river, as well as the highest overall watershed / catchment area and resultant overall assimilative capacity.

3.10 Aggregate Source Location

Most of the aggregate required to develop the Project will be inert mine rock produced incidentally from ore extraction. However, it can be difficult to produce aggregate for concrete and other strictly defined applications from mine rock. As there are no commercial aggregate operations located close to the Project site, three aggregate locations were identified (Figure 3-7). Note that insufficient detailed field information is available regarding the subsurface conditions for selecting a single preferred aggregate source. Therefore, both Alternatives 1 and 2 have been carried, as there is the potential that both locations will be developed for different uses. Alternative 3 is not considered viable except for a specialized aggregate type if the required material cannot be obtained from Alternatives 1 or 2.

These are the potentially viable alternatives for aggregate:

- Alternative 1: north of the southeast arm of Springpole Lake (JP17a, JP17b, JP18);
- Alternative 2: off Wenasaga Road (north; JP10, JP11, JP12, JP13); and
- Alternative 3: off Wenasaga Road (south; JP1).

Alternative 3 Wenasaga Road (south; JP1), is distant from both the mine access road and Project site and is not considered viable. Both Alternatives 1 and 2 are considered viable options.

545000 550000 555000 560000 565000

5700000 5695000 5690000 5685000 5680000 5675000 5670000

Joneston Lake
Casummit Lake
Penson Lake
Keigat Creek
Birch Lake
Keigat Lake
L-19
Dole Lake
L-20
L-16
Durkin Lake
L-10
Springpole Lake (North Basin)
L-11
L-13
L-14
Alternative 1
Alternative 5
Springpole Lake (Southeast Arm)
Birch River
Satterly Lake
Cromarty Lake
Alternative 3
Superstition Lake
Graydarl Lake
Seagrave Lake
Skingle Lake
Bertha Lake
Alternative 4
Wenasaga Road
Ruddy Lake
Deaddog Lake
Argosy Lake
Cavano Lake
Bumpy Lake
Christina Lake
Cook Lake
Marsh Lake
Hailstone Lake
Sesikinaga River
Margaret Lake
Costello Lake
Latreille Lake
Sesikinaga Lake

LEGEND

- Proposed Mine Feature
- Existing Road
- Watercourse
- Waterbody
- Contour (10 m intervals)

Mine Access Road Route Alternatives

- Alternative 1 (17.7 km)
- Alternative 3 (28.1 km)
- Alternative 4 (28.2 km)
- Alternative 5 (18.6 km)

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.

0 1 2 4 6 8 10 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

N W E S

First Mining Gold

WSP

SPRINGPOLE GOLD PROJECT

Mine Access Road Route Alternatives

PROJECT N°: ONS2104 | **FIGURE: 3-1**

SCALE: 1:102,000 | DATE: October 2024

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520000 540000 560000 580000 600000 620000 640000

5680000

5660000

5640000

SPRINGPOLE GOLD PROJECT

Alternative 1

Alternative 2

Alternative 3

Alternative 4

SLATE FALLS NATION

Ear Falls to Pickle Lake (E1C)

Wataynikaneyap Transmission Line

Keigat Lake
Zionz Lake
Birch Lake
Springpole Lake
Cluderay Lake
Fawcett Lake
Obaskaka River
Strout Lake
Dorothy Lake
Muskegsagagen Lake
Wright Lake
Nabemakoseka Lake
Shabumeni Lake
Gull Lake
Superstition Lake
Seagrave Lake
Scanes Lake
Kezik Lake
Graniteboss Lake
Jacknife Lake
Mousetrap Lake
Grace Lake
Bertha Lake
Deaddog Lake
Ruddy Lake
Christina Lake
Strachan Lake
Fry Lake
Washagomis Lake
Bumpy Lake
Fawthrop Lake
Woman Lake
Narrow Lake
Hailstone Lake
Senior Lake
Wesleyan Lake
Teevin Lake
Okanse Lake
Cook Lake
Drum Lake
Mukukee Lake
Philchub Lake
Found Lake
Margaret Lake
Latreille Lake
North Bamaji Lake
Woman River
Perrigo Lake
Sesikinaga Lake
Bamaji Lake
Austin Lake
Honderich Lake
Pembina Lake
Rowe Lake
Confederation Lake
Snelgrove Lake
One Island Lake
Jeanette Lake
Brokenmouth River
Coyston Lake
Roadhouse Lake
Blackstone Lake
Fly Lake
Drake Lake
Wakeman Lake
Polzin Lake
Buddell Lake
Dalgas Lake
Jubilee Lake
Fly Creek
Lake St. Joseph
Slate Lake
Curie Lake
Kesaka Lake
Roadhouse River
Ben Lake
Lower Slate Lake
Avis Lake
Trist Lake
Badrock Lake
Papaonga Lake
Root Lake
Ogani Lake
Whitemud Lake
Sharp Lake
Otatakan Lake
Polka Lake
Churchill Lake

X:\CAD\OAK300-OAK\MIS-FS1-Project\F2021\Projects\ONS2104_FMG_Springpole_EIS\11_GIS\EIS\MXD\Transmission_Line_Alternative_6.mxd

LEGEND

- Proposed Mine Feature
- Existing Road
- Winter Road
- Existing Transmission Line
- First Nation Reserve
- Watercourse
- Waterbody

230 kV Transmission Line Route Alternatives

- Alternative 1 (93.9 km)
- Alternative 2 (100.5 km)
- Alternative 3 (88.9 km)
- Alternative 4 (114.4 km)

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- 230 kV transmission line provided by First Mining Gold, April 2024.

FIRST MINING GOLD

WSP

SPRINGPOLE GOLD PROJECT

Transmission Line Alternatives

Datum: NAD83
Projection: UTM Zone 15N

N W E S

0 10 20 40 60 80 100 Kilometres

PROJECT N°: ONS2104 | **FIGURE: 3-2**

SCALE: 1:325,000 | DATE: July 2024

546000 548000 550000 552000 554000 556000

5694000

5692000

5690000

Birch Lake

Birch Lake

Birch Lake

L-18

L-17

L-1

L-2

L-19

Alternative1
West of Open Pit

L-3

L-4

L-5

L-6

L-16

Dole Lake

L-20

Springpole Lake
(North Basin)

Alternative 2
East of Springpole Lake

L-10

L-12

L-11

L-13

L-14

X:\CA\CAOAK300-OAK\MS-FS1-Project\P2021\Projects\ONS2104_FMG_Springpole_EIS\11_GIS\EIS\MXD\MineRock_Alternatives_4.mxd

LEGEND

- Open Pit Basin
- Watercourse
- Waterbody
- Contour (10 m intervals)

Mine Rock Storage Location Alternatives

- Alternative 1 West of Open Pit (371.0 ha)
- Alternative 2 East of Springpole Lake (470.0 ha)

NOTES:
- Topographic information extracted from LIO, MNRF.

0 0.5 1 2 3 4 5 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

N W E S

First Mining Gold

wsp

SPRINGPOLE GOLD PROJECT

Mine Rock Storage Location Alternatives

PROJECT N°: ONS2104 | **FIGURE: 3-3**

SCALE: 1:32,000 | DATE: July 2024

542500 545000 547500 550000 552500 555000 557500 560000 562500 565000 567500

5695000 5692500 5690000 5687500 5685000 5682500

5-km 7-km 10-km 13-km 17-km

Alternative 1 Alternative 2 Alternative 3 Alternative 4 Alternative 5 Alternative 6 Alternative 7 Alternative 8

L-1 L-2 L-3 L-4 L-5 L-6 L-10 L-11 L-12 L-14 L-16 L-18 L-19 L-20

Birch Lake Dole Lake Springpole Lake (North Basin) Springpole Lake (Southeast Arm) Durkin Lake Birch River Cromarty Lake Satterly Lake Bertha Lake Seagrave Lake

X:\CA\CA\OAK300-OAK\MIS-FS1-Project\P2021\Projects\ONS2104_FMG_Springpole_EIS\11_GIS\EIS\MXD\Tailings_Alternatives_4.mxd

LEGEND

- Open Pit Basin
- Distance Buffer from Project Location (labelled on map)
- Watercourse
- Waterbody
- Contour (10 m intervals)

Tailings Storage Location Alternatives

- Alternative 1 (371.0 ha)
- Alternative 2 (470.0 ha)
- Alternative 3 (312.1 ha)
- Alternative 4 (377.1 ha)
- Alternative 5 (413.6 ha)
- Alternative 6 (472.3 ha)
- Alternative 7 (542.4 ha)
- Alternative 8 (460.4 ha)

0 1 2 4 6 8 10 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.

FIRST MINING GOLD

wsp

SPRINGPOLE GOLD PROJECT

Tailings Storage Location Alternatives

Datum: NAD83
Projection: UTM Zone 15N

N W E S

PROJECT N°: ONS2104 | **FIGURE: 3-4**

SCALE: 1:68,000 | DATE: July 2024

546000 547000 548000 549000 550000 551000 552000

5695000 5694000 5693000 5692000

Birch Lake
Birch Lake
Dole Lake
L-1
L-2
L-19
L-20
L-16
Springpole Lake (North Basin)
Springpole Lake (North Basin)

Alternative 1 Adjacent to Process Plant

Alternative 2 Adjacent to Mine Access Road

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LEGEND

- Proposed Mine Feature
- Watercourse
- Waterbody
- Contours (5 m interval)

Ore Stockpile Location Alternatives

- Alternative 1 Adjacent to Process Plant (50.1 ha)
- Alternative 2 Adjacent to Mine Access Road (50.5 ha)

NOTES:
- Contours extracted from 2020 LiDAR survey.

0 0.5 1 2 3 4 5 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

N W E S

First Mining Gold

wsp

SPRINGPOLE GOLD PROJECT

Ore Stockpile Location Alternatives

PROJECT N°: ONS2104 | **FIGURE: 3-5**

SCALE: 1:17,000 | DATE: July 2024

546000 547000 548000 549000 550000 551000 552000 553000

5695000 5694000 5693000 5692000

Birch Lake

Birch Lake

Alternative W3

L-1

L-19 Alternative W2

Dole Lake

L-2 Alternative W1

Alternative W4

L-20

Springpole Lake (North Basin)

Springpole Lake (North Basin)

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LEGEND

- Proposed Mine Feature
- Proposed 230 kV Transmission Line
- Watercourse
- Waterbody
- Contours (5 m interval)

Central Water Storage Pond Alternatives

- Alternative Site W1 (12.7 ha)
- Alternative Site W2 (16.7 ha)
- Alternative Site W3 (11.0 ha)
- Alternative Site W4 (21.5 ha)

NOTES:
- Contours extracted from 2020 LiDAR survey.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- 230 kV transmission line provided by First Mining Gold, April 2024.

0 0.5 1 2 3 4 5 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

N W E S

First Mining Gold

wsp

SPRINGPOLE GOLD PROJECT

Central Water Supply Location Alternatives

PROJECT N°: ONS2104

FIGURE: 3-6

SCALE: 1:17,000

DATE: July 2024

550000 555000 560000 565000

5700000 5695000 5690000 5685000 5680000 5675000

Birch Lake
Keigat Creek
Keigat Lake
L-19
Dole Lake
L-20
L-16
Springpole Lake (North Basin)
L-10
L-12
L-11
L-13
Durkin Lake
Location 1
North of Southeast
Arm of Springpole Lake
Springpole Lake (Southeast Arm)
Birch River
Cromarty Lake
Satterly Lake
Location 2
Off Wenasaga
Road (North)
Graydarl Lake
Seagrave Lake
Skingle Lake
Bertha Lake
Wenasaga
Forestry Road
Gull Lake
Deaddog Lake
Ruddy Lake
Bumpy Lake
Christina Lake
Hailstone Creek
Location 3
Off Wenasaga
Road (South)
Hailstone Lake
Marsh Lake
Sesikinaga River

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LEGEND

- Proposed Mine Feature
- Proposed 230 kV Transmission Line
- Existing Road
- Watercourse
- Waterbody
- Contour (10 m intervals)

Sand and Gravel Resource Area

- Location 1 North of Southeast Arm of Springpole Lake (32.3 ha)
- Location 2 Off Wenasaga Road (North) (51.9 ha)
- Location 3 Off Wenasaga Road (South) (9.5 ha)

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- 230 kV transmission line provided by First Mining Gold, April 2024.

0 1 2 4 6 8 10 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

N W E S

First Mining Gold

WSP

SPRINGPOLE GOLD PROJECT

Aggregate Source Location Alternatives

PROJECT N°: ONS2104

FIGURE: 3-7

SCALE: 1:81,000

DATE: July 2024

4.0 ASSESSMENT AND EVALUATION OF ALTERNATIVES ON SPECIES AT RISK

The following criteria and indicators are included in the EA to address the MECP's legislative and policy framework (MECP 2021a). Two criteria are considered, aligned with Sections 9 and 10 of the ESA: habitat and individuals.

Species habitat criteria can use the indicator of impacts to Category 1, 2 and 3 habitats. The rationale behind GHD use is that Category 1 habitats have the lowest tolerance to alteration, Category 2 habitats have a moderate tolerance to alteration and Category 3 habitats have the highest tolerance to alteration. Both direct (e.g., habitat removal) and indirect (e.g., habitat fragmentation) impacts have been assessed for each alternative. Only two species presented here have GHDs: Boreal Caribou and Eastern Whip-poor-will (MECP 2021b, 2017). For species without provincially authored GHDs, habitat suitability mapping has been developed and used to estimate habitat impacts. Of note is that only the preferred option (the Project Development Area [PDA]) has indirect effects modelling. The LSA is used to estimate the area of indirect impacts for non-preferred alternatives.

The species individuals' criteria are the indicators of impacts on the species. The rationale is that both direct (e.g., unavoidable killing) and indirect (e.g., increased threats to mortality) impacts on individuals of the species have been assessed for each alternative. The impact on individuals is predicted to be the same regardless of the alternative; for example, all mine access road options will increase mortality risk. Therefore, the qualitative impacts on individuals for the alternatives are the same as the preferred EA sections.

4.1 Boreal Caribou

Boreal Caribou are listed provincially as Threatened and consequently receives species protection under Section 9 and general habitat protection under Section 10 of the ESA. Multiple methods are used to quantify the abundance, distribution and life stages of Boreal Caribou, their habitat and their predators within the RSA. Winter aerial surveys were completed in 2021, 2022, 2023 and 2024. Satellite telemetry collaring occurred from February 3 to 6, 2023. A total of 50 Telonics global positioning system satellite iridium collars (model TGW-4670 4) equipped with a CR-5A collar release mechanism were deployed on adult female Boreal Caribou. Collars were deployed in the Churchill (n = 19), Kinloch (n = 15) and Berens (n = 16) ranges. The Terrestrial Baseline Report (Appendix P of the EIS/EA) provides a detailed description of field methods. The final EIS/EA Section 6.13 discusses survey methods, results and assessment.

Multiple scales of assessment for Boreal Caribou populations and habitats were applied. Local scales are represented by the PDA, and LSA (Figure 4-1). In addition, Environment Canada (EC 2011) concluded that a modified 500 m buffer of total disturbance (PDA+500m buffer) was the best conservative choice to account for the direct and indirect effects of total disturbance on local Boreal Caribou population calf recruitment and population growth (λ), with the acknowledgment that there can be regional variation in response thresholds for local Boreal Caribou populations (EC 2012; CBFA 2016). To account for potential indirect effects to habitat, a 500 m buffer around the PDA was included (Figure 4-1), per ECCC (2020). Regional Study Area (RSA) scales include the Churchill Range (Habitat RSA) as well as a Population RSA composed of Berens, Kinloch and Churchill Ranges (Figure 4-2). Habitat disturbance assessments for Project alternatives were based on the federal disturbance management threshold.

4.1.1 Criteria and Indicators

This section summarizes the indicators and measurable parameters per the MECP guidance (2021a) for undertaking the alternatives effects assessment on Boreal Caribou. These parameters were carried forward in the final EIS/EA Section 6.13.

4.1.2 Alternatives Analysis Methods

The alternatives were ranked as "favoured," "moderately favoured" and "not favoured." Favoured indicates minimal habitat loss and no fragmentation compared to not favoured, which means maximum habitat loss or intrusive fragmentation. Habitat effects across all indicators are summarized in Table 4-2, Table 4-3 and Table 4-4. More detailed tables relative to each habitat impact analysis are provided in Attachment 1 (Table A-1, Table A-2, Table A-3 and Table A-4). Table 4-5 and Table 4-6 provide details pertaining to demographic results relative to each alternative.

4.1.2.1 Habitat Effects: Direct and Indirect

Boreal Caribou habitat within Churchill Range was modelled using multiple approaches (Figure 4-5, Figure 4-6, Figure 4-7, Figure 4-8). The Province has developed habitat models for Boreal Caribou that identify the distribution of key habitats within a given range (Elkie et al. 2013; Hornseth and Rempel 2016) and these models were used to quantify the distribution of Boreal Caribou habitats for this assessment:

- North–West Ontario Boreal Caribou Refuge Habitat Model (Elkie et al. 2013); and
- Classified General Habitat Description for Boreal Caribou (Hornseth and Rempel 2016).

In addition to the provincial models (Elkie et al. 2013; Hornseth and Rempel 2016), a suite of Resource Selection Probability Function (RSPF) Nursery and Calving models, as well as movement models, were also developed with recent satellite telemetry data and aerial survey monitoring results. RSPF models were developed using the satellite telemetry data to identify the distribution of potential calving areas within the Churchill Range based on the habitat selection behaviour displayed by the collared cows (Appendix B) and integrated with the RSPF developed by Rempel and Hornseth (2018) to determine the extent to which it predicted the Provincial Spring RSPF (Appendix C). All models used the updated Forest Resource Inventory (FRI) and disturbance data obtained from the Province in September 2023. In addition, one of the Calving RSPF models (Appendix C) was developed with data recently made available by the Provincial Impact Assessment Model:

- **Category 1**—Sub-range habitat features and high-use areas that exhibit repeated intensive use by individual Boreal Caribou or groups (e.g., nursery areas, winter use areas, travel corridors), often over multiple years. Figure 4-6 illustrates Category 1 calving and nursery habitats at the Habitat RSA and Population RSA scales relative to Project alternatives. Figure 4-7 illustrates Category 1 winter habitats at the Habitat RSA and Population RSA scales relative to Project alternatives.
- **Category 2**—Seasonal ranges—i.e., large sub-range habitat features or areas (>100 square kilometre [km^2] interconnected patches) of mature (>40- to 60-year-old Jack Pine and/or Black Spruce) stands used across multiple years, which delineate the majority of current Boreal Caribou distribution within a range. Category 2 habitats were produced based on Appendix A and are illustrated in Figure 4-8.
- **Category 3**—Remaining areas within the range that show high tolerance to alteration before the function is compromised. This category has biophysical features and forest composition consistent with seasonal ranges, but that are currently young (e.g., regenerating burn <40 years old). Category 3 habitats were produced based on Appendix A and are illustrated in Figure 4-8.

In addition to the GHD mapping, the provincial Boreal Caribou habitat strategy also quantifies mature coniferous and refuge habitat areas (Elkie et al. 2013) using the Conventional North-West Caribou Refuge Habitat Model (MNRF 2014e; Figure 4-9) as inputs into the Dynamic Caribou Habitat Strategy framework (MNRF 2014f). The forest unit, species composition and forest age are assessed for refuge and/or mature coniferous habitat suitability. The North-West Caribou Refuge Habitat Model distributions in the LSA and

portions of the Habitat RSA were recreated using existing provincial models and used to quantify the current distribution of refuge habitat for Boreal Caribou for baseline assessment input (Figure 4-9).

To quantify the direct effects of removing habitat, resultant habitat maps were overlaid with the alternatives, and the removal areas were calculated. The overlap between modelled habitat and Project alternatives was calculated using the simple features (sf) package in R v 4.3.2. When it was necessary to subtract the area of one feature from another, the "st_difference" function was used. The shared spatial geometry of any two features was determined using the "st_intersection" function. The area of the resulting intersection was then calculated in square kilometres.

In addition, Category 2 and Category 3 RSPF models were run with the preferred and alternative options to assess the extent to which each option contributed to the fragmentation of GHD Category 2 habitat (Appendix A).

Areas adjacent to the PDA may experience indirect effects, such as fugitive dust emissions, edge effects (e.g., increased light, wind or dust at the edge of cleared areas), altered vegetative growth from edge effects (e.g., increased density, increased shrub production) noise disturbance and changes in environmental conditions due to adjacent ground disturbance. Sensory disturbance (noise, movement and altered cover) is the main driver of impaired wildlife habitat function. Non-lethal human disturbance can affect Boreal Caribou behaviour (movements and habitat selection) and mortality risk because of trade-offs between avoiding perceived risk and other fitness-enhancing activities such as resource use, foraging, predator avoidance, reproduction and parental care. Prey species have evolved anti-predator responses to threatening stimuli such as loud noises and rapidly approaching objects; therefore, they perceive human-caused noise and movement as a form of predation risk (Frid and Dill 2002).

Environment Canada (EC 2011) concluded that a modified 500 m buffer of total disturbance was the best conservative choice to account for the direct and indirect effects of total disturbance on local Boreal Caribou population calf recruitment and population growth rate (λ), with the acknowledgment that there can be regional variation in response thresholds for local Boreal Caribou populations (EC 2012; CBFA 2016). Therefore, indirect habitat impacts were calculated using a 500 m buffer around the Project footprint as per Environment and Climate Change Canada (ECCC) (2020). Like the direct effects, indirect effects can be conservatively accounted for by overlaying habitat mapping and calculating the potentially affected area.

4.1.2.2 Habitat Effects: Landscape Fragmentation

The best available Boreal Caribou habitat is defined as "areas of suitable habitat within a given range where the probability of Caribou persistence is enhanced" (Antoniuk et al. 2012). To evaluate the probability of the alternatives impacting connectivity, mean patch size, edge density and total edge were calculated using the results from the North-West Caribou Refuge Habitat Model (Figure 4-11 and Figure 4-12).

- **Mean Patch Size**—The average patch size of contiguous habitat within a landscape. Fragmentation of Boreal Caribou habitat decreases when the mean patch size increases. Therefore, reductions in mean patch size should be avoided to the extent possible to reduce impacts on Boreal Caribou.
- **Edge Density**—Length of edge per hectare for the landscape. Fragmentation of Boreal Caribou habitat decreases when the edge density decreases. Therefore, increases in edge density should be avoided to the extent possible to reduce impacts on Boreal Caribou.
- **Total Edge:** Total length of edge for the landscape. Fragmentation of the Boreal Caribou habitat decreases when the total edge decreases. Therefore, increases in total edge density should be avoided to the extent possible to reduce impacts.

Table 4-3 and Table 4-4, summarize the change in available Boreal Caribou refuge habitat from baseline state to post-development state for each alternative. Attachment 1, Table A- 1 provides additional detail pertaining to the habitat refuge results. All development alternatives resulted in lower total edge relative to baseline, with scoring in the middle of the range of changes and resulting in a 0.39%.decrease of total edge relative to baseline. Overall, the preferred alternative is the least obtrusive to Boreal Caribou refuge habitat, particularly when considering that 62.1% of transmission line 1 would be parallel to a legacy transmission line disturbance.

Movement Behaviour and Landscape Connectivity

Provincial satellite telemetry data and kernels of individual seasonal core use areas (wintering and calving / nursery) from all three local populations (Berens, Churchill and Kinloch ranges) were acquired from the MECP. This telemetry and kernel dataset represents all collared adult females that could potentially interact with the PDA, including Boreal Caribou from Berens, Churchill and Kinloch Ranges who chose to over-winter or calve within the 20 to 40 km buffer of the Project. In addition, satellite telemetry collars were deployed on 50 adult cows in February 2023. All recent and MECP telemetry data have been integrated into the analysis.

Barrier and movement effects were assessed using several methods: (1) KDE+ Activity Analysis, (2) Brownian Bridge Movement Models and (3) Circuitscape Landscape Connectivity Models.

1) **Activity Analysis: Kernel Density Estimation (KDE+) Method** Satellite telemetry data obtained through a data-sharing agreement with the MECP, as well as a recent telemetry study (February 2023 to June 2024), were used to identify potential activity areas (clusters of movement activity of Boreal Caribou movements using the KDE+ method [Bil et al. 2013, 2016]). A 100 m default bandwidth was used for KDE+ analyses to account for the spatial accuracy of the data and to avoid over-smoothing the output results in identifying activity areas. The Monte Carlo method of repeated random simulations (n = 800 simulations) was then conducted to generate cluster identification thresholds to assess the significance of activity areas (defined as clusters above the 95th percentile level) identified using the KDE+ method (Bil et al. 2013, 2016). These locations were overlaid with the PDA, and potential locations where Project components may interact with Boreal Caribou movement and habitat connectivity were identified for each alternative (Figure 4-13 and Figure 4-14; Table 4-3, Attachment 1 – Table A- 2).

    - **Assessment of mine access road alternatives** indicates that mine access road 5, which traverses the north edge of Springpole Lake, was the least obtrusive relative to Boreal Caribou movements, followed by mine access road 1 (the preferred alternative); the remaining mine access road alternatives resulted in more activity area conflicts (Figure 4-13, Table 4-3). There is a cluster of activity areas along mine access road 1 on the portion of the alignment that is north of Springpole Lake.
        - Mine access road 3 has multiple activity areas on either side of the crossing over Springpole Lake.
        - Mine access road 4 activity areas are all clusters at the northern end where it connects to the mine site.
        - Mine access road 5 did not have any significant activity areas along its length based on recent telemetry data analyses.

In summary, mine access road 1 has significantly fewer Boreal Caribou activity area crossings and a smaller extent of area affected compared to mine access road 3 and mine access road 4 (Table 4-3, Table 4-4, Figure 4-13) and is, therefore, considered the least obtrusive on local scale Boreal Caribou movements within the affected Category 1 calving / nursery polygon. Mine access road 5 did not have any activity areas

crossings identified, but it is not a favoured alternative because of effects on traditional land uses and engineering constraints.

- **Assessment of transmission line alternatives** (Figure 4-14, Table 4-4) indicates that transmission line 4 had the fewest activity areas but the longest length of new disturbance. Transmission line 3 had the most activity areas, followed by transmission line 1 (the preferred alternative). Transmission line 1 shared similar activity area locations (west of Slate Falls First Nation) with transmission line 2 and transmission line 3. It is important to note that transmission line 1 is the second shortest in length and 62.1% (57.3 km) of it is parallel to an existing transmission line. Therefore, transmission line 1 is considered to be the least obtrusive transmission line alternative.
    - Transmission line 1 activity areas are all situated west of Slate Falls along the portion of the alignment (57.3 km or 62.1% of the corridor) that is parallel to an existing transmission line and north of Springpole Lake along the shared alignment with mine access road 1.
    - Transmission line 2 activity areas are all west of Slate Falls, with the majority along the portion of the alignment (9.5 km or 9.4%) that is parallel to an existing transmission line and north of Springpole Lake along the shared alignment with mine access road 1.
    - Transmission line 3 activity areas are all west of Slate Falls, with the majority along the portion of the alignment (20.2 km or 22.7%) that is parallel to an existing transmission line and north of Springpole Lake along the shared alignment with mine access road 1.
    - Transmission Line 4 activity areas are clustered southwest of Jeanette Lake and north of Springpole Lake along the shared alignment with mine access road 1.

In summary, there is an aggregation of significant Boreal Caribou crossing activity areas where transmission lines 1, 2 and 3 converge on the west side of Slate Falls (proximate to an area bounded by Senior Lake, Snelgrove Lake and Fawthrop Lake), and an additional aggregation of crossing activity areas along the segment of the corridor shared by all alternatives to the Project. Additional smaller aggregations of crossing activity areas for transmission line 4 occur southeast of Jeanette Lake.

2) Movement Corridors

Dynamic Brownian bridge movement models were used to quantify Boreal Caribou habitat use and movement. Specifically, these models were used to produce individual utilization distributions for Boreal Caribou, which were combined to provide a metric of habitat use across the study area. Models were run separately for calving (May 7 to July 14), post-calving (July 15 to November 14) and nursery dates (May 1 to September 15), as well as early winter (November 15 to January 20), late winter (January 20 to March 5), over winter (December 1 to March 31) and spring (March 5 to May 6). A final model was run for all seasons combined.

Brownian bridge movement models use fine-scale observations, such as telemetry data, to estimate probability of space use (Horne et al. 2007; Kauffman et al. 2021; Palm et al. 2015; Seidler et al. 2014) and delineate highly utilized habitat (Fischer et al. 2013; Kranstauber et al. 2012) and travel routes (Kauffman et al. 2021; Sawyer et al. 2009). During modelling, probability of use is calculated using consecutive telemetry locations along an individual's movement trajectory. This incorporates the duration and distance of consecutive steps with the Brownian motion variance, which is a static estimate of the individual's mobility based on its general movement direction and speed (Horne et al. 2007; Sawyer et al. 2009). Dynamic Brownian bridge movement models similarly estimate probability of use but differ in that the Brownian motion variance estimate is allowed to vary (i.e., is dynamic) in time and space along the

individual's movement trajectory (Byrne et al. 2014; Kranstauber et al. 2012). As a result, these movement models produce utilization distributions that more accurately reflect movement trajectories.

As dynamic Brownian bridge movement models quantify patterns of movement, the resulting utilization distributions show both stopover sites and travel corridors between them (Palm et al. 2015). Travel corridors can be considered estimates of connectivity informed by actual Boreal Caribou movement under existing conditions. Dynamic Brownian bridge movement models were fit with the "move" package (Kranstauber 2023) in R v 4.3.2 (R Core Team 2023). Five model parameters were defined, including the resolution, margin, window size, location error and time step (Kranstauber 2023). Resolution determines the size of spatial raster outputs and was set to 100 × 100 m. Margin and window size were set based on recommendations from the available literature (Kranstauber et al. 2012). In the model, the Margin sets the number of telemetry locations before a change in movement analysis is possible. This was set to 11 telemetry locations. Window size is the number of consecutive telemetry locations over which Brownian motion variance is calculated and must be at least twice the number of telemetry locations as the margin (Kranstauber 2023). Window size was set to 31 telemetry locations. Generally, differences in the Margin and Window size have little effect on model outputs (Smolla et al. 2023). One individual was dropped from the Calving and Nursery analysis as they did not have enough telemetry locations to accommodate the window and margin. Location error is the error associated with telemetry locations. No location error data were available for these data. As such, a location error of 10 m was estimated based on an inspection of the standard errors of the collar fixations. Time step is the time interval over which the movement model is calculated, which should be approximately 1/15th of the collar fix rate (Kranstauber 2023). These default values were used. Before the models were fit, movement segments in which the time lag (i.e., fixation) variance was larger than expected (> 10 hours) were identified and removed for each individual (Smolla et al. 2023). After the models were fit, they were averaged over all Boreal Caribou for each time period. The resulting values were normalized to range from 0 to 1.0 and inversed so that low values indicate movement corridors and high values indicated areas of high use. The resulting model output was a 99.9% habitat utilization distribution fit with contours showing the 99% and 95% isopleths. The impact of the PDA on the resulting habitat utilization distribution was assessed by calculating both the number of square kilometres impacted, and the number of completely bisected habitat polygons. The overall habitat utilization distribution was split into separate isopleth shapes (99.9% [full model], 99%, 95%) for further analysis. The 95% isopleth is more likely to contain stop over locations, whereas the 99.9% isopleth contains movement corridors. Bisections were counted by removing the PDA shape from the various isopleth shapes using the "st_difference" function from the "sf package" in R. The number of polygons before and after the PDA was removed were compared; a bisection occurred if the number of polygons increased. To minimize the impact of minor bisections, only polygons greater than 5 km^2 were included in the analysis.

Results of the data analysis are found in Attachment 1 – Table A- 3.

Landscape Connectivity

To evaluate the connectivity of the RSA, a connectivity model was developed using the Circuitscape application (McRea et al. 2013). The connectivity model was applied to the Habitat RSA (Churchill range boundary) and the Population RSA.

Two input layers are required for the connectivity model: a resistance raster and a focal node raster. A 150 m resolution resistance raster was created using the spring Resource Selection Function (RSF) created by Hornseth and Rempel (2016). The RSF output of the Kinlock, Churchill and Berens Boreal Caribou ranges were connected together (to represent the Population RSA) filling small holes between the model outputs using a 500-m moving window average. The RSF predicted use values were reclassified into five bins (Table 4-5) using the Jenks natural breaks classification method, rounded to the nearest five hundredths

(0.05). The upper level of the third natural breaks bin was replaced with the predicted high use threshold of Boreal Caribou in the Churchill range / Habitat RSA (FERIT Environmental Consulting 2024). Resistances between 1 – 1000 Ω were assigned based on previous scientific literature (Bowman et al. 2020; McRae 2006). Low resistance values (i.e., resistance of 1 Ω) represent landscapes in which the focal species can traverse without impediment and correspond to high RSF values (i.e., high use). High resistance values (i.e., resistance of 1000 Ω) represent a landscape in which the focal species would incur a significant cost to traverse and correspond to low RSF values (i.e., low use).

Focal nodes represent spring Boreal Caribou core use areas and were produced using the centroid of the 85% kernel density utilization distribution created from the Ministry of Natural Resources and Springpole Boreal Caribou telemetry data collected during spring between April 15 and June 21, inclusive. Focal nodes were converted to a 150 m resolution raster for use within the program.

The connectivity model was run using Circuitscape Version 4.0.5, in pairwise modelling mode to produce a map representing habitat connectivity in current (Ω). To analyze the effect of the Project on connectivity, the overall Circuitscape model for both the Population RSA and the Habitat RSA scales were split into three separate maps representing high, medium and low connectivity zones. Connectivity values were binned as follows: high connectivity contained values above the ~90th percentile, medium above the 80th percentile and low above the 70th. To assess the impact of the PDA on these separate high, medium, low connectivity maps, both the area of direct impact and the number of complete bisections were assessed. Functions from the *sf* package in R v 4.3.2 were used. The area of impact was assessed using the "st_intersection" function to find the overlap between the PDA and each connectivity map. Connectivity bisections were also assessed. This was done by removing the PDA shape from each connectivity maps using the "st_difference" function. The number of polygons before and after the PDA was removed were compared; a bisection occurred if the number of polygons increased. To minimize the impact of minor bisections, only polygons greater than 5 km^2 were included in the analysis.

Results of the circuitscape analysis are found in Figure 4-8.

Range Scale Cumulative Disturbance

The recommended disturbance management threshold, based on Environment Canada and Climate Change (2020), is 65% undisturbed (or 35% disturbed) habitat within a local population range to achieve a 60% probability of self-sustainability (i.e., a stable or growing population) over a 20-year horizon. Lower amounts of range-scale disturbance would theoretically result in higher probabilities of local population self-sustainability.

Ontario provincial criteria for disturbance assessment differs from the federal criteria with respect to age of disturbance. Federally, boreal forest <40 years old is considered disturbed and >40 years is considered undisturbed. In Ontario, young forest is defined as <37 years old, and it is assumed that Boreal Caribou refuge and winter habitat begin to become suitable at 40 years of age, but it may take 50+ years for Boreal Caribou to frequent previously disturbed habitat (MNRF 2014b). The provincial RMP (MNRF 2014a) as well as the federal recovery strategy (ECCC 2020) directs that Boreal Caribou ranges will be managed such that the amount of cumulative disturbance remains at or moves toward a level that supports a self-sustaining Boreal Caribou population (i.e., less than 35% cumulative disturbance / range). This final EIS/EA provides an updated range condition habitat disturbance assessment on the Churchill Range using the most current available FRI and disturbance data acquired through a data-sharing agreement with the MECP in 2023, composed of Trout Lake Forest Management Unit data provided by Paper Excellence Group (formerly Domtar) and supplemented with publicly available information including the most current LandSat imagery to support the cumulative effects assessment for the Project. Since Boreal Caribou rely directly and indirectly

on the entire range to carry out their life processes, the condition of their range informs the relative tolerance to alteration and determines the risk due to a particular activity.

The updated Churchill Range disturbance assessment using federal criteria indicates a disturbance level of 41.6% (8,850.1 km^2), resulting in 58.4% of the Churchill Range in an undisturbed state as of 2024. The addition of the Project would increase the future conditions of the Churchill Range by 0.58% (51.1 km^2) to 41.9% (8,901.2 km^2) disturbed. The updated Churchill Range disturbance assessment using provincial criteria indicates a total disturbance level of 41.6% composed of 7% fire disturbance and anthropogenic disturbance 34.7% (Section 6.13, Table 6.13 –10). The addition of the Project would increase the future conditions of the Churchill Range by 0.58% (51.1 km^2) to 41.9% (8,901.2 km^2) disturbed.

Results from the range scale analysis relative to alternatives assessment can be found in Figure 4-3 and Figure 4-4.

4.1.2.3 Species Effects: Demographic and Population

As presented above, direct and indirect impacts to Boreal Caribou habitat drive the population, community and cumulative effects for Boreal Caribou at larger scales. At this time, existing baseline states of Moose (*Alces alces*) and Wolf (*Canis lupus*) relative abundance and distribution, as well as Boreal Caribou population state (abundance, relative distribution, population density, probability of persistence, demographic structure) and vital rates (calf recruitment, adult sex ratio, adult female survival rate from telemetry data and λ), are obtained from winter aerial surveys and historical provincial data. The potential change in the risk of mortality to Boreal Caribou and the resultant community dynamics between Boreal Caribou, Moose and Wolves was undertaken qualitatively, considering overlaps of the relative distributions of these species during winter aerial surveys, experience with other mine operations, literature and Project-specific factors.

Population Reconstruction and Trend Modelling

Table 4-5 and Table 4-6 summarize the demographic results relative to each alternative considered.

Population reconstruction and trend models were constructed in Microsoft Excel© for each Boreal Caribou range using Ontario Government published historical data (Integrated Range Plans) and Project winter population aerial survey data (2021, 2022, 2023 and 2024) to discern patterns of population structure, abundance and trend (White 2000). Model construction involved linear interpolation between survey years using demographic data and available λ estimates (to calculate population density for a given year) and demographic structure data between successive survey years. A third-degree polynomial was used to fit a population trend line to a 3-yr moving average of abundance estimates for the study population (Figure 4-3). The polynomial was used because it is more sensitive to fluctuations in population size than a linear or log-linear trend line (Kuzyk 2016; Arsenault et al. 2019). Third-degree polynomial regression more accurately captures non-linear relationships, provides a higher degree of flexibility to fit a trend line to observed data points and improves prediction accuracy compared to linear regression (Vucetich and Peterson 2012; Halli and Rao 1992). The objective of model fitting was to enable the assessment of population performance metrics of the study population with respect to changes over time in 1) population state (winter abundance and demographic composition), 2) vital rates (λ, calf recruitment, adult sex ratio) and 3) historical range of variability relative to the long-term (13-yr) mean.

Population reconstruction with trend analysis indicated a declining population in recent years (Figure 4-3) with an estimated mean λ = 0.957 for the Population RSA (Table 4-5). Population reconstruction and trend modelling revealed that the Boreal Caribou population of the Churchill Range and surrounding survey area (adjacent portions of Berens and Kinloch ranges) has been in a long-term population decline and that this would continue regardless of the addition of the Project to the landscape (Figure 4-3).

Dynamic Modelling of Lambda (λ)

Estimates of λ based on historical values taken from IRAR for the Habitat RSA and Population RSA were 0.955 and 0.931, respectively. Using combinations of historical data and recent survey data, three additional modelling approaches (see Appendix D for analytical details) were used to aid with the assessment of population trends:

- **Empirical Modelling** of the population RSA using data regression analysis of recent surveys (2021-2024) indicated a declining population trend (estimated mean **λ = 0.949**) (Table 4-5). An estimate of λ can be obtained through log-linear regression of $\ln(N_t)$ versus *t,* where *N* is the observed number of Boreal Caribou at time *t*.
- **Vital Rate Modelling of λ** based on adult female survivorship and changes to calf recruitment using vital rates obtained from the IRAR and applying the female-only equation (Hatter and Bergerud 1991). Vital rate modelling using IRAR calf recruitment rates (Model 1) yielded an estimated mean **λ = 0.953** (Table 4-5). Vital rate modelling using recruitment from recent aerial surveys (Model 2) yielded an estimated mean **λ = 0.964** (Table 4-5).
- **Leslie Matrix Modelling** to simulate λ over longer time horizons (1-55 years) resulted in an estimated mean **λ = 0.937** (Table 4-5).

Regardless of the modelling approach used, all lines of evidence indicate λ values ranging from 0.923 to 0.967, below a sustainable λ of 1.00 (Table 4-5). This confirms that the RSA population and Churchill Range portion of the Population are in a state of long-term decline regardless of the addition of the Project to the landscape at either RSA scale (Population RSA or Habitat RSA), which are the scales that are most ecologically meaningful to Boreal Caribou given their home range size. The LSA scale does not estimate the effect at the population scale but does indicate the effect on locally occurring Boreal Caribou.

Forecast Population Trend Models

Simulation of proposed Project disturbance net effect involved utilization of the baseline case (Figure 4-3) with projection of the population trend model to out to 80 years using the mean population λ (0.957; 2010 to 2024). The effect of the Project on population abundance was projected (80 years) based on proportional loss of available Category 1 calving and nursery habitat (+500 m buffer), with a 50% Project disturbance effect at 60 years and effect disappearing at 80 years. The purpose was to evaluate spatial and temporal scales of effect relative to baseline state (Figure 4-3 and Figure 4-4).

Three spatial scales were simulated (single population / Churchill Range, study population / Survey Area and multi-population / Population RSA). An alternative to identifying natural populations (i.e., Churchill Range, Population RSA) is to define "population of interest" in terms of the spatial extent of the anticipated drivers of change (i.e., Survey Area) (Roy et al. 2019). This approach reduces the likelihood of including mixed population trajectories of multiple populations within a single analysis (Roy et al. 2019). However, the spatial drivers may have different scales (e.g., local habitat change and landscape level change) and may be non-stationary (e.g., disturbance) or change through time (e.g., ecological succession).

Forecast modelling applied 2 scenarios: (1) permanent loss and (2) temporary (5-yr) loss of Category 1 calving / nursery habitat, after which alternative habitat is found (Table 4-6). The purpose was to evaluate Project effects with respect to temporary versus permanent loss. Last, forecast models were developed for the preferred Project footprint and each Project alternative to assess differences. Population trend and forecast modeling for all Project alternatives yielded very similar results at each scale for all alternatives considered (Figure 4-4, Table 4-6). In all cases, permanent loss had a greater effect than temporary loss at the scales assessed (Table 4-6).

4.1.3 Summary of Habitat Protection Criteria

As indicated in the guidance document provided by the MECP (2021a), habitat and impacts to category habitat from a GHD must be considered when evaluating alternatives. GHD mapping can be used to identify which alternatives from the various Project components affect the least amount of habitat. This can be done to determine which alternatives avoid or minimize potential impacts on habitat.

Per Ontario's Woodland CCP, RMP, the IRAR for the Churchill Range and the guidance provided by the MECP (2021a) regarding the alternatives assessment for the Project EA, the following are considered when evaluating habitat protection:

- **Alignment with Existing or Proposed Disturbance**: Aligning new activities with existing disturbance presents an opportunity to minimize the overall cumulative disturbance at the range level. A quantitative assessment describing the amount of overlap between existing disturbances and proposed disturbances for all alternatives was completed.
- **Landscape Connectivity Habitat Amount and Arrangement**: Projects need to minimize landscape fragmentation and barrier effects on Boreal Caribou as landscape fragmentation reduces the probability that the Boreal Caribou population can persist on a landscape (EC 2012; ECCC 2020).
- **Category 1 High Use Areas – Nursery Areas, Over-wintering Areas, Travel Corridors**: Category High Use Areas are essential contributors to the persistence of Boreal Caribou on the landscape; nursery area habitat is an important habitat feature that directly supports reproduction in Boreal Caribou; over-wintering areas are important habitat features that support Boreal Caribou survival through the winter months by providing ground lichen for winter forage; and travel corridors are important habitat features that Boreal Caribou use to move between nursery areas and winter use areas.
- **Category 1 Habitats within 10 km of the project**: Boreal Caribou may avoid suitable Category 1 locations due to sensory disturbance from development and recreational activities when selecting nursery areas, winter use areas and/or travel corridors. Activities within 10 km of these features may, therefore, indirectly impact the use and function of these sites for Boreal Caribou.
- **Category 2 Seasonal Ranges**: Category 1 habitat is generally nested within more extensive seasonal ranges (Category 2) and depends on the refuge function provided at a larger spatial scale. Seasonal ranges may also provide connectivity between Category 1 habitat areas and are anticipated to have a moderate tolerance to alteration.
- **Range Condition**: Boreal Caribou rely directly and indirectly on the entire range to carry out their life processes. Range condition informs the relative tolerance of the range to alteration and the determination of the risk of a particular activity. The Project is in the northwest corner of the Churchill Range, and direct impacts on Boreal Caribou habitat in this range from the Project footprint will occur. The IRAR for the Churchill Range will provide a qualitative assessment of range condition.
- **Cumulative Disturbance at Range Level**: the provincial RMP directs that Boreal Caribou ranges will be managed such that the amount of cumulative disturbance remains at or moves toward a level that supports a self-sustaining Boreal Caribou population (i.e., <35% cumulative disturbance / range). For the final EIS/EA, the Project footprint will be integrated into the current disturbance estimate for the Churchill Range (IRAR) to measure the change in disturbance contributed by the proposed Project. The most currently available spatially informed disturbance data, including forest

fires, forestry and linear corridors, is used to update the disturbance estimate for the Churchill Range, including the proposed Project.

Explanation of how all adverse effects on habitat will be avoided:

Direct impacts on Category 1 high-use nursery areas and Category 2 seasonal range areas from the mine site will occur. Direct and indirect effects on Category 1 and 2 habitats will occur with most mine access road and transmission line alternatives and on Category 3 remaining areas within the range(s).

- Compact footprint will reduce spatial impacts.
- Minimize the Project footprint in Category 1 Boreal Caribou habitat by restricting the size of the area cleared with heavy machinery, using safe operating practices.
- Adverse effects on Category 1 and 2 habitats due to construction of the mine access road beyond the footprint will be avoided during construction and operation by following appropriate best management practices (BMPs). For Boreal Caribou, the Province has developed BMPs to provide guidance to avoid, minimize or mitigate adverse effects on the species and their habitat. BMPs will be selected and implemented to avoid, minimize and mitigate potential direct and indirect effects on Boreal Caribou during construction.
- Ground Disturbance - Minimize using winter construction BMPs.
- Minimize noise in Category 1 Boreal Caribou habitat by requiring that all exhaust systems have mufflers appropriately installed, that all machinery operates as per specifications and that idling is avoided.
- Adverse effects would not be permanent, as habitat would be restored post-construction between 40 and 80 years for areas to be rehabilitated to be functional Boreal Caribou habitat.
- Mine access road and transmission line route optimizations, including sharing the corridor, may be possible.
- Mine access road 5 placement parallels the north shore of Springpole Lake to retain a larger unfragmented block of Category 1 Boreal Caribou habitat. It is sited to avoid movement barrier effects for Boreal Caribou habitat access along Birch Lake.
- Use an adaptive management approach by incorporating monitoring results (aerial surveys, satellite telemetry, ground surveys by environmental monitors) to improve mitigation during the construction and operations phases. If new crossing activity areas are revealed during monitoring, vegetation management to reduce barrier effects should be applied to newly identified locations.
- Minimize transmission line footprints by selectively removing woody vegetation (limit to removal of hazard trees, clearing sufficient for safe construction access and transmission line infrastructure needs) along Boreal Caribou activity area clusters to maintain partial connectivity of natural cover to adjacent areas. This will lessen predator efficiency, reduce direct and indirect habitat loss to the extent practicable, accelerate natural vegetation regeneration of construction disturbance and help maintain habitat connectivity at locations used as movement corridors.
- Access Management—Discourage local use of the transmission line corridor for access by vehicle, snowmobile or all-terrain vehicle, particularly in winter, to avoid creating compacted access that would improve predator travel efficiency through the application of physical barriers (gates, slash role back, ridging / berming access points), revegetation with native species and signage.

- Vegetation Management—Minimize vegetation management of the transmission line corridor within Category 1 Boreal Caribou habitat to hazard trees necessary for safe operation while maintaining natural vegetation structure and composition to the extent possible to maintain Boreal Caribou habitat connectivity at locations used as movement corridors and to limit predator travel efficiency.

4.1.3.1 Mine Access Road Alternatives

The construction of an access road is required to meet the activity's primary purpose (operating a mine). The four mine access road alternatives (Figure 4-15 and Table 4-8) were considered with respect to Changes in Habitat Availability and Effectiveness and Cumulative and Range-Scale Effects. Regarding the direct Changes in Habitat Availability and Effectiveness, mine access road 3 and mine access road 4 favours the fewest impacts on Category 1 nursery areas. The placement of mine access road 5 parallels the north shore of Springpole Lake to retain a larger unfragmented block of Category 1 Boreal Caribou habitat. It is sited to avoid movement barrier effects for Boreal Caribou habitat access along Birch Lake. However, mine access road 1 has the least total indirect area of impact, is the shortest length and can be co-located in part with the transmission line, reducing the number of new corridors and making it the least intrusive for disturbance.

4.1.3.2 Transmission Line Alternatives

Construction of transmission line is required to meet the primary purpose of the activity (operation of a mine). This alternative would provide electrical servicing. The four transmission line alternatives were considered with respect to Changes in Habitat Availability and Effectiveness (Table 4-9 and Figure 4-18). There is an aggregation of significant Boreal Caribou crossing activity areas where transmission lines 1, 2 and 3 converge on the west side of Slate Falls (proximate to an area bounded by Senior Lake, Snelgrove Lake and Fawthrop Lake) and an additional aggregation of crossing activity areas along the segment of the corridor shared by all alternatives to the Project. Additional smaller aggregations of crossing activity areas for transmission line 4 occur at Jeanette Lake and south of Polzin Lake. A single activity area is common to transmission line 2, and 4 is at Root Lake.

The transmission line 4 corridor minimizes crossing Category 1 habitat; however, it is the longest overall length (114.4 km) of transmission line linear disturbance and doesn't follow any existing infrastructure; all new infrastructure would be required, resulting in the most intrusive new disturbance. transmission line 1 is the least intrusive with respect to linear corridor impacts to Boreal Caribou habitat; transmission line 1 has most overlap with existing transmission line, both largely share common corridor alignments where the activity areas occur, but transmission line 1 has lower amount of incremental new activity area cumulative length compared to others. Therefore, transmission line 1 is favoured with respect to Boreal Caribou habitat function.

4.1.3.3 Mine Site Area Alternatives

Construction of a mine site is required to fulfill the primary purpose of the activity (operating a mine). The mine site area will be the main Project component, consisting of the ore body, associated facilities and infrastructure. There are no alternatives for this general location as it is to be built around the ore body. It is conservatively considered that the entire footprint of the mine site area will be removed. Components considered include the following:

- Mine rock storage locations;
- Tailings storage location;
- Ore stockpile location;

- Central water storage pond; and
- Aggregate source location.

The alternatives have been considered with respect to relative potential for residual effects. A compact mine site area is favoured as to limit linear disturbances and sprawl.

The following placements of Project components had the lowest direct impacts on Boreal Caribou habitat:

- Mine rock storage locations – Alternative 1;
- Tailings storage locations – Alternative 1;
- Low grade ore stockpile location – Alternative 1 and Alternative 2 (considered together);
- Central water storage pond – Alternative W4; and
- Aggregate source location – Alternative 2.

4.1.4 Summary Species / Individual Protection Criteria

As indicated in the guidance document provided by the MECP (2021a), species / individual impacts must be considered when evaluating alternatives. There is no favoured alternative, as they all have the same potential impacts on individuals. Therefore, this is a qualitative assessment. A summary of how the adverse effects will be avoided is provided below. Impacts on individuals are unlikely, provided mitigations (such as seasonal timing windows, speed limits and speed reducers, attractant management, reporting and stop-work protocols) are effectively applied through all Project phases.

Potential Impacts on Individuals

The underlying mechanism that drives population, community and cumulative effects is the direct and indirect impacts on Boreal Caribou habitat. Impacts on Boreal Caribou habitat can directly alter population and community level dynamics by enhancing habitat attributes selected by Moose and facilitating more efficient hunting and access for predators and people. These impacts can then synergistically alter range condition and connectivity at a more regional scale. As such, the underlying mechanism of habitat impacts is the focus for this alternatives assessment, as ultimately reducing direct and indirect impacts to Boreal Caribou habitat will in turn act to reduce population, community and cumulative impacts on Boreal Caribou.

In accordance with Ontario's Woodland CCP, RMP, the IRAR for the Churchill Range and the guidance provided by the MECP (2021a) regarding the alternatives assessment for the Project EA, the following are considered potential impacts on individuals:

- **Incidental and Indirect mortality:** Increased access (new roads, trails and transmission lines) or easier accessibility (cleared vegetation or widened linear corridors) allows for more efficient travel across the landscape and may increase hunting and predation pressure on Boreal Caribou. This could result in higher levels of mortality as an indirect result of the proposed Project, particularly if the linear corridors offer ease of travel (packed and stable surface) with increased lines of sight (e.g., vegetation <1 m height on transmission line or bladed surface on the mine access road).
- Disturbed areas support increased browsing for Moose (early successional habitat), which increases their densities, changes their distribution and abundance and can result in a similar change in wolf / bear populations. Wolves and bears may then prey on Boreal Caribou remaining in these areas. The indirect mortality from apparent competition is expected to be negligible as the zone of influence is too small for landscape-level effect.

- Increased densities of Moose can also increase the potential for transmission of parasite burdens (amount and spread) such as brainworm to Boreal Caribou. However, the indirect mortality for parasite burdens is expected to be negligible as the incremental risk at the landscape-level is too small.
- Altered incidental mortality rates from anthropogenic impacts (e.g., vehicle collisions).
- **Indirect impacts due to sensory disturbance:** Adverse effects on Boreal Caribou may result from sensory disturbances such as light, sound, vibrations and movement associated with the Project activities. Boreal Caribou may avoid sub-range habitat features due to sensory disturbance from activities that may adversely affect their ability to perform one or more life processes and may impact their movement and distribution across the range. Boreal Caribou are particularly sensitive to sensory disturbances during calving and over-wintering times of the year. Sensory Disturbance (light, sound, vibration, olfactory + movement) will be created during the construction phase but will not remain in the same place for long, as the construction progresses. The Project development area and mine access road operations phase will have ongoing sensory disturbance, which may have a seasonal effect on Category 1 and Category 2 habitat polygons that are directly traversed by the Project footprint. No sensory disturbance is predicted during the use of the transmission line other than for periodic vegetation maintenance.
- Changes in population abundance and seasonal distribution.
- Altered population vital rates, including lambda, adult female survival, calf recruitment.

Explanation of How All Adverse Effects on Species Will Be Avoided

- Do not follow or disturb Boreal Caribou encountered or where recent activity is detected.
- Direct adverse effects (e.g., mortality) will be avoided during construction and operation by following appropriate BMPs. For Boreal Caribou, the Province has developed BMPs to provide guidance to avoid, minimize or mitigate adverse effects on the species and their habitat. BMPs will be selected and implemented to avoid, minimize and mitigate potential direct and indirect effects on Boreal Caribou during construction (e.g., timing windows, winter construction and related construction activities will be suspended when Boreal Caribou are within 500 m of operations). Clearing and construction activities will be restricted in Category 1 nursery habitat during the nursery period (May 1 – September 15).
- If monitoring reveals that Boreal Caribou are using Category 1 habitats (nursery or overwintering) adjacent to the road, portions of the road will be temporarily closed or reduced use during these sensitive periods to reduce sensory disturbance.
- Avoid (via planning) or minimize (spatially and temporally) construction in:
- Category 1 habitat during winter (December 1 to March 31), spring / summer nursery (May 1 to September 15) and travel corridors (April and November) sensitive periods.
- Avoid late winter construction and clearing activities along alignment segments that are within Category 1 habitat (overwintering habitat) but undertake this activity in early winter during frozen conditions. This will reduce disturbance to Boreal Caribou in late winter when Boreal Caribou energy reserves are lowest and encourage natural vegetation regeneration via minimal ground disturbance. If avoidance is not possible, undertake construction activities as quickly as possible during frozen conditions to minimize soil surface disturbance and limit the duration of sensory disturbance.

- Boreal Caribou can have a higher risk of predation around mine sites if predators occur at higher densities due to the attraction of food waste at dump sites. FMG plans on hauling all garbage and food waste off site. Therefore, the creation of a sink habitat or higher predation risk is not anticipated to occur.
- Reduce traffic speed along roadway sections traversing Category 1 habitat, particularly along segments with identified activity area crossing locations.
- If encountered, vehicles must come to a stop to give Boreal Caribou passage to cross the roadway.
- Habitat Disturbance—Minimize habitat destruction by applying minimum route clearing in Category 1 habitat. This will lessen predator efficiency, reduce direct and indirect habitat loss to the extent practicable, accelerate natural vegetation regeneration of construction disturbance and help maintain habitat connectivity at locations used as movement corridors.
- Limit traffic volumes to daylight hours only.
- Take measures to retain lines of sight across the route corridors, particularly at crossing activity areas identified within Category 1 habitat to reduce the potential of barrier effects and to enhance semi-permeability.

4.1.5 Conclusion with Respect to Boreal Caribou-Focused Alternatives Assessment

Since the do nothing approach cannot be carried forward if the Project is to proceed, measures will have to be identified first to avoid any adverse effects, and in cases where there are no practicable or feasible alternatives, identify measures that minimize or mitigate the adverse effects (what will be implemented, when, where and how actions will be applied). Such measures may be general, site-specific or activity specific. To quantify the anticipated net effects after measures are applied, a comparison of the net effects for each alternative was completed via habitat direct and indirect impact areas.

Mine access road 1 (preferred) is the least intrusive at the range scale of the mine access road alternatives with respect to incremental new disturbance but is the most intrusive at the local scale on Category 1 calving / nursery habitat. mine access road 5 is comparable to mine access road 1 but has reduced local intrusiveness by retaining a larger patch size of the affected Category 1 calving / nursery habitat polygon. Mine access road 2 and mine access road 3 have overall greater incremental disturbance to habitat because of their larger footprint. It is important to note that mine access road 5 is opposed by local land users because it traverses local user interests and historically culturally significant areas with pictographs—therefore, mine access road 1 is the least obtrusive from a Boreal Caribou movement and local cultural significance perspective.

Overall, transmission line 4 is least intrusive to Boreal Caribou Category 1 habitat, but transmission line 4 has the greatest cumulative length and the greatest potential effect on population sustainability (at range scale). Transmission line 1, transmission line 2 and transmission line 3 could be partially co-located with other linear disturbances to reduce overall incremental impacts. Transmission line 3 is overall shortest in length, but transmission line 1 has the greatest opportunity to have the most length of any of the transmission line alternatives to co-locate with an existing transmission line linear disturbance. Collectively, the transmission line alternatives are relatively similar in cumulative effect, but transmission line 1 is considered least intrusive overall on Boreal Caribou habitat and is not expected to have a significant long-term impact on Category 1 Boreal Caribou wintering habitat.

Overall, mine access road 5 and transmission line 1 are considered the most advantageous routes for Boreal Caribou of the alternatives considered.

The following placements of Project components had the lowest direct impacts on Boreal Caribou habitat: mine rock storage locations—Alternative 1, tailings storage locations—Alternative 1, low grade ore stockpile locations—Alternative 1 and Alternative 2 (considered together), Central Water Storage Pond—Alternative W4, and aggregate source location—Alternative 2.

4.2 Wolverine

Wolverine is listed as Threatened on the Species at Risk in Ontario List and consequently receives species protection under Section 9 and general habitat protection under Section 10 of the ESA. Wolverines are difficult to study because they inhabit remote wilderness areas, have wide-ranging movements and naturally occur at low population density on the landscape. Their space use patterns link their conservation to preserving large tracts of undisturbed habitat (Pasitschniak-Arts and Larivière 1995). Assessing the Wolverine population or distribution over time requires substantial coordination, sampling effort and analytical tools (Fisher et al. 2022). For these reasons, Wolverine habitat use, demographics, denning and population dynamics are not fully understood across Canada and are not well described in many regions of Ontario.

Wolverine surveys, including aerial surveys and run pole stations (tree-mounted platforms equipped with remote cameras), were used to inform demographics (number of unique females [lactating / nonlactating] and males), estimate occupancy / population density, habitat use, and dispersal, and identify areas of concentration / activity centres. Wolverine survey methods, results and assessment are discussed in Appendix P-1 and Section 6.14. Habitat Suitability Modelling was based on assumptions related to FRI habitat interpretations, professional judgment and experience related to Wolverine and Wolverine habitat, as well as available peer-reviewed and public literature. Assumptions include the quantitative rating of FRI units for value to Wolverine and are based on similar models used and tested in Ontario.

4.2.1 Criteria and Indicators

Table 4-11 summarizes the indicators and measurable parameters per the MECP guidance for undertaking the alternatives effects assessment on Wolverine. These parameters were carried forward in the final EIS/EA Section 6.14.

4.2.2 Alternatives Analysis Methods

The alternatives assessment for Wolverine was undertaken in two ways 1) using geographic information systems to overlay the Project components and physical activities on Habitat Suitability Modelling mapping to quantify the direct effects and identify potential indirect effects on Wolverine, and 2) to quantify the direct effects of removing habitat, resultant model surfaces (habitat maps) were overlaid with the alternatives, and the removal areas were calculated. The overlap between high and moderate modelled habitat and Project alternatives was calculated using the sf package in R v 4.3.2. When it was necessary to subtract the area of one feature from another, the “st_difference” function was used. The shared spatial geometry of any two features was determined using the “st_intersection” function. The area of the resulting intersection was then calculated in square kilometres.

Areas adjacent to the PDA may experience indirect effects, such as fugitive dust emissions, edge effects (e.g., increased light, wind or dust at the edge of cleared areas), noise disturbance and changes in environmental conditions due to adjacent ground disturbance. As noted above, effects were only modelled for the preferred PDA.

The potential change in the risk of mortality and change in movement was undertaken in a qualitative manner, considering experience with other mine operations, literature and Project-specific factors. Habitat bisected by the PDA is predicted to experience fragmentation.

The Alternatives were ranked as favoured, moderately favoured and not favoured in Table 4-10, Table 4-11 and Table 4-12. Favoured indicates minimal habitat loss and no fragmentation compared to not favoured, which means maximum habitat loss or intrusive fragmentation.

4.2.3 Habitat Protection Criteria

As indicated in the guidance document provided by the MECP (2021a) habitat and impacts to category habitat from a GHD are to be considered when evaluating alternatives. As Wolverine does not have a GHD, the habitat suitability index mapping is used to determine which alternative from the various Project components affects the least amount of habitat.

Explanation of how all adverse effects on habitat will be avoided:

- Local residual effects during Construction may occur if Bedrock land cover (with suitable den sites) or moderate and high-quality habitats are removed; however, there are no currently documented dens. If they are detected: Avoid (via planning) or minimize (spatially and temporally) construction within a minimum of 8 km of active or recently occupied (past 3 years) natal and maternal dens and sensitive periods (i.e., the denning period, which is January 15 through May 31 in any year, when female Wolverine are likely to be giving birth and raising their kits). Active dens that are known or suspected with a high degree of certainty should be buffered from disturbance from construction activities. The Ministry of Natural Resources (2010) recommends avoiding disturbance of natal / maternal dens that are active or known to have been occupied within the past 10 years (unless documented as unoccupied for >3 consecutive years).
- Areas designated for winter construction will undergo a pre-construction aerial search for active dens and Wolverine activity along the corridor route and an 8 km buffer.
- Avoid (via planning) or minimize (spatially and temporally) construction to retain vegetation corridors along major watercourses and interior forest corridors with a minimum width of 500 to 1,000 m (Magoun et al. 2005; Cat Lake / Slate Falls and MNRF 2016). Some vegetation disturbance interspersed with a buffer corridor of undisturbed forest cover along smaller watercourses where Beaver (*Castor canadensis*) are active will encourage regrowth of chosen Beaver forage species, as Beaver are a prey species for Wolverine; the undisturbed forest buffer provides cover for Wolverine foraging in these areas and associated deadfall may be used as rendezvous sites for female Wolverine with young kits (Ontario Wolverine Recovery Team 2013).
- Minimize the footprint by minimizing the removal of woody vegetation (limit to the removal of dangerous trees, clearing sufficient for safe construction access and transmission line infrastructure needs) to maintain partial connectivity of natural cover to adjacent areas. This will reduce direct and indirect habitat loss to the extent practicable, accelerate natural vegetation regeneration of construction disturbance and help to maintain habitat connectivity.

It is unlikely that transmission lines act as physical barriers to Wolverine. However, Wolverine will often avoid roads, with greater avoidance associated with all-season roads (Scrafford et al. 2018, Stewart et al. 2016), which generally experience greater traffic volumes. The greatest effect on Wolverine movement will be during the construction stage, a period that is anticipated to be characterized by heavy machinery, increased human presence and increased noise levels across the PDA. Therefore, construction activities associated with the development of Project components have the potential to create both physical and sensory barriers that may affect Wolverine movement across study areas.

However, local residual direct effects on Wolverine are predicted only if a natal / maternal den (that was not detected through baseline studies) or moderate and high-quality habitat are indirectly impacted during

Construction. The potential for denning would be reduced within a 10 km buffer to the mine access road because of sensory disturbance during the operations phase. A minor local scale residual effect is predicted during the operations phase, resulting in avoidance behaviour by locally occurring Wolverine within 10 km of the corridor.

4.2.3.1 Mine Access Road Alternatives

The construction of an access road is required to meet the main purpose of the activity (operation of a mine). The four mine access road alternatives were considered with respect to Changes in Habitat Availability and Effectiveness. The favoured alignments are mine access road 5 and mine access road 1, which results in the lowest direct and indirect habitat removal (Figure 4-19). Mine access road 1 has the shortest length (Table 4-12) and is therefore anticipated to have the lowest potential for residual effects during all Project phases because it has the smallest footprint. The mine access road 1 and transmission line alternatives are co-located within a portion of each other's alignments, which further limits the potential for residual impacts. However, mine access road 5 does not fragment the mature block of forest.

4.2.3.2 Transmission Line Alternatives

Construction of transmission line is required to meet the main purpose of the activity (operation of a mine). This alternative would provide electrical servicing. The four transmission line alternatives were considered with respect to Changes in Habitat Availability and Effectiveness. All four transmission line alternatives start on the east side of the Project development area and are proposed to follow the mine access road until a location north of the existing E1C transmission line. Transmission line 1, 2 and 3 all follow the existing E1C transmission line for varying lengths, while transmission line 4 is a new route.

The favoured alignment is transmission line 1 which has the second shortest length and indirect footprint (Figure 4-19 and Table 4-13). Transmission line 1 results in some of the lowest amounts of high and moderate wolverine habitat impacts (direct and indirect) and is therefore anticipated to have the lowest potential for residual effects during all Project phases and anticipated lowest mitigation effort to avoid / minimize potential effects. In addition, it could be co-located with a portion of a mine access road alternative and with the existing E1C transmission line to further limit the potential for residual impacts.

4.2.3.3 Mine Site Area Alternatives

Construction of a mine site area is required to fulfill the primary purpose of the activity (operating a mine). The mine site area will be the main Project component, consisting of the ore body, associated facilities and infrastructure. There are no alternatives for this general location as it is to be built around the ore body. It is conservatively considered that the entire footprint of the mine site area will be removed. Components considered include:

- Mine rock storage locations;
- Tailings storage locations;
- Ore stockpile locations;
- Central water storage pond; and
- Aggregate source locations.

A compact mine site area is favoured so as to limit linear disturbances and sprawl. The following placements of Project components had the lowest direct impacts on moderate and high-quality Wolverine habitat:

- Mine rock storage locations—Alternative 1;
- Tailings storage locations—Alternative 1;
- Low grade ore stockpile location—Alternative 1 and Alternative 2 (considered together);
- Central water storage pond—Alternative W4; and
- Aggregate source location—Alternative 3.

4.2.4 Species / Individual Protection Criteria

As indicated in the guidance document provided by the MECP (2021a), species / individual impacts must be considered when evaluating alternatives. There is no favoured alternative, as they all have the same potential impacts on individuals. Therefore, this is a qualitative assessment. A summary of how the adverse effects will be avoided is provided below. Impacts on individuals are unlikely, provided mitigations (such as seasonal timing windows, speed limits and speed reducers, attractant management, reporting and stop-work protocols) are effectively applied through all Project phases.

Potential Impacts on Individuals

- Habitat loss and fragmentation from construction disturbance may affect Wolverine mortality risk. The alteration of Wolverine's habitat during construction and operations resulting from the Project could result in the displacement of young from natal or maternal dens, resulting in mortality.
- The risk of mortality resulting from collisions during operation is expected to be low, based purely on the probability of encounter with a Wolverine.
- The risk of mortality from changes in prey availability is expected to be low, Wolverine are facultative predators; they do not rely exclusively on animal prey and can use different food sources depending on availability and environmental conditions
- Sensory disturbance (light, sound, vibration, olfactory + movement) will be created during the construction, and ongoing sensory disturbance during the use of the mine access road at the LSA scale may occur during the operations phase, resulting in avoidance behaviour by locally occurring Wolverine within 10 km of the corridor.
- Food waste attractants could influence locally occurring Wolverine if waste is not properly managed during the construction, operations and active closure phases. As FMG is planning on hauling waste off site (rather than creating a garbage dump), food waste attractants are anticipated to be minimal.

Explanation of How All Adverse Effects on Species Will be Avoided

- No dens are currently documented.
- If dens are detected, local access and use of the transmission line corridor by vehicle, snowmobile or all-terrain vehicle is discouraged, particularly in winter, to avoid sensory disturbance or the creation of compacted access that would alter wildlife movements by creating physical barriers (gates, slash roll back, ridging / berming access points), revegetation with native species and signage.

- Following appropriate BMPs will help to avoid direct adverse effects (e.g., mortality) during construction and operation. BMPs will be selected and implemented to help avoid, minimize and mitigate potential direct and indirect effects during construction.
- Vehicular access will be restricted and speed limits will be enforced at night. If encountered, vehicles must come to a stop to give Wolverine passage to cross the roadway.
- Construction will be avoided (via planning) or minimized (spatially and temporally) to retain vegetation corridors along major watercourses and interior forest corridors with a minimum width of 500 to 1,000 m (Magoun et al. 2005; Cat Lake / Slate Falls and MNRF 2016). Some vegetation disturbance interspersed with a buffer corridor of undisturbed forest cover along smaller watercourses where Beaver are active will encourage regrowth of chosen Beaver forage species as Beaver are a prey species for Wolverine; the undisturbed forest buffer provides cover for Wolverine foraging in these areas and associated deadfall may be used as rendezvous sites for female Wolverines with young kits (Ontario Wolverine Recovery Team 2013).
- Operation: Implement a Wolverine occurrence and distribution monitoring program (initiated during the construction phase) to assess predicted residual effects on Wolverine over time in relation to mining activities, mine infrastructure (including transmission line and mine access road) and habitat changes at the appropriate spatial and temporal scales and timing.
- Following appropriate BMPs helps to avoid direct adverse effects (e.g., mortality) during construction and operation. BMPs will be selected and implemented to aid in avoiding, minimizing and mitigating potential direct and indirect effects during construction.
- Waste and extraneous materials will be removed, particularly anything that is an attractant for scavenging Wolverine; all waste products will be adequately secured, stored and disposed of. All food and attractants will be stored in airtight, sealed, wildlife-proofed containers or enclosed wildlife-proof areas. The preferred and selected alternative is to transport domestic solid waste to an existing facility off site, such as the Hidden Lake Landfill, pending commercial agreements (i.e., hauling all waste off site rather than creating an onsite garbage dump area). Therefore, the attractants for predators and furbearer species are anticipated to be minimal.

4.2.5 Conclusion with Respect to Wolverine Focused Alternatives Assessment

Since the do nothing approach cannot be carried forward if the Project is to proceed, measures will have to be identified first to avoid any adverse effects and, in cases where there are no practicable or feasible alternatives, minimize or mitigate the adverse effects (what will be implemented, when, where and how actions will be applied). Such measures may be general, site-specific or activity-specific. To quantify the anticipated net effects after measures are applied comparison of the net effects for each alternative was completed via habitat direct and indirect impact areas.

The mine access road 1 and mine access road 5 alternatives are similar in the lowest direct and indirect habitat removal. Both can be co-located within a portion of the transmission line alignment. Mine access road 1 has the shortest length; however, mine access road 5 does not fragment the mature block of forest. The favoured transmission line alignment is transmission line 1, which has the second shortest length and indirect footprint—and it could be co-located with a portion of a mine access road alternative and with the existing E1C transmission line to further limit the potential for residual impacts.

The following placements of Project components had the lowest direct impacts on moderate and high-quality Wolverine habitat: mine rock storage locations—Alternative 1, tailings storage locations—Alternative 1, low grade ore stockpile locations—Alternative 1 and Alternative 2 (considered together), Central Water Storage Pond—Alternative W4 and aggregate source location—Alternative 3.

4.3 Species at Risk Bats

Four of the eight bat species in Ontario are endangered species and consequently receive species protection under Section 9 and general habitat protection under Section 10 of the ESA. Surveys to identify suitable bat maternity roosting habitat for SAR bats and acoustic surveys were conducted to confirm the presence and use of the surveyed maternity roosting habitat by bats in 2021, 2022 and 2023. In July 2022, a visual assessment of the existing accommodations complex's buildings was also undertaken for evidence of potential bat maternity roosting. Potential hibernacula were first identified through a geographic information system investigation of abandoned mines in Ontario using the Abandoned Mines Information System, as well as topography, bedrock geology, ground surveys and incidental aerial observations. To confirm use of the potentially suitable abandoned mine and cliff sites as hibernacula by bats, acoustic bat surveys were conducted to capture fall swarming and spring emergence activity in 2021, 2022 and 2023. Survey methods, results and assessment are discussed in Appendix P of the EA/EIS and Section 6.15. Habitat Suitability Modelling was based on assumptions related to FRI habitat interpretations, professional judgment and experience related to bats and bat habitat, and available peer-reviewed and public literature.

4.3.1 Criteria and Indicators

Table 4-15 summarizes the indicators and measurable parameters per the MECP guidance for undertaking the alternatives effects assessment on SAR bats. These parameters were carried forward in the final EIS/EA Section 6.15 (WSP 2024).

4.3.2 Alternatives Analysis Methods

The alternatives assessment for SAR bats was undertaken using mapped foraging and maternity habitats relative to each alternative being considered. To quantify the direct effects of removing habitat, it was conservatively assumed that all vegetation would be removed. The alternatives assessment for SAR bats was undertaken in two ways: 1) using geographic information systems to overlay the Project components and physical activities on Habitat Suitability Modelling mapping to quantify the direct effects and identify potential indirect effects on Wolverine; and 2) calculating removal areas by quantifying the direct effects of removing habitat and overlaying resultant model surfaces (habitat maps) with the alternatives. The overlap between modelled habitat and Project alternatives was calculated using the sf package in R v 4.3.2. When it was necessary to subtract the area of one feature from another, the "st_difference" function was used. The shared spatial geometry of any two features was determined using the "st_intersection" function. The area of the resulting intersection was then calculated in square kilometres.

Areas adjacent to the PDA may experience indirect effects, such as fugitive dust emissions, edge effects (e.g., increased light, wind or dust at the edge of cleared areas), noise disturbance and changes in environmental conditions due to adjacent ground disturbance. As noted above, effects were modelled only for the preferred PDA. Since the modelled effects were contained within the LSA, a similar LSA was applied for alternative components and used to estimate indirect effects on habitat. Like the direct effects, air, groundwater drawdown and noise effects (indirect effects) can be conservatively accounted for by overlaying habitat mapping and calculating the potentially affected area.

The potential change in the risk of mortality and change in movement was undertaken in a qualitative manner, considering experience with other mine operations, literature and Project-specific factors. Habitat bisected by the PDA is predicted to experience fragmentation.

4.3.3 Habitat Protection Criteria

As indicated in the guidance document provided by the MECP (2021a) habitat and impacts to category habitat from a GHD are to be considered when evaluating alternatives. As SAR bats do not have a GHD, the habitat mapping is used to determine which alternative from the various Project components affects the least amount of habitat.

Explanation of How All Adverse Effects on Habitat Will Be Avoided

- Impacts occur to bat maternity-roosting habitat. Adverse effects are expected to persist beyond closure / reclamation due to the preference by bats for mature forests / large decaying trees.
- Adverse effects on bat maternity habitat would occur from the construction of the mine site area due to the removal of suitable maternity-roosting habitat and disturbance from noise / vibrations to adjacent roosts. Adverse effects could also occur during operations due to noise / vibrations. BMPs will be selected and implemented to avoid, minimize and mitigate potential direct and indirect effects on bats during construction (e.g., timing windows and speed limitations for vehicles).
    - A 200 m buffer around hibernacula; and
    - A 500 m buffer around hibernacula that is in contact with Project activities likely to produce loud noises and/or vibrations.

4.3.3.1 Mine Access Road Alternatives

The construction of an access road is required to meet the main purpose of the activity (operation of a mine). The favoured alignment is mine access road 1, which results in the lowest direct and indirect habitat removal. mine access road 1 has the shortest length (Figure 4-20 and Table 4-16) and is therefore anticipated to have the lowest potential for residual effects during all Project phases because it has the smallest footprint. The mine access road and transmission line alternatives are co-located within a portion of each other's alignments. In addition, mine access road 1 is anticipated to require the lowest mitigation effort to avoid / minimize potential effects since mine access road 5 is closest to a potential hibernaculum (Springpole Cliff). Even though mine access road 5 would not fragment a block of forest (compared to mine access road 1) it is more favourable to increase the distance from a potential hibernaculum.

4.3.3.2 Transmission Line Alternatives

Construction of transmission line is required to meet the main purpose of the activity (operation of a mine). This alternative would provide electrical servicing. The four transmission line alternatives were considered with respect to Changes in Habitat Availability and Effectiveness. All four transmission line alternatives start on the east side of the Project development area and are proposed to follow the mine access road until a location north of the existing E1C transmission line. Transmission lines 1, 2 and 3 all follow the existing E1C transmission line for varying lengths, while transmission line 4 is a new route.

The favoured alignments are transmission line 3 and transmission line 1, which have the shortest lengths and footprints (Figure 4-20 and Table 4-17) and is therefore anticipated to have the lowest potential for residual effects during all Project stages as well as the anticipated lowest mitigation effort to avoid / minimize potential effects. In addition, either option can be co-located with corridors alternative to further limit the potential for residual impacts.

4.3.3.3 Mine Site Area Alternatives

Construction of a mine site area is required to fulfill the primary purpose of the activity (operating a mine). The mine site area will be the main Project component, consisting of the ore body, associated facilities and infrastructure. There are no alternatives for this general location as it is to be built around the ore body. It is conservatively considered that the entire footprint of the mine site area will be removed. Components considered include:

- Mine rock storage locations;
- Tailings storage locations;
- Ore stockpile locations;
- Central water storage pond; and
- Aggregate source locations.

These have been considered with respect to relative potential for residual effects. A compact mine site area is favoured to limit linear disturbances and sprawl.

The following placements of Project components had the lowest direct impacts on maternity and foraging habitat:

- Mine rock storage locations—Alternative 1;
- Tailings storage locations—Alternative 1;
- Low-grade ore stockpile location—Alternative 1 and Alternative 2 (considered together);
- Central water storage pond – Alternative W1 and Alternative W2 (considered together); and
- Aggregate source location – Alternative 3.

4.3.4 Species / Individual Protection Criteria

As indicated in the guidance document provided by the MECP (2021a), species / individual impacts must be considered when evaluating alternatives. There is no favoured alternative, as they all have the same potential impacts on individuals. Therefore, this is a qualitative assessment. A summary of how the adverse effects will be avoided is provided below. Impacts on individuals are unlikely, provided mitigation (avoidance of sensitive timing windows) is effectively applied through all Project phases.

Potential Impacts on Individuals

- Direct adverse effects (e.g., mortality) will be avoided during construction and operation by following appropriate BMPs. BMPs will be selected and implemented to avoid, minimize and mitigate potential direct and indirect effects on bats during construction (e.g., timing windows).
- Some SAR bats may still occupy habitat determined to be suboptimal for maternity roosting and these bats may be killed if Project activities occur during the SAR bat active period. Adverse effects may also arise from collisions with vehicles.
- Altered mortality risk resulting from disturbance / abandonment of maternity roosts: Predicted to be minimal if removals of bat maternity roosting habitat occur outside the active period for SAR bats. Bat mortality is expected to occur if maternity roosting habitat is removed (roost trees cut down) while roosts are occupied.

- Additionally, some SAR bats may still occupy habitat determined to be suboptimal for maternity roosting and these bats may be killed if Project activities occur during the SAR bat active period.
- Sensory Disturbance (light, sound, vibration, olfactory and movement): No residual effect predicted.
- Sensory disturbance will be created during the construction phase but will not remain at the same place for long, as Construction progresses.
- Ongoing sensory disturbance during use of the mine access road at the LSA scale may occur during the operations phase, resulting in avoidance behaviour by locally occurring SAR bats roosting within 500 m of the corridor. No sensory disturbance is predicted during use of the transmission line other than for periodic vegetation maintenance.

Explanation of How All Adverse Effects on Species Will Be Avoided

- A compact mine site will be developed to limit the footprint of disturbance.
    - The transmission line, mine access road and airstrip will be overlapping, to achieve a narrow and compact Project corridor.
    - The existing Wenasaga Road will be used, where possible, to reduce the creation of new road impacts.
    - Existing transmission lines will be used, where possible, to reduce the creation of new impacts.
- Appropriate timing windows for vegetation removals will be followed; in combination with timing windows for birds (Section 6.12 and 6.16), vegetation removal should be avoided between April 15 and August 31 in any given year.
    - During construction, avoid the removal of bat maternity habitat outside the bat active season of April 15 to August 31, to the extent practicable. This timing follows ECCC recommendations to FMG and extends beyond the window suggested by the MECP (2021c) for northern Ontario. The implementation of a timing window will reduce the potential effects on adjacent habitat used during sensitive periods, particularly indirect effects on habitat and the risk of mortality. Sensitive windows that cannot be avoided may be subject to additional conditions under an ESA permit.
- A 200 m radius of uncleared habitat will be maintained around the entrance of any identified potential / candidate bat hibernaculum, as recommended by the MECP Bat Survey Standards Note (2021c) document, which states that "tree clearing activities located more than 200 m from hibernacula entrances are considered unlikely to damage or destroy hibernacula."
- Foraging resources within 2.6 km of any identified potential / candidate bat hibernaculum will be considered habitat associated with the hibernaculum, as per the Ontario Recovery Strategy (Humphrey and Fotherby 2019). Removal / disturbance of such habitat will be avoided to the extent possible. If avoidance is not possible, removal of the foraging habitat associated with the hibernaculum will be limited to the appropriate timing window for vegetation reveals.
- Noise will be limited within 500 m of any identified hibernaculum entrance, as required by the MECP Bat Survey Standards Note (MECP 2021c) document, which states that "activities producing loud noises and/or vibrations (e.g., blasting, drilling, movement of heavy equipment, etc.) that occur more than 500 m from a bat hibernaculum are unlikely to harm or harass hibernating bats."
- Speed limits will be reduced and enforced; employee SAR training will help to reduce the risk of mortality.

- Vegetation (and, therefore, habitat) will be re-established through reclamation—a standard approach.
- Restoration of disturbed habitats will take place at closure; development of habitats capable of providing suitable habitat for SAR bats will be encouraged.

4.3.5 Conclusion with Respect to Species at Risk Bats Focused Alternatives Assessment

Since the do nothing approach cannot be carried forward if the Project is to proceed, measures will have to be identified first to avoid any adverse effects, and in cases where there are no practicable or feasible alternatives, identify measures that minimize or mitigate the adverse effects (what will be implemented, when, where and how actions will be applied). Such measures may be general, site-specific or activity-specific. To quantify the anticipated net effects after measures are applied, a comparison of the net effects for each alternative was completed via habitat direct and indirect impact areas.

In the interest of minimizing impacts on SAR bats, mine access road 1 is the favoured mine access road alternative. Mine access road 1 has the lowest direct and indirect impacts on bat foraging and maternity habitats. Alternative transmission lines 1 and 3 are the favoured transmission line alternatives for SAR bats. Compared to all other transmission line alternatives, Transmission lines 1 and 3 have the lowest impacts on bat habitat.

The following Project component placements had the lowest direct impacts on SAR bat habitat: mine rock storage locations—Alternative 1, tailings storage locations—Alternative 1, low grade ore stockpile locations—Alternative 1 and Alternative 2 (considered together), central water storage pond—Alternative W1 and Alternative W2, and aggregate source location—Alternative 3.

4.4 Species at Risk Birds

Three threatened or endangered bird species have been documented or are considered present in the Project area. Eastern Whip-poor-will, Lesser Yellowleg and Short-eared Owl are considered and consequently receive species protection under Section 9 and general habitat protection under Section 10 of the ESA. Breeding bird surveys, acoustic recording unit surveys, crepuscular acoustic recording unit surveys, owl surveys, stick nest surveys and migratory bird surveys were conducted to identify suitable bird breeding / nesting habitats and species presence. Survey methods, results and assessment are discussed in Appendix P and Section 6.16. Habitat Suitability Modelling was based on assumptions related to FRI habitat interpretations, professional judgment and experience related to bird habitat, as well as available peer-reviewed and public literature.

4.4.1 Criteria and Indicators

Table 4-19 summarizes the indicators and measurable parameters per the MECP guidance in undertaking the alternatives effects assessment of SAR birds (Eastern Whip-poor-will, Lesser Yellowlegs and Short-eared Owl). These parameters were carried forward in the final EIS/EA Section 6.16.

4.4.2 Alternatives Analysis Methods

The alternatives assessment for SAR birds was undertaken in two ways 1) using geographic information systems to overlay the Project components and physical activities on Habitat Suitability Modelling mapping to quantify the direct effects and identify potential indirect effects on Wolverine; and 2) to quantify the direct effects of removing habitat, resultant model surfaces (habitat maps) were overlaid with the alternatives, and the removal areas were calculated. The overlap between modelled habitat and Project alternatives was calculated using the sf package in R v 4.3.2. When it was necessary to subtract the area of one feature from another, the st_difference function was used. The shared spatial geometry of any two

features was determined using the st_intersection function. The area of the resulting intersection was then calculated in square kilometres.

Areas adjacent to the PDA may experience indirect effects, such as fugitive dust emissions, edge effects (e.g., increased light, wind or dust at the edge of cleared areas), noise disturbance and changes in environmental conditions due to adjacent ground disturbance. As noted above, effects were only modelled for the preferred PDA. Since the modelled effects were contained within the LSA, a similar LSA was applied for alternative components and used to estimate indirect effects on habitat. Like the direct effects, air, groundwater drawdown and noise effects (indirect effects) can be conservatively accounted for by overlaying habitat mapping and calculating the potentially affected area.

The potential change in the risk of mortality and change in movement was undertaken in a qualitative manner, considering experience with other mine operations, literature and Project-specific factors. Habitat bisected by the PDA is predicted to experience fragmentation.

4.4.3 Habitat Protection Criteria

As indicated in the guidance document provided by the MECP (2021a) habitat and impacts to category habitat from a GHD are to be considered when evaluating alternatives. Habitat mapping is used to determine which alternative from the various Project components affects the least habitat for each species of SAR bird considered.

Explanation of How All Adverse Effects on Habitat Will Be Avoided

- The construction phase of the Project may result in fragmentation and direct habitat loss. Site preparation activities and construction of the PDA, including clearing, grubbing and bulk earthworks, will result in the direct loss of habitat for SAR birds and are assessed for potential effects as a change in the relative abundance of habitat by assuming the area of the PDA will be removed.
- Direct adverse effects (e.g., mortality) will be avoided during construction and operation by following appropriate BMPs. BMPs will be selected and implemented to avoid, minimize and mitigate potential direct and indirect effects on SAR birds during construction (i.e., timing windows). Timing window BMPs include not operating equipment in potential habitat during the breeding season (mid-May – mid-August).

4.4.3.1 Alternative Assessment for Eastern Whip-poor-will

Mine Access Road Alternatives

The construction of an access road is required to meet the main purpose of the activity (operation of a mine). The four mine access road alternatives were considered with respect to Changes in Habitat Availability and Effectiveness. The favoured alignments are mine access road 1 and mine access road 5, which results in the lowest direct and indirect habitat removal (Figure 4-21). Both options have the shortest lengths of all alternatives (mine access road 5 is 0.6 km longer; Table 4-20) and is therefore anticipated to have the lowest potential for residual effects during all Project phases. The mine access road 1 and transmission line alternatives are co-located within a portion of each other's alignments, further limiting the potential for residual impacts. As such, mine access road 1 is anticipated to require the lowest mitigation effort to avoid / minimize potential effects.

The proposed route is the most direct and feasible route from the existing road network, avoiding major waterbodies and minimizing new disturbance. Route optimizations may be possible, including sharing the corridor with the proposed transmission line alternative.

Transmission Line Alternatives

Construction of transmission line is required to meet the main purpose of the activity (operation of a mine). This alternative would provide electrical servicing. The four transmission line alternatives were considered with respect to Changes in Habitat Availability and Effectiveness. All four transmission line alternatives start on the east side of the Project development area and are proposed to follow the mine access road until a location north of the existing E1C transmission line. Transmission lines 1, 2 and 3 all follow the existing E1C transmission line for varying lengths, while transmission line 4 is a new route.

The favoured alignments are transmission line 3 and transmission line 1, which have the shortest lengths and footprints (Figure 4-21 and Table 4-21) and is therefore anticipated to have the lowest potential for residual effects during all Project phases, as well as the anticipated lowest mitigation effort to avoid / minimize potential effects.

Mine Site Area Alternatives

Construction of a mine site area is required to fulfill the primary purpose of the activity (operating a mine). The mine site area will be the main Project component, consisting of the ore body, associated facilities and infrastructure. There are no alternatives for this general location as it is to be built around the ore body. It is conservatively considered that the entire footprint of the mine site area will be removed. Components considered include:

- Mine rock storage locations;
- Tailings storage locations;
- Ore stockpile locations;
- Central water storage pond; and
- Aggregate source locations.

These have been considered with respect to relative potential for residual effects. A compact mine site area is favoured so as to limit linear disturbances and sprawl.

The following placements of Project components had the lowest direct impacts on maternity and foraging habitat:

- Mine rock storage locations—Alternative 1;
- Tailings storage locations—Alternative 1;
- Low grade ore stockpile location—Alternative 1 and Alternative 2 (considered together);
- Central water storage pond—Alternative W4; and
- Aggregate source location—Alternative 1.

4.4.3.2 Alternative Assessment for Lesser Yellowlegs

Mine Access Road Alternatives

The construction of an access road is essential for the operation of the mine. Four alternatives for the mine access road were evaluated in terms of Changes in Habitat Availability and Effectiveness. The favoured alignments are mine access road 1 and mine access road 5, as they result in the least direct and indirect habitat removal (Figure 4-22). Both options are the shortest among all alternatives, with mine access road 5 being only 0.6 km longer (see Table 4-19). Consequently, they are expected to have the lowest potential for

residual effects throughout the Project. Additionally, mine access road 1 and the transmission line alternatives share portions of their alignments, reducing potential residual impacts. Therefore, mine access road 1 is anticipated to require the least mitigation effort to avoid or minimize potential effects.

The proposed route is the most direct and feasible from the existing road network, avoiding major waterbodies and minimizing new disturbances. Route optimizations, such as sharing the corridor with the proposed transmission line alternative, may also be possible.

Transmission Line Alternatives

Construction of transmission line is required to meet the main purpose of the activity (operation of a mine). This alternative would provide electrical servicing. The four transmission line alternatives were considered with respect to Changes in Habitat Availability and Effectiveness. All four transmission line alternatives start on the east side of the Project development area and are proposed to follow the mine access road until a location north of the existing E1C transmission line. Transmission lines 1, 2 and 3 all follow the existing E1C transmission line for varying lengths, while transmission line 4 is a new route.

The favoured alignment is transmission line 3, which has the shortest overall length and footprint (see Figure 4-22 and Table 4-24). Consequently, it is anticipated to have the lowest potential for residual effects throughout the Project and the lowest mitigation effort required to avoid or minimize potential impacts. Additionally, this option can be co-located with a portion of a mine access road alternative, further limiting potential residual impacts.

Mine Site Area Alternatives

Construction of a mine site area is necessary to achieve the primary goal of operating a mine. This area will be the main component of the Project, including the ore body, associated facilities and infrastructure. Since the mine site must be built around the ore body, there are no alternative locations for this general area. It is conservatively assumed that the entire footprint of the mine site area will be impacted. These are the components considered:

- Mine rock storage locations;
- Tailings storage locations;
- Ore stockpile locations;
- Central water storage pond; and
- Aggregate source locations.

These were evaluated based on their relative potential for residual effects. A compact mine site area is favoured to minimize linear disturbances and sprawl.

The following placements of Project components had the lowest direct impacts on moderate and high suitable habitat:

- Mine rock storage locations—Alternative 1;
- Tailings storage locations—Alternative 1;
- Low grade ore stockpile location—Alternative 1 and Alternative 2 (considered together);
- Central water storage pond—Alternative W4; and
- Aggregate source location—Alternative 3.

4.4.3.3 Alternative Assessment for Short-eared Owl

Mine Access Road Alternatives

The construction of an access road is required to meet the main purpose of the activity (operation of a mine). The four mine access road alternatives were considered with respect to Changes in Habitat Availability and Effectiveness. The favoured alignment is mine access road 1 which results in the lowest direct and indirect habitat removal (Figure 4-23, Table 4-26) and is therefore anticipated to have the lowest potential for residual effects during all Project phases. The mine access road 1 and transmission line alternatives are co-located within a portion of each other's alignments, further limiting the potential for residual impacts. As such, mine access road 1 is anticipated to require the lowest mitigation effort to avoid / minimize potential effects.

The proposed route is the most direct and feasible route from the existing road network, avoiding major waterbodies and minimizing new disturbance. Route optimizations, including sharing the corridor with the proposed transmission line alternative, may be possible.

Transmission Line Alternatives

Construction of transmission line is required to meet the main purpose of the activity (operation of a mine). This alternative would provide electrical servicing. The four transmission line alternatives were considered with respect to Changes in Habitat Availability and Effectiveness. All four transmission line alternatives start on the east side of the Project development area and are proposed to follow the mine access road until a location north of the existing E1C transmission line. Transmission lines 1, 2 and 3 all follow the existing E1C transmission line for varying lengths, while transmission line 4 is a new route.

The favoured alignments are transmission line 1 and transmission line 3, which have the shortest lengths and direct footprints (Figure 4-23, Table 4-27) and is therefore anticipated to have the lowest potential for residual effects during all Project phases, as well as the anticipated lowest mitigation effort to avoid / minimize potential effects. In addition, either option can be co-located with a portion of a mine access road alternative to further limit the potential for residual impacts. transmission line 4 has the lowest indirect area of impact; however, it can't be aligned with the existing E1C transmission line.

Mine Site Area Alternatives

Construction of a mine site area is required to fulfill the primary purpose of the activity (operating a mine). The mine site area will be the main Project component, consisting of the ore body, associated facilities and infrastructure. There are no alternatives for this general location, as it is to be built around the ore body. It is conservatively considered that the entire footprint of the mine site area will be removed. These are the components considered:

- Mine rock storage location alternatives;
- Tailings storage location alternatives;
- Ore stockpile location alternatives;
- Central water storage pond alternatives; and
- Aggregate source location alternatives.

These have been considered with respect to relative potential for residual effects. A compact mine site area is favoured so as to limit linear disturbances and sprawl.

The following placements of Project components had the lowest direct impacts on maternity and foraging habitat:

- Mine rock storage locations—Alternative 1;
- Tailings storage locations—Alternative 1;
- Low grade ore stockpile location—Alternative 1 and Alternative 2 (considered together);
- Central water storage pond—Alternative W4; and
- Aggregate source location—Alternative 1.

4.4.4 Species / Individual Protection Criteria for Species at Risk Birds

General measures to be implemented to avoid, reduce or minimize the effects of the Project on all identified SAR birds will include:

- Development of a compact mine site to limit the footprint of disturbance;
- Overlap of transmission line, mine access road and airstrip to achieve a narrow and compact Project corridor;
- Use of existing Wenasaga Road where possible to reduce the creation of new road impacts;
- Use of existing transmission line where possible to reduce the creation of new impacts;
- Water from dewatering activities will not be directed to terrestrial habitats and existing hydro-period conditions outside the dewatering zone of influence are maintained;
- If Eastern Whip-poor-will, Lesser Yellowlegs or Short-eared Owl individuals or nests are encountered during Project activities, the Project must comply with the prohibitions of the *Migratory Birds Convention Act* and Migratory Birds Regulations (i.e., stop work);
- Vegetation removal should be avoided between April 15 and August 31 in any given year;
- Enforce reduced speed limits and employee SAR training to reduce the risk of mortality; and
- Re-establish vegetation (and, therefore, habitat) through reclamation (a standard approach).

Eastern Whip-poor-will Specific Mitigation Measures:

- The breeding window for Eastern Whip-poor-will is covered in the April 15 and August 31 window.
- Additional occupancy surveys along the PDA should be completed to inform the removal of Eastern Whip-poor-will habitat. Avoid removal of Category 1, 2 and 3 habitats as feasible.
- Permitting under the ESA may be required.
- Follow-up monitoring programs to follow population goals from the Recovery Strategy (MECP 2019b). In the short term (10 years), the local population should not decrease by more than 10%.

Lesser Yellowlegs Specific Mitigation Measures

- The breeding window for Lesser Yellowlegs is covered in the April 15 and August 31 window.
- Mine tailings should never be directed towards Lesser Yellowlegs habitat.
- Permitting under the ESA may be required.

- Follow-up monitoring programs to follow performance measures from the Recovery Strategy (Catling et al. 2024). In the short term (10 years), a maintained or increased number of mature individuals from baseline conditions.

Short-eared Owl Specific Mitigation Measures

- The breeding window for Short-eared owls is covered in the April 15 and August 31 window.
- Permitting under the ESA may be required.
- Monitoring for shrub abundance should align with the vegetation community monitoring outlined in Section 6.11.

4.4.5 Conclusion with Respect to Species at Risk Birds

Since the do nothing approach cannot be carried forward if the Project is to proceed, measures will have to be identified first to avoid any adverse effects, and in cases where there are no practicable or feasible alternatives, identify measures that minimize or mitigate the adverse effects (what will be implemented, when, where and how actions will be applied). Such measures may be general, site-specific or activity-specific. To quantify the anticipated net effects after measures are applied, each alternative's net effects was compared via habitat direct and indirect impact areas.

In the interest of minimizing impacts to SAR birds, the favoured mine access road and transmission line alternatives are those that consistently show the least habitat disruption across multiple species. Based on the direct habitat losses for all species (Eastern Whip-poor-will, Lesser Yellowlegs and Short-eared Owl), the options with the lowest overall direct impacts on SAR habitat are mine access road 1 and mine access road 5. Alternative transmission lines 1 and 3 are the favoured transmission line alternative for SAR birds. Transmission lines 1 and 3 have the lowest impact to bird habitat. Each of the transmission line alignments also supports the creation of new habitats for Eastern Whip-poor-will and Short-eared Owl which can mitigate some of the adverse impacts of habitat removal.

To further reduce residual effects, it is recommended to construct within the smallest footprint possible, minimize disturbance by using existing trails and roads, limit the area cleared with heavy machinery, reduce the removal of woody vegetation and implement progressive revegetation. Based on the alternatives assessment, the following options are identified as the best choices for minimizing impacts on the habitats on SAR birds. The following Project components placements had the lowest direct impacts on SAR bird habitat: mine rock storage locations—Alternative 1, tailings storage locations—Alternative 1, low grade ore stockpile locations—Alternative 1 and Alternative 2 (considered together), central water storage pond—Alternative W4 and aggregate source location—Alternative 1 (Lesser Yellowlegs suggests Alternative 3 is the favoured aggregate source location; however Alternative 1 is second with 0.02 km^2 more impact).

Table 4-1: Summary of Indicators and Parameters for Boreal Caribou

MECP Criteria	Indicator	Measurable Parameter	Rationale
Habitat protection	**Change in habitat availability and effectiveness:** • Direct loss of habitat (habitat destruction / removal) • Indirect or functional loss of habitat (habitat damage from avoidance and barrier effects)	• Range Condition (Churchill / habitat RSA) – Changes in relative amounts of Category 1, 2 and 3 from direct and indirect disturbance • Cumulative Disturbance at Range Level remains at or moves towards a level supporting a self-sustaining population • Alignment with Existing or Proposed Disturbance • Habitat Amount and Arrangement • Number of Category 1 Habitat (nursery areas, winter use areas, travel corridors) found within 10 km of the proposal. • Spatial Extent of Predicted Sensory Disturbance (noise and light)	Boreal Caribou rely on their entire range for survival, so maintaining the condition is essential. The RMP outlines three key principles for managing Boreal Caribou habitats: Cumulative Disturbance: Principle 1 emphasizes that cumulative disturbance within the range should be kept at levels that support a self-sustaining population. Habitat Arrangement: Principle 2 directs that the amount and arrangement of habitat should reflect natural landscapes, minimizing human impact. Forest Composition and Structure: Principle 3 mandates that forest composition and structure within the range should maintain the ecological functions of sub-range habitats crucial for Boreal Caribou. Additionally, when planning activities, it is essential to consider minimizing the anthropogenic disturbance footprint by aligning activities with existing or proposed developments. Sensory disturbances (within 10 km) from development can also cause Boreal Caribou to avoid otherwise suitable habitats.
	Cumulative and range scale effects: • Cumulative effects of habitat changes at range scale or incremental addition of the Project footprint at local scale or altered range connectivity		

Table 4-1: Summary of Indicators and Parameters for Boreal Caribou

MECP Criteria	Indicator	Measurable Parameter	Rationale
Species / Individual protection	**Population effects:** • Altered mortality risk, changes in population state and/or altered population vital rates	• Qualitative risk of mortality • Changes in population abundance and seasonal distribution • Altered population vital rates, including lambda, adult female survival, calf recruitment	Changes in demography are assessed due to potential impacts from altered mortality risk, changes in population state (abundance and distribution) and/or altered vital rates (lambda, adult female survival and calf recruitment) resulting from habitat disturbance and landscape connectivity. Changes in predator-prey dynamics are assessed due to increased mobility and hunting efficiency by predators due to the creation or widening of linear corridors and/or increases in Moose abundance due to the availability of early successional habitats resulting from Project development activities. The Project may result in increased predation via the increase in alternate prey sources (Moose), which in turn will lead to increased predation (wolves, bears) and increased parasite burdening (amount and spread). Sensory and ground disturbance and vegetation clearing can result in physical disturbance of key habitat features (e.g., sub-range habitat) and lead to avoidance. Vehicle and equipment movement can result in accidental mortality (i.e., wildlife–vehicle collisions).
	Community effects: • Altered community dynamics between Boreal Caribou, Moose and Wolves		

Table 4-2: Direct and Indirect Impacts to General Habitat Description Habitats Comparison of Range Scale and Local Scale Disturbance to Category 1 Habitats by Alternative

Alternative	Scale	Baseline Area (km^2)		Amount of Area (km^2)			
				Direct Disturbance Only		Direct Disturbance + 500 m buffer	
		Category 1 Calving / Nursery	Category 1 Wintering	Category 1 Calving / Nursery	Category 1 Wintering	Category 1 Calving / Nursery	Category 1 Wintering
				Change in Area from Baseline (km^2)			
Mine access road 1 (Preferred)	**Habitat RSA**	**4,273.24**	**3,098.53**	**-0.28**	**-0.0**	**-10.31**	**-0.0**
	LSA	**251.34**	**0.22**	**-0.28**	**-0.0**	**-10.31**	**-0.0**
Mine access road 3	Habitat RSA	4,273.24	3,098.53	-0.02	-0.0	-1.4	-0.0
	LSA	307.5	0.00	-0.02	-0.0	-1.4	-0.0
Mine access road 4	Habitat RSA	4,273.24	3,098.53	-0.02	-0.0	-3.15	-0.0
	LSA	290.49	51.18	-0.02	-0.0	-3.15	-0.0
Mine access road 5	Habitat RSA	4,273.24	3,098.53	-0.25	-0.0	-9.52	-0.0
	LSA	251.36	0.22	-0.25	-0.0	-9.52	-0.0
Transmission line 1 (Preferred)	**Habitat RSA**	**4,273.24**	**3,098.53**	**-1.18**	**-1.07**	**-27.87**	**-27.54**
	LSA	**56.95**	**53.89**	**-1.18**	**-1.07**	**-27.87**	**-27.54**
Transmission line 2	Habitat RSA	4,273.24	3,098.53	-0.9	-0.98	-23.44	-24.94
	LSA	46.13	48.83	-0.9	-0.98	-23.44	-24.94
Transmission line 3	Habitat RSA	4,273.24	3,098.53	-0.71	-1.04	-19.15	-27.1
	LSA	38.53	53.61	-0.71	-1.04	-19.15	-27.1
Transmission line 4	Habitat RSA	4,273.24	3,098.53	-0.65	-0.34	-16.94	-8.97
	LSA	35.12	19.62	-0.65	-0.34	-16.94	-8.97

Table 4-3: Boreal Caribou Habitat Regional Study Area (Churchill Range) – Alternatives Assessment for Mine Access Road Routing

Indicator at Churchill Range Scale (Habitat RSA)	Alternative	GHD Categories				
Range condition – Change in relative amounts of Category 1, 2 and 3 habitats from direct and indirect mine access road disturbance	**Baseline Legacy Disturbance (%)**	**Category 1**	**Category 2**	**Category 3**	**Pooled**	**Summary**
		17.34	**32.81**	**64.93**	**41.547**	
		Incremental New Disturbance (%)				Mine access road 1 has the least total overall incremental new disturbance to GHD habitats but highest disturbance to Category 1
	Mine access road 1 (Preferred)	+0.005	+0.006	+0.000	+0.004	
	Mine access road 3	+0.000	+0.015	+0.001	+0.005	
	Mine access road 4	+0.000	+0.009	+0.004	+0.004	
	Mine access road 5	+0.004	+0.008	+0.000	+0.004	
Cumulative disturbance (%) – Project disturbance relative to ECCC disturbance management threshold	**Baseline Disturbance**	**Disturbance (%)**	**Length (km)**	**Summary**		
		41.547	**N/A**	**N/A**		
	Mine access road 1 (Preferred)	41.561	17.2	Shortest length minimizing direct effects on terrestrial habitat. Is co-located in part with transmission line to reduce number of new corridors		
	Mine access road 3	41.562	28.1	Longer overall length. Potential to be co-located along or near a portion of the route to minimize new corridor creation		
	Mine access road 4	41.561	28.2	Longest overall length. No reasonable potential to co-locate with a transmission line route, resulting in creation of two (mine access road and transmission line) linear corridors		
	Mine access road 5	41.561	17.8	Short length, slightly longer than mine access road 1. Doesn't bisect the Category 1 nursery area that mine access road 1 interacts with. Located along the southern border of this Category 1 area.		
Self-Sustaining population Principle 1 of the RMP - Cumulative effects remains at or moves towards a level supporting a self-sustaining population		**% Increase in Disturbance**		**Summary**		
	Mine access road 1 (Preferred)	0.004		Least Intrusive		
	Mine access road 3	0.0.005		Most Intrusive		
	Mine access road 4	0.004		Most Intrusive		
	Mine access road 5	0.0.004		More Intrusive		

Table 4-3: Boreal Caribou Habitat Regional Study Area (Churchill Range) – Alternatives Assessment for Mine Access Road Routing

Indicator at Churchill Range Scale (Habitat RSA)	Alternative	GHD Categories				
Habitat amount and arrangement Principle 2 of RMP – Managed consistent with simulated ranges of natural variation NOTE: effect of the transmission line is considered if it shares a corridor with the mine access road.	**Alternative**	**Boreal Caribou Refuge Habitat**			**Summary**	
		$\bar{x}$ Patch Size (km^2)	**Edge Density (m/ha)**	**Total Edge (km)**		
	Baseline	0.1193	64.60	48,933.6	Mine access road 1 has smallest effect on mean patch size, edge density relative to baseline, but has the greatest effect on total edge increase. However overall, effects of all alternatives are minor to Boreal Caribou refuge habitat fragmentation statistics.	
	Mine access road 1 (Preferred)	0.1192	64.65	48,967.1		
	Mine access road 3	0.1186	64.63	48,955.0		
	Mine access road 4	0.1186	64.63	48,949.5		
	Mine access road 5	0.1191	64.64	48,965.6		
Category 1 calving / nursery habitat disturbance Principle 3 of RMP – Forest (composition, pattern, structure) management to maintain ecological function at sub-range level		**Legacy Direct Disturbance (km^2)**	**Incremental New Direct Disturbance (km^2)**	**Legacy Indirect Disturbance (km^2)**	**Incremental New Indirect Disturbance (km^2)**	**Summary**
	Mine access road 1 (Preferred)	0.00	0.279	0.574	9.739	Transects the greatest length / area of Category 1 calving / nursery habitat, which may be additionally disruptive, but with a shorter length affects a reduced area of seasonal range.
	Mine access road 3	0.00	0.017	0.3	1.1	Avoids crossing Category 1 calving / nursery habitat, but a portion is very close to this habitat type which would be disruptive.
	Mine access road 4	0.00	0.025	0.667	2.488	Avoids crossing Category 1 calving / nursery area) habitat, but a portion is very close to this habitat type which would be disruptive
	Mine access road 5	0.00	0.255	01.105	8.419	Transects a greater length / area of Category 1 calving / nursery habitat, which may be additionally disruptive, but with a shorter length affects a reduced area of seasonal range. Alignment is along the southern border of the Category 1 calving / nursery area, not bisecting it like mine access road 1.

Table 4-3: Boreal Caribou Habitat Regional Study Area (Churchill Range) – Alternatives Assessment for Mine Access Road Routing

Indicator at Churchill Range Scale (Habitat RSA)	Alternative	GHD Categories				
Category 1 winter habitat disturbance Principle 3 of RMP – Forest (composition, pattern, structure) management to maintain ecological function at sub-range level		**Legacy Direct Disturbance (km^2)**	**Incremental New Direct Disturbance (km^2)**	**Legacy Indirect Disturbance (km^2)**	**Incremental New Indirect Disturbance (km^2)**	**Summary**
	Mine access road 1 (Preferred)	0.00	0.00	0.00	0.00	Mine access road alternatives do not impact any winter habitat.
	Mine access road 3	0.00	0.00	0.00	0.00	
	Mine access road 4	0.00	0.00	0.00	0.00	
	Mine access road 5	0.00	0.00	0.00	0.00	
Category 1 travel corridor disturbance Principle 3 of RMP – Forest (composition, pattern, structure) management to maintain ecological function at sub-range level		**Number of Significant Clusters**	**Mean Cluster Strength Score**	**Mean Cluster Length (km)**	**Cumulative Cluster Length (km)**	**Summary**
	Mine access road 1 (Preferred)	3	0.519	0.263	0.788	Mine access road 5 does not affect movement. Mine access road 1 is the least intrusive and has the smallest potential effect relative to the remaining alternatives
	Mine access road 3	7	0.357	0.415	2.906	
	Mine access road 4	8	0.415	0.458	3.663	
	Mine access road 5	0	0.000	0.000	0.000	
Category 2 seasonal range habitat disturbance Principle 3 of RMP – Forest (composition, pattern, structure) management to maintain ecological function at sub-range level		**Directly Impacted Area (km^2)**	**Indirectly Impacted Area (km^2)**	**Summary**		
	Mine access road 1 (Preferred)	0.25	8.45	Mine access road 1 has the smallest direct and indirect overlap with Category 2 habitat.		
	Mine access road 3	0.8	26.5			
	Mine access road 4	0.65	21.23			
	Mine access road 5	0.3	9.93			
Category 3 remaining range (future habitat) impacts – Forest managed to retain refuge function and trajectory towards future habitat		**Directly Impacted Area (km^2)**	**Indirectly Impacted Area (km^2)**	**Summary**		
	Mine access road 1 (Preferred)	0.00	0.00	Mine access road 1 does not affect Category 3 habitat; mine access road 4 is the only alternative that overlaps with Category 3 habitat.		
	Mine access road 3	0.02	0.73			
	Mine access road 4	0.17	4.45			
	Mine access road 5	0.00	0.00			

Table 4-3: Boreal Caribou Habitat Regional Study Area (Churchill Range) – Alternatives Assessment for Mine Access Road Routing

Indicator at Churchill Range Scale (Habitat RSA)	Alternative	GHD Categories		
Number of Category 1 habitat polygons within LSA (10 km buffer of MAR) (km^2)		**Number of Polygons Affected**	**Area Affected (km^2)**	**Summary**
	Mine access road 1 (Preferred)	2	251.34	Mine access road 1 LSA impacts the fewest polygons and has the least overlap with Category 1 habitat.
	Mine access road 3	4	307.50	
	Mine access road 4	3	290.49	
	Mine access road 5	3	251.36	
Incidental mortality from anthropogenic impacts (e.g., vehicle collisions, hunting mortality)	Unlikely for all alternatives.			
Indirect mortality resulting from apparent competition effects or from parasite burdening (amount, spread)	Nil to negligible: the zone of influence is too small for landscape level effect of apparent competition or incremental risk of parasite burdening.			
Sensory disturbance (light, sound, vibration, olfactory + movement)	Mine access road construction phase: sensory disturbance will occur during the construction phase but will not remain at the same place for long, as the road construction progresses. Mine access road operations phase: ongoing sensory disturbance during use of the road may have a seasonal local effect on Category 1 and Category 2 habitat polygons that are directly traversed by the Project footprint.			
Wildlife movement corridors Maintenance and/or provision	All mine access road alternatives may potentially act as a corridor for large predators, thereby affecting species such as Boreal Caribou.			

Note:
m/ha = metres per hectare; N/A = not applicable.

Table 4-4: Boreal Caribou Habitat Regional Study Area (Churchill Range) – Alternatives Assessment for Transmission Line Routing

Indicator at Habitat RSA Scale (Churchill Range)	**Alternative**	**GHD Categories**				
Range condition – Change in relative amounts of Category 1, 2 and 3 habitats from direct and indirect transmission line disturbance	**Baseline Legacy Disturbance (%)**	**Category 1**	**Category 2**	**Category 3**	**Pooled**	**Summary**
		17.34	**32.81**	**64.93**	**41.547**	
		Incremental New Disturbance (%)				Transmission line 1 has lowest total incremental new disturbance, which is additionally reduced by parallel alignment with an existing transmission line
	Transmission line 1 (Preferred)	+0.007	+0.007	+0.000	+0.005	
	Transmission line 2	+0.007	+0.012	+0.010	+0.009	
	Transmission line 3	+0.008	+0.007	+0.031	+0.014	
	Transmission line 4	+0.014	+0.030	+0.007	+0.017	
Cumulative disturbance (%)	**Baseline**	**Disturbance (%)**	**Length (km)**	**Summary**		
		41.547	**N/A**	N/A		
	Transmission line 1 (Preferred)	41.552	93.4	Short overall length with 57.3 km (62.1%) of length collocated in parallel with the existing Wataynikaneyap 230 kV transmission line to reduce disturbance effects on terrestrial habitat. Could be co-located in part with a mine access road route to minimize new corridor creation.		
	Transmission line 2	41.556	100.6	Long overall length. Potential to be co-located along or near a portion of a mine access road route to minimize new corridor creation.		
	Transmission line 3	41.561	89.1	Shortest overall length. No reasonable potential to co-locate with a mine access road route, resulting in creation of two (mine access road and transmission line) linear corridors.		
	Transmission line 4	41.564	114.4	Longest overall length with all new infrastructure required.		
Self-sustaining population Principle 1 of the RMP—Cumulative effects remains at or moves towards a level supporting a self-sustaining population		**% Increase in Disturbance**		**Summary**		
	Transmission line 1 (Preferred)	0.005		Least intrusive		
	Transmission line 2	0.009		More intrusive		
	Transmission line 3	0.014		More intrusive		
	Transmission line 4	0.017		Most intrusive		

Table 4-4: Boreal Caribou Habitat Regional Study Area (Churchill Range) – Alternatives Assessment for Transmission Line Routing

Indicator at Habitat RSA Scale (Churchill Range)	**Alternative**	**GHD Categories**				
Habitat amount and arrangement Principle 2 of RMP—Managed consistent with simulated ranges of natural variation Note: The effect of the transmission line is considered if it shares a corridor with the mine access road.	**Alternative**	**Boreal Caribou Refuge Habitat**			**Summary**	
		$\bar{x}$ Patch Size (km^2)	**Edge Density (m/ha)**	**Total Edge (km)**		
	Baseline	0.1193	64.60	48,933.6	Transmission line 1 has the smallest effect on all fragmentation statistics of the alternatives considered. Overall, the effects of the alternatives to Boreal Caribou Refuge habitat are minor	
	Transmission line 1 (Preferred)	0.1187	64.66	48,972.2		
	Transmission line 2	0.1183	64.69	48,993.5		
	Transmission line 3	0.1183	64.72	49,014.1		
	Transmission line 4	0.1180	64.74	49,028.6		
Category 1 calving / nursery Habitat Disturbance Principle 3 of RMP—Forest (composition, pattern, structure) management to maintain ecological function at sub-range level		**Legacy Direct Disturbance (km^2)**	**Incremental New Direct Disturbance (km^2)**	**Legacy Indirect Disturbance (km^2)**	**Incremental New Indirect Disturbance (km^2)**	**Summary**
	Transmission line 1 (Preferred)	0.335	0.849	17.84	10.032	Transects the greatest length / area of Category 1 calving / nursery habitat, which may be additionally disruptive.
	Transmission line 2	0.075	0.822	11.67	11.769	Largely avoids crossing Category 1 calving / nursery habitat but crosses Category 1 winter habitat.
	Transmission line 3	0.056	0.658	7.745	11.406	Avoids crossing Category 1 calving / nursery habitat, but a portion is very close to this habitat type, which would be disruptive. Also crosses Category 1 winter habitat.
	Transmission line 4	0.007	0.638	2.543	14.401	Minimizes crossing of Category 1 calving / nursery habitat.

Table 4-4: Boreal Caribou Habitat Regional Study Area (Churchill Range) – Alternatives Assessment for Transmission Line Routing

Indicator at Habitat RSA Scale (Churchill Range)	**Alternative**	**GHD Categories**				
Category 1 winter use habitat disturbance Principle 3 of RMP—Forest (composition, pattern, structure) management to maintain ecological function at sub-range level		**Legacy Direct Disturbance (km^2)**	**Incremental New Direct Disturbance (km^2)**	**Legacy Indirect Disturbance (km^2)**	**Incremental New Indirect Disturbance (km^2)**	**Summary**
	Transmission line 1 (Preferred)	0.064	1.004	25.7	1.836	Transmission line 4 has the lowest impact on Category 1 winter use habitat, with no legacy direct or indirect disturbances and the smallest incremental new direct disturbances. Transmission line 1 has the lowest incremental new indirect disturbance.
	Transmission line 2	0.177	0.802	22.283	2.661	
	Transmission line 3	0.095	0.946	23.336	3.764	
	Transmission line 4	0.000	0.34	0.000	8.971	
Category 1 travel corridor disturbance Principle 3 of RMP—Forest (composition, pattern, structure) management to maintain ecological function at sub-range level		**Number of Significant Clusters**	**Mean Cluster Strength Score**	**Mean Cluster Length (km)**	**Cumulative Cluster Length (km)**	**Summary**
	Transmission line 1 (Preferred)	18	0.436	0.348	6.265	Transmission line 3 is the most intrusive, followed by the preferred Alternative (transmission line 1). Note that 57.3 km (62.1%) of length of transmission line 1 is collocated in parallel with the existing Wataynikaneyap 230 kV transmission line, which would reduce its effect footprint.
	Transmission line 2	15	0.487	0.357	5.349	
	Transmission line 3	20	0.403	0.333	6.661	
	Transmission line 4	11	0.505	0.204	2.243	
Category 2 seasonal range habitat disturbance Principle 3 of RMP – Forest (composition, pattern, structure) management to maintain ecological function at sub-range level		**Directly Impacted Area (km^2)**	**Indirectly Impacted Area (km^2)**	**Summary**		
	Transmission line 1 (Preferred)	1.41	38.25	Transmission line 1 has the largest direct and indirect disturbance overlap on Category 2 habitat. However, 57.3 km (62.1%) of its length is collocated in parallel with the existing Wataynikaneyap 230 kV transmission line, which would reduce its effect footprint		
	Transmission line 2	1.44	36.33			
	Transmission line 3	1.01	25.43			
	Transmission line 4	2.78	68.45			

Table 4-4: Boreal Caribou Habitat Regional Study Area (Churchill Range) – Alternatives Assessment for Transmission Line Routing

Indicator at Habitat RSA Scale (Churchill Range)	**Alternative**	**GHD Categories**		
Category 3 remaining range (future habitat) impacts – Forest managed to retain refuge function and trajectory towards future habitat		**Directly Impacted Area (km²)**	**Indirectly Impacted Area (km²)**	**Summary**
	Transmission line 1 (Preferred)	0.00	0.02	Transmission line 1 does not affect Category 3 habitat; transmission line 3 has the greatest overlap with Category 3 habitat.
	Transmission line 2	1.08	27.42	
	Transmission line 3	1.04	26.45	
	Transmission line 4	0.94	23.97	
Number of Category 1 habitat polygons within LSA (1 km buffer of transmission line) and area (km²)	**Alternatives**	**Number of Polygons Affected**	**Area Affected (km²)**	**Summary**
	Transmission line 1 (Preferred)	13	56.95	Transmission line 4 LSA has the least impact on Category 1 habitat. Transmission line 1 has the most.
	Transmission line 2	3	46.14	
	Transmission line 3	3	38.53	
	Transmission line 4	4	35.12	
Incidental mortality from anthropogenic impacts (e.g., vehicle collisions, hunting mortality)	Unlikely for all alternatives (with mitigations applied)			
Indirect mortality resulting from apparent competition effects or from parasite burdening (amount, spread)	Nil to negligible – Zone of influence too small for landscape level effect of apparent competition or incremental risk of parasite burdening for transmission line 1 and transmission line 3 alternatives. Greater risks associated with transmission line 2 and transmission line 4 because of longer lengths.			
Sensory disturbance (light, sound, vibration, olfactory + movement)	Transmission line construction phase – Sensory disturbance will occur during the construction phase but will not remain at the same place for long, as the road construction progresses. Transmission line operation phase – No sensory disturbance predicted during use of the transmission line other than for periodic vegetation maintenance and confounding effects if all-terrain vehicles or snowmobiles use the transmission line route.			
Wildlife movement corridors Maintenance and/or provision	All transmission line alternatives may potentially act as a corridor for large predators, thereby affecting species such as Boreal Caribou			

Table 4-5: Potential Project Effects on λ Based on Population Modelling Lines of Evidence

Population Modelling Method	Spatial Scale	Modelled λ Estimates
Sustainability Metrics under Current Conditions		
Empirical Model of λ (based on 2021 to 2023 surveys) (Appendix D Page 3)	Population RSA	0.949
	Habitat RSA	---
Vital Rate Model 1 of λ (based on IRAR estimates 2009 to 2013) (Appendix D, Table 2)	Population RSA	0.953
	Habitat RSA	0.960
Vital Rate Model 2 of λ (based on 2021 to 2023 surveys) (Appendix D, Table 3)	Population RSA	0.964
	Habitat RSA	---
Scenario Analysis of Sustainability Metrics under Current Conditions		
Population Reconstruction Trend Model (2010 to 2024)	Population RSA	0.957
	Survey Area	0.957
	Habitat RSA	0.957
ECCC Disturbance / Recruitment Model M3 (Appendix D, Table 11)	Population RSA	0.967
	Habitat RSA	0.943
	LSA	0.954
Leslie Matrix Model 1 (using ECCC method to estimate drop-in vital rates from addition of Project time 3 to 30 yrs) (Appendix D, Table 12)	Population RSA	0.936
	Habitat RSA	0.936
	LSA	0.936
Leslie Matrix Model 2 (using change in Category 1 calving / nursery habitat to estimate change in fecundity; time 3 to 30 years) (Appendix D, Table 13)	Population RSA	0.936
	Habitat RSA	0.936
	LSA	0.936

Note:
Baseline case λ = **0.936** (Leslie Matrix Modelling) to **0.967** (ECCC Disturbance-Recruitment Model M3).

Table 4-6: Comparison of Project Effect on λ Relative to Project Alternatives and With Respect to Temporary versus Permanent Effect on Category 1 Calving / Nursery Polygon

Population Reconstruction Trend Model	Project Alternative Combinations	Spatial Scale	Modelled λ Estimates Applied to Change in Category 1 Calving / Nursery Habitat	
			Permanent Loss*	Temporary Loss**
Baseline case (2010 to 2024)		Population RSA	0.957	0.957
		Survey area	0.957	0.957
		Habitat RSA	0.957	0.957
Preferred alternative	**MAR1_TL1**	Population RSA	0.956	0.956
		Survey area	0.953	0.956
		Habitat RSA	0.950	0.956
Preferred mine access road 1 with transmission line alternatives	**MAR1_TL2**	Population RSA	0.956	0.957
		Survey area	0.954	0.956
		Habitat RSA	0.951	0.956
	MAR1_TL3	Population RSA	0.956	0.957
		Survey area	0.954	0.956
		Habitat RSA	0.952	0.956
	MAR1_TL4	Population RSA	0.956	0.957
		Survey area	0.955	0.957
		Habitat RSA	0.952	0.956
Preferred TL1 with mine access road alternatives	**MAR3_TL1**	Population RSA	0.956	0.957
		Survey area	0.954	0.956
		Habitat RSA	0.952	0.956
	MAR4_TL1	Population RSA	0.956	0.957
		Survey area	0.954	0.956
		Habitat RSA	0.951	0.956
	MAR5_TL1	Population RSA	0.956	0.957
		Survey area	0.954	0.956
		Habitat RSA	0.950	0.956

Note(s):
* = permanent loss (no alternative habitat found) modelled out to 80 years; ** = temporary loss (alternate habitat found after 5 years) modelled out to 80 years.

Table 4-7: Amount (km²) of Habitat Directly and Indirectly Affected or Altered for Boreal Caribou

Criteria and Indicators (Table 4-1)	Mine Access Road 1	Mine Access Road 3	Mine Access Road 4	Mine Access Road 5
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of high and moderate habitat <u>directly</u> affected or altered for Boreal Caribou	Cat 1 nursery areas **0.28 km²** directly impacted.	Cat 1 nursery areas **0.02 km²** directly impacted.	Cat 1 nursery areas **0.02 km²** directly impacted.	Cat 1 nursery areas **0.25 km²** directly impacted.
	No Cat 1 winter use areas are directly impacted.	No Cat 1 winter use areas are directly impacted.	No Cat 1 winter use areas are directly impacted.	No Cat 1 winter use areas are directly impacted.
	3 significant crossing activity areas totalling 16.1 km. Mine access road 1 is the shortest but has the greatest length of Cat 1 Boreal Caribou habitat (high-use nursery range). Brownian Bridge and Circuitscape models: Mine access road 1 has relatively low impact on movement corridors (0.17 km²) and bisects no movement corridors at the broadest level. For landscape corridors, Mine access road 1 has the least impact on high (0.49) and medium (0.53) connectivity areas in km².	**7 significant crossing activity areas** totalling 22.4 km. Mine access road 3 is longer overall than mine access road 1 and mine access road 5, resulting in greater length / area of habitat loss. However, it crosses less Cat 1 Boreal Caribou habitat (high-use nursery area). Brownian Bridge and Circuitscape models: Mine access road 3 has the most impact on movement corridors (0.43 km²) and is the only access road to impact stopover locations (0.02 km²). It bisects 1 corridor at the broadest level of analysis. For landscape corridors, mine access road 3 has the most impact on high (0.8) and medium (0.84) connectivity areas in km².	**8 significant crossing activity areas** totalling 22.4 km. Mine access road 4 has the longest overall length, resulting in the greatest habitat loss, but avoids crossing Cat 1 Boreal Caribou habitat. Brownian Bridge and Circuitscape models: Mine access road 4 has relatively high impact on movement corridors (0.31) and bisects 1 corridor at the broadest level of analysis. For landscape corridors, mine access road 4 has relatively more impact on high (0.7) and medium (0.84) connectivity areas in km².	**0 significant crossing activity areas** totalling 16.9 km. Mine access road 5 shares some of the same route as Mine access road 1 but is longer in length and crosses the second greatest length / area of Category 1 Boreal Caribou habitat (high-use nursery range). Brownian Bridge and Circuitscape models: Mine access road 5 has the least impact movement corridors (0.07 km²). It bisects no corridors at the broadest scale. For landscape corridors, mine access road 5 has the second smallest impact on high (0.51) and medium (0.55) connectivity areas in km².

Table 4-7: Amount (km²) of Habitat Directly and Indirectly Affected or Altered for Boreal Caribou

Criteria and Indicators (Table 4-1)	Mine Access Road 1	Mine Access Road 3	Mine Access Road 4	Mine Access Road 5
	Cat 2 seasonal range **0.25 km²** directly impacted.	Cat 2 seasonal range **0.80 km²** directly impacted.	Cat 2 seasonal range **0.65 km²** directly impacted.	Cat 2 seasonal range **0.30 km²** directly impacted.
	Cat 3 remaining range **0.00 km²** directly impacted.	Cat 3 remaining range **0.02 km²** directly impacted.	Cat 3 remaining range **0.17 km²** directly impacted.	Cat 3 remaining range **0.00 km²** directly impacted.
	Cat 1, 2 and 3 (no travel corridors) area total (excluding overlap): **0.53 km²**	Cat 1, 2 and 3 (no travel corridors) area total (excluding overlap): **0.84 km²**	Cat 1, 2 and 3 (no travel corridors) area total (excluding overlap): **0.84 km²**	**Cat 1, 2 and 3 (no travel corridors) area total** (excluding overlap)**: 0.55 km²**
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of high and moderate habitat <u>indirectly</u> affected or altered for Boreal Caribou (500 m buffer of direct destruction)	Cat 1 nursery area - **10.03 km²** indirectly impacted. No Cat 1 winter use areas are indirectly impacted. Cat 2 seasonal ranges **8.45km²** indirectly impacted. Cat 3 remaining range **0.00 km²** indirectly impacted. **Cat 1, 2 and 3 area total: 18.48 km²**	Cat 1 nursery area – **1.38 km²** indirectly impacted. No Cat 1 winter use areas are indirectly impacted. Cat 2 seasonal ranges **26.5km²** indirectly impacted. Cat 3 remaining range **0.73km²** indirectly impacted. Cat 1, 2 and 3 area total: **28.61 km²**	Cat 1 nursery area - **3.13 km²** indirectly impacted. No Cat 1 winter use areas are indirectly impacted. Cat 2 seasonal ranges **21.23km²** indirectly impacted. Cat 3 remaining range **4.45km²** indirectly impacted. Cat 1, 2 and 3 area total: **28.81 km²**	Cat 1 nursery area **9.27 km²** indirectly impacted. No Cat 1 winter use areas are indirectly impacted. Cat 2 seasonal ranges **9.93km²** indirectly impacted. Cat 3 remaining range **0.00 km²** indirectly impacted. Cat 1, 2 and 3 area total: **19.190 km²**
Habitat protection **Cumulative and range scale effects** Cumulative effects of Category (Cat) habitat changes at range scale or incremental addition of the Project footprint at local scale or altered range connectivity **Legacy disturbance (%):**	Incremental new direct disturbance (%) Cat 1 = 0.005 Cat 2 = 0.006 Cat 3 = 0.000 Pooled = 0.004 **Least intrusive** 41.547 (legacy)+ 0.011 (incremental new) = **41.558%** The mine access road corridor's most direct route and shortest length (17.2 km) minimizes direct effects on terrestrial habitat. To reduce the number	Incremental new direct disturbance (%) Cat 1 = 0.000 Cat 2 = 0.015 Cat 3 = 0.001 Pooled = 0.005 Most intrusive 41.547 (legacy) + 0.016 (incremental new) = **41.563%** Longer overall length (28.1 km) of mine access road corridor. There is no reasonable potential to co-locate with the transmission line route, creating two	Incremental new direct disturbance (%) Cat 1 = 0.000 Cat 2 = 0.009 Cat 3 = 0.004 Pooled = 0.004 Most Intrusive 41.547 (legacy) + 0.013 (incremental new) = **41.56%** Longest overall length (28.2 km) of the mine access road corridor. There is no reasonable potential to co-locate with the transmission line route, creating two	Incremental new direct disturbance (%) Cat 1 = 0.004 Cat 2 = 0.008 Cat 3 = 0.000 Pooled = 0.004 More intrusive 41.547 (legacy)+ 0.012 (incremental new) = **41.559%** The second-shortest mine access road corridor (17.8 km) could be co-located with transmission line in part to reduce the number of new corridors.

Table 4-7: Amount (km²) of Habitat Directly and Indirectly Affected or Altered for Boreal Caribou

Criteria and Indicators (Table 4-1)	Mine Access Road 1	Mine Access Road 3	Mine Access Road 4	Mine Access Road 5
Cat 1 = 17.34 Cat 2 = 32.81 Cat 3 = 64.93 Pooled = 41.547 **Cumulative disturbance (%) (Churchill) –** Project disturbance relative to ECCC disturbance management threshold	of new corridors, **it could be co-located in part with transmission line.**	(mine access road and transmission line) linear corridors.	(mine access road and transmission line) linear corridors.	

Note(s):

Favoured	Minimal habitat loss and fragmentation. Least intrusive
Moderately favoured	Minimal habitat loss and fragmentation. More intrusive
Not favoured	Maximum habitat loss or severe fragmentation. Most intrusive

Cat = category.

Table 4-8: Amount (km²) of Habitat Directly and Indirectly Affected or Altered for Boreal Caribou

Criteria and Indicators (Table 4-1)	Transmission Line 1	Transmission Line 2	Transmission Line 3	Transmission Line 4
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of high and moderate habitat directly affected or altered for Boreal Caribou	Cat 1 nursery areas **1.18 km²** directly impacted.	Cat 1 nursery areas **0.90 km²** directly impacted.	Cat 1 nursery areas **0.71 km²** directly impacted.	Cat 1 nursery areas **0.65 km²** directly impacted.
	Cat 1 winter use areas **1.07 km²** directly impacted.	Cat 1 winter use areas **0.98 km²** directly impacted.	Cat 1 winter use areas **1.04 km²** directly impacted.	Cat 1 winter use areas **0.34 km²** directly impacted.
	18 significant crossing activity areas across 92.3 km. This corridor crosses the greatest length / area of Cat 1 high-use nursery area habitat activity areas immediately west of Slate Falls along the existing transmission line. Brownian Bridge and Circuitscape models: Transmission line 1 has the largest impact on movement corridors in km² (1.24) and stopover locations (0.09). When considering bisections alone, it has the lowest impact (2 or fewer bisections per season). For landscape corridors, transmission line 1 has the lowest impact on high connectivity (0.7) area, but the second highest for medium connectivity (0.84) areas in km². Transmission line 1	**15 significant crossing activity areas across 98.8 km.** This corridor avoids crossing Cat 1 high-use nursery area habitat west of the cluster of crossing activity areas near Slate Falls but does cross Category 1 high-use wintering habitat. Brownian Bridge and Circuitscape models: Transmission line 2 has the second largest impact on movement corridors in km² (1.16) but the second smallest on stopover locations (0.07). Transmission line 2 bisects several post-calving (3) and nursery (4) corridors. For landscape corridors, transmission line 2 has the second smallest impact on both high (1.60 km²) and medium (3.14 km²) connectivity areas.	**20 significant crossing activity areas across 87.2 km.** This corridor avoids crossing Cat 1 high-use nursery area habitat, but a portion is very close to this habitat type, which would be disruptive, and it does cross Cat 1 high-use wintering habitat. Brownian Bridge and Circuitscape models: Transmission line 3 has the second smallest impact on movement corridors in (1.13), but a comparatively large impact on stopover locations (0.09) in km². Transmission line 3 bisects several post-calving corridors (4). For landscape corridors, Transmission line 3 has the second largest impact on high (1.68) connectivity areas but the smallest	**11 significant crossing activity areas across 112.7 km.** This corridor minimizes crossing Cat 1 habitat. Brownian Bridge and Circuitscape models: For movement models, transmission line 4 has the lowest impact on movement corridors (0.63) and stop over locations (0.00) in km². It bisects several calving season (3) and nursery (4) corridors. For landscape corridors, transmission line 4 has the largest impact on both high (2.93 km²) and medium (3.98 km²) connectivity areas but does not bisect any corridors.

Table 4-8: Amount (km²) of Habitat Directly and Indirectly Affected or Altered for Boreal Caribou

Criteria and Indicators (Table 4-1)	Transmission Line 1	Transmission Line 2	Transmission Line 3	Transmission Line 4
	bisects one landscape corridor.	Transmission line 2 bisects one landscape corridor.	impact on medium (2.92) connectivity areas in km². Transmission line 3 bisects the most landscape corridors (2).	
	Cat 2 seasonal range **1.41 km²** directly impacted.	Cat 2 seasonal range **1.44 km²** directly impacted.	Cat 2 seasonal range **1.01 km²** directly impacted.	Cat 2 seasonal range **2.78 km²** directly impacted.
	Cat 3 remaining range **0.00** km² directly impacted.	Cat 3 remaining range **1.08 km²** directly impacted.	Cat 3 remaining range **1.04 km²** directly impacted.	Cat 3 remaining range **0.94 km²** directly impacted.
	Cat 1, 2 and 3 (no travel corridors) area total: **3.54 km²**	Cat 1, 2 and 3 (no travel corridors) area total: **4.01 km²**	Cat 1, 2 and 3 (no travel corridors) area total: **3.54 km²**	Cat 1, 2 and 3 (no travel corridors) area total: **4.56 km²**
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of high and moderate habitat indirectly affected or altered for Boreal Caribou (500 m buffer of direct destruction)	Cat 1 nursery area **26.69 km²** indirectly impacted.	Cat 1 nursery area **22.54 km²** indirectly impacted.	Cat 1 nursery area **18.44 km²** indirectly impacted.	Cat 1 nursery area **16.3** km² indirectly impacted.
	Cat 1 winter use areas **26.47 km²** indirectly impacted.	Cat 1 winter use areas **23.96 km²** indirectly impacted.	Cat 1 winter use areas **26.06 km²** indirectly impacted.	Cat 1 winter use areas **8.63 km²** indirectly impacted.
	Cat 2 seasonal ranges **38.25 km²** indirectly impacted.	Cat 2 seasonal ranges **36.33 km²** indirectly impacted.	Cat 2 seasonal ranges **25.43 km²** indirectly impacted.	Cat 2 seasonal ranges **68.45 km²** indirectly impacted.
	Cat 3 remaining range **0.01 km²** indirectly impacted.	Cat 3 remaining range **27.42 km²** indirectly impacted.	Cat 3 remaining range **26.45 km²** indirectly impacted.	Cat 3 remaining range **23.97 km²** indirectly impacted.
	Cat 1, 2 and 3 area total (excluding overlap): **88** km²	Cat 1, 2 and 3 area total (excluding overlap): 100.92 km²	Cat 1, 2 and 3 area total (excluding overlap): 89.32 km²	Cat 1, 2 and 3 area total (excluding overlap): 114.79 km²
Habitat protection **Cumulative and range scale effects**	Incremental new disturbance (%) Cat 1 = 0.007 Cat 2 = 0.007 Cat 3 = 0.000 Pooled = 0.005 **Least intrusive**	Incremental new disturbance (%) Cat 1 = 0.007 Cat 2 = 0.012 Cat 3 = 0.01 Pooled = 0.009 More intrusive	Incremental new disturbance (%) Cat 1 = 0.008 Cat 2 = 0.007 Cat 3 = 0.031 Pooled = 0.014 More Intrusive	Incremental new disturbance (%) Cat 1 = 0.014 Cat 2 = 0.03 Cat 3 = 0.007 Pooled = 0.017 Most intrusive

Table 4-8: Amount (km²) of Habitat Directly and Indirectly Affected or Altered for Boreal Caribou

Criteria and Indicators (Table 4-1)	Transmission Line 1	Transmission Line 2	Transmission Line 3	Transmission Line 4
Cumulative effects of category habitat changes at range scale or incremental addition of the Project footprint at local scale or altered range connectivity **Legacy disturbance (%):** Cat 1 = 17.34 Cat 2 = 32.81 Cat 3 = 64.93 Pooled = 41.547 **Cumulative disturbance (%) (Churchill) –** Project disturbance relative to ECCC disturbance management threshold	41.547 (legacy)+ 0.014 (incremental new) = **41.561%** The transmission line corridor's **most direct route to existing infrastructure** and short length (93.4 km) minimizes direct effects on terrestrial habitat. It could be co-located in part with mine access road to reduce the number of new corridors and **largely follows existing infrastructure.**	41.547 (legacy) + 0.029 (incremental new) = 41.576% Longer overall length (100.6 km) of transmission line corridor. To reduce the number of new corridors, it could be co-located in part with mine access road and a small section would follow existing infrastructure.	41.547 (legacy) + 0.046 (incremental new) = 41.593% Shortest overall length (89.1 km) of transmission line linear disturbance. To reduce the number of new corridors, it could be co-located in part with mine access road and a section would follow existing infrastructure.	41.547 (legacy)+ 0.051 (incremental new) = 41.598% Longest overall length (114.4 km) of transmission line linear disturbance. All new infrastructure would be required.

Note(s):

Favoured	Minimal habitat loss and fragmentation; least intrusive
Moderately favoured	Minimal habitat loss and fragmentation; more intrusive
Not favoured	Maximum habitat loss or severe fragmentation; most intrusive

Cat = category.

Table 4-9: Amount (km²) of Habitat Directly Affected by Mine Site Components

Mine Site Components	Favoured	Moderately Favoured	Not Favoured
Mine rock storage locations	Alternative 1 west of the open pit. • Cat 1 (nursery): 0 km² PDA and 2.13 km² PDA+500 m • Cat 1 (wintering): 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Nursery: 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Wintering: 0 km² PDA and 0 km² PDA+500. • Cat 2: 3.70 km² PDA and 6.43 km² PDA+500 m • Cat 3: 0 km² PDA and 0 km² PDA+500 m	Alternative 2 east of Springpole Lake. • Cat 1 (nursery): 0.05 km² PDA and 0.59 km² PDA+500 m • Cat 1 (wintering): 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Nursery: 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Wintering: 0 km² PDA and 0 km² PDA+500. • Cat 2: 4.64 km² PDA and 9.09 km² PDA+500 m Cat 3: **0 km² PDA and 0 km² PDA+500 m**	N/A only two options
Tailings storage locations (only Alternative 1 and Alternative 2 are carried forward within the alternatives review process for mine waste)	Alternative 1 • Cat 1 (nursery): 0 km² PDA and 2.13 km² PDA+500 m • Cat 1 (wintering): 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Nursery: 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Wintering: 0 km² PDA and 0 km² PDA+500. • Cat 2: 3.70 km² PDA and 6.43 km² PDA+500 m • Cat 3: 0 km² PDA and 0 km² PDA+500 m	Alternative 2 • **Cat 1 (nursery):** 0.05 km² PDA and 0.59 km² PDA+500 m • **Cat 1 (wintering):** 0 km² PDA and 0 km² PDA+500. • **WSP Telemetry Nursery:** 0 km² PDA and 0 km² PDA+500. • **WSP Telemetry Wintering:** 0 km² PDA and 0 km² PDA+500. • **Cat 2:** 4.64 km² PDA and 9.09 km² PDA+500 m **Cat 3**: 0 km² PDA and 0 km² PDA+500 m	N/A only two options

Table 4-9: Amount (km²) of Habitat Directly Affected by Mine Site Components

Mine Site Components	Favoured	Moderately Favoured	Not Favoured
Low grade ore stockpile location	Alternative 1 and 2 • Cat 1 (nursery): 0.01 km² PDA and 1.36 km² PDA+500 m • Cat 1 (wintering): 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Nursery: 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Wintering: 0 km² PDA and 0 km² PDA+500. • Cat 2: 1.0 km² PDA and 4.45 km² PDA+500 m • Cat 3: 0 km² PDA and 0 km² PDA+500m	N/A—smaller stockpiles at both Alternative 1 and Alternative 2 locations were carried into the Project to optimize efficiency	N/A—smaller stockpiles at both Alternative 1 and Alternative 2 locations were carried into the Project to optimize efficiency
Central Water Storage Pond	Alternative W4 • Cat 1 (nursery): 0 km² PDA and 0.18 km² PDA+500 m • Cat 1 (wintering): 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Nursery: 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Wintering: 0 km² PDA and 0 km² PDA+500. • Cat 2: 0.21 km² PDA and 1.88 km² PDA+500 m • Cat 3: 0 km² PDA and 0 km² PDA+500 m	Alternative W1 and W2 • Cat 1 (nursery): <0.01 km² PDA and 0.56 km² PDA+500 m • Cat 1 (wintering): 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Nursery: 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Wintering: 0 km² PDA and 0 km² PDA+500. • Cat 2: 0.29 km² PDA and 2.83 km² PDA+500 m • Cat 3: 0 km² PDA and 0 km² PDA+500 m	Alternative W1, W2, W3 and W4 • Cat 1 (nursery): <0.01 km² PDA and 1.00 km² PDA+500 m • Cat 1 (wintering): 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Nursery: 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Wintering: 0 km² PDA and 6.06 km² PDA+500. • Cat 2: 0.61 km² PDA and 1.88 km² PDA+500 m • Cat 3: 0 km² PDA and 0 km² PDA+500 m

Table 4-9: Amount (km²) of Habitat Directly Affected by Mine Site Components

Mine Site Components	Favoured	Moderately Favoured	Not Favoured
Aggregate Source Location	Alternative 2: off Wenasaga Road (north; JP10, JP11, JP12, JP13) • Cat 1 (nursery): 0 km² PDA and 0 km² PDA+500 m • Cat 1 (wintering): 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Nursery: 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Wintering: 0 km² PDA and 0 km² PDA+500. • Cat 2: 0.52 km² PDA and 2.93 km² PDA+500 m • Cat 3: 0 km² PDA and 0 km² PDA+500 m	Alternative 1: north of southeast arm of Springpole Lake (JP17a, JP17b, JP18); • Cat 1 (nursery): 0 km² PDA and 0.02 km² PDA+500 m • Cat 1 (wintering): 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Nursery: 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Wintering: 0 km² PDA and 0 km² PDA+500. • Cat 2: 0.32 km² PDA and 2.16 km² PDA+500 m Cat 3: 0 km² PDA and 0 km² PDA+500 m	Alternative 3: off Wenasaga Road (south; JP1) • Cat 1 (nursery): 0 km² PDA and 0.4 km² PDA+500 m • Cat 1 (wintering): 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Nursery: 0 km² PDA and 0 km² PDA+500. • WSP Telemetry Wintering: 0 km² PDA and 1.43 km² PDA+500. • Cat 2: 0.09 km² PDA and 1.88 km² PDA+500 m • Cat 3: 0 km² PDA and 0 km² PDA+500 m

Note:
Cat = category; N/A = not applicable.

Table 4-10: Summary of Indicators and Parameters for Wolverine

MECP Criteria	Indicator	Measurable Parameter	Rationale
Habitat protection	Change in habitat availability and effectiveness	• Amount (ha) of high and moderate habitat directly and indirectly affected or altered for Wolverine	Effects on population abundance and distribution are directly affected by habitat availability and displacement from effective habitat. Vegetation clearing for the Project and disturbance from Project activities during construction and operations may affect habitat availability and quality.
Species / Individual protection	Change in movement Indirect impacts due to sensory disturbance (e.g., light, sound, vibration, olfactory)	• Qualitative assessment of effects of habitat change and sensory disturbance on Wolverine movement	Changes in movement patterns may affect Wolverine breeding and survival rates and may increase predation / mortality. Aspects such as noise, light, odours and human presence may affect use of habitats close to Project activities.
	Change in mortality risk	• Qualitative risk of mortality	Ground disturbance and vegetation clearing can result in physical disturbance of key habitat features (e.g., dens) Vehicle and equipment movement can result in accidental mortality (i.e., wildlife–vehicle collisions) Project may result in increased predation via creation of novel linear features and human-attractants. Changes in prey availability can affect mortality risk.

Table 4-11: Amount (km²) of High and Moderate Habitat Directly and Indirectly Affected or Altered for Wolverine

Criteria and Indicators (Table 4-11)	Mine Access Road 1	Mine Access Road 3	Mine Access Road 4	Mine Access Road 5
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of high and moderate habitat directly affected or altered for Wolverine	Shortest length (17.2 km) of mine access road corridor It could be co-located in part with transmission line, minimizing the creation of a new corridor 0.51 km² of direct habitat impacted, minimizing direct effects on terrestrial habitat	Longer overall length (28.1 km) of mine access road corridor Potential to be co-located along or near a portion of the route to minimize new corridor creation 0.73 km² of habitat directly impacted	Longest overall length (28.2 km) of mine access road corridor There is no reasonable potential to co-locate with the transmission line route, creating two (mine access road and transmission line) linear corridors 0.76 km² of habitat directly impacted	Short length (17.8 km) of mine access road corridor This alternative is routed along the north edge of Springpole Lake to reduce the potential effects of traversing through the middle of a Category 1 Boreal Caribou habitat; this could also benefit Wolverine by retaining a larger polygon of mature conifer habitat 0.50 km² of habitat directly impacted
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of high and moderate habitat <u>indirectly</u> affected or altered for Wolverine	Smallest LSA covering an area of 1,318.07 km² on the landscape 461.55 km² of habitat indirectly impacted	LSA covers an area of 1,602.84 km² 548.37 km² of habitat indirectly impacted	Largest LSA covering an area of 1,657.08 km². 577.08 km² of habitat indirectly impacted.	LSA covers an area of 1,345.66 km² 472.68 km² of habitat indirectly impacted

Note(s):

Favoured	Minimal habitat loss and no fragmentation
Moderately favoured	Minimal habitat loss
Not favoured	Maximum habitat loss

Table 4-12: Amount (km²) of High and Moderate Habitat Directly and Indirectly Affected or Altered for Wolverine

Criteria and Indicators (Table 4-11)	Transmission Line 1	Transmission Line 2	Transmission Line 3	Transmission Line 4
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of high and moderate habitat directly affected or altered for Wolverine	Short overall length (93.4 km) of transmission line linear disturbance minimizing direct effects on terrestrial habitat. Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation. Largely co-located along the existing E1C transmission line. 3.23 ha of habitat impacted, minimizing direct effects on terrestrial habitat	Long overall length (100.6 km) of transmission line linear disturbance Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation. A small portion co-located along the existing E1C transmission line. 3.04 ha of habitat directly impacted	The shortest overall length (89.1 km) of transmission line linear disturbance resulting in the lowest cumulative effect of all transmission line. Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation. Portion co-located along the existing E1C transmission line. 3.05 ha of habitat directly impacted	Longest overall length (114.4 km) of transmission line linear disturbance resulting in the greatest cumulative disturbance Potential to be co-located along or near a portion of the mine access road route, but no potential co-location with existing E1C transmission line. 3.50 ha of habitat directly impacted
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of high and moderate habitat indirectly affected or altered for Wolverine	LSA covers an area of 2,155.23 km² but largely follows existing corridors 1,637.15 km² of habitat indirectly impacted	LSA covers an area of 2,274.804 km² 1,653.18 km² of habitat indirectly impacted	Smallest LSA covering an area of 2,029.63 km² 1,511.03 km² of habitat indirectly impacted	LSA covers the largest area of any of the corridors:, 2,540.687km² 1,834.91 km² of habitat indirectly impacted

Note(s):

Favoured	Minimal habitat loss and no fragmentation
Moderately favoured	Minimal habitat loss
Not favoured	Maximum habitat loss

Table 4-13: Amount (km²) of High and Moderate Habitat Directly Affected by Mine Site Components

Mine Site Components	Favoured	Moderately Favoured	Not Favoured
Mine rock storage locations	Alternative 1 west of the open pit 3.09 km² of habitat impacted, minimizing direct effects on habitat	N/A—only two options	Alternative 2 east of Springpole Lake 4.68 km² of habitat impacted
Tailings storage locations (only Alternative 1 and Alternative 2 are carried forward within the alternatives review process for mine waste)	Alternative 1 3.09 km² of habitat impacted, minimizing direct effects on habitat.	N/A—only two options	Alternative 2 4.68 km² of habitat impacted
Low grade ore stockpile location	Alternative 1 and Alternative2 0.89 km² of habitat impacted, minimizing direct effects on habitat	N/A—smaller stockpiles at both Alternative 1 and Alternative 2 locations were carried into the Project to optimize efficiency	N/A—smaller stockpiles at both Alternative 1 and Alternative 2 locations were carried into the Project to optimize efficiency
Central water storage pond	Alternative W4 0.21 km² of habitat impacted	Alternative W1 and W2 0.33 km² of habitat impacted	Alternative W1, W2, W3 and W4 0.36 km² of habitat impacted
Aggregate source location	Alternative 3: off Wenasaga Road (south; JP1) 0.03 km² of habitat impacted, minimizing direct effects on habitat	Alternative 2: off Wenasaga Road (north; JP10, JP11, JP12, JP13) 0.10 km² of habitat impacted	Alternative 1: north of southeast arm of Springpole Lake (JP17a, JP17b, JP18) 0.32 km² of habitat impacted

Note(s):

Favoured	Minimal habitat loss
Moderately favoured	Moderate habitat loss
Not favoured	Maximum habitat loss

N/A = not applicable.

Table 4-14: Summary of Indicators and Parameters for Species at Risk Bats

MECP Criteria	Indicator	Measurable Parameter	Rationale
Habitat protection	Change in habitat availability and effectiveness	• Area and relative abundance of habitat (ha) directly and indirectly affected or altered (Suitable habitat is determined from baseline studies and recommendations from regulators)	It helps to quantify the direct loss of habitat available due to the Project. The area and relative abundance of habitat provide a measure of the availability of resources (e.g., food, shelter).
Species / Individual protection	Indirect impacts due to sensory disturbance (e.g., light, sound, vibration, olfactory)	• Qualitative assessment of effects of habitat change and sensory disturbance	It helps to assess a project's indirect effects on habitat. Changes in habitat function, connectivity and quality can affect movement and dispersal, access to resources and survival. Aspects such as noise, light, odours and human presence may affect the use of habitats near Project activities.
	Change in the risk of mortality	• Qualitative risk of mortality	It helps assess the risk of increased mortality due to factors such as ground disturbance and vegetation clearing. Ground disturbance and vegetation clearing can result in physical disturbance of key habitat features (e.g., maternity roosts), and vehicle and equipment movement can result in accidental mortality (e.g., wildlife–vehicle collisions). A qualitative assessment can help identify potential risks and develop mitigation measures.

Table 4-15: Amount (km²) of Foraging and Maternity Habitat Directly and Indirectly Affected or Altered for Species at Risk Bats

Criteria and Indicators (Table 4-15)	Mine Access Road 1	Mine Access Road 3	Mine Access Road 4	Mine Access Road 5
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of foraging and maternity habitat directly affected or altered for SAR bats	Shortest length (17.2 km) of mine access road corridor Could be co-located in part with transmission line, minimizing the creation of a new corridor Lowest habitat loss compared to other alternatives is 0.23 km² of bat foraging habitat and 0.52 km² of bat maternity roosting, which are directly impacted; combined total of 0.76 km² Distance to nearest candidate bat hibernacula = 0.98 km	Longer overall length (28.1 km) of mine access road corridor Potential to be co-located along or near a portion of the route to minimize new corridor creation 0.16 km² of bat foraging habitat and 0.81 km² of bat maternity roosting directly impacted; combined total of 0.97 km² Distance to nearest candidate bat hibernacula = 4.67 km	Longest overall length (28.2 km) of mine access road corridor There is no reasonable potential to co-locate with the transmission line route, creating two (mine access road and transmission line) linear corridors 0.26 km² of bat foraging habitat and 0.79 km² of bat maternity roosting directly impacted; combined total of 1.05 km² Distance to nearest candidate bat hibernacula = 9.50 km	Short length (17.8 km) of mine access road corridor This alternative is routed along the north edge of Springpole Lake to reduce the potential effects of traversing through the middle of a Cat 1 Boreal Caribou habitat; this could also benefit bats by retaining a larger polygon of mature conifer habitat 0.26 km² of bat foraging habitat and 0.54 km² of bat maternity roosting directly impacted. Combined total of 0.80 km² Distance to nearest candidate bat hibernacula = 0.16 km

Table 4-15: Amount (km^2) of Foraging and Maternity Habitat Directly and Indirectly Affected or Altered for Species at Risk Bats

Criteria and Indicators (Table 4-15)	Mine Access Road 1	Mine Access Road 3	Mine Access Road 4	Mine Access Road 5
Habitat protection **Change in habitat availability and effectiveness** **Amount (km^2)** of foraging and maternity habitat indirectly affected or altered for SAR bats	Smallest LSA associated with a mine access road corridor 83.53 km^2 35.17 km^2 of bat foraging habitat and 58.12 km^2 of bat maternity roosting indirectly impacted 93.28 km^2 of combined bat habitat indirectly impacted	Second largest LSA associated with a mine access road corridor 120.29 km^2. 120.29 km^2 of bat foraging habitat and 76.95 km^2 of bat maternity roosting indirectly impacted 109.89 km^2 of combined bat habitat indirectly impacted	Largest LSA associated with a mine access road corridor 121.50 km^2 34.49 km^2 of bat foraging habitat and 83.63 km^2 of bat maternity roosting indirectly impacted 118.12 km^2 of combined bat habitat indirectly impacted	Second smallest LSA associated with a mine access road corridor 86.33 km^2 39.54 km^2 of bat foraging habitat and 57.62 km^2 of bat maternity roosting indirectly impacted 97.16 km^2 of combined bat habitat indirectly impacted

Note(s):

Favoured	Minimal habitat loss
Moderately favoured	Moderate habitat loss
Not favoured	Maximum habitat loss

Cat = category

Table 4-16: Amount (km²) of Foraging and Maternity Habitat Directly and Indirectly Affected or Altered for Species at Risk Bats

Criteria and Indicators (Table 4-15)	Transmission Line 1	Transmission Line 2	Transmission Line 3	Transmission Line 4
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of foraging and maternity habitat directly affected or altered for SAR bats	Short overall length (93.4 km) of transmission line linear disturbance minimizing direct effects on terrestrial habitat Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation; largely co-located along the existing E1C transmission line 1.29 km² of bat foraging habitat and 3.42 km² of bat maternity roosting directly impacted; combined total of 4.71 km² Distance to nearest candidate bat hibernacula = 0.95 km	Long overall length (100.6 km) of transmission line linear disturbance Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation. A small portion co-located along the existing E1C transmission line 1.58 km² of bat foraging habitat and 3.46 km² of bat maternity roosting directly impacted; combined total of 5.04 km² Distance to nearest candidate bat hibernacula = 0.95 km	The shortest overall length (89.1 km) of transmission line linear disturbance resulting in the lowest cumulative effect of all transmission line. Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation. Portion co-located along the existing E1C transmission line. Lowest habitat loss in comparison to other alternatives with: 1.39 km² of bat foraging habitat and 3.20 km² of bat maternity roosting directly impacted. Combined total of 4.59 km² Distance to nearest candidate bat hibernacula = 0.95 km	Longest overall length (114.4 km) of transmission line linear disturbance resulting in the greatest cumulative disturbance Potential to be co-located along or near a portion of the mine access road route, but no potential co-location with existing E1C transmission line 1.65 km² of bat foraging habitat and 3.95 km² of bat maternity roosting directly impacted. Combined total of 5.60 km² Distance to nearest candidate bat hibernacula = 0.95 km

Table 4-16: Amount (km²) of Foraging and Maternity Habitat Directly and Indirectly Affected or Altered for Species at Risk Bats

Criteria and Indicators (Table 4-15)	Transmission Line 1	Transmission Line 2	Transmission Line 3	Transmission Line 4
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of high and moderate habitat indirectly affected or altered for SAR bats	LSA associated with corridor covers 194.05 km² but largely follows existing corridors 77.17 km² of bat foraging habitat and 149.06 km² of bat maternity roosting indirectly impacted; combined total of 226.22 km²	LSA associated with corridor covers an area of 207.27 km² 85.56 km² of bat foraging habitat and 165.96 km² of bat maternity roosting indirectly impacted; combined total of 251.52 km²	Smallest LSA associated with a transmission line corridor covering an area of 183.54 km² Lowest habitat loss in comparison to other alternatives with: 80.09 km² of bat foraging habitat and 145.35 km² of bat maternity roosting indirectly impacted; combined total of 225.43 km²	Largest LSA associated with a transmission line corridor covering an area of 235.52 km² 85.68 km² of bat foraging habitat and 192.76 km² of bat maternity roosting indirectly impacted; combined total of 278.44 km²

Note(s):

Favoured	Minimal habitat loss
Moderately favoured	Moderate habitat loss
Not favoured	Maximum habitat loss

Table 4-17: Amount (km²) of High and Moderate Habitat Directly Affected by Mine Site Components

Mine Site Components	Favoured	Moderately Favoured	Not Favoured
Mine rock storage locations	Alternative 1 west of the open pit 3.31 km² of maternity habitat and 0.91 km² of foraging habitat directly impacted	N/A—only two options	Alternative 2 east of Springpole Lake 3.85 km² of maternity habitat and 1.40 km² of foraging habitat directly impacted
Tailings storage locations (only Alternatives 1 and 2 are carried forward within the alternatives review process for mine waste)	Alternative 1 3.31 km² of maternity habitat and 0.91 km² of foraging habitat directly impacted	N/A—only two options	Alternative 2 3.85 km² of maternity habitat and 1.40 km² of foraging habitat directly impacted
Low grade ore stockpile location	Alternative 1 and Alternative 2 1.00 km² of maternity habitat and 1.00 km² of foraging habitat directly impacted	N/A—smaller stockpiles at both Alternative 1 and Alternative 2 locations were carried into the Project to optimize efficiency	N/A—smaller stockpiles at both Alternative 1 and Alternative 2 locations were carried into the Project to optimize efficiency
Central water storage pond	Alternative W1 and Alternative W2 0.02 km² of maternity habitat and 0.12 km² of foraging habitat directly impacted	Alternative W4 0.21 km² of maternity habitat and <0.01 km² of foraging habitat directly impacted	Alternatives W1, W2, W3 and W4 0.34 km² of maternity habitat and 0.13 km² of foraging habitat directly impacted
Aggregate source location	Alternative 3: off Wenasaga Road (south; JP1) 0.09 km² of maternity habitat and 0.09 km² of foraging habitat directly impacted	Alternative 1: north of southeast arm of Springpole Lake (JP17a, JP17b, JP18) 0.32 km² of maternity habitat and 0.32 km² of foraging habitat directly impacted	Alternative 2: off Wenasaga Road (north; JP10, JP11, JP12, JP13) 0.52 km² of maternity habitat and 0.51 km² of foraging habitat directly impacted

Note(s):

Favoured	Minimal habitat loss
Moderately favoured	Moderate habitat loss
Not favoured	Maximum habitat loss

N/A = not applicable.

Table 4-18: Summary of Indicators and Parameters for Species at Risk Birds

MECP Criteria	Indicator	Measurable Parameter	Rationale
Habitat protection	Change in relative abundance of habitat	• Amount (km^2) of high and moderate breeding habitat directly and indirectly affected or altered for SAR birds	Quantifies the direct loss of breeding habitat available due to the Project. The area and relative abundance of habitat can provide a measure of the availability of resources (e.g., food, shelter).
Species / Individual protection	Change in the function, connectivity and quality of habitat Indirect impacts due to sensory disturbance (e.g., light, sound, vibration, olfactory)	• Qualitative assessment of effects of habitat change and sensory disturbance on Wolverine movement	Changes in the function, connectivity and quality of habitat can affect movement and dispersal, access to resources and survival. Aspects such as such as fugitive dust emissions, edge effects (e.g., increased light, wind or dust at the edge of cleared areas), noise disturbance and changes in environmental conditions due to adjacent ground disturbance may affect use of habitats close to Project activities.
Species / Individual protection	Change in mortality risk	• Qualitative risk of mortality	Increased mortality may be due to factors such as ground disturbance and vegetation clearing. Ground disturbance and vegetation clearing can result in physical disturbance of key habitat features (e.g., nests), and vehicle and equipment movement can result in accidental mortality (e.g., wildlife–vehicle collisions).

Table 4-19: Amount (km²) of Suitable Habitat Directly and Indirectly Affected or Altered for Eastern Whip-poor-will

Criteria and Indicators (Table 4-19)	Mine Access Road 1	Mine Access Road 3	Mine Access Road 4	Mine Access Road 5
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of moderate to high suitable habitat directly affected or altered for Eastern Whip-poor-will.	Shortest length (17.2 km) of mine access road corridor It could be co-located in part with transmission line, minimizing the creation of a new corridor No direct habitat loss is expected with this option (0 km²)	Longer overall length (28.1 km) of mine access road corridor Potential to be co-located along or near a portion of the route to minimize new corridor creation 0.12 km² of direct habitat loss	Longest overall length (28.2 km) of mine access road corridor There is no reasonable potential to co-locate with the transmission line route, resulting in the creation of two (mine access road and transmission line) linear corridors 0.11 km² of habitat directly impacted	Short length (17.8 km) of mine access road corridor This alternative is routed along the north edge of Springpole Lake No direct habitat loss is expected with this option (0 km²)
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of moderate to high suitable habitat indirectly affected or altered for Eastern Whip-poor-will.	Smallest LSA associated with a mine access road corridor 83.53 km² 4.34 km² of habitat indirectly impacted	Second largest LSA associated with a mine access road corridor 120.29 km² Largest amount of habitat indirectly affected or altered in comparison to other alternatives: 17.53 km²	Largest LSA associated with a mine access road corridor 121.50 km² 11.37 km² of habitat indirectly impacted	Second smallest LSA associated with a mine access road corridor 86.33 km² Lowest amount of habitat indirectly affected or altered in comparison to other alternatives: 4.24 km²

Note(s):

Favoured	Minimal habitat loss
Moderately favoured	Moderate habitat loss
Not favoured	Maximum habitat loss

Table 4-20: Amount (km²) of Suitable Habitat Directly and Indirectly Affected or Altered for Eastern Whip-poor-will

Criteria and Indicators (Table 4-19)	Transmission Line 1	Transmission Line 2	Transmission Line 3	Transmission Line 4
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of moderate to high suitable habitat directly affected or altered for Eastern Whip-poor-will	Short overall length (93.4 km) of transmission line linear disturbance minimizing direct effects on terrestrial habitat Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation; largely co-located along the existing E1C transmission line 0.47 km² of habitat directly impacted	Long overall length (100.6 km) of transmission line linear disturbance Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation; a small portion co-located along the existing E1C transmission line 0.79 km² of habitat directly impacted	The shortest overall length (89.1 km) of transmission line linear disturbance, resulting in the lowest cumulative effect of all transmission lines Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation; portion co-located along the existing E1C transmission line 0.46 km² of habitat directly impacted	Longest overall length (114.4 km) of transmission line linear disturbance, resulting in the greatest cumulative disturbance Potential to be co-located along or near a portion of the mine access road route, but no potential co-location with existing E1C transmission line 1.12 km² of habitat directly impacted
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of moderate to high suitable habitat indirectly affected or altered for Eastern Whip-poor-will	LSA associated with corridor covers 194.05 km² but largely follows existing corridors 23.72 km² of habitat indirectly impacted	LSA associated with corridor covers an area of 207.27 km² 38.13 km² of habitat indirectly impacted	Smallest LSA associated with a transmission line corridor covering an area of 183.54 km² 24.51 km² of habitat indirectly impacted	Largest LSA associated with a transmission line corridor covering an area of 235.52 km² 54.45 km² of habitat indirectly impacted

Note(s):

Favoured	Minimal habitat loss
Moderately favoured	Moderate habitat loss
Not favoured	Maximum habitat loss

Table 4-21: Amount (km²) of High and Moderate Habitat Directly Affected by Mine Site Components

Mine Site Components	Favoured	Moderately Favoured	Not Favoured
Mine rock storage locations	Alternative 1 west of the open pit 0.06 km² of habitat directly impacted	N/A—only two options	Alternative 2 east of Springpole Lake 0.32 km² of habitat directly impacted
Tailings storage locations (only Alternative 1 and Alternative 2 are carried forward within the alternatives review process for mine waste)	Alternative 1 0.06 km² of habitat directly impacted	N/A—only two options	Alternative 2 0.32 km² of habitat directly impacted
Low grade ore stockpile location	Alternative 1 and 2 Not expected to directly impact any habitat (0 km²)	N/A—smaller stockpiles at both Alternative 1 and Alternative 2 locations were carried into the Project to optimize efficiency	N/A—smaller stockpiles at both Alternative 1 and Alternative 2 locations were carried into the Project to optimize efficiency
Central water storage pond	Alternative W4 Not expected to directly impact any habitat (0 km²)	Alternative W1 and Alternative W2 <0.01 km² of habitat directly impacted	Alternatives W1, W2, W3 and W4 <0.01 km² of habitat directly impacted
Aggregate source location	Alternative 1: north of southeast arm of Springpole Lake (JP17a, JP17b, JP18) Not expected to directly impact any habitat (0 km²)	Alternative 3: off Wenasaga Road (south; JP1) 0.06 km² of habitat directly impacted	Alternative 2: off Wenasaga Road (north; JP10, JP11, JP12, JP13) 0.40 km² of habitat directly impacted

Note(s):

Favoured	Minimal habitat loss
Moderately favoured	Moderate habitat loss
Not favoured	Maximum habitat loss

N/A = not applicable.

Table 4-22: Amount (km²) of Moderate and High Suitable Habitat Directly and Indirectly Affected or Altered for Lesser Yellowlegs

Criteria and Indicators (Table 4-19)	Mine Access Road 1	Mine Access Road 3	Mine Access Road 4	Mine Access Road 5
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of moderate to high suitable habitat directly affected or altered for Lesser Yellowlegs.	Shortest length (17.2 km) of mine access road corridor It could be co-located in part with transmission line, minimizing the creation of a new corridor 0.19 km² of direct habitat loss	Longer overall length (28.1 km) of mine access road corridor Potential to be co-located along or near a portion of the route to minimize new corridor creation 0.41 km² of direct habitat loss	Longest overall length (28.2 km) of mine access road corridor There is no reasonable potential to co-locate with the transmission line route, resulting in the creation of two (mine access road and transmission line) linear corridors 0.55 km² of habitat directly impacted	Short length (17.8 km) of mine access road corridor This alternative is routed along the north edge of Springpole Lake 0.23 km² of direct habitat loss
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of moderate to high suitable habitat indirectly affected or altered for Lesser Yellowlegs.	Smallest LSA associated with a mine access road corridor 83.53 km² 27.76 km² of habitat indirectly impacted	Second largest LSA associated with a mine access road corridor 120.29 km² 41.68 km² of habitat indirectly impacted	Largest LSA associated with a mine access road corridor 121.50 km² Largest amount of habitat indirectly affected or altered in comparison to other alternatives: 51.77 km²	Second smallest LSA associated with a mine access road corridor 86.33 km2 Lowest amount of habitat indirectly affected or altered in comparison to other alternatives: 27.13 km2

Note(s):

Favoured	Minimal habitat loss
Moderately favoured	Moderate habitat loss
Not favoured	Maximum habitat loss

Table 4-23: Amount (km²) of Suitable Habitat Directly and Indirectly Affected or Altered for Lesser Yellowlegs

Criteria and Indicators (Table 4-19)	Transmission Line 1	Transmission Line 2	Transmission Line 3	Transmission Line 4
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of moderate to high suitable habitat directly affected or altered for Lesser Yellowlegs	Short overall length (93.4 km) of transmission line linear disturbance, minimizing direct effects on terrestrial habitat Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation; largely co-located along the existing E1C transmission line 1.81 km² of habitat directly impacted	Long overall length (100.6 km) of transmission line linear disturbance Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation; a small portion co-located along the existing E1C transmission line 1.56 km² of habitat directly impacted	The shortest overall length (89.1 km) of transmission line linear disturbance, resulting in the lowest cumulative effect of all transmission lines Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation; portion co-located along the existing E1C transmission line 1.54 km² of habitat directly impacted	Longest overall length (114.4 km) of transmission line linear disturbance, resulting in the greatest cumulative disturbance Potential to be co-located along or near a portion of the mine access road route, but no potential co-location with existing E1C transmission line 1.71 km² of habitat directly impacted.
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of high and moderate habitat indirectly affected or altered for Lesser Yellowlegs.	LSA associated with corridor covers 194.05 km² but largely follows existing corridors 89.08 km² of habitat indirectly impacted	LSA associated with corridor covers an area of 207.27 km² 86.10 km² of habitat indirectly impacted	Smallest LSA associated with a transmission line corridor, covering an area of 183.54 km² 80.30 km² of habitat indirectly impacted	Largest LSA associated with a transmission line corridor, covering an area of 235.52 km² 89.35 km² of habitat indirectly impacted

Note(s):

Favoured	Minimal habitat loss
Moderately favoured	Moderate habitat loss
Not favoured	Maximum habitat loss

Table 4-24: Amount (km^2) of High and Moderate Habitat Directly Affected by Mine Site Components

Mine Site Components	Favoured	Moderately Favoured	Not Favoured
Mine rock storage locations	Alternative 1 west of the open pit 1.90 km^2 of habitat directly impacted	N/A—only two options	Alternative 2 east of Springpole Lake 1.99 km^2 of habitat directly impacted
Tailings storage locations (only Alternative 1 and Alternative 2 are carried forward within the alternatives review process for mine waste)	Alternative 1 1.90 km^2 of habitat directly impacted	N/A—only two options	Alternative 2 1.99 km^2 of habitat directly impacted
Low grade ore stockpile location	Alternative 1 and Alternative 2 0.82 km^2 of habitat directly impacted	N/A—smaller stockpiles at both Alternative 1 and Alternative 2 locations were carried into the Project to optimize efficiency	N/A—smaller stockpiles at both Alternative 1 and Alternative 2 locations were carried into the Project to optimize efficiency
Central water storage pond	Alternative W4 Not expected to directly impact any habitat (0 km^2)	Alternative W1 and Alternative W2 <0.01 km^2 of habitat directly impacted	Alternatives W1, W2, W3 and W4 <0.01 km^2 of habitat directly impacted
Aggregate source location	Alternative 3: off Wenasaga Road (south; JP1) 0.03 km^2 of habitat directly impacted	Alternative 1: north of southeast arm of Springpole Lake (JP17a, JP17b, JP18) 0.05 km^2 of habitat directly impacted	Alternative 2: off Wenasaga Road (north; JP10, JP11, JP12, JP13) 0.12 km^2 of habitat directly impacted.

Note(s):

Favoured	Minimal habitat loss
Moderately favoured	Moderate habitat loss
Not favoured	Maximum habitat loss

N/A = not applicable.

Table 4-25: Amount (km²) of Habitat Directly and Indirectly Affected or Altered for Short-eared Owl

Criteria and Indicators (Table 4-19)	Mine Access Road 1	Mine Access Road 3	Mine Access Road 4	Mine Access Road 5
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of moderate to high suitable habitat directly affected or altered for Short-eared Owl.	Shortest length (17.2 km) of mine access road corridor It could be co-located in part with transmission line, minimizing the creation of a new corridor 0.01 km² of direct habitat loss	Longer overall length (28.1 km) of mine access road corridor Potential to be co-located along or near a portion of the route to minimize new corridor creation 0.03 km² of direct habitat loss	Longest overall length (28.2 km) of mine access road corridor There is no reasonable potential to co-locate with the transmission line route, resulting in the creation of two (mine access road and transmission line) linear corridors 0.03 km² of habitat directly impacted	Short length (17.8 km) of mine access road corridor This alternative is routed along the north edge of Springpole Lake 0.02 km² of direct habitat loss
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of moderate to high suitable habitat indirectly affected or altered for Short-eared Owl.	Smallest LSA associated with a mine access road corridor (83.53 km²) 3.42 km² of habitat indirectly impacted	LSA associated with corridor covers an area of 120.29 km² 4.70 km² of habitat indirectly impacted	Largest LSA associated with a mine access road corridor (121.50 km²) Largest amount of Short-eared Owl habitat indirectly affected or altered in comparison to other alternatives: 5.31 km²	LSA associated with corridor covers an area of 86.33 km² 3.55 km² of habitat indirectly impacted

Note(s):

Favoured	Minimal habitat loss
Moderately favoured	Moderate habitat loss
Not favoured	Maximum habitat loss

Table 4-26: Amount (km²) of Habitat Directly and Indirectly Affected or Altered for Short-eared Owl

Criteria and Indicators (Table 4-19)	Transmission Line 1	Transmission Line 2	Transmission Line 3	Transmission Line 4
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of moderate to high suitable habitat directly affected or altered for Short-eared Owl	Short overall length (93.4 km) of transmission line linear disturbance minimizing direct effects on terrestrial habitat. Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation. Largely co-located along the existing E1C transmission line. 0.31 km² of habitat directly impacted.	Long overall length (100.6 km) of transmission line linear disturbance. Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation. A small portion co-located along the existing E1C transmission line. 0.41 km² of habitat directly impacted.	The shortest overall length (89.1 km) of transmission line linear disturbance resulting in the lowest cumulative effect of all transmission line. Potential to be co-located along or near a portion of the mine access road route, minimizing new corridor creation. Portion co-located along the existing E1C transmission line. 0.31 km² of habitat directly impacted.	Longest overall length (114.4 km) of transmission line linear disturbance resulting in the greatest cumulative disturbance Potential to be co-located along or near a portion of the mine access road route, but no potential co-location with existing E1C transmission line. 0.35 km² of habitat directly impacted.
Habitat protection **Change in habitat availability and effectiveness** **Amount (km²)** of high and moderate habitat indirectly affected for Short-eared Owl	LSA associated with corridor covers 194.05 km² but largely follows existing corridors 20.48 km² of habitat indirectly impacted	LSA associated with corridor covers an area of 207.27 km² 22.10 km² of habitat indirectly impacted	Smallest LSA associated with a transmission line corridor, covering an area of 183.54 km² 20.57 km² of habitat indirectly impacted	Largest LSA associated with a transmission line corridor, covering an area of 235.52 km² 18.23 km² of habitat indirectly impacted

Note(s):

Favoured	Minimal habitat loss
Moderately favoured	Moderate habitat loss
Not favoured	Maximum habitat loss

Table 4-27: Amount (km²) of High and Moderate Habitat Directly Affected by Mine Site Components

Mine Site Components	Favoured	Moderately Favoured	Not Favoured
Mine rock storage locations	Alternative 1 west of the open pit 3.70 km² of habitat directly impacted	N/A—only two options	Alternative 2 east of Springpole Lake 4.89 km² of habitat directly impacted
Tailings storage locations (only Alternative 1 and Alternative 2 are carried forward within the alternatives review process for mine waste)	Alternative 1 0.09 km² of habitat directly impacted	N/A—only two options	Alternative 2 0.63 km² of habitat directly impacted
Low grade ore stockpile location	Alternative 1 and Alternative 2 Not expected to directly impact any habitat (0 km²)	N/A—smaller stockpiles at both Alternative 1 and Alternative 2 locations were carried into the Project to optimize efficiency	N/A—smaller stockpiles at both Alternative 1 and Alternative 2 locations were carried into the Project to optimize efficiency
Central water storage pond	Alternative W4 Not expected to directly impact any habitat (0 km²)	Alternative W1 and Alternative W2 <0.01 km² of habitat directly impacted	Alternatives W1, W2, W3 and W4 <0.01 km² of habitat directly impacted
Aggregate source location	Alternative 1: north of southeast arm of Springpole Lake (JP17a, JP17b, JP18), or Alternative 2: off Wenasaga Road (north; JP10, JP11, JP12, JP13) Not expected to directly impact any habitat (0 km²)	N/A— only two options	Alternative 3: off Wenasaga Road (south; JP1) <0.01 km² of habitat directly impacted

Note(s):

Favoured	Minimal habitat loss
Moderately favoured	Moderate habitat loss
Not favoured	Maximum habitat loss

520000 540000 560000 580000 600000 620000 640000

5700000 5680000 5660000 5640000

SPRINGPOLE GOLD PROJECT

Mine Access Road Alternative 1

Mine Access Road Alternative 5

Mine Access Road Alternative 4

Mine Access Road Alternative 3

Transmission Line Alternative 1

Transmission Line Alternative 2

Transmission Line Alternative 3

Transmission Line Alternative 4

Watay nikaneyap Transmission Line

SLATE FALLS NATION

Ear Falls to Pickle Lake (E1C)

Birch Lake, Springpole Lake, Keigat Lake, Fawcett Lake, Gull Lake, Cluderay Lake, Dorothy Lake, Obaskaka River, Strout Lake, Nabemakoseka Lake, Muskegsagagen Lake, Wright Lake, Granitebos Lake, Jacknife Lake, Mousetrap Lake, Teevin Lake, Drum Lake, Honderich Lake, Pembina Lake, Austin Lake, Bamaji Lake, North Bamaji Lake, Blackstone Lake, Lake St. Joseph, Trist Lake, Churchill Lake, Polka Lake, Dalgas Lake, Roadhouse River, Root Lake, Otatakan Lake, Sharp Lake, Papaonga Lake, Badrock Lake, Ogani Lake, Whitemud Lake, Slate Lake, Ben Lake, Lower Slate Lake, Fly Creek, Fly Lake, Drake Lake, Jubilee Lake, Kesaka Lake, Avis Lake, Cune Lake, One Island Lake, Jeanette Lake, Poizin Lake, Buddell Lake, Coyston Lake, Sheigrove Lake, Sesikinaga Lake, Latreille Lake, Margaret Lake, Philchub Lake, Found Lake, Mukukee Lake, Perrigo Lake, Narrow Lake, Woman Lake, Washagomis Lake, Shabumeni Lake, Superstition Lake, Grace Lake, Okanse Lake, Cook Lake, Bumpy Lake, Ruddy Lake, Deaddog Lake, Seagrave Lake, Kezik Lake, Scanes Lake, Christina Lake, Strachan Lake, Fawthrop Lake, Hailstone Lake, Senior Lake, Wesleyan Lake

LEGEND

- Proposed Mine Feature
- Existing Road
- Winter Road
- Existing Transmission Line
- First Nation Reserve
- Waterbody
- Churchill Range Boundary

Caribou Habitat Summary within Churchill Range (MECP GHD data, 2024)

- Category 1 - High Nursery Use
- Category 1 - Winter Use
- Category 1 - Winter Use and Nursery
- Category 2 - Seasonal Range
- Category 3 - Remaining Areas within the Range

- Nursery 65% probability of occurrence kernel data from telemetry fixes (2023)
- Wintering 65% probability of occurrence kernel data from telemetry fixes (2023-2024)
- High Density Observation Areas (winter aerial surveys 2021-2024)
- Project Development Areas (PDA) for TL and MAR Alternatives
- 500 m Buffer Area Boundaries for TL and MAR Alternatives
- Local Study Area Boundaries for TL (1 km buffer) and MAR (10 km buffer) Alternatives

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1, 26 June 2023 and modified by WSP July 2023.

Datum: NAD83
Projection: UTM Zone 15N

0 10 20 40 60 80 100 Kilometres

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SPRINGPOLE GOLD PROJECT

Local Study Areas for Boreal Caribou and their Habitats

PROJECT N°: ONS2104 | **FIGURE: 4-1**

SCALE: 1:378,000 | DATE: September 2024

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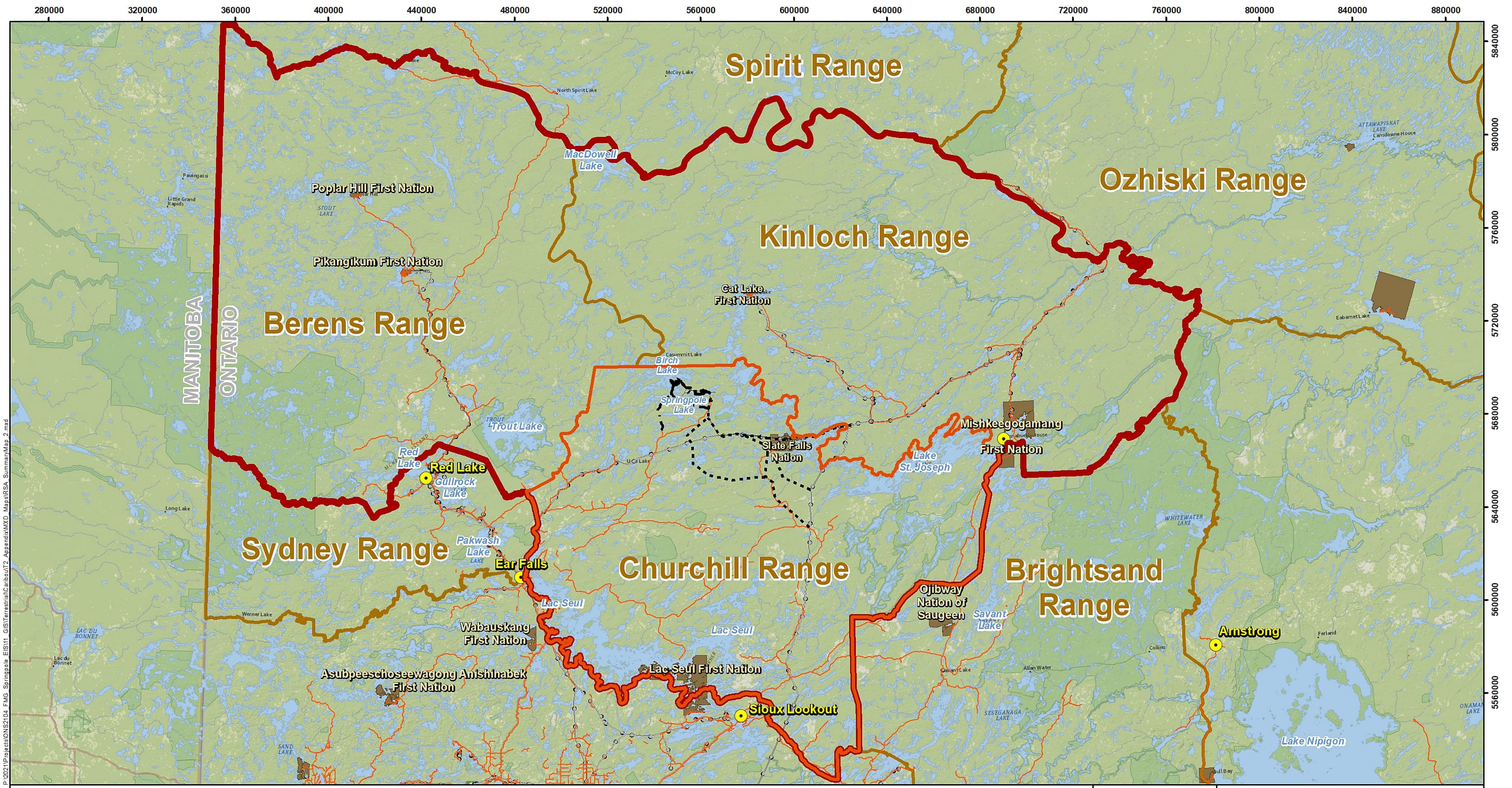
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640000
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840000
880000
5840000
5800000
5760000
5720000
5680000
5640000
5600000
5560000
Spirit Range
Ozhiski Range
Kinloch Range
Berens Range
Sydney Range
Churchill Range
Brightsand Range
MANITOBA
ONTARIO
MacDowell Lake
Poplar Hill First Nation
Pikangikum First Nation
Cat Lake First Nation
Birch Lake
Springpole Lake
Trout Lake
Red Lake
Gullrock Lake
Slate Falls Nation
Lake St. Joseph
Mishkeegogamang First Nation
Pakwash Lake
Ear Falls
Lac Seul
Wabauskang First Nation
Asubpeeschoseewagong Anishinabek First Nation
Lac Seul First Nation
Sioux Lookout
Ojibway Nation of Saugeen
Savant Lake
Armstrong
Lake Nipigon
North Spirit Lake
McCoy Lake
Eabamet Lake
Whitewater Lake
Long Lake
Werner Lake
Ferland
Collins
Allan Water

LEGEND

- Proposed Mine Features
- Proposed Transmission Line Alternatives
- Mine Access Road Alternatives
- First Nation Reserve (labelled with name)
- Town
- Existing Road
- Existing Transmission Line
- Population Level Caribou Regional Study Area (RSA) Boundary
- Habitat Level Caribou Regional Study Area (RSA) Boundary
- Caribou Range Boundary (labelled with name)

NOTES:
- Topographic information extracted from ESRI Basemap service.

Datum: NAD83
Projection: UTM Zone 15N

0 25 50 100 150 200 250 300 350 400 450 Kilometres

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SPRINGPOLE GOLD PROJECT

Population and Habitat Regional Study Areas for Boreal Caribou

PROJECT Nº: ONS2104	FIGURE: 4-2
SCALE: 1:1,526,800	DATE: June 2024

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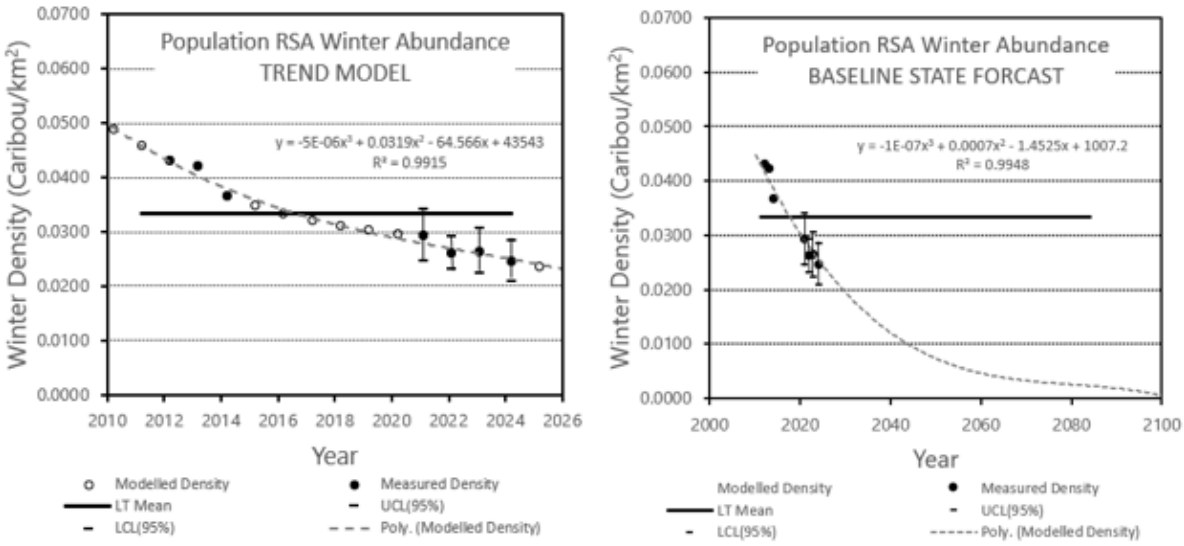

Figure 4-3: Boreal Caribou Population Reconstruction and Trend Model and Baseline State Forecast Model

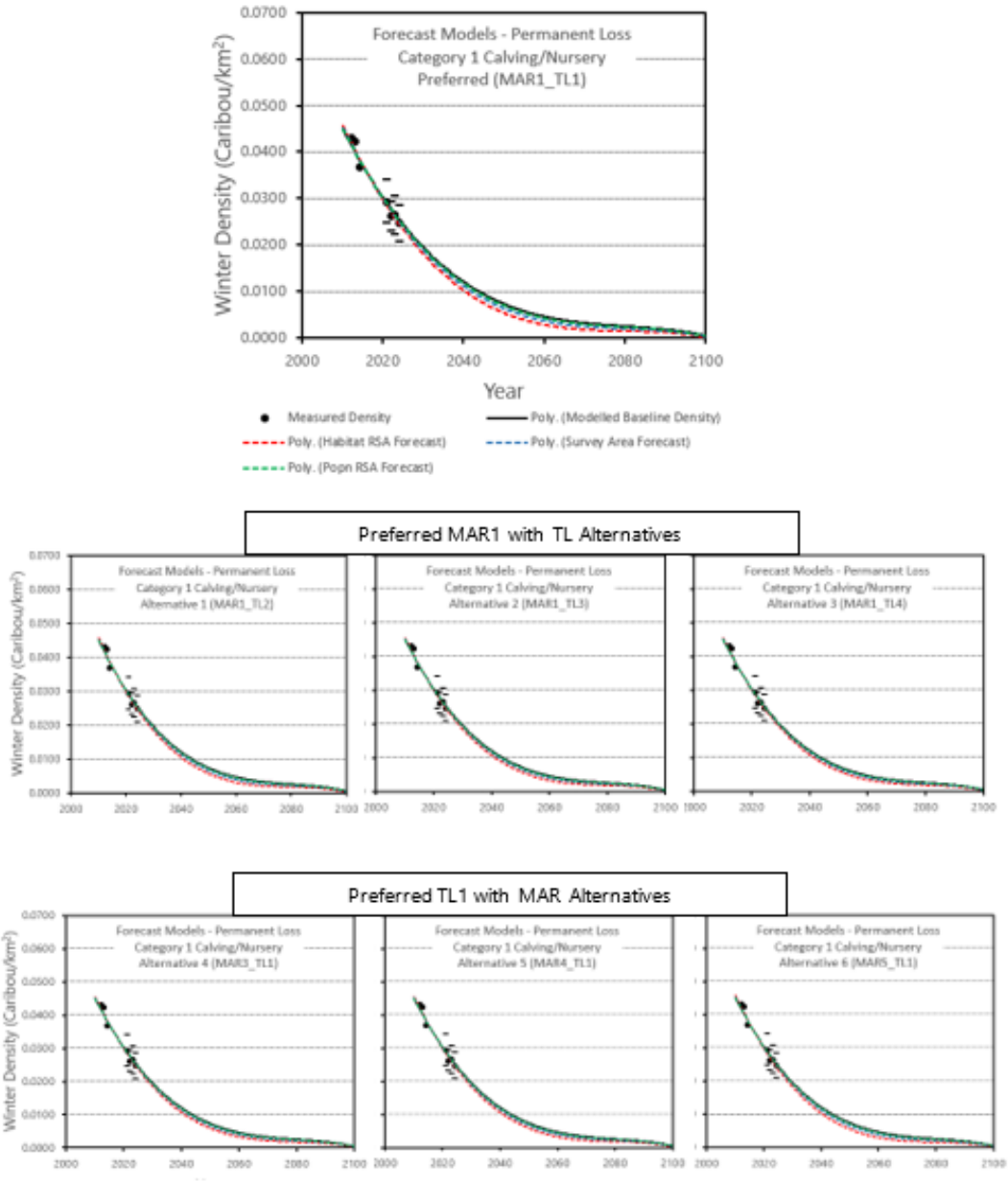

Figure 4-4: Boreal Caribou Population Forecast Models for all Project Alternatives at Regional Study Area Scales

Figure 4-5: Boreal Caribou Habitat Summary in Churchill Range Relative to Project Alternatives

CONFIDENTIAL

Figure 4-6: General Habitat Description Category 1 Calving and Nursery Habitat with 2023 Satellite Telemetry Calving Kernels

CONFIDENTIAL

Figure 4-7: General Habitat Description Category 1 Winter Habitat and Winter Kernels from Aerial Surveys (2021-2024) and Satellite Telemetry (2023-2024)

CONFIDENTIAL

400000 440000 480000 520000 560000 600000 640000 680000 720000

5680000 5640000 5600000 5560000

Berens Range

Kinloch Range

Sydney Range

Churchill Range

Brightsand Range

Birch Lake

Springpole Lake

Trout Lake

Red Lake

Red Lake

Gullrock Lake

Pakwash Lake

Ear Falls

Lac Seul

Lac Seul

Lac Seul

Lac Seul First Nation

Slate Falls Nation

Lake St. Joseph

Mishkeegogamang First Nation

Savant Lake

Ojibway Nation of Saugeen

Wabauskang First Nation

Asubpeeschoseewagong Anishinabek First Nation

Sioux Lookout

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LEGEND

- Proposed Mine Site Features
- Mine Access Road
- Proposed Transmission Line Alternatives
- Town
- Existing Main Road
- First Nation Reserve (labelled with name)
- Caribou Range Boundary (labelled with name)
- Churchill Range Boundary (labelled with name)
- Waterbody

Caribou Habitat Summary for Category 2 and 3

- Category 2 - Seasonal Range
- Category 3 - Remaining Areas within **Range**

NOTES:
- Topographic information extracted from LIO, MNRF.
- Modelled category 2 and category 3 land coverage model within Churchill Range (R. Rempel, 2024)

0 25 50 100 150 200 250 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

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SPRINGPOLE GOLD PROJECT

Category 2 and Category 3 Habitat within Churchill Range, with overlay of linear features

PROJECT N^{O}: ONS2104 | **FIGURE: 4-8**

SCALE: 1:855,000 | DATE: September 2024

400000 440000 480000 520000 560000 600000 640000 680000 720000

5630000 5640000 5600000 5560000

Berens Range

Sydney Range

Churchill Range

Kinloch Range

Brightsand Range

Birch Lake

Springpole Lake

Trout Lake

Red Lake

Red Lake

Guilrock Lake

Pakwash Lake

Ear Falls

Lac Seul

Lac Seul

Lac Seul

Lac Seul

Slate Falls Nation

Lake St. Joseph

Mishkeegogamang First Nation

Savant Lake

Qjibway Nation of Saugeen

Wabauskang First Nation

Asubpeeschoseewagong Anishinabek First Nation

Lac Seul First Nation

Sioux Lookout

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LEGEND

- Springpole Project Location
- Proposed Transmission Line Alternatives
- Mine Access Road Alternatives
- Town
- Existing Road
- Existing Transmission Line
- First Nation Reserve (labelled with name)
- Caribou Range Boundary (labelled with name)
- Churchill Range Boundary (labelled with name)
- Waterbody
- Caribou Telemetry – Spring Focal Node Areas used in Analysis

Circuitscape Connectivity Analysis Results (Spring)

- High Flow/Connectivity
- Low Flow/Connectivity

NOTES:
- Topographic information extracted from LIO, MNRF.

Datum: NAD83
Projection: UTM Zone 15N

0 25 50 100 150 200 250 Kilometres

First Mining Gold

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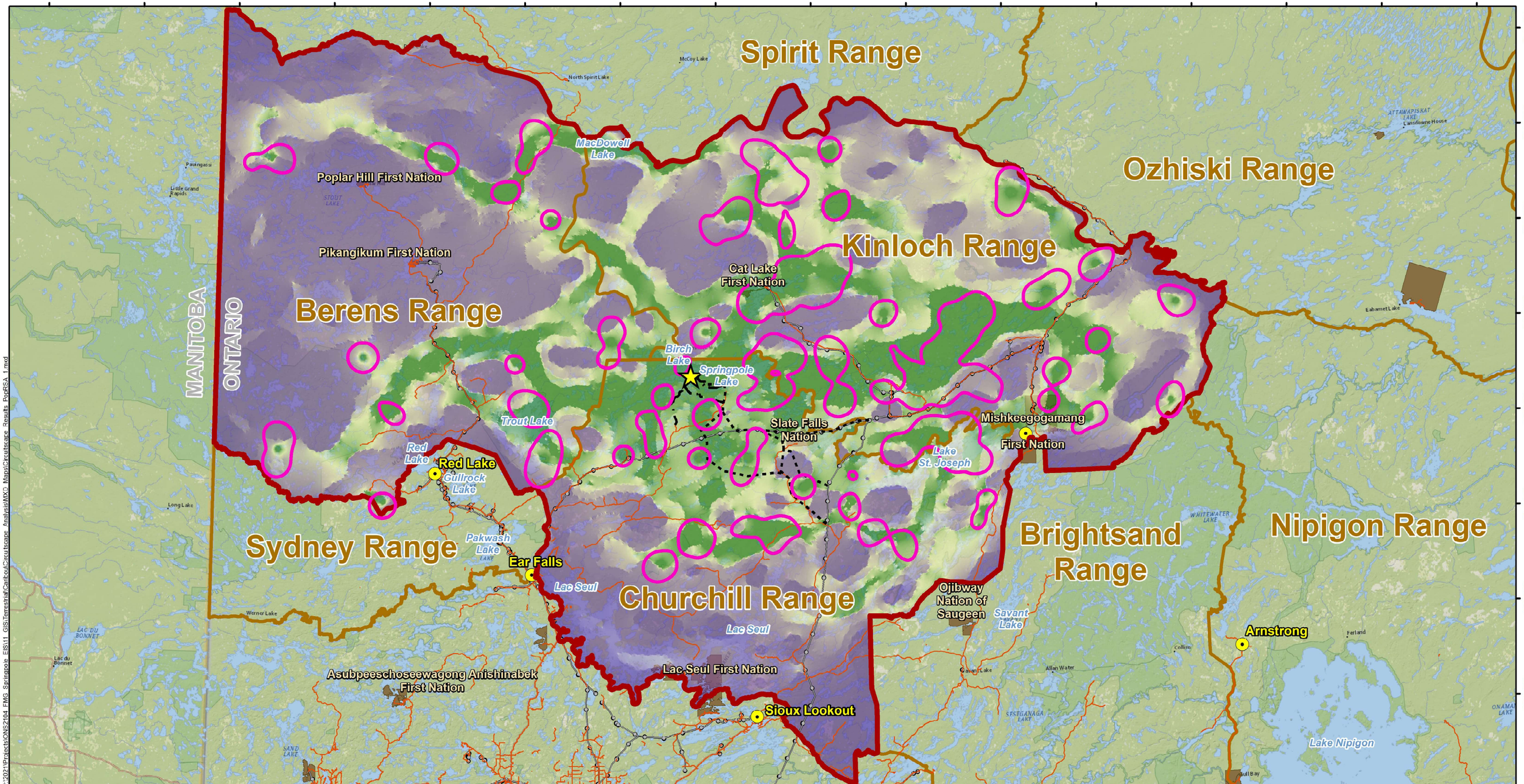
SPRINGPOLE GOLD PROJECT

Landscape Connectivity within Churchill Range relative to alternatives

PROJECT N°: ONS2104 | **FIGURE: 4-9**

SCALE: 1:855,000 | DATE: August 2024



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LEGEND

- Springpole Project Location
- Proposed Transmission Line Alternatives
- Mine Access Road Alternatives
- Town
- Existing Road
- Existing Transmission Line
- First Nation Reserve (labelled with name)
- Caribou Range Boundary (labelled with name)
- Population Level Caribou Regional Study Area (RSA) Boundary
- Caribou Telemetry – Spring Focal Node Areas used in Analysis

Circuitscape Connectivity Analysis Results (Spring)

- High Flow/Connectivity
- Low Flow/Connectivity

NOTES:
- Topographic information extracted from LIO, MNRF and ESRI

0 25 50 100 150 200 250 300 350 400 450 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

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SPRINGPOLE GOLD PROJECT

Landscape Connectivity within Population RSA relative to alternatives

PROJECT N°: ONS2104	**FIGURE: 4-10**
SCALE: 1:1,526,800	DATE: August 2024

400000 440000 480000 520000 560000 600000 640000 680000 720000

5680000 5640000 5600000 5560000

Berens Range

Kinloch Range

Sydney Range

Churchill Range

Brightsand Range

Birch Lake

Springpole Lake

Trout Lake

Slate Falls Nation

Mishkeegogamang First Nation

Lake St. Joseph

Red Lake

Red Lake

Gullrock Lake

Pakwash Lake

Ear Falls

Lac Seul

Lac Seul

Savant Lake

Ojibway Nation of Saugeen

Wabauskang First Nation

Lac Seul

Lac Seul First Nation

Asubpeeschoseewagong Anishinabek First Nation

Sioux Lookout

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LEGEND

- Springpole Project Location
- Proposed Transmission Line Alternatives
- Mine Access Road Alternatives
- Town
- Existing Main Road
- First Nation Reserve (labelled with name)
- Caribou Range Boundary (labelled with name)
- Churchill Range Boundary (labelled with name)
- Waterbody
- Anthropogenic and Fire Habitat Disturbance Areas (500 m buffer from anthropogenic sources)

Main Sources of Anthropogenic Habitat Disturbance and Fire Disturbance Areas

- Building/Structure/Dam/Tower
- Drillhole
- Recreation Point
- Roads (Secondary and Resource)
- Railway
- Utility Line
- Aggregate Authorized (active)
- Waste Management Site
- Airport/Aerodrome
- Cottage Residential Site
- Forest Harvested Area
- Mining Leases and Patents
- Agriculture/Infrastructure (land use-land cover)
- Tourist Establishment Area
- Fire Disturbance Area

NOTES:
- Topographic information extracted from LIO, MNRF.

0 25 50 100 150 200 250 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

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SPRINGPOLE GOLD PROJECT

Anthropogenic (+500m buffer) and Natural Disturbance in Churchill Range

PROJECT N°: ONS2104

FIGURE: 4-11

SCALE: 1:855,000

DATE: September 2024

400000 440000 480000 520000 560000 600000 640000 680000 720000

5680000 5640000 5600000 5560000

Berens Range

Kinloch Range

Sydney Range

Brightsand Range

Birch Lake

Springpole Lake

Trout Lake

Red Lake

Red Lake

Gullrock Lake

Pakwash Lake

Ear Falls

Lac Seul

Lac Seul

Lac Seul

Lac Seul

Lake St. Joseph

Savant Lake

Slate Falls Nation

Mishkeegogamang First Nation

Wabauskang First Nation

Lac Seul First Nation

Asubpeeschoseewagong Anishinabek First Nation

Ojibway Nation of Saugeen

Sioux Lookout

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LEGEND

- Proposed Mine Site Features
- Mine Access Road Alternatives
- Proposed Transmission Line Alternatives
- Town
- Existing Main Road
- First Nation Reserve (labelled with name)
- Caribou Range Boundary (labelled with name)
- Churchill Range Boundary (labelled with name)
- Waterbody
- Far North Land Cover (no FRI available for Refuge Habitat Model)
- Caribou Refuge Habitat (conventional northwest model, NDMNRF)

NOTES:
- Topographic information extracted from LIO, MNRF.

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SPRINGPOLE GOLD PROJECT

Distribution of Refuge Habitat within Churchill Range relative to all Alternatives

Datum: NAD83
Projection: UTM Zone 15N

N W E S

PROJECT N^{O}: ONS2104 | **FIGURE: 4-12**

SCALE: 1:855,000 | DATE: September 2024

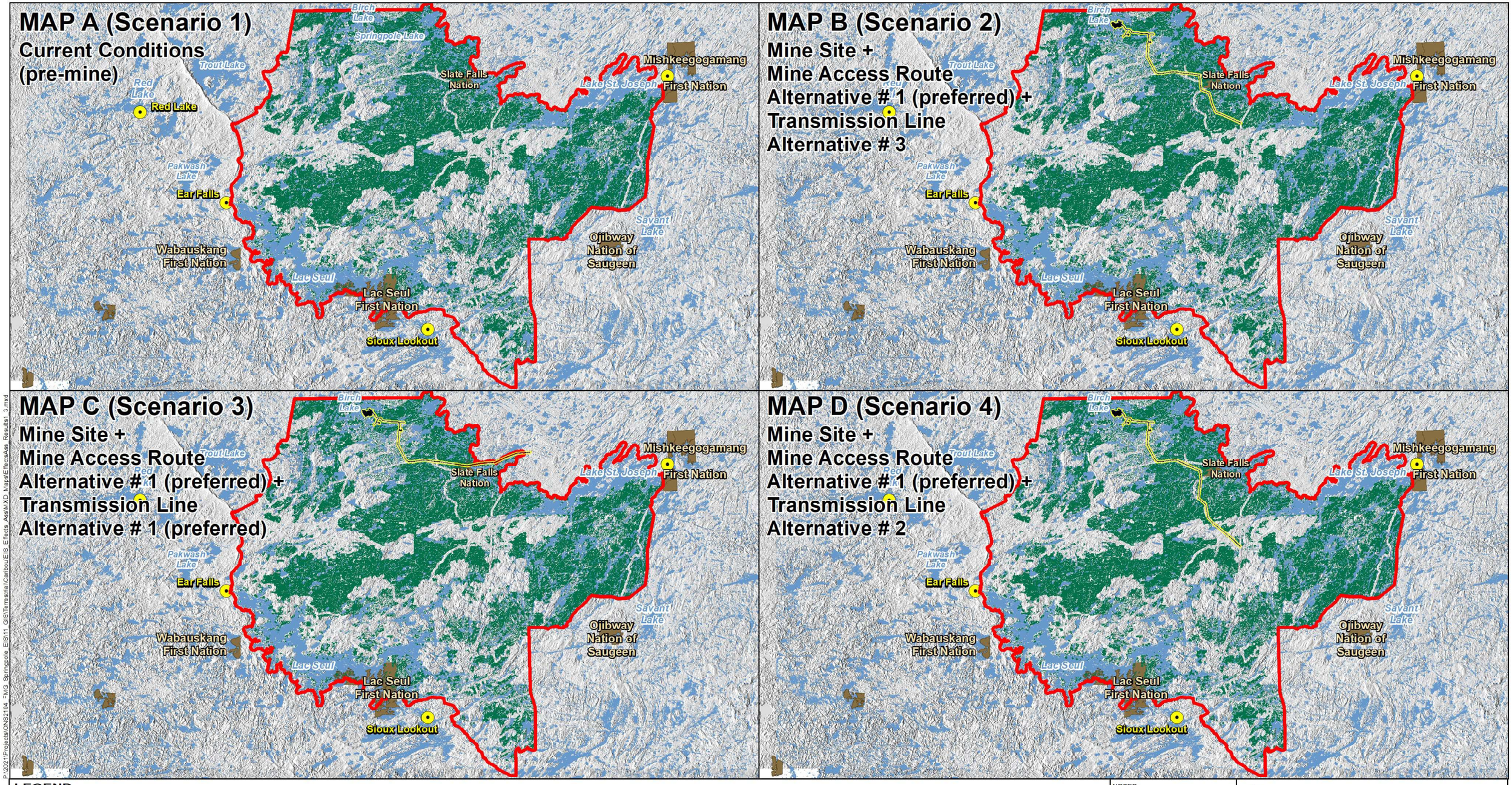
0 25 50 100 150 200 250 Kilometres

MAP A (Scenario 1)
Current Conditions (pre-mine)

MAP B (Scenario 2)
Mine Site + Mine Access Route Alternative # 1 (preferred) + Transmission Line Alternative # 3

MAP C (Scenario 3)
Mine Site + Mine Access Route Alternative # 1 (preferred) + Transmission Line Alternative # 1 (preferred)

MAP D (Scenario 4)
Mine Site + Mine Access Route Alternative # 1 (preferred) + Transmission Line Alternative # 2



LEGEND

- Town
- First Nation Reserve (labelled with name)
- Waterbody
- Proposed Mine Site Features
- Effects Assessment Impact Area (direct + indirect impact)
- Caribou Refuge Habitat Effects Assessment Boundary (Churchill Caribou Range)
- Caribou Refuge Habitat (conventional northwest model, NDMNRF)

NOTES:
- Topographic information extracted from LIO, NDMNRF.
- All anthropogenic features were buffered by 500 m, including existing roads and power lines and proposed mine site features

0 25 50 100 150 200 250 300 350 400 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

N W E S

First Mining Gold

WSP

SPRINGPOLE GOLD PROJECT

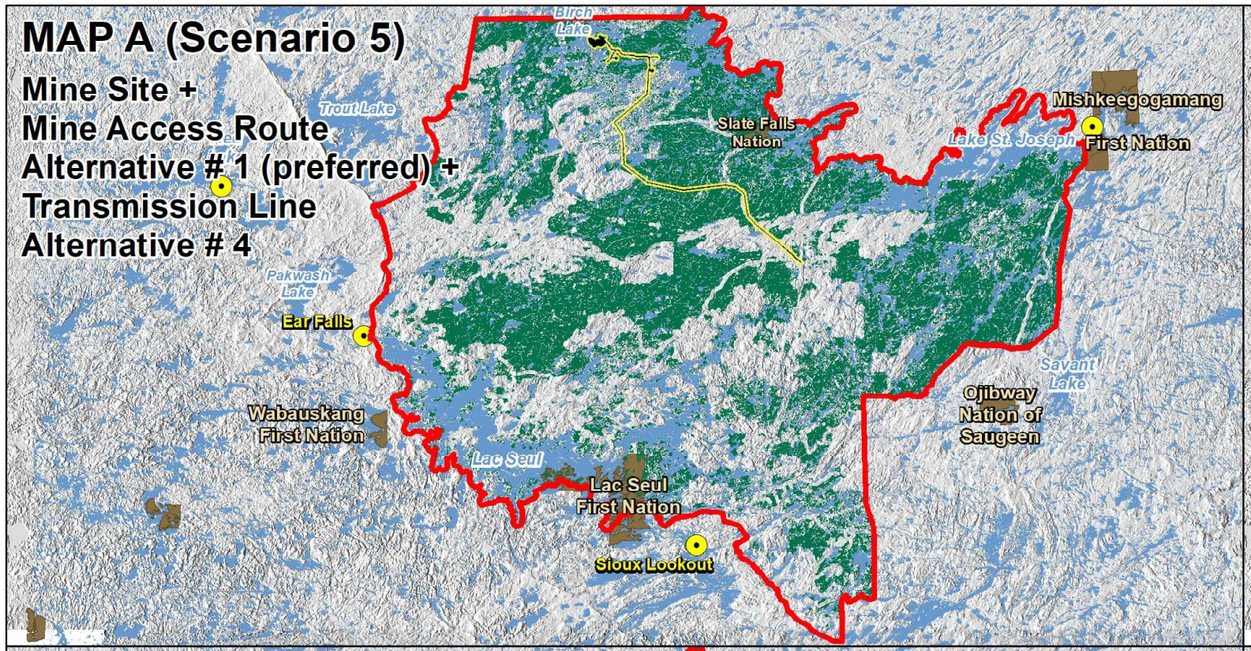
Refuge Habitat - Preferred MAR1 with TL Alternatives

PROJECT N°: ONS2104 | **FIGURE: 4-13**

SCALE: 1:1,700,000 | DATE: May 2024

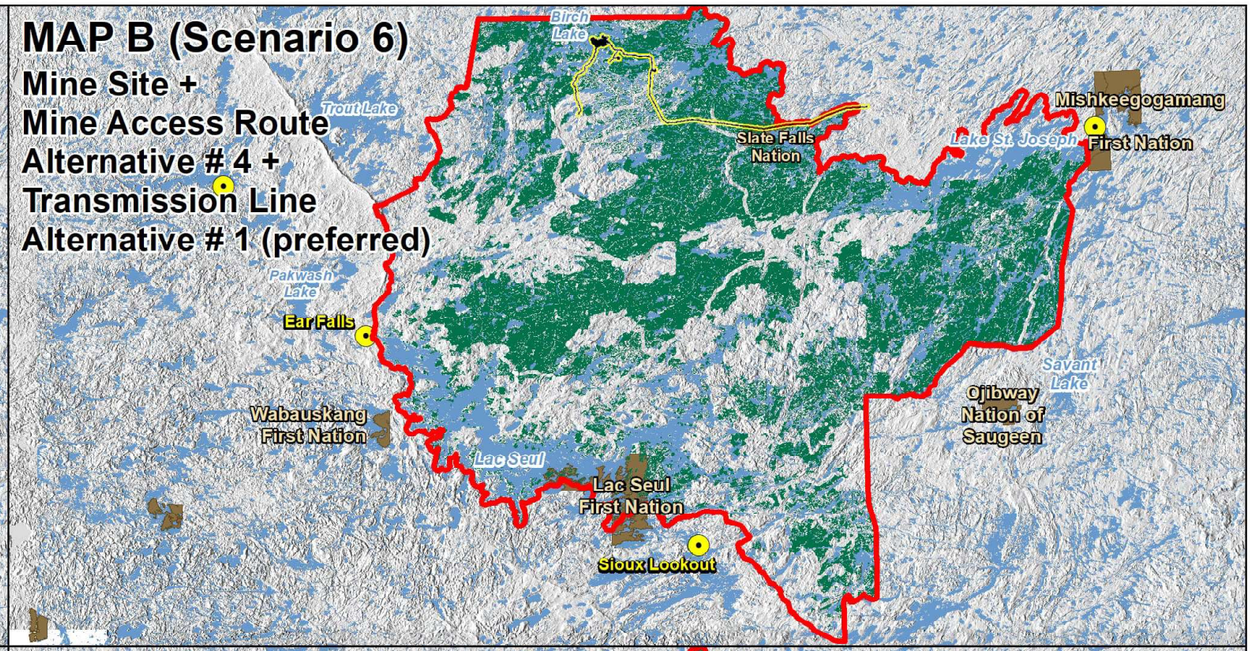
MAP A (Scenario 5)

Mine Site +
Mine Access Route
Alternative # 1 (preferred) +
Transmission Line
Alternative # 4



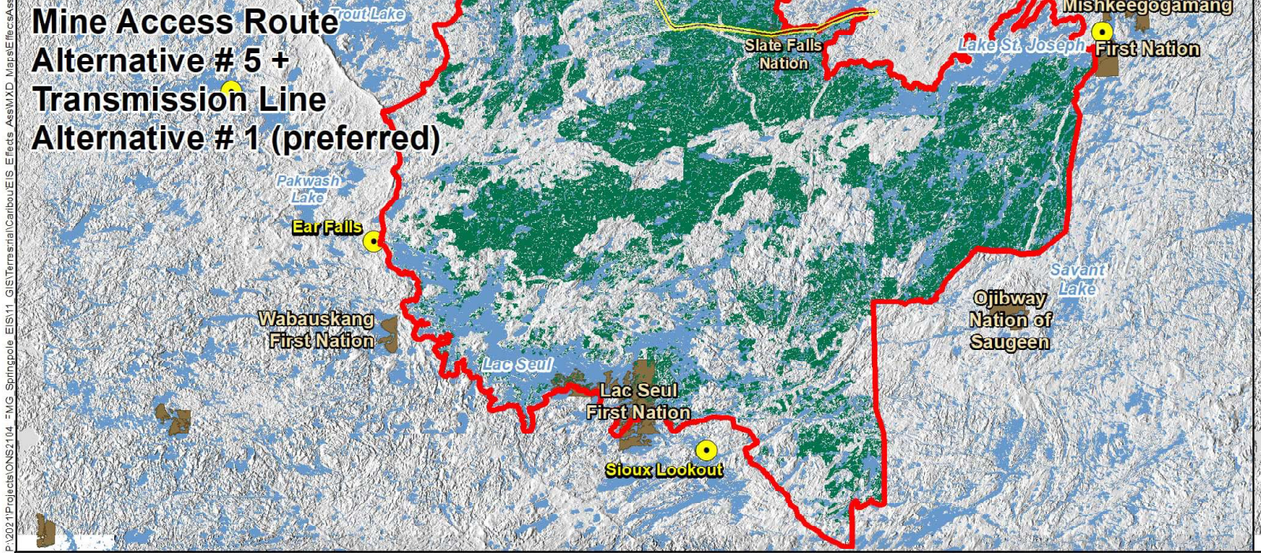
MAP B (Scenario 6)

Mine Site +
Mine Access Route
Alternative # 4 +
Transmission Line
Alternative # 1 (preferred)



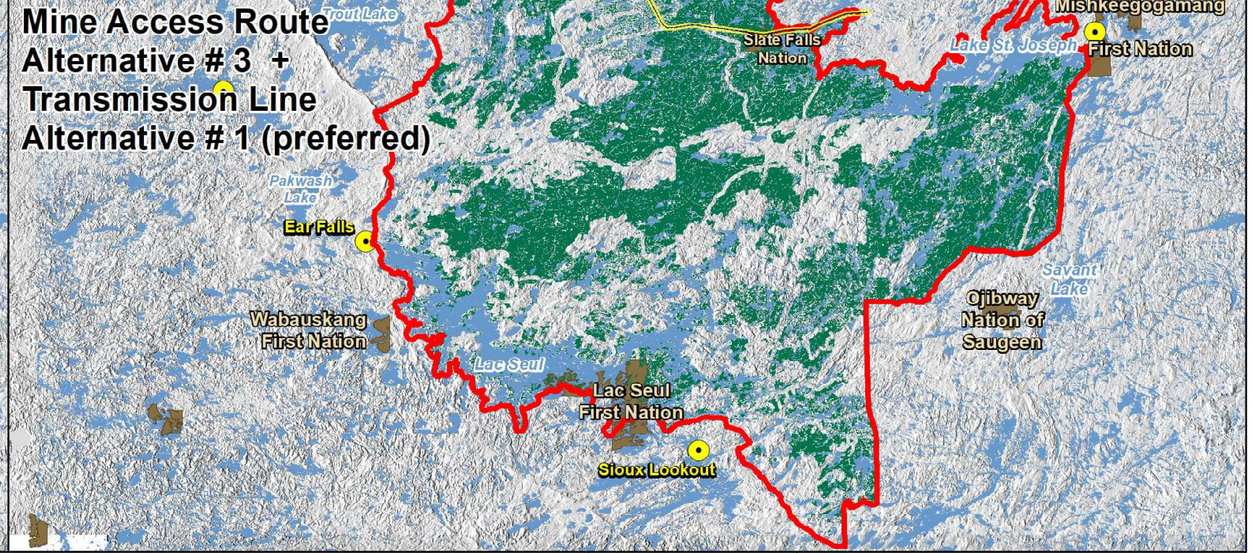
MAP C (Scenario 7)

Mine Site +
Mine Access Route
Alternative # 5 +
Transmission Line
Alternative # 1 (preferred)



MAP D (Scenario 8)

Mine Site +
Mine Access Route
Alternative # 3 +
Transmission Line
Alternative # 1 (preferred)



LEGEND

- Town
- First Nation Reserve (labelled with name)
- Waterbody
- Proposed Mine Site Features
- Effects Assessment Impact Area (direct + indirect impact)
- Caribou Refuge Habitat Effects Assessment Boundary (Churchill Caribou Range)
- Caribou Refuge Habitat (conventional northwest model, NDMNRF)

NOTES:
- Topographic information extracted from LIO, NDMNRF.
- All anthropogenic features were buffered by 500 m, including existing roads and power lines and proposed mine site features

0 25 50 100 150 200 250 300 350 400 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

N W E S

First Mining Gold

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SPRINGPOLE GOLD PROJECT

Refuge Habitat - MAR Alternatives with Preferred TL1 Alternative

PROJECT N°: ONS2104 | **FIGURE: 4-14**

SCALE: 1:1,700,000 | DATE: May 2024

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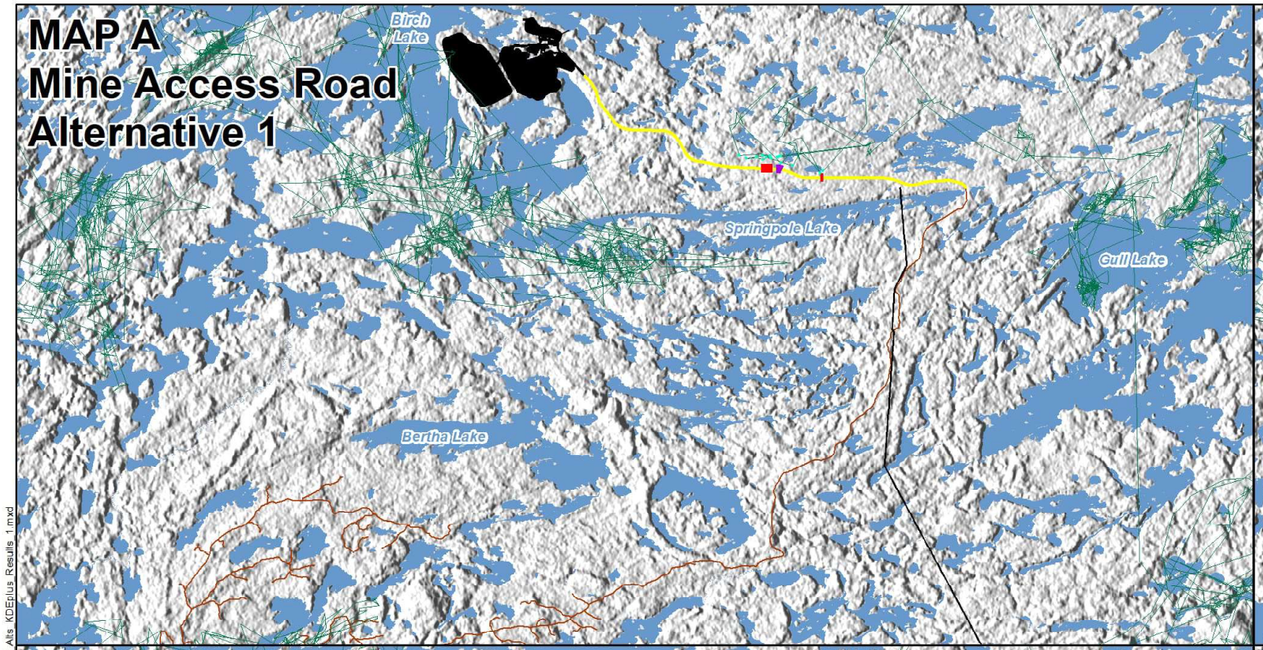

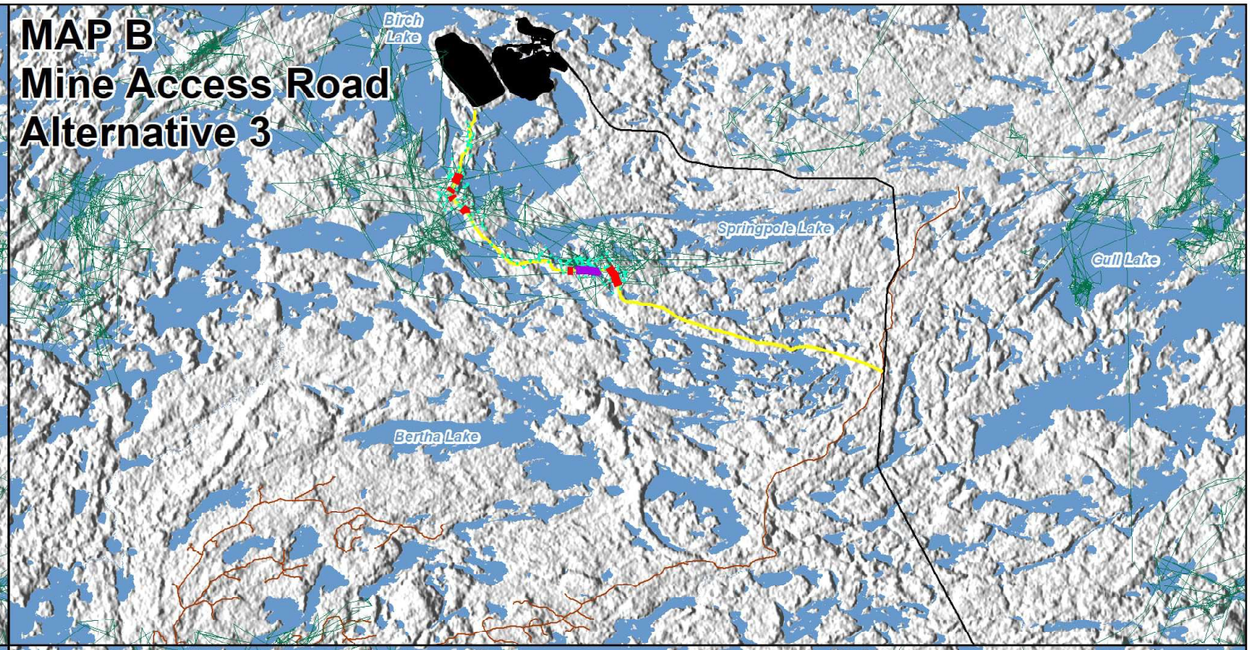

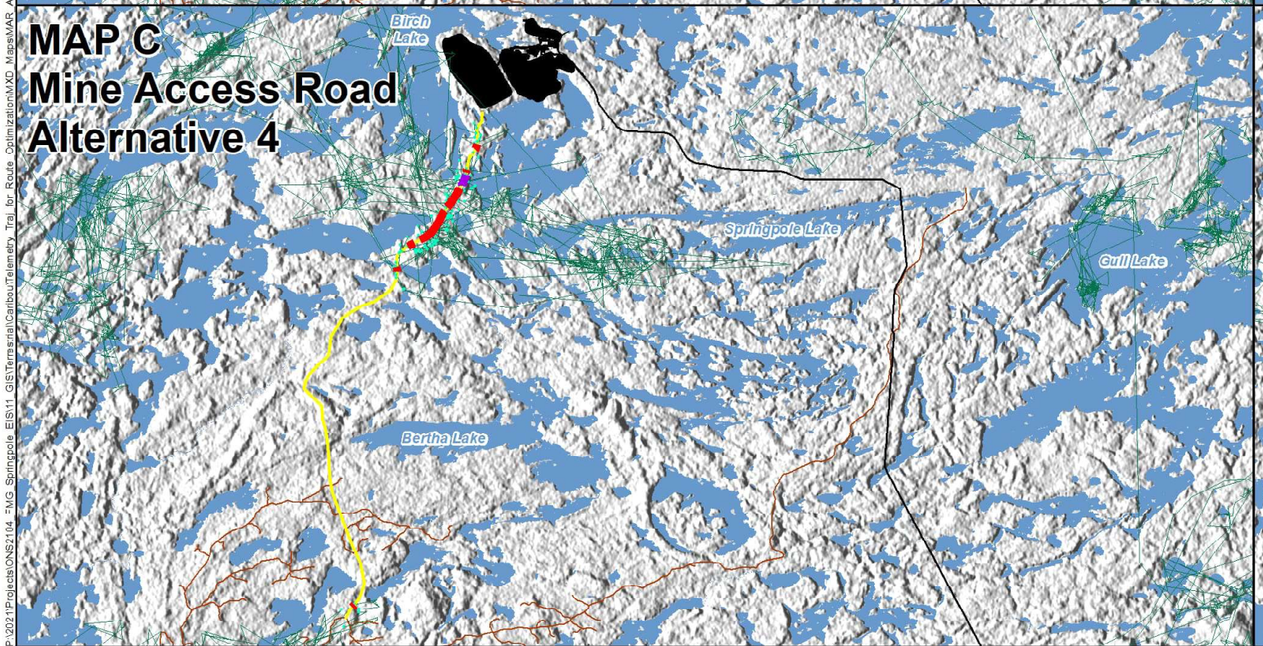

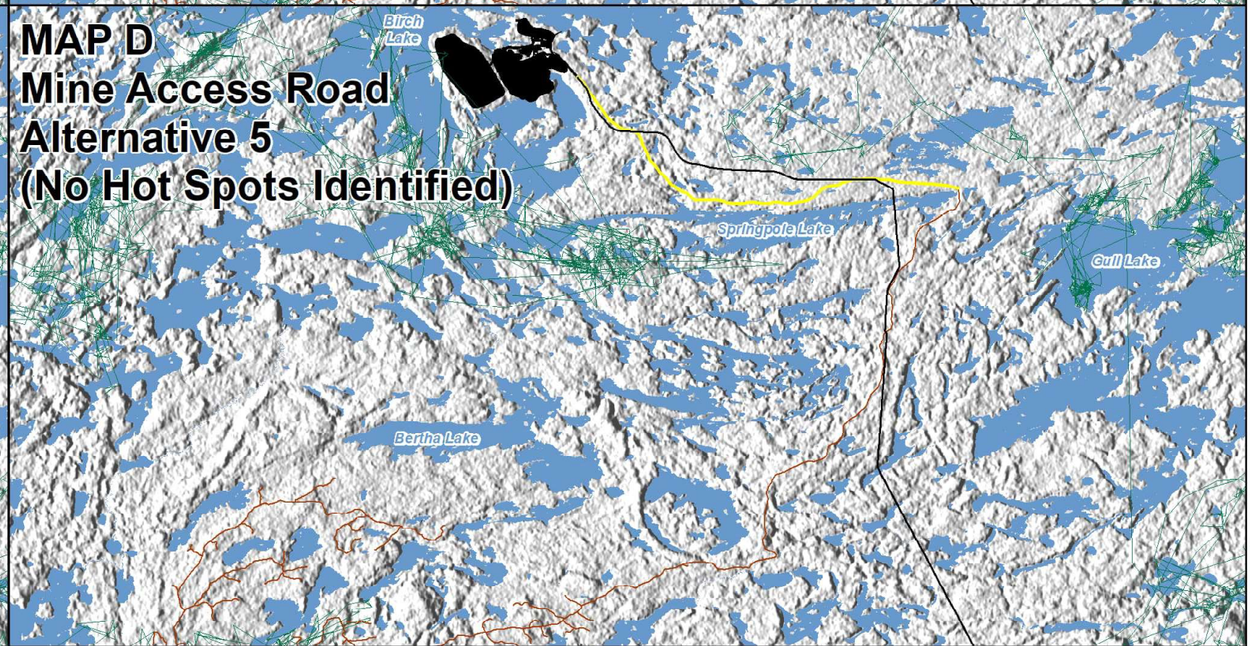

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LEGEND

- Points used in KDE+ Hot Spot Analysis (telemetry locations within 500 m of alternative and trajectory crossing locations)
- Collared Caribou Trajectory Lines (Feb. 2023 to Apr. 2024)
- Mine Access Road Alternative
- Identified Significant Hot Spot (cluster) Locations along Alternative
- Identified Most Significant Hot Spot (cluster) Location along Alternative
- Proposed Mine Site Features
- Existing Road / Resource Road
- Waterbody

0 12.5 25 50 Kilometres

NOTES:
- Topographic information extracted from LIO, NDMNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP 2023.

Datum: NAD83
Projection: UTM Zone 15N

N W E S

FIRST MINING GOLD

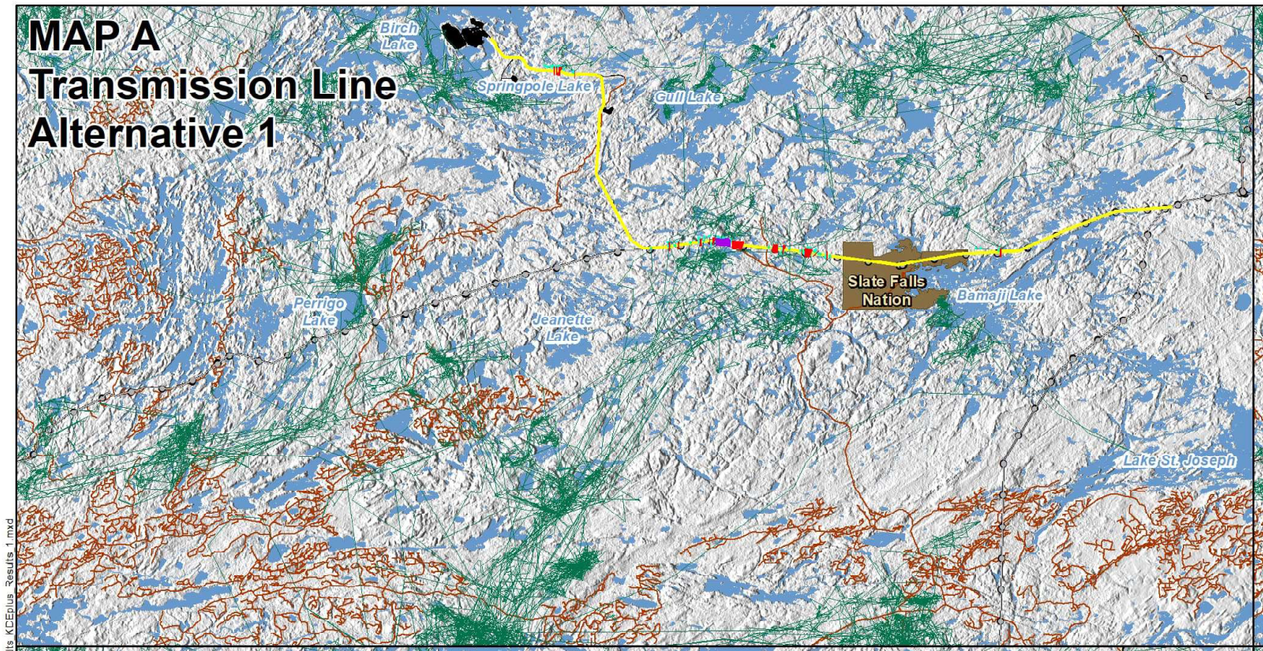
WSP

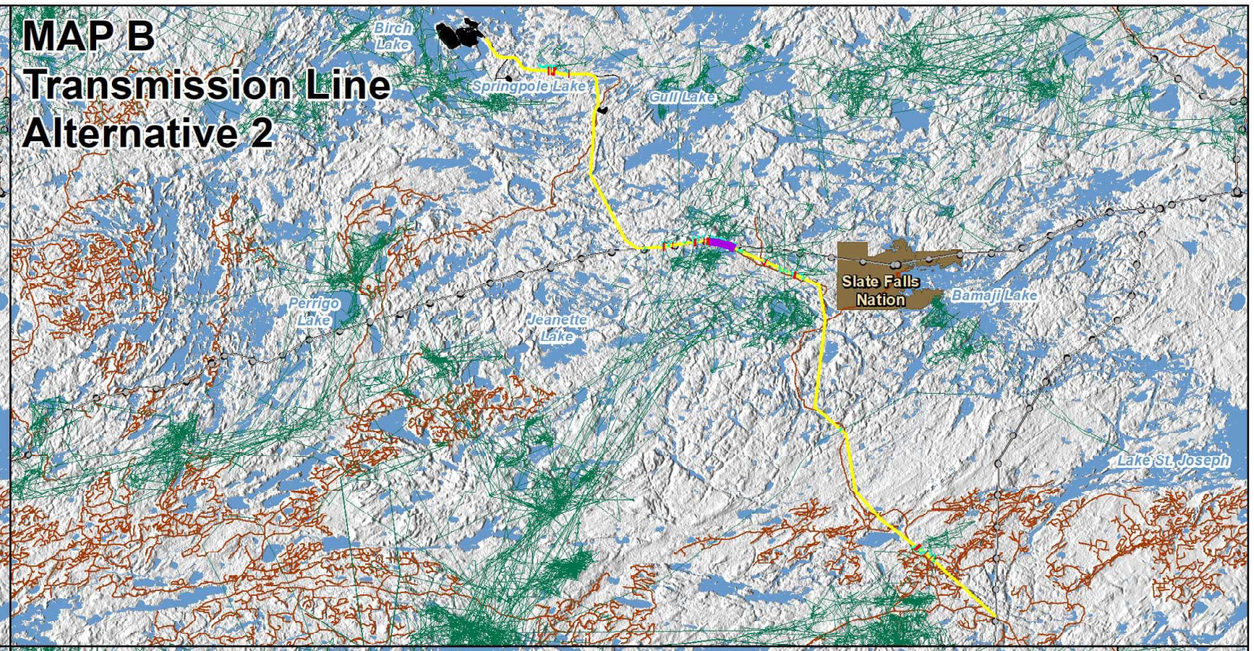
SPRINGPOLE GOLD PROJECT

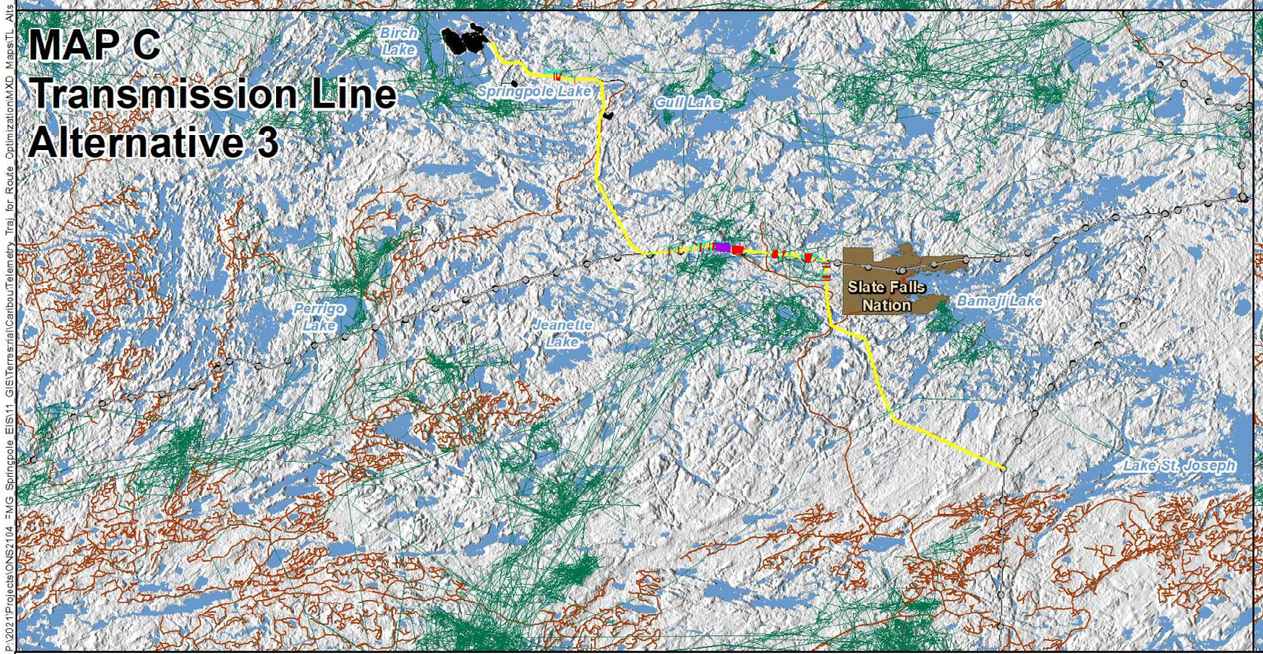
Activity area Locations identified through KDE+ Analysis for Mine Access Routes (Alternative 1 is preferred)

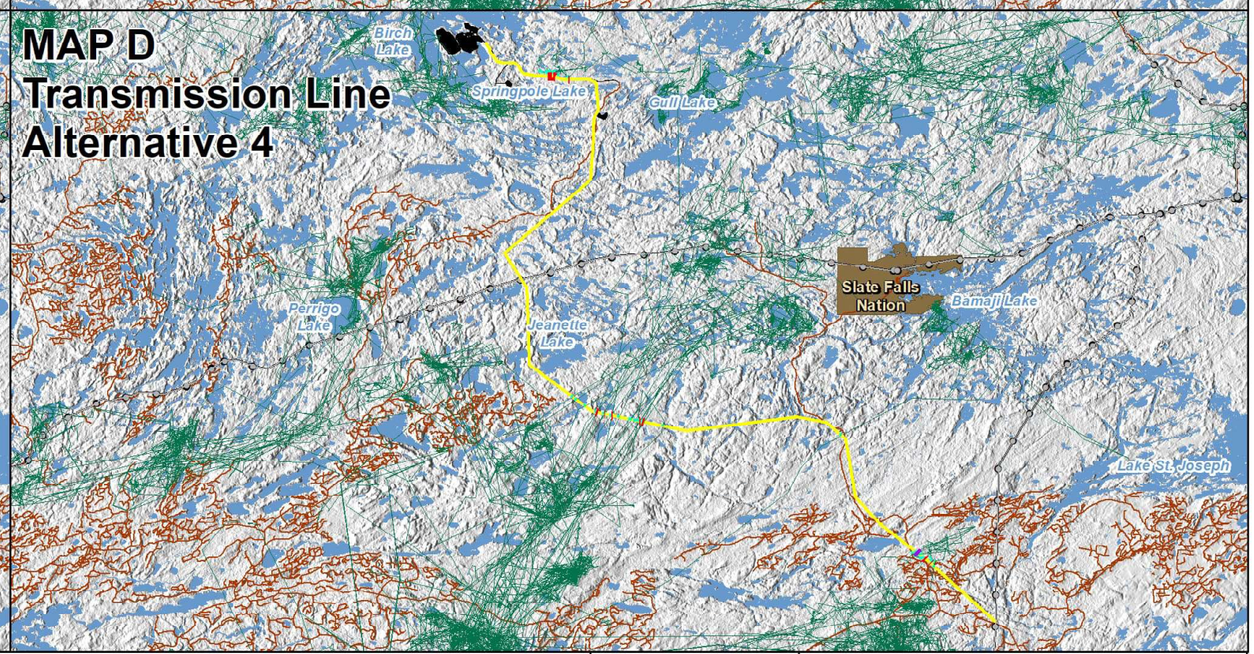
PROJECT N°: ONS2104 | **FIGURE: 4-15**

SCALE: 1:225,000 | DATE: July 2024









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LEGEND

- Points used in KDE+ Hot Spot Analysis (telemetry locations within 500 m of alternative and trajectory crossing locations)
- Collared Caribou Trajectory Lines (Feb. 2023 to Apr. 2024)
- Transmission Line Alternative
- Identified Significant Hot Spot (cluster) Locations along Alternative
- Identified Most Significant Hot Spot (cluster) Location along Alternative
- Proposed Mine Site Features
- Existing Road / Resource Road
- First Nation Reserve (labelled with name)
- Waterbody

0 12.5 25 50 75 100 125 Kilometres

NOTES:
- Topographic information extracted from LIO, NDMNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP 2023.

Datum: NAD83
Projection: UTM Zone 15N

N W E S

First Mining Gold

WSP

SPRINGPOLE GOLD PROJECT

Activity area Locations identified through KDE Analysis for Transmission Line Routes (Alternative 1 is preferred)

PROJECT N°: ONS2104 | **FIGURE: 4-16**

SCALE: 1:645,000 | DATE: July 2024

545000 550000 555000 560000 565000

5700000 5695000 5690000 5685000 5680000 5675000 5670000

Joneston Lake
Casummit Lake
Penson Lake
Keigat Creek
Birch Lake
Keigat Lake
L-19
Dole Lake
L-20
L-16
Durkin Lake
L-10
L-11
L-13
L-14
Springpole Lake (North Basin)
Springpole Lake (Southeast Arm)
Birch River
Satterly Lake
Cromarty Lake
Superstition Lake
Graydarl Lake
Seagrave Lake
Skingle Lake
Bertha Lake
Wenasaga Forestry Road
Deaddog Lake
Ruddy Lake
Cavano Lake
Bumpy Lake
Christina Lake
Cook Lake
Marsh Lake
Hailstone Lake
Sesikinaga River
Margaret Lake
Latreille Lake
Sesikinaga Lake

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LEGEND

- Proposed Mine Feature
- Existing Road
- Watercourse
- Waterbody
- Contour (10 m intervals)
- 500 m Buffer Around Mine Access Road Alternatives
- Existing Habitat Disturbance Areas (within 500 m buffers)
- Undisturbed Existing Habitat Areas (within 500 m buffers)

Mine Access Road Route Alternatives

- Alternative 1 (17.7 km)
- Alternative 3 (28.1 km)
- Alternative 4 (28.2 km)
- Atlerantive 5 (18.5 km)

Caribou Habitat Summary (within 500 m buffers) *

- Category 1 - High Nursery Use
- Category 2 - Seasonal Range
- Category 3 - Remaining Areas within the Range

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
* Caribou habitat areas are derived from a combination of MECP (2024) GHD data, 65% probability of occurrence kernel data from telemetry fixes (2023-2024), categorized high density areas delineated from observation data collected during winter aerial surveys (2021 to 2024), modelled category 2 and category 3 land coverage model within Churchill Range, and predicted calving/nursery areas from RSF model (R. Rempel 2024)

Datum: NAD83
Projection: UTM Zone 15N

0 1 2 4 6 8 10 Kilometres

N W E S

FIRST MINING GOLD

WSP

SPRINGPOLE GOLD PROJECT

MAR Alternatives Relative to GHD Habitats

PROJECT N°: ONS2104 | **FIGURE: 4-17**

SCALE: 1:102,000 | DATE: August 2024

520000 540000 560000 580000 600000 620000 640000

5680000

5660000

5640000

SPRINGPOLE GOLD PROJECT

SLATE FALLS NATION

Ear Falls to Pickle Lake (E1C)

Wataynikaneyap Transmission Line

Keigat Lake
Zionz Lake
Obaskaka River
Strout Lake
Birch Lake
Cluderay Lake
Dorothy Lake
Springpole Lake
Fawcett Lake
Muskegsagagen Lake
Wright Lake
Shabumeni Lake
Gull Lake
Nabemakoseka Lake
Superstition Lake
Scanes Lake
Granitebossy Lake
Seagrave Lake
Kezik Lake
Jacknife Lake
Grace Lake
Mousetrap Lake
Bertha Lake
Washagomis Lake
Deaddog Lake
Ruddy Lake
Christina Lake
Strachan Lake
Fry Lake
Bumpy Lake
Woman Lake
Fawthrop Lake
Teevin Lake
Narrow Lake
Hailstone Lake
Senior Lake
Wesleyan Lake
Okanse Lake
Cook Lake
Drum Lake
Mukukec Lake
Philchub Lake
Found Lake
Margaret Lake
Latreille Lake
North Bamaji Lake
Woman River
Perrigo Lake
Sesikinaga Lake
Bamaji Lake
Honderich Lake
Austin Lake
Pembina Lake
Rowe Lake
Snelgrove Lake
Confederation Lake
One Island Lake
Brokenmouth River
Jeanette Lake
Coyston Lake
Roadhouse Lake
Blackstone Lake
Fly Lake
Drake Lake
Wakeman Lake
Polzin Lake
Buddell Lake
Dalgas Lake
Jubilee Lake
Lake St. Joseph
Fly Creek
Slate Lake
Curie Lake
Kesaka Lake
Roadhouse River
Ben Lake
Lower Slate Lake
Avis Lake
Trist Lake
Papaonga Lake
Badrock Lake
Root Lake
Ogani Lake
Sharp Lake
Otatakan Lake
Polka Lake
Churchill Lake
Whitemud Lake

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LEGEND

- Proposed Mine Feature
- Existing Road
- Winter Road
- Existing Transmission Line
- First Nation Reserve
- Watercourse
- Waterbody

230 kV Transmission Line Route Alternatives

- Alternative 1 (93.9 km)
- Alternative 2 (100.5 km)
- Alternative 3 (88.9 km)
- Alternative 4 (114.4 km)

- 500 m Buffer Around Transmission Line Alternatives
- Existing Habitat Disturbance Areas (within 500 m buffers)
- Undisturbed Existing Habitat Areas (within 500 m buffers)

Caribou Habitat Summary (within 500 m buffers) *

- Category 1 - High Nursery Use
- Category 1 - Winter Use
- Category 1 - Winter Use and Nursery
- Category 2 - Seasonal Range
- Category 3 - Remaining Areas within the Range

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
* Caribou habitat areas are derived from a combination of MECP (2024) GHD data; 65% probability of occurrence kernel data from telemetry fixes (2023-2024), categorized high density areas delineated from observation data collected during winter aerial surveys (2021 to 2024), modelled category 2 and category 3 land coverage model within Churchill Range, and predicted calving/nursery areas from RSF model (R. Rempel 2024)

FIRST MINING GOLD

WSP

SPRINGPOLE GOLD PROJECT

TL Alternatives Relative to GHD Habitats

Datum: NAD83
Projection: UTM Zone 15N

N W E S

PROJECT N°: ONS2104

FIGURE: 4-18

SCALE: 1:325,000

DATE: August 2024

0 10 20 40 60 80 100 Kilometres

480000 500000 520000 540000 560000 580000 600000 620000 640000 660000 680000 700000

5740000 5720000 5700000 5680000 5660000 5640000 5620000

CAT LAKE FIRST NATION
SLATE FALLS NATION
Upper Goose Lake
Mamakwash Lake
Pringle Lake
Nungesser Lake
Trout Lake
Joyce Lake
Little Trout Lake
Bruce Lake
Pakwash Lake
Bluffy Lake
Whitemud Lake
Slate Lake
Confederation Lake
Perrigo Lake
Narrow Lake
Woman Lake
Okanse Lake
Shabumeni Lake
Cat Lake
Carillon Lake
Kapikik Lake
Gitche Lake
Zionz Lake
Gull Lake
Fawcett Lake
Kezik Lake
Dobie Lake
Wright Lake
Fry Lake
Bamaji Lake
Blackstone Lake
Lake St. Joseph
Doran Lake
Miniss Lake
St. Raphael Lake
De Lesseps Lake
McCrea Lake
Ochig Lake
Kasagiminnis Lake
Annimwash Lake
Otatakan Lake

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LEGEND

- Proposed Mine Feature
- Wolverine Local Study Area
- Wolverine Regional Study Area
- Wolverine Presence Detected (2023)
- First Nation Reserve
- Existing Road
- Existing Winter Road
- Existing Transmission Line
- Watercourse
- Waterbody
- Transmission Line Alternative - 1
- Transmission Line Alternative - 2
- Transmission Line Alternative - 3
- Transmission Line Alternative - 4
- Mine Access Road Alternative - 1
- Mine Access Road Alternative - 3
- Mine Access Road Alternative - 4
- Mine Access Road Alternative - 5

HSI Value
High Suitability (1)
Low Suitability (0)

0 5 10 20 30 40 50 Kilometres

NOTES:
- Topographic information extracted from LIO, NDMNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- Centreline is shown for ease of viewing

First Mining Gold

WSP

SPRINGPOLE GOLD PROJECT

Wolverine habitat and Project Alternatives

Datum: NAD83
Projection: UTM Zone 15N

N W E S

PROJECT N°: ONS2104 | **FIGURE: 4-19**

SCALE: 1:600,000 | DATE: August 2024

480000 500000 520000 540000 560000 580000 600000 620000 640000 660000 680000

5700000 5680000 5660000 5640000 5620000

Carillon Lake
Kapikik Lake
Gitche Lake
Doble Lake
Zionz Lake
Fawcett Lake
Gull Lake
Wright Lake
Kezik Lake
Shabumeni Lake
Fry Lake
Woman Lake
Narrow Lake
Okanse Lake
Trout Lake
SLATE FALLS NATION
Bamaji Lake
Joyce Lake
Perrigo Lake
Blackstone Lake
Confederation Lake
Lake St. Joseph
Little Trout Lake
Doran Lake
Slate Lake
Otatakan Lake
Whitemud Lake
Miniss Lake
Bruce Lake
Bluffy Lake
De Lesseps Lake
St. Raphael Lake

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LEGEND

- Proposed Mine Feature
- Local Study Area for Alternatives
- Regional Study Area for SAR Bats
- Bat Candidate Hibernacula
- SAR Bat Detections Locations
- Bat Maternity Habitat
- First Nation Reserve
- Existing Road
- Existing Winter Road
- Existing Transmission Line
- Watercourse
- Waterbody
- Transmission Line Alternative - 1
- Transmission Line Alternative - 2
- Transmission Line Alternative - 3
- Transmission Line Alternative - 4
- Mine Access Road Alternative - 1
- Mine Access Road Alternative - 3
- Mine Access Road Alternative - 4
- Mine Access Road Alternative - 5

NOTES:
- Topographic information extracted from LIO, NDMNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- Centreline is shown for ease of viewing

0 5 10 20 30 40 50 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

N W E S

First Mining Gold

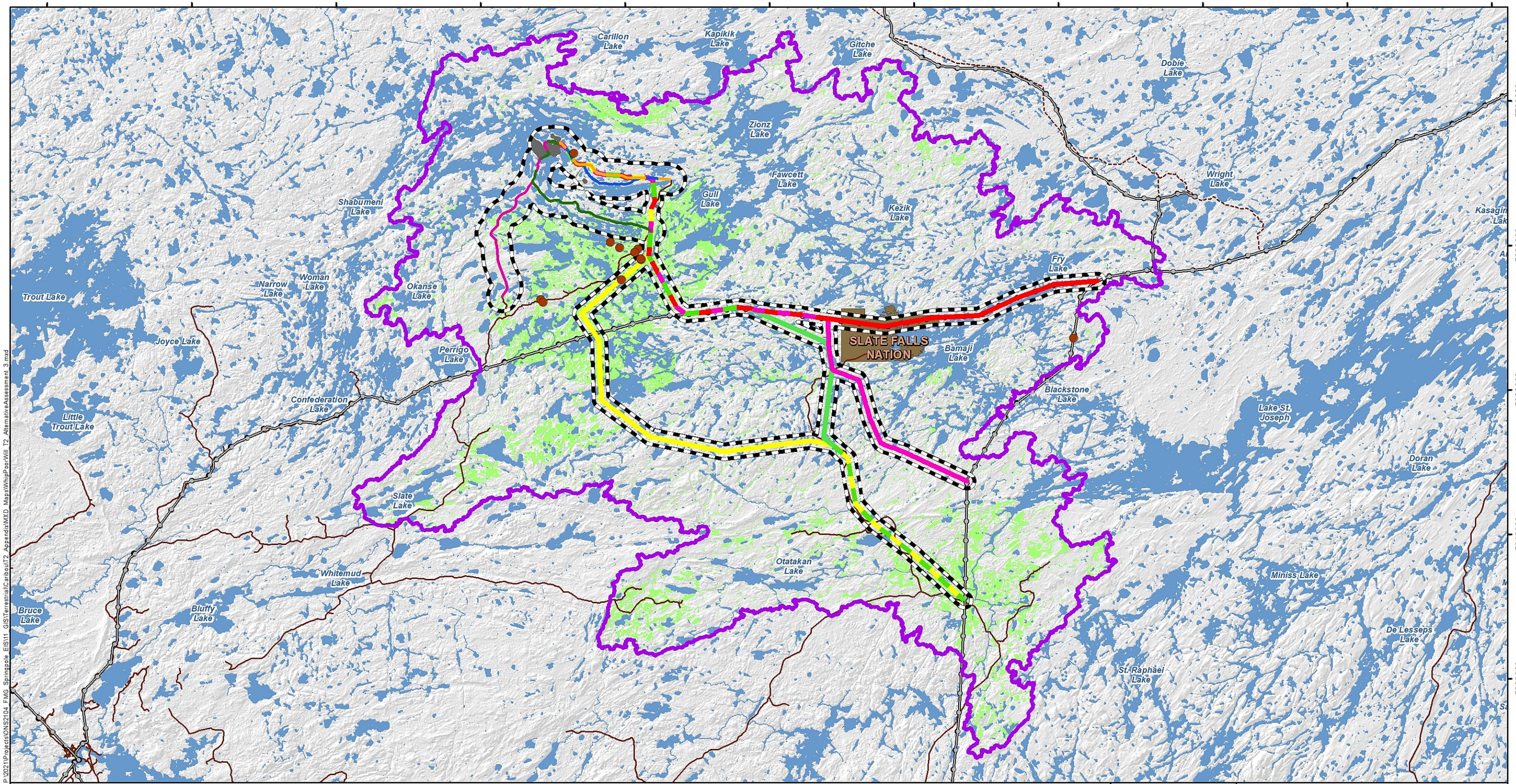
wsp

SPRINGPOLE GOLD PROJECT

SAR Bat habitat and Project Alternatives

PROJECT N^{o}: ONS2104 | **FIGURE: 4-20**

SCALE: 1:500,000 | DATE: August 2024



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LEGEND

- Proposed Mine Feature
- Local Study Area for Alternatives
- Regional Study Area for SAR Birds
- Whip-poor-will Observation/Detection Locations
- Whip-poor-will - Moderate to High Habitat Suitability Areas
- First Nation Reserve
- Existing Road
- Existing Winter Road
- Existing Transmission Line
- Watercourse
- Waterbody
- Transmission Line Alternative - 1
- Transmission Line Alternative - 2
- Transmission Line Alternative - 3
- Transmission Line Alternative - 4
- Mine Access Road Alternative - 1
- Mine Access Road Alternative - 3
- Mine Access Road Alternative - 4
- Mine Access Road Alternative - 5

0 5 10 20 30 40 50 Kilometres

NOTES:
- Topographic information extracted from LIO, NDMNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- Centreline is shown for ease of viewing

Datum: NAD83
Projection: UTM Zone 15N

N W E S

FIRST MINING GOLD

WSP

SPRINGPOLE GOLD PROJECT

Whip-poor-will habitat and Project Alternatives

PROJECT N^{o}: ONS2104	**FIGURE: 4-21**
SCALE: 1:500,000	DATE: August 2024

480000 500000 520000 540000 560000 580000 600000 620000 640000 660000 680000

5700000 5680000 5660000 5640000 5620000

Carillon Lake
Kapikik Lake
Gitche Lake
Doble Lake
Zionz Lake
Fawcett Lake
Wright Lake
Gull Lake
Kezik Lake
Shabumeni Lake
Fry Lake
Narrow Lake
Woman Lake
Okanse Lake
Trout Lake
SLATE FALLS NATION
Joyce Lake
Perrigo Lake
Bamaji Lake
Blackstone Lake
Confederation Lake
Lake St. Joseph
Little Trout Lake
Doran Lake
Slate Lake
Otatakan Lake
Whitemud Lake
Miniss Lake
Bruce Lake
Bluffy Lake
De Lesseps Lake
St. Raphael Lake

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LEGEND

- Proposed Mine Feature
- Local Study Area for Alternatives
- Regional Study Area for SAR Birds
- Lesser Yellow-legs Observation/Detection Locations
- Lesser Yellowlegs - Moderate to High Habitat Suitability Areas
- First Nation Reserve
- Existing Road
- Existing Winter Road
- Existing Transmission Line
- Watercourse
- Waterbody
- Transmission Line Alternative - 1
- Transmission Line Alternative - 2
- Transmission Line Alternative - 3
- Transmission Line Alternative - 4
- Mine Access Road Alternative 1
- Mine Access Road Alternative 3
- Mine Access Road Alternative 4
- Mine Access Road Alternative 5

0 5 10 20 30 40 50 Kilometres

NOTES:
- Topographic information extracted from LIO, NDMNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- Centreline is shown for ease of viewing

Datum: NAD83
Projection: UTM Zone 15N

N W E S

FIRST MINING GOLD

wsp

SPRINGPOLE GOLD PROJECT

Lesser Yellow-legs habitat and Project Alternatives

PROJECT N^{o}: ONS2104 | **FIGURE: 4-22**

SCALE: 1:500,000 | DATE: August 2024

480000 500000 520000 540000 560000 580000 600000 620000 640000 660000 680000

5700000 5680000 5660000 5640000 5620000

Carillon Lake
Kapikik Lake
Gitche Lake
Doble Lake
Zionz Lake
Fawcett Lake
Wright Lake
Gull Lake
Kezik Lake
Shabumeni Lake
Fry Lake
Narrow Lake
Woman Lake
Okanse Lake
Trout Lake
Joyce Lake
Perrigo Lake
Bamaji Lake
Blackstone Lake
Confederation Lake
Lake St. Joseph
Little Trout Lake
Slate Lake
Doran Lake
Otatakan Lake
Whitemud Lake
Miniss Lake
Bruce Lake
Bluffy Lake
De Lesseps Lake
St. Raphael Lake

MAR: 3,4
MAR: 1,5
MAR: 1
MAR: 5
TLA: 1, 2, 3, 4
MAR: 3
MAR: 4
TLA: 1, 2, 3
TLA: 1
TLA: 1, 3
SLATE FALLS NATION
TLA: 2
TLA: 4
TLA: 3
TLA: 2, 4

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LEGEND

- Proposed Mine Feature
- Local Study Area for Alternatives
- Regional Study Area for SAR Birds
- Short-eared Owl - Moderate to High Habitat Suitability Areas
- First Nation Reserve
- Existing Road
- Existing Winter Road
- Existing Transmission Line
- Watercourse
- Waterbody
- Transmission Line Alternative - 1
- Transmission Line Alternative - 2
- Transmission Line Alternative - 3
- Transmission Line Alternative - 4
- Mine Access Road Alternative 1
- Mine Access Road Alternative 3
- Mine Access Road Alternative 4
- Mine Access Road Alternative 5

NOTES:
- Topographic information extracted from LIO, NDMNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- Centreline is shown for ease of viewing

FIRST MINING GOLD

WSP

SPRINGPOLE GOLD PROJECT

Short-eared owl habitat and Project Alternatives

Datum: NAD83
Projection: UTM Zone 15N

0 5 10 20 30 40 50 Kilometres

PROJECT N^{O}: ONS2104

FIGURE: 4-23

SCALE: 1:500,000

DATE: August 2024

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Attachment 1
Alternatives Analysis

Table A-1: Project Alternative Relative to Boreal Caribou Refuge Habitat at Churchill Range (Habitat Regional Study Area) Scale

Alternative *	Mean Patch Size (km^2)	Edge Density (m/ha)	Total Edge (km)	Proportion Parallel to Existing Transmission Line **	
				km	%
Baseline	1.193	64.60	48,934	N/A	N/A
Mine access road 1 (Preferred)	1.192	64.65	48,967	N/A	N/A
Mine access road 3	1.186	64.63	48,955	N/A	N/A
Mine access road 4	1.186	64.62	48,950	N/A	N/A
Mine access road 5	1.191	64.64	48,966	N/A	N/A
Transmission line 1 (Preferred)	1.187	64.66	48,972	57.3	62.1
Transmission line 2	1.183	64.69	48.994	9.5	9.4
Transmission line 3	1.183	64.72	49,014	20.2	22.7
Transmission line 4	1.180	64.74	49,029	0.0	0.0

Note(s):
* All anthropogenic disturbances are buffered by 500 m to incorporate indirect impact on the Boreal Caribou refuge habitat landscape.
** Legacy disturbance = existing Wataynikaneyap 230 kV transmission line.
*** **All transmission line alternatives share the mine access road 1 corridor.**

m/ha = metres per hectare; N/A = not applicable.

Table A-2: Summary of Kernel Density Estimation+ Activity Analysis Results

Alternative	Length (km) *	Number of Significant Clusters	Cluster Strength Score		Length of Clusters (km)		
			Mean	Range	Total	Mean	Range
Mine access road 1 (Preferred)	**16.142**	**3**	**0.519**	**0.406 – 0.652**	**0.788**	**0.263**	**0.118 – 0.436**
Mine access road 3	22.445	7	0.357	-0.006 – 0.815	2.906	0.415	0.152 – 0.932
Mine access road 4	22.596	8	0.415	0.064 – 0.755	3.663	0.458	0.113 – 1.487
Mine access road 5	16.869	0	---	---	---	---	---
Transmission line 1 ** (Preferred)	**92.315**	**18**	**0.436**	**0.112 – 0.945**	**6.265**	**0.348**	**0.072 – 1.679**
Transmission line 2	98.852	15	0.487	0.215 – 0.951	5.349	0.357	0.090 – 2.847
Transmission line 3	87.247	20	0.403	0.040 – 0.940	6.661	0.333	0.072 – 1.676
Transmission line 4	112.797	11	0.505	0.278 – 0.886	2.243	0.204	0.111 – 0.436

Note(s):
* All mine access road and transmission line alternatives were truncated at the mine site for KDE+ analyses. All transmission line alternatives share the mine access road 1 alignment.
** The transmission line 1 (preferred), transmission line 2 and transmission line 3 alternatives have a portion of their alignment parallel to the existing Wataynikaneyap 230 kV transmission line—the activity areas for these alternatives all occur along this parallel / existing transmission line alignment.
(1) The effect of a transmission line alternative is considered if it shares a corridor with a mine access road alternative.

Table A-3: Impact of Project Alternative on Boreal Caribou Stopover Locations and Movement Corridors at Churchill Range (Habitat Regional Study Area) Scale

Alternative	Area Impacted (km²)								Bisections[1]							
	Calving	Post-Calving	Nursery	Early Winter	Late Winter	Over-winter	Spring	All Year	Calving	Post-Calving	Nursery	Early Winter	Late Winter	Over-winter	Spring	All Year
99.9% Isopleth																
Mine access road 1 (Preferred)	0	.36	.20	0	0	0	.25	.17	0	0	1	0	0	0	0	0
Mine access road 3	.16	.58	.57	0	0	0	.56	.43	1	1	1	0	0	0	1	1
Mine access road 4	.21	.44	.43	.12	0	.09	.57	.31	1	2	2	1	0	1	2	1
Mine access road 5	0	.39	.28	0	0	0	.23	.07	0	0	1	0	0	0	0	0
Transmission line 1 (Preferred)	0	1.61	.71	1.1	.99	.98	1.84	1.24	0	2	2	1	1	1	1	1
Transmission line 2	.84	1.84	1.78	1.7	.96	1.43	1.83	1.16	2	3	4	2	1	2	2	1
Transmission line 3	.96	1.82	1.83	1.38	1.06	1.15	1.73	1.13	0	4	2	2	2	2	2	1
Transmission line 4	1.29	1.55	1.75	1.32	.54	1.23	1.19	.63	3	2	4	1	1	1	1	1
99.0% Isopleth																
Mine access road 1 (Preferred)	0	.07	0	0	0	0	0	.03	0	0	0	0	0	0	0	0
Mine access road 3	.08	.40	.21	0	0	0	0	.34	0	1	1	0	0	0	0	1
Mine access road 4	.07	.25	.21	.04	0	0	.08	.22	0	1	1	0	0	0	0	1
Mine access road 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transmission line 1 (Preferred)	0	.14	.16	.36	.25	.32	.10	.34	0	0	1	0	0	0	0	1
Transmission line 2	0	.26	.16	.34	.16	0.24	.08	.29	0	0	1	0	0	0	0	1
Transmission line 3	.12	.14	.16	.45	.28	.4	.1	.38	0	0	1	0	0	0	0	1
Transmission line 4	0	0.2	0	.16	0	0	0	.13	0	0	0	1	0	0	0	0

Table A-3: Impact of Project Alternative on Boreal Caribou Stopover Locations and Movement Corridors at Churchill Range (Habitat Regional Study Area) Scale

Alternative	Area Impacted (km^2)								Bisections[1]							
	Calving	Post-Calving	Nursery	Early Winter	Late Winter	Over-winter	Spring	All Year	Calving	Post-Calving	Nursery	Early Winter	Late Winter	Over-winter	Spring	All Year
95.0% Isopleth																
Mine access road 1 (Preferred)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mine access road 3	0	.23	.05	0	0	0	0	.02	0	1	0	0	0	0	0	0
Mine access road 4	0	.14	.07	0	0	0	0	0	0	0	0	0	0	0	0	0
Mine access road 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transmission line 1 (Preferred)	0	0	0	.04	.13	.12	.04	.09	0	0	0	0	0	0	0	0
Transmission line 2	0	.04	0	.01	.13	.10	.01	.07	0	0	0	0	0	0	0	0
Transmission line 3	0	0	0	.09	.13	.12	.04	.09	0	0	0	0	0	0	0	0
Transmission line 4	0	.04	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note(s):
(1) Habitat polygons 5 km^2 or less were not considered.

Table A- 4: Impact of Project Alternatives on Landscape Connectivity at Both the Habitat Regional Study Area (Churchill Range) and Population Regional Study Area Scale

Alternative	Area Impacted		Bisections[1]	
	Habitat RSA	Population RSA	Habitat RSA	Population RSA
High				
Mine access road 1 (Preferred)	0.46	0.49	0	0
Mine access road 3	0.43	0.80	0	0
Mine access road 4	0.19	0.70	0	0
Mine access road 5	0.49	0.51	0	0
Transmission line 1 ** (Preferred)	1.79	1.48	0	1
Transmission line 2	1.93	1.60	1	1
Transmission line 3	1.61	1.68	1	2
Transmission line 4	3.57	2.93	1	0
Medium				
Mine access road 1 (Preferred)	0.53	0.53	0	0
Mine access road 3	0.84	0.84	0	0
Mine access road 4	0.84	0.84	0	0
Mine access road 5	0.55	0.55	0	0
Transmission line 1 ** (Preferred)	2.98	3.73	0	0
Transmission line 2	3.27	3.24	0	0
Transmission line 3	2.94	2.92	0	0
Transmission line 4	3.99	3.98	0	0
Low				
Mine access road 1 (Preferred)	0.53	0.53	0	0
Mine access road 3	0.84	0.84	0	0
Mine access road 4	0.84	0.84	0	0
Mine access road 5	0.55	0.55	0	0
Transmission line 1 ** (Preferred)	3.06	3.75	0	0
Transmission line 2	3.99	3.32	0	0
Transmission line 3	3.54	3.02	0	0
Transmission line 4	4.56	4.00	0	0

Note(s):
(1) Habitat polygons 5 km^2 or less were not considered.