OSISKO DEVELOPMENT

CARIBOO GOLD PROJECT

CARIBOU MITIGATION AND MONITORING PLAN REV2

JUNE 2025

OSISKO DEVELOPMENT

Cariboo Gold Project

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REVISION HISTORY

Rev. No.	Date	Author	Description
0	April 3, 2024	Paula Bentham	Initial version for environmental assessment condition review
1	January 30, 2025	Paula Bentham	Revised to address environmental assessment condition review comments
2	June 12, 2025	Paula Bentham	Revised to address review comments from the BC Environmental Assessment Office, the BC Ministry of Water, Lands and Natural Resource Stewardship, and Lhtako Dené Nation

EXECUTIVE SUMMARY

Barkerville Gold Mines Ltd. (BGM) is developing the Cariboo Gold Project (the Project), an underground gold mine located within the traditional territory of the Southern Dakelh Nations, now known as the District of Wells and Cariboo Regional District, British Columbia (BC). BGM is a wholly owned subsidiary of Osisko Development Corp. (ODV). The Project overlaps the known range of southern mountain caribou (*Rangifer tarandus*, population 1), Barkerville sub-population. The Project includes the Mine Site, Quesnel River Mill (QR Mill), Transmission Line, and Transportation Routes. The Barkerville herd is a part of Designatable Unit 9, which is listed as Threatened on Schedule 1 of the *Species at Risk Act*. This Caribou Mitigation and Monitoring Plan (CMMP) has been prepared as a program framework to avoid and reduce Project-related effects to caribou.

This document provides an overview of baseline conditions for caribou and their habitat in the Project area and the Caribou Assessment Area (CAA), describes mitigation measures to reduce adverse effects to caribou, identifies potential residual effects to caribou and their habitat, and outlines monitoring and reporting requirements to measure the success of mitigation and restoration measures.

Baseline conditions for the CAA are described using two mountain caribou components: habitat condition and population structure and dynamics. At baseline conditions, caribou habitat is disturbed in the CAA, both directly and indirectly. Direct disturbance includes areas of existing anthropogenic disturbances such as highways, towns, cutblocks, roads, and infrastructure, as well as natural or human-caused fire disturbance. Indirect impacts include areas within a zone of influence (ZOI) around anthropogenic disturbance that caribou avoid due to sensory disturbance. Potential Project-related effects identified in the Environmental Assessment Certificate Application included habitat alteration, sensory disturbance, disturbance to movement, and indirect mortality, with anticipated residual effects on mountain caribou habitat availability and mortality risk.

The Project footprint is sited entirely within caribou habitat that, at baseline conditions, is considered directly (74.8%) or indirectly (25.2%) disturbed. Although the federal recovery strategy provides a 500 m wide buffer to account for indirect effects of anthropogenic disturbances to mountain caribou, a variable Zone of Influence (ZOI) was applied to the Project based on information provided by the BC Ministry of Water, Lands and Resource Stewardship (WLRS) to acknowledge that different types of anthropogenic disturbance have variable impacts to caribou from sensory disturbance. A review of disturbance level of caribou habitat within the ZOI for the Project identified that 30% of the Project ZOI is located in habitat that is already directly disturbed at baseline conditions, and 70.0% is located in areas considered indirectly disturbed at baseline conditions. There are 0.7 hectares (ha) of habitat within the ZOI for the Project that is considered

undisturbed at baseline conditions (<0.1% of the ZOI area). Mitigation measures for the Project follow the mitigation hierarchy (avoid, minimize, restore on-site, offset) outlined in the provincial Procedures for Mitigating Impacts on Environmental Values. For each mitigation level, the type of mitigation approach, the results and discussion of the effectiveness of the mitigation measures, and the rationale for moving to the next mitigation level are described. The monitoring and reporting section provides guidance on two types of recommended monitoring (implementation and effectiveness) to assess whether applicable mitigation measures were implemented as planned and to determine whether the caribou mitigation program is meeting conservation targets.

Avoidance measures for the Project have been identified including siting the Project within existing disturbance to the extent possible, as well as implementing restrictions on timing of Project-related activities near sensitive caribou habitat (i.e., within 1 km of Mt. Tom calving areas). Minimization measures have focused on retaining intact vegetation habitat patches along the Transmission Line corridor during construction and operations, reducing line of site and barriers along the Transmission Line and access roads to restrict predator and human access, and stop work procedures if caribou are observed in the area. Final restoration within the Project footprint that overlaps the CAA will focus on restoring to suitable caribou habitat.

Despite mitigation measures designed to avoid, minimize, and restore-on-site, the Project is expected to result in residual effects. Residual effects have been conservatively estimated assuming the entirety of the Project footprint is disturbed for construction and do not factor in minimization measures designed to reduce vegetation loss over the life of the Project. The Project is expected to result in 159.4 ha of residual impacts for 100-120 years before suitable caribou habitat is restored-on-site.

This CMMP has been prepared as a strategy for addressing residual impacts to caribou. As such, this CMMP includes an offset strategy, which includes as a first step engaging with Indigenous nations. The CMMP is a living document and will be updated as defined offsets are confirmed. The Decision Support Tool (DST) developed by WLRS was used as a habitat offset calculator tool to provide an offset ratio to be used as a starting point for the offset strategy. The resultant calculated offset by hectare will be used to guide initial discussions between ODV, WLRS, and participating Indigenous Nations. As no offset location is identified at this stage of the Project, and given that the habitat offset calculator tool requires assumptions be made for an offset location, assumptions were made in the DST around a future offset action. Through ongoing discussions with WLRS's caribou recovery strategy team during the development of this CMMP, in lieu payments are the preferred and most feasible option for offsets to residual impacts to caribou for the Project, due to constraints within the CAA. The CAA is primarily Crown land managed for forest tenure and ODV does not own sufficient land to restore to meet offset requirements. Final determination of in lieu payment will be determined through negotiations with WLRS and provided in the final Offset Plan.

ABBREVIATIONS

Terminology used in this document has been defined where it is first used, while the following list has been presented to assist readers that choose to review only portions of the document.

Abbreviation	Description
BC	British Columbia
BEC	Biogeoclimatic Ecosystem Classification
BGM	Barkerville Gold Mines Ltd.
CAA	Caribou Assessment Area
CCLUP	Cariboo Chilcotin Land Use Plan
CEMP	Construction Environmental Management Plan
CMMP	Caribou Mitigation and Monitoring Plan
CMP	Conservation Measures Partnership
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRD	Cariboo Regional District
DBH	Diameter at Breast Height
DST	Decision Support Tool
DU	Designatable Unit
EC	Environment Canada
EAC	Environmental Assessment Certificate
EAO	Environmental Assessment Office (BC)
ECCC	Environment and Climate Change Canada
EMLI	BC Ministry of Energy, Mines and Low Carbon Innovation
ENV	Ministry of Environment and Climate Change Strategy (BC) – formerly Ministry of Environment
EMPR	Ministry of Energy and Mines & Petroleum Resources (BC)
ESSFwk1	Engelmann Spruce Subalpine Fir wet cool subzone, Cariboo variant
FRPA	*Forest and Range Practices Act*
FLNRO	Ministry of Forests, Lands and Natural Resource Operations (BC)
FLNRORD	Ministry of Forests, Lands, Natural Resources Operations and Rural Development (BC)
FSR	Forest Service Road
GWM	General Wildlife Measures
ha	hectare
km	kilometre

Abbreviation	Description
km^2	square kilometre
LDN	Lhtako Dene Nation
LPU	Local Population Unit
Ltd	Limited
m	metre
MCM	BC Ministry of Mines and Critical Minerals (BC)
MCRIP	Mountain Caribou Recovery Implementation Plan
MCST	Mountain Caribou Science Team
MOE	Ministry of Environment (BC)
MOF	Ministry of Forests (BC)
NPAG	Non-Potentially Acid Generating
ODV	Osisko Development Corp.
PAG	Potentially Acid Generating
PEM	Predictive Ecosystem Mapping
Plan	Cariboo Mitigation and Monitoring Plan
Project	Cariboo Gold Project
QP	Qualified Professional
QR Mill	Quesnel River Mill
RIC	Resources Inventory Committee
ROW	right of way
SARA	*Species at Risk Act*
SBSwk1	Sub-Boreal Spruce wet cool subzone, willow variant
SOP	Standard Operating Procedure
TEM	Terrestrial Ecosystem Mapping
ZOI	Zone of Influence
WHA	Wildlife Habitat Area
WLRS	Ministry of Water, Land and Resource Stewardship (BC)
WRSF	Waste Rock Storage Facility
WSP	WSP Canada Inc.
WTP	Water Treatment Plant

1. INTRODUCTION

This Caribou Mitigation and Monitoring Plan (CMMP or the Plan) was prepared to satisfy Environmental Assessment Certificate (EAC) Condition #14 for Barkerville Gold Mine Ltd.'s (BGM's) Cariboo Gold Project (the Project). BGM is a wholly owned subsidiary of Osisko Development Corp. (ODV).

The CMMP was prepared by WSP Canada Inc. (WSP). A Declaration of Competency Form for Paula Bentham, RPBio, for preparation of the CMMP is provided as Appendix A.

This CMMP is organized as follows:

- Section 1 provides an overview of the Project, the CMMP objectives, and the regulatory framework for caribou management in BC.
- Section 2 describes the roles and responsibilities for the CMMP implementation.
- Section 3 describes the boundaries of the assessment.
- Section 4 characterizes the existing baseline condition of caribou habitat and population status.
- Section 5 describes the proposed mitigation.
- Section 6 quantifies residual impacts to caribou habitat following mitigation.
- Section 7 determines offsetting strategy.
- Section 8 summarizes the monitoring and reporting program.
- Section 9 describes the consultation strategy.
- Section 10 provides a summary of the next steps of the CMMP.

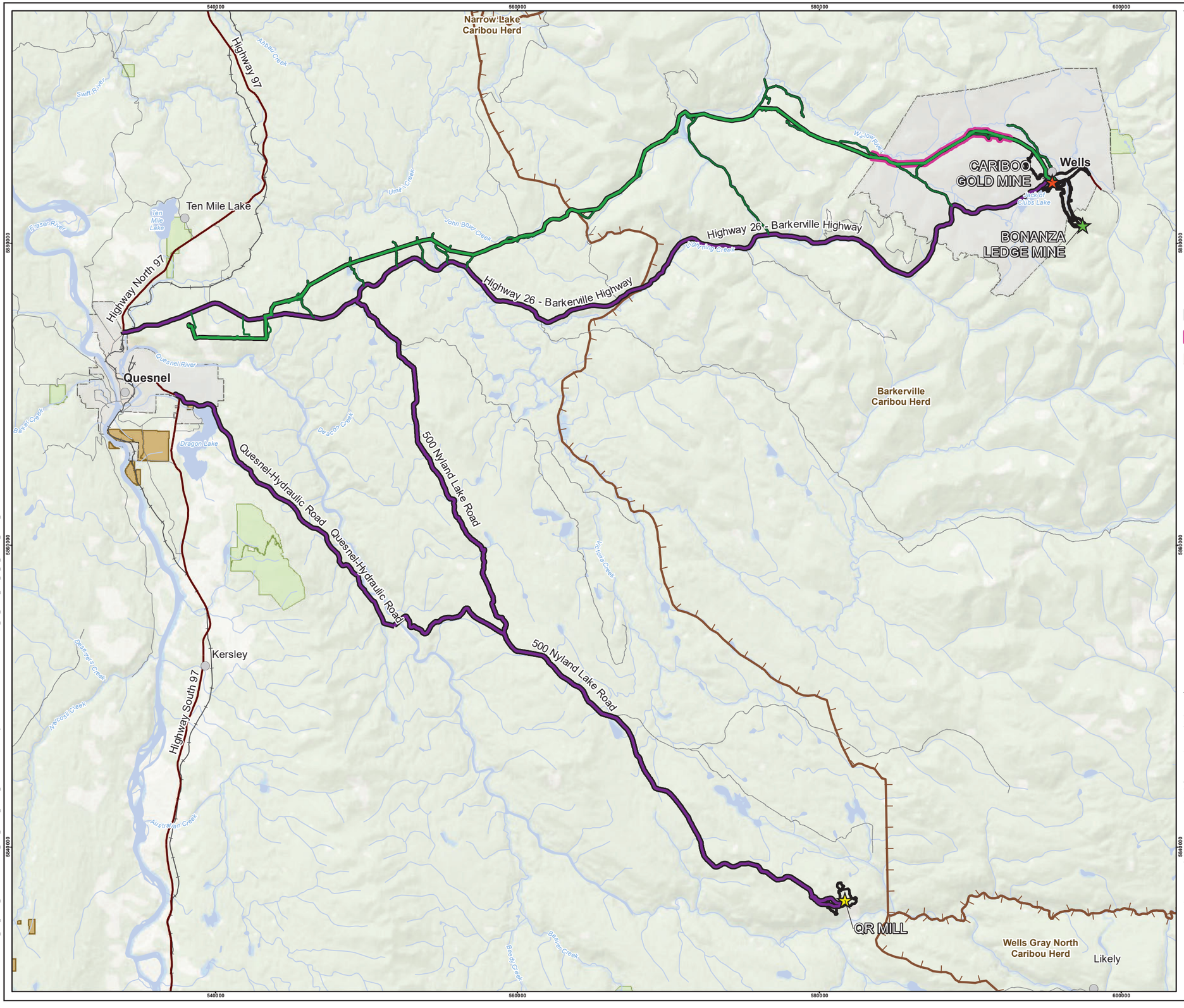
1.1 Project Description

ODV is developing the Project, an underground gold mine with a maximum production capacity of 1,793,400 tonnes per year of mineralized material (ore) located in the District of Wells and Cariboo Regional District (CRD), British Columbia (BC). The Project includes the following sites and key components (Figure 1–1):

- Mine Site Complex:
  - Waste management facilities;
  - Water supply and management structures and facilities;
  - Services Building;
  - Electrical Substation;

  - Camp (Worker Accommodation);
  - Valley Portal;
  - Water Treatment Plant (WTP); and
  - Other ancillary infrastructure.
- Bonanza Ledge Site:
  - A Waste Rock Storage Facility (WRSF) and associated water management structures;
  - Overburden Stockpiles;
  - Temporary Ore Stockpile;
  - Cow Portal; and
  - Other ancillary infrastructure.
- Quesnel River Mill (QR Mill):
  - ODV's existing and associated infrastructure within the Project footprint, including use of the Worker Accommodation and necessary upgrades to the existing infrastructure.
- Transmission Line including access roads to facilitate construction and operations.
- Transportation Route:
    - Use of existing provincial roads and Forest Service Roads (FSRs) between the Mine Site Complex to QR Mill.

The mine will have an estimated operational mine life of 12 years and will operate 24 hours per day, 365 days per year. Closure will occur over a period of 2 years after mining is completed.



LEGEND

- CARIBOO GOLD MINE
- BONANZA LEDGE MINE
- QR MILL
- TOWN
- TRANSPORTATION ROUTES
- TRANSMISSION LINE ROUTE
- TRANSMISSION LINE ACCESS ROAD
- HIGHWAY
- ROAD
- RAILWAY
- WATERCOURSE
- WATERBODY
- MUNICIPALITY BOUNDARY
- INDIAN RESERVE
- PARK/PROTECTED AREA
- PROJECT DISTURBANCE AREA
- CARIBOU MOVEMENT CORRIDOR OVERLAPPING TRANSMISSION LINE ROUTE
- CARIBOU HERD SUB-POPULATION BOUNDARY

0 5 10
1:250,000 KILOMETRES

REFERENCE(S)

1.WATER FEATURES, TRANSPORTATION FEATURES OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. CARIBOU HERD SUB-POPULATION BOUNDARIES, CITIES/TOWNS, INDIAN RESERVES AND PARK/PROTECTED AREAS OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
3. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.
NAD83 CSRS UTM ZONE 10N

CLIENT
OSISKO DEVELOPMENT CORP.

PROJECT
CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE
LOCATION AND ACCESS

CONSULTANT

YYYY-MM-DD	2025-06-12
DESIGNED	GH
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
1774160	43100	0	1-1

1.2 Purpose, Objectives, and Scope

The purpose of this CMMP is to provide a program framework to avoid and reduce Project-related effects to southern mountain caribou (*Rangifer tarandus*, population 1), hereafter referred to as mountain caribou, and their habitat. This CMMP applies to Project activities during the Construction, Operations, and Closure Phases taking place within the Barkerville caribou herd boundary and the CAA (Figure 1–1).

The objective of this CMMP is to provide an overview of baseline conditions for caribou and their habitat in the vicinity of the Project, a summary of the effects assessment on mountain caribou from the Project EAC Application (ODV 2022), and proposed mitigation measures in accordance with the mitigation hierarchy guidance outlined in the Environmental Mitigation Policy (MOE 2014a). The structure and content of this CMMP generally follows the provincial Procedures for Mitigating Impacts on Environmental Values (MOE 2014b) and considers currently available information and management actions identified in the provincial caribou recovery program (Government of BC 2023), the Guidance for the Development of Caribou Mitigation and Monitoring Plans for the South Peace Northern Caribou (MOE 2013), the Operational Restoration Framework for Woodland Caribou Habitat Restoration in British Columbia (FLNRORD 2021), the Draft Woodland Caribou Plan for the Barkerville Subpopulation (Government of BC [date unknown]a), and the Draft Woodland Caribou Plan for the Wells Gray North Subpopulation (Government of BC [date unknown]b).

ODV, in consultation with the BC Ministry of Water, Land and Resource Stewardship (WLRS; formerly the BC Ministry of Forests, Lands, Natural Resource Operations, and Rural Development [FLNRORD]) and the BC Ministry of Mines and Critical Materials (MCM; formerly the BC Ministry of Energy, Mines, and Low Carbon Innovation [EMLI]), previously determined that mountain caribou habitat is the primary end land use target for the Bonanza Ledge Mine and mature coniferous forest will be established to meet this target (Golder 2017). It is assumed that mountain caribou habitat will be the primary end land use target for the Project components where they overlap mountain caribou herd boundaries. Although the end land use target focuses on mountain caribou, several other wildlife species will benefit from the establishment of mature coniferous forest, as described in the End Land Use Plan (ODV 2024a). Commitments described in this document should be considered along with those listed in the End Land Use Plan.

ODV also has an existing CMMP specific to the Bonanza Ledge Mine, which was prepared in 2017 (Golder 2017) and updated in 2020 (Golder 2020). Although the Project partially overlaps the Bonanza Ledge Mine permit boundaries (e.g., Waste Rock Storage Facility and haul roads), the CMMPs are separate because they address distinct permitting requirements. This CMMP does not replace the Bonanza Ledge Mine CMMP and its associated commitments.

1.3 Regulatory Context

Woodland caribou in BC occur in 54 populations that have been classified into three ecotypes – mountain, northern, and boreal – based primarily on feeding behaviour and habitat associations (Government of BC 2021a). The range of the arboreal lichen–winter feeding mountain ecotype (mountain caribou) corresponds closely with the distribution of the Interior Wet Belt in southeastern and east-central BC (Cichowski et al. 2004). Mountain caribou in the vicinity of the Project belong to the Barkerville subpopulation, which, along with the Wells Grey (North) subpopulation, make up the Quesnel Highland Mountain Caribou Planning Unit Boundary (Unit 5B (Government of BC [date unknown]a). Population estimates from 2020 for the Barkerville sub-population were reported at 65 individuals (Government of BC 2021a). The most recent population estimate for the Barkerville sub-population is 50 individuals in 2023 and is declining (Bsteh 2024a. pers. comm., Zimmerman et al. 2025).

The Barkerville sub-population is part of Designatable Unit (DU) 9 of the Southern Mountain population (EC 2014), which is recommended as Endangered by the Committee on the Status of Endangered Wildlife in Canada and is listed as Threatened on Schedule 1 of the *Species at Risk Act* (SARA) (Government of Canada 2023). In BC, the Southern Mountain Caribou population is ranked S1 (critically imperilled) by the BC Conservation Data Centre and is on the provincial Red List (BC CDC 2023).

The Government of BC prepared implementation plans to meet its commitment to manage and/or recover species at risk under the Accord for the Protection of Species at Risk in Canada and the Canada-British Columbia Agreement on Species at Risk (WLRS 2023a). An implementation plan outlines the response of the provincial government to the need to manage species at risk for which management and/or recovery in BC may have significant socioeconomic implications (WLRS 2023a). Implementation plans guide and prioritize management actions that are required to meet objectives and goals identified through government decisions (WLRS 2023a). To facilitate the implementation of government commitments for mountain caribou management, the Province of BC developed the Mountain Caribou Recovery Implementation Plan (MCRIP), which was informed by the Mountain Caribou Science Team (MCST). The goal of the MCRIP is to recover the mountain caribou population to the pre-1995 level of 2,500 animals within 20 years. As such, the MCRIP identifies management options and associated actions and targets that are deemed necessary for mountain caribou management. Initially, the MCST recommended no timber harvest within 'core' habitat, and habitat management, as appropriate actions for self-sustaining recovery in Quesnel Highland Unit 5B (MCST 2006). In 2009, the MCST updated the recommended actions for mountain caribou recovery and identified predator management, prey management (i.e., moose), population census, recreation management, and habitat management as priority actions for Quesnel Highland Unit 5B (MOE 2009a).

In 2018, the Province of BC committed to the Caribou Recovery Program led at the time by the BC Ministry of Environment and Climate Change Strategy (ENV) and the former FLNRORD. The goals of the Caribou Recovery Program are to reverse the decline and to achieve stable, increasing populations, of woodland caribou herds, to provide certainty to affected natural resource users, to advance collaboration and reconciliation with Indigenous nations, to collaborate with partners in caribou recovery, and to increase public confidence via accountable, effective program delivery/management (FLNRORD 2018). In 2020, the federal government of Canada and provincial government of BC signed a Section 11 Agreement regarding woodland caribou. A Partnership Agreement was also signed among Canada, BC, West Moberly First Nations, and Saulteau First Nations. The Section 11 Agreement and Partnership Agreement apply to all Southern Mountain Caribou herds (Government of BC 2023). This partnership focuses on specific caribou conservation and recovery measures for Southern Mountain Caribou that align with the Provincial Caribou Recovery Program Plan. The Government of BC continues to lead the Provincial Caribou Recovery Program with a purpose to develop, implement, and monitor management actions and provincial strategies that meet or exceed the provincial and federal population and habitat objectives for caribou (Government of BC 2023).

The Cariboo-Chilcotin Land Use Plan (CCLUP) Mountain Caribou Strategy used habitat suitability index modelling to designate 'no timber harvest' and 'modified timber harvest' Wildlife Habitat Areas (WHAs) for the Hart and Cariboo Mountains (CCLUP 2000). Wildlife Habitat Areas encompassing proposed 'no harvest' and 'modified harvest' areas were legally established under the *Forest and Range Practices Act* (FRPA) in 2004, with General Wildlife Measures (GWM) for these areas established in 2005 (ENV 2022). Core all-season caribou habitat overlapping the Project was not included in the WHA delineation; therefore, no formal provincial conservation measures apply under FRPA.

Critical habitat for Southern Mountain Caribou is identified in the recovery strategy as habitat possessing biophysical attributes required to carry out life processes. There are four categories of critical habitat for the Southern Group of Southern Mountain Caribou (EC 2014):

- High elevation winter and/or summer (spring, calving, summer, fall/rut) range delimited by the local population unit (LPU) boundaries.
- Low elevation early winter and/or spring range delimited by the LPU boundaries.
- Type 1 matrix range consisting of areas within an LPU's designated annual range that have not been delineated as summer or winter range and includes seasonal migration areas and areas of lower use compared to delineated seasonal ranges.
- Type 2 matrix range consisting of areas surrounding annual ranges and influence predator/prey dynamics within southern mountain caribou annual ranges. Type 2 matrix range includes areas of trace occurrence and provide connectivity between subpopulations within and among LPUs.

This CMMP uses the terms 'core all-season habitat' to refer to high and low elevation range caribou critical habitat and 'matrix range' to refer to Type 1 and Type 2 matrix range caribou critical habitat. In addition to the four categories of critical habitat defined above, 'unmapped range' critical habitat also exists to the west of the core all-season and matrix range habitat (Data BC 2023). The unmapped range critical habitat is still considered critical habitat, but is an area where more information is required to classify the area into core all-season and matrix range habitat (Seider 2023, pers. comm.).

Mountain caribou core all-season habitat mapping for Quesnel Highland Unit 5B was obtained from WLRS on May 17, 2024 and includes the updated Barkerville herd boundary and areas designated as core all-season and matrix habitat. This updated mapping is currently not available to the public, but was used under confidentiality access agreements for this CMMP (WLRS 2024a).

1.4 Consultation of Residual Effects Before Offsetting with the BC Ministry of Water, Land and Resource Stewardship and Outcomes

A draft CMMP Version (April 2024 version) was submitted in response to the EAC Conditions to WLRS and Indigenous Nations on April 3, 2024. The draft CMMP Version (April 2024 version) aligned with the ECCC (Environment and Climate Change Canada; EC 2014) guidance on calculating residual impacts. Comments and subsequent discussions were held between ODV, WSP, and WLRS regarding comments received on the draft CMMP Version (April 2024 version) and to discuss calculation of residual effects before offsetting for the Project. A summary of meetings and discussions held is provided below for context.

On July 31, 2024, ODV and WSP met with WLRS to review comments received on the draft CMMP Version (April 2024 version). Based on the review comments received and discussions, the main concerns WLRS indicated regarding the draft CMMP Version (April 2024 version) were as follows:

- WLRS disagreed with the use of the 500 m buffer as indicated by ECCC (EC 2014) to determine indirect impacts from the Project. WLRS indicated additional ongoing research that suggested the Zone of Influence (ZOI) for caribou varies based on the disturbance type and requested the CMMP acknowledge and use these variable ZOI values (Palm [date unknown]). The preliminary findings were provided by WLRS to WSP and were incorporated into the current version of the CMMP.
- WSP acknowledged the variable ZOIs, but also indicated that if Project indirect disturbance was to utilize the ZOIs, then disturbances at existing conditions should also use the ZOIs to determine existing indirect disturbance for consistency. The disturbance layer was updated using the ZOIs provided by WLRS, and it has been incorporated into the current version of the CMMP. WLRS disagreed with the Recovery Strategy (EC 2014) approach to excluding existing indirect disturbance areas from residual impact calculations.

- WSP presented a revised CAA boundary to acknowledge federal critical habitat "unmapped range" for caribou outside of the herd boundary, previously not captured by the CAA. WLRS indicated the Province currently does not manage for caribou in this area (Watters 2024a, pers. comm.).
- WLRS re-iterated the main concern from the Project was the disturbance associated with the Transmission Line and indicated the draft CMMP Version (April 2024 version) did not adequately address increased predation risk presented by the Transmission Line (Stapleton 2024, pers. comm.).
- WSP reviewed the proposed Project alignment and showed the current conditions based on imagery available to illustrate the degree of disturbance associated with selected siting of the Transmission Line. WLRS agreed there was significant disturbance in the study area, but additional disturbance would 'set-back' the area from achieving a restored state.
- WLRS provided spatial information on the Mt. Tom calving area and requested ODV extend avoidance periods for this area from May 15 to June 15 to May 15 to July 15. The update was made in the current version of the CMMP.

Following this initial discussion, WSP and WLRS met again on October 23, 2024 to discuss the use of the BC Habitat Offset Decision Support Tool (DST; Government of BC 2019) and its application to the Project, as well as to determine options for offsets for the Project. Main discussion points were:

- WLRS agreed that in-lieu payment for the offset for the Project made the most sense and understood there were few options for ODV to protect Crown land or to find restoration sites outside of Project footprints in the Barkerville Herd Boundary.
- WLRS acknowledged that there would need to be assumptions made using the habitat decision support tool for projects exploring in lieu payment over off-site restoration to work through the tool, since the DST assumes there is an identified off-site restoration area under consideration.
- An approach to determining a reasonable in lieu payment was discussed as calculating the cost of restoration for linear infrastructure. This approach was used in the Blackwater Gold CMMP which estimated $8,000 per km (BW Gold Ltd. 2022). WLRS noted there is no current direction on how in-lieu payments are to be calculated. However, it was flagged that $8,000 per km does not accurately capture the planning stages required for on-site restoration and that it could be as high as up to $20,000 per km to capture planning and implementation of restoration (Watters 2024b, pers. comm.). Estimates also should include width of right of way (ROW) and, for the purpose of estimating in lieu payments, a width of 10 metres (m) was employed.
- It was determined that WSP would prepare an appendix showing the inputs and outputs of the DST calculator, along with rationale for the inputs used (Appendix B).

Finally, a meeting was held on November 7, 2024, along WSP, WLRS, and ODV to further discuss offsetting for the Project. The key discussion items are outlined below:

- WSP presented the re-calculated direct and indirect disturbance areas using the revised ZOI for different disturbance types. Just under 160 hectares (ha) of new direct disturbance, in areas of existing indirect disturbance were being carried through to residual impacts along with 0.6 ha of new indirect disturbance in an area where no disturbance occurred at existing conditions.
- WLRS re-iterated that the main concern regarding the calculation of residual impacts is that it does not consider new indirect impacts on areas that are indirectly impacted at existing conditions. WLRS indicated that there should be an additive effect or recognition that the Project would extend the time period indirect impacts are experienced in the area, that otherwise would return to undisturbed habitat in a shorter time period.
- ODV indicated the life of the Transmission Line would be approximately 16 years, after which it would be no longer required and would be restored (Gauthier 2024, pers. comm).
- WLRS indicated there was a caribou movement corridor in the vicinity of the Project based on telemetry data that were not included in the draft CMMP Version (April 2024 version). The movement corridor area where inferred movements occur was confirmed/provided to WSP in a follow up email (Bsteh 2024b, pers. comm.). WSP acknowledged that the movement corridor (now defined) would be used to support site-specific planning of where to maintain vegetation cover across the Transmission Line for the life of the Transmission Line.
- WLRS requested the draft CMMP Version (April 2024 version) be updated to include more rationale to address uncertainty with movement corridors and indirect predator impacts. WLRS requested that the current CMMP clearly identify what actions were undertaken to make the estimates more conservative in the results section (Bings 2024, pers. comm).
- The indirect impacts from the Project on areas of existing indirect impacts were further discussed and WLRS agreed that if the movement corridor is considered separately, these areas do not need to be included as residual indirect impacts from the Project (Watters 2024c, pers. comm.). WLRS agreed that the 0.7 ha of new indirect impacts would be the only indirect impacts carried forward for the Project.
- It was agreed that the CMMP would be updated to include two versions of the offsetting DST considering two approaches: 1. Consider new direct disturbance in the movement corridor as ‘moderate’ ecological quality, 2. Consider the rest of the new direct disturbance outside the movement corridor as ‘low’ ecological quality, and 3. Combine the two outputs to determine the final offset required. The assumptions, values, and outputs from the DST scenarios, along with the rationale, are included in this version of the CMMP in Appendix B.
- WLRS requested that the in-lieu payment option should be described with the ultimate goal of restoration of caribou habitat in the area of the Barkerville herd boundary. Ideally, the funds could be used to target restoration of high priority areas identified from *A Tactical Plan for Restoration of Habitat for the Southern Group of Southern Mountain Caribou* (Cichowski et al. 2021).

2. ROLES AND RESPONSIBILITIES

2.1 ODV

ODV bears overall responsibility for implementing the CMMP, including implementing mitigation measures, conducting on-site restoration, and, where residual effects are predicted, identifying offsets for the Project.

2.2 General Manager

The General Manager bears overall responsibility for the operation of the Project and responsibility for implementing on-site restoration that follows the CMMP, for on-site environmental monitoring, and for compliance related to Project activities. The General Manager, or delegate, will verify:

- That qualified personnel are in place (e.g., caribou qualified professional [QP]) and following the CMMP;
- The required resources are in place to execute the CMMP; and
- Compliance with relevant regulations, acts, guidelines, permits and policies.

2.3 Environmental Manager

The Environmental Manager or delegate is responsible for tracking compliance with the Plan, permits and approvals, and applicable provincial and federal regulations. The Environmental Manager coordinates training sessions for ODV employees and contractors on-site, including the identification and understanding of the effects of the Project on caribou and mitigation to reduce those effects.

2.4 ODV Site Personnel and Contractors

Employees or contractors working on-site will be required to undertake a wildlife orientation prior to working on-site. Employees and contractors involved with on-site restoration will be required to review the CMMP initially and when the Plan undergoes major changes. Records of review will be logged with the General Manager and kept with other training records.

2.5 Caribou Qualified Professional

ODV will retain a QP with experience in caribou restoration and offset planning. The caribou QP will be responsible for preparing updates to the CMMP, reviewing monitoring reports, and identifying any trigger responses or adaptive management required based on the outcomes of monitoring. The caribou QP will also be responsible for auditing of the work conducted under the CMMP, such as auditing implemented mitigation measures, including installed barriers and planting for progressive restoration.

3. BOUNDARIES OF THE ASSESSMENT

This section introduces the spatial and temporal boundaries used to describe the existing condition of caribou habitat and population status in the vicinity of the Project. These boundaries were used to quantify Project effects to caribou habitat in the EAC Application (ODV 2022), determine mitigation strategies, and determine subsequent Project residual effects.

3.1 Spatial Boundaries

The spatial boundaries selected for the caribou assessment were chosen because they allow for a description of existing conditions in sufficient detail to enable potential Project-caribou interactions and effects to be identified, understood, and assessed. The Project is generally located within the Barkerville herd boundary. The Barkerville herd boundary was updated in 2024, but is not yet publicly available; however, the updated herd boundary was obtained from WLRS on May 17, 2024 for use in this version of the CMMP and to prepare data summaries for the CMMP. As the data is not yet publicly available, figures and data have been redacted or obscured to protect the sensitive nature of the data.

This CMMP uses the following spatial boundaries (Figure 3-1):

- Caribou Assessment Area (CAA): The CAA is considered the spatial scale at which mountain caribou require year-round habitat.
- Project Footprint: The Project Footprint includes areas of new disturbance from the Project and areas of existing disturbance being used for new Project infrastructure. In some cases, the Project Footprint is further divided into two pieces:
    - Mine and Transportation Footprint: Includes areas of new disturbance and new Project infrastructure located in the Mine Site Complex, Bonanza Ledge Site, QR Mill, and Transportation Route.
    - Transmission Line: Includes the Transmission Line ROW (centreline and 20 m either side) and access roads, including existing, upgraded, and new build access roads required for construction and/or operation outside the Transmission Line ROW.
- Mine Site outside of new disturbance: This includes areas within the Permit Mine Footprint where no new disturbance is planned.

The CAA is specific to southern mountain caribou and covers 334,322.3 ha of caribou critical habitat. The CAA is defined by the boundaries of the Barkerville herd boundary obtained from WLRS on May 17, 2024 (WLRS 2024a), plus an additional area of federally designated ‘unmapped range’ caribou critical habitat west of the Barkerville herd boundary. The spatial mapping for the Barkerville herd boundary is confidential and maps displaying this information have been redacted. Rather than including the entire polygon of unmapped range critical habitat, which

would dilute the potential Project-caribou interactions, the CAA includes a buffered area around Project components in this area, an approach which was agreed upon with WLRS.

Buffers were applied based on ZOI information and recommendations provided by WLRS (Palm, n.d., unpublished data) that is specific to disturbance type. A ZOI is an area outside direct disturbance, where adjacency effects or indirect impacts may limit habitat use by a species. Table 3-1provides a summary of the range of ZOI calculated for each disturbance type based on the report provided by WLRS (Palm [date unknown] unpublished data). Portions of the Transmission Line ROW, Transportation Route, and QR Mill are sited within this unmapped range critical habitat, which were classified as other linear, roads, and mines based on Table 3-1, respectively. As a conservative approach, the largest buffer in the ZOI range was used to develop the CAA boundaries within unmapped range caribou critical habitat and the following buffers were applied:

- A 2 km buffer around the Transmission Line ROW;
- A 3.6 km buffer around QR Mill; and,
- A 0.8 km buffer around the Transportation Route and any access roads to the Transmission Line ROW.

Table 3–1: Zone of Influence Ranges for Disturbance Types (Palm n.d., unpublished data)

Disturbance Category	Disturbance Type	Description based on Data Layers Available	Range of estimates across Seasons (m)	Buffer applied to Indirect Disturbance Calculation (m)
Polygonal	Burns	<50 years[(a)]	300 – 1,500	1,500
	Cutblocks	<40 years	500 – 1,300	1,300
	Mines	<40 years	1,500 – 3,600	3,600
	Wells	<40 years	500 – 1,700	1,700
	Other Polygonal	Agriculture, airfields, urban areas, “other” areas	1,500 – 4,000	4,000
Linear	Roads	<40 years	300 – 800	800
	Seismic Lines	<40 years	50 – 500	500
	Other Linear	Transmission lines and pipelines	500 – 2,000	2,000

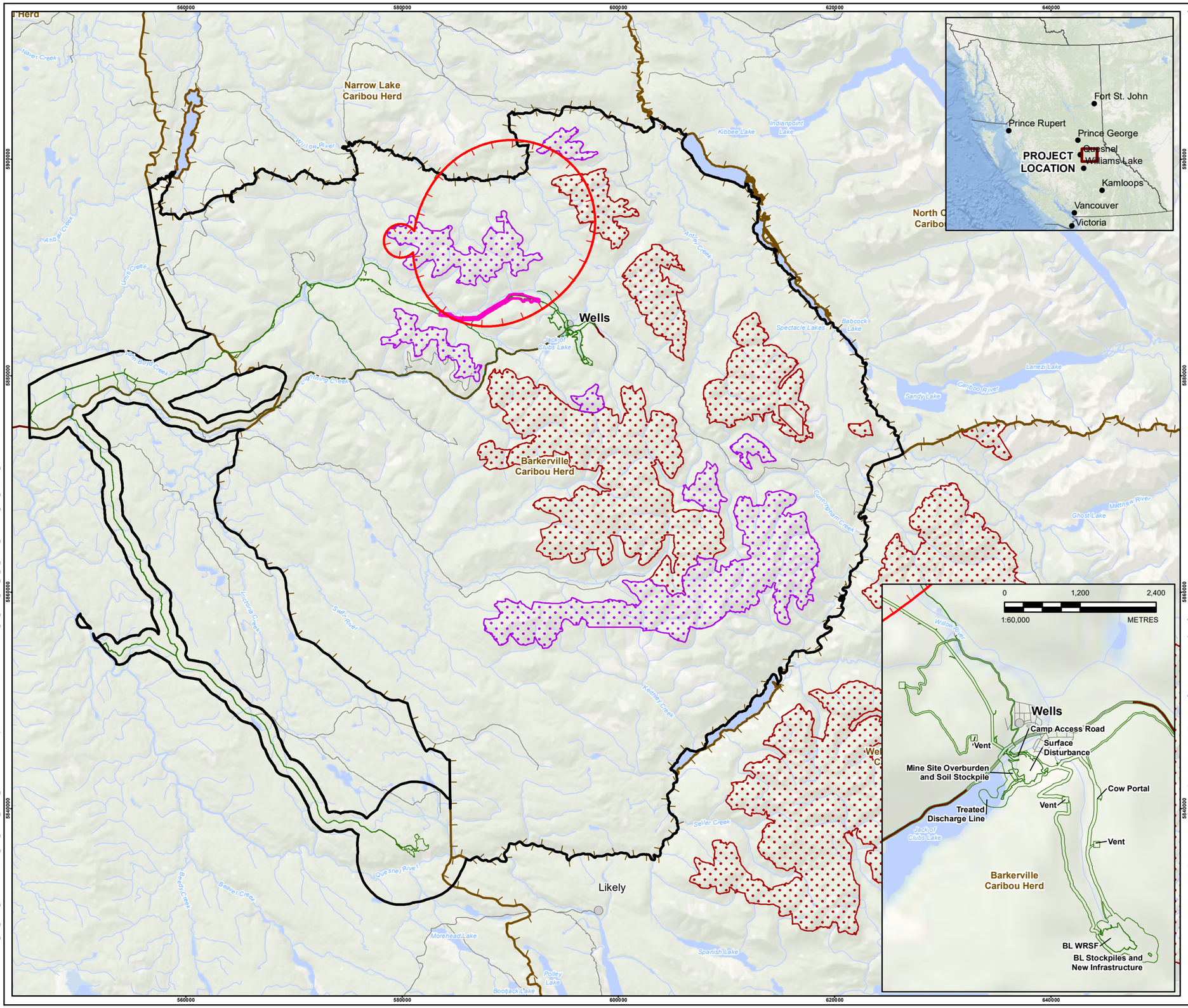
Note: (a) Palm (n.d., unpublished data) included burns from the past 50 years in the data analysis; however, for this CMMP fire disturbance from the past 40 years was included in the disturbance layer.

The CAA is referred to as the Southern Mountain Caribou Regional Assessment Area in the EAC Application (ODV 2022); however, the CAA was revised in the CMMP due to updated provincial herd boundaries generated by WLRS since the EAC Application, the inclusion of federally mapped ‘unmapped’ critical habitat, and in response to comments received on the CMMP.

The Project Footprint is 979.9 ha and can be further divided into the following components:

- Transmission Line:
  - Transmission Line ROW, which includes the Transmission Line centreline and a 20 m buffer on either side of the centreline (40 m width total).
  - Access roads to access the Transmission Line ROW, which includes existing roads and roads that will require upgrades, and will be used to access the Transmission Line ROW for construction and operations.
- Mine and Transportation Footprint:
  - Transportation Route, which includes existing roads that will be used to transport material between the Mine Site and QR Mill.
  - Mine Site Complex areas of new disturbance for the Project, which include mine site overburden, soil stockpiles, surface disturbance, ventilation raises, and a treated discharge line.
  - Bonanza Ledge areas of new disturbance for the Project, which include portions of the WRSF, stockpiles, and new infrastructure.
  - QR Mill areas that will be used for the Project. No new disturbance is planned for the QR Mill site; however, operation of some of the facilities will continue for the Project.

The Mine Site Area outside of new disturbance includes areas within the Permit Mine Footprint where no new disturbance is planned. The Mine Site Area outside of new disturbance is 117.3 ha and includes existing access roads with no upgrades planned; Bonanza Ledge, where no new infrastructure or disturbance will occur; Cow Portal, which was approved under a bulk sample permit that was amalgamated with the Bonanza Ledge Permit (M-238) and subsequently amalgated to the Cariboo Gold Project Permit (M-247); and, the Mine Site Complex outside of new surface disturbance that will not be disturbed by the Project.



LEGEND

- CARIBOU ASSESSMENT AREA
- PROJECT ASSESSMENT AREA
- CARIBOU MOVEMENT CORRIDOR OVERLAPPING TRANSMISSION LINE ROUTE
- CARIBOU HERD SUB-POPULATION BOUNDARY
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - NO HARVEST ZONE
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - MODIFIED HARVEST ZONE
- MOUNT TOM CALVING PERIOD RESTRICTED AREA
- TOWN
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY

0 7 14

1:350,000 KILOMETRES

NOTE(S)

ANY PROJECTS OCCURRING IN ECCC MAPPED CRITICAL HABITAT NEED TO CAPTURE THE ENTIRE FEDERAL BOUNDARIES NOT JUST THE PROVINCIAL MAPPED BOUNDARIES. FOR THE MOUNTAIN CARIBOU LAYERS IT SEEMS THE PROVINCIAL BOUNDARIES MISS THE UNMAPPED POLYGONS THAT ARE PART OF ECCC CRITICAL HABITAT FOR THIS SPECIES – BOTH SHOULD BE REVIEWED WHEN WE LOOK AT MOUNTAIN CARIBOU HABITAT IN THE FUTURE.

REFERENCE(S)

1.WATER FEATURES, TRANSPORTATION FEATURES OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. CARIBOU HERD BOUNDARIES, MOUNTAIN CRAIBOU WILDLIFE HABITAT AREAS, MOUNTAIN CARIBOU CORE ALL-SEASON HABITAT, MOUNTAIN CARIBOU MATRIX RANGE, CITIES/TOWNS, INDIAN RESERVES AND PARK/PROTECTED AREAS OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
3. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.
NAD83 CSRS UTM ZONE 10N

CLIENT
OSISKO DEVELOPMENT CORP.

PROJECT
CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE
CARIBOO GOLD PROJECT CARIBOU ASSESSMENT AREA

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	TS
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
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3.2 Temporal Boundaries

Temporal boundaries for the CMMP are used to establish both the baseline conditions and potential Project-caribou interactions based on the life of the Project. Baseline conditions within the CAA are used to understand the degree of disturbance prior to the Project. Baseline conditions for the Project rely on summaries of existing data. The data used to summarize the existing conditions and determine disturbances are described in detail in Section 4.2.1 and include:

- Terrestrial Ecosystem Mapping (TEM) conducted for the Project in 2016, 2018, 2019, and 2020 for various areas in the CAA, which is used to identify anthropogenic features in the CAA, such as mines, roads, and urban areas.
- Predictive Ecosystem Mapping (PEM) available from Moon et al. (2008) and MOE (2018) to supplement areas of the CAA outside of available TEM for the Project, which is also used to identify anthropogenic features in the CAA.
- Publicly available layers from Data BC (Data BC 2023), including the BC Road Atlas, RESULT – Openings (to identify cutblocks), BC Wildfire Fire Locations – Current, BC Wildfire Locations – Historic, BC Road Atlas, and Forest Tenure Road Segments.

Habitat condition for caribou uses the current (i.e., up to 2023) timber harvest areas and roads. Timber harvest is recognized as adversely affecting mountain caribou habitat availability and distribution in BC. Forestry selectively removes mature and old forest, resulting in an increase in early seral habitats relative to what would be expected under natural disturbance regimes. Early seral habitats are used by other ungulates, such as moose and deer, and the increase in alternative prey, such as moose, has led to a decline in caribou due to higher levels of predation (See Section 4).

Similarly, roads and other linear ROWs create early seral habitats and facilitate access for predators, hunters, and poachers. Therefore, the assessment would not accurately identify effects to mountain caribou from the Permit Mine Footprint and Transmission Line ROW that require mitigation, without the inclusion of existing roads and timber harvest areas at baseline.

The temporal boundaries for the CMMP to assess Project-related impacts to caribou, and determine an offset strategy, are based on the current proposed schedule detailed in Table 3–2. The temporal boundaries include 12 years from construction to the start of closure, which is the start of site-wide reclamation.

Table 3–2: Description of Project Phases

Phase	Years	Reclamation Milestone
Construction – Phase 1	Year -1	• Bonanza Ledge and QR Mill Construction. • Construction of the Transmission Line. • Progressive reclamation of the Transmission Line to reduce access and control line-of-sight. • Commissioning of the Transmission Line.
Construction – Phase 2	Year 2	• Construction of the Mine Site Complex.
Operation	Year 1 to 12	• Following completion of Construction, the Transmission Line will be revegetated with vegetation at heights that provide cover and block access / line-of-sight, but also allow access and lines of sight for maintenance. Where feasible, the Transmission Line will be site prepped and planted with ecologically appropriate tree seedlings based on the adjacent ecosystems. • Progressive reclamation of areas, as practical with operational activities. • Monitoring/maintenance – operations.
Closure	Year 13 to 14	• Decommissioning and removing surface infrastructure. • Decommissioning of the Transmission Line will occur within the first year of active closure. Establishing debris piles of minimum height 1.5 m at 20 m intervals (at maximum) and planting trees along the Transmission Line will occur within the first year of active closure. Debris piles will be placed in a zig zag pattern to minimize line of sight. • Construction of engineered cover on the Bonanza Ledge WRSF. • Surface preparation, soil placement, and revegetation, including planting of disturbed areas. • Erosion control measures for remaining disturbed areas. • Monitoring and maintenance – post operations.
Post-closure Active Care, Monitoring and Maintenance	Year 15 to 17	• Year 1: Monitoring and maintenance.
Post-closure Passive Care, Monitoring and Maintenance	Year 17+	• Year 3: Monitoring and maintenance (see Section 8.0). • Removal of sediment control structures and contact water ditches (pending water quality monitoring performance and Section 8.0). • Re-sloping and revegetating temporary roads no longer required for monitoring and maintenance. • Year 5: Monitoring and maintenance (see Section 8.0). • Post-closure reporting. • Year 10: Monitoring and maintenance (see Section 8.0). • Year 15: Monitoring and maintenance (see Section 8.0).

4. BASELINE CONDITIONS

4.1 Caribou Components

The provincial Policy for Mitigating Impacts on Environmental Values (MOE 2014a) and the associated Procedures (MOE 2014b) are intended to support and improve efforts to mitigate impacts on environmental values and associated components. An environmental component is defined as "an attribute of the natural resource system that is measured, managed, and maintained to ensure the integrity and well-being of the environmental value with which the component is associated" (MOE 2014a, p. 2). For the purposes of this CMMP, two mountain caribou components are identified as having environmental value that should be managed and maintained through mitigation measures: habitat condition and population structure and dynamics (Table 4–1). Each component has two indicators identified as metrics used to measure and report upon the condition and trend of the component. This section describes the baseline condition of the identified caribou components.

Table 4–1: Mountain Caribou Components and Indicators

Component	Indicator
Habitat Condition	Habitat Availability
	Habitat Distribution (and Barriers to Movement)
Population Structure and Dynamics	Population Size
	Mortality Risk

Both habitat condition and population structure and dynamics were selected as environmental components as they were identified as the leading interactions with the Project based on the EAC Application (ODV 2022). Habitat condition was selected as an environmental component because anthropogenic activities interact with caribou habitat through direct and indirect habitat loss, alteration, or degradation. Loss of habitat or altered habitat that changes predator/prey dynamics have been identified as a threat to woodland caribou (EC 2014). Population structure and dynamics were also selected as an environmental component because, within small populations, such as the Barkerville herd, mortality and population size can have significant impacts on overall population dynamics. Habitat condition and population structure and dynamics are both components that can be measured and managed to assess the condition of the Barkerville herd.

4.2 Habitat Condition

4.2.1 Habitat Availability

At large spatial scales, such as the CAA, mountain caribou rely on late successional and old growth coniferous forest for several life-history requirements, including the abundance of caribou's primary winter food, arboreal lichen, and a scarcity of other ungulates and their predators (Stevenson et al. 2001; Cichowski et al. 2004; Serrouya et al. 2008; Apps and McLellan 2006; COSEWIC 2014). They tend to avoid cutblocks that lack food resources (lichen), although they may forage on cutblock edges where windthrow and lichen litterfall is common (Smith et al. 2000; Serrouya et al. 2006; 2007). Their habitat use varies seasonally and is based on elevational movements (Stevenson et al. 2001; Cichowski et al. 2004). Historically, mountain caribou were likely distributed within suitable habitat throughout their geographic range; however, they now occur in several relatively distinct subpopulations (MCST 2005). Use of high elevation versus low elevation habitats differs between subpopulations and reflects differences in predation patterns and snow conditions (Stevenson et al. 2001; Cichowski et al. 2004). Their winter diet primarily consists of arboreal lichens, while their use of shrubs and conifer foliage is dependent on snow conditions and accumulation (Stevenson et al. 2001; Cichowski et al. 2004).

The Project occurs within Quesnel Highland Unit 5B. In the Quesnel Highlands and adjacent northern Cariboo Mountains, mountain caribou select mid-elevation forests dominated by subalpine fir during early winter where they forage primarily on arboreal lichens on fallen trees and lichen litterfall, but also understory vegetation that is not buried by snow (Seip 1992; Terry et al. 1996; 2000; Stevenson et al. 2001). In mid- and late-winter, and after the snowpack deepens and hardens, mountain caribou move to high elevation subalpine fir forests and open, subalpine parkland habitats where they primarily forage on arboreal lichens (Seip 1992; Terry et al. 1996; Terry et al. 2000; Stevenson et al. 2001). In spring, some mountain caribou descend to lower elevation subalpine forest habitats where they have access to new vegetation growth, while others remain at higher elevations and continue to feed on lichens and conifer browse (Seip 1992; Stevenson et al. 2001). Pregnant females in spring move to remote high elevation calving areas where predators are less abundant, although forage is limited (Seip 1992; Stevenson et al. 2001). Mountain caribou in the Hart Mountain range utilize areas with an elevation greater than 1,000 m when calving (Seip et al. 2007). Throughout the summer and fall, mountain caribou may use forested habitats at all elevations where they feed on a variety of shrubs, forbs, and graminoids, in addition to lichens and conifer browse (Seip 1992; Stevenson et al. 2001).

Approximately 401,440 ha of Quesnel Highland Unit 5B has been identified as core all-season habitat for mountain caribou based on empirically derived habitat suitability models developed for the Hart and Cariboo Mountains (MOE 2011). Many of the mountain complexes in the CAA were designated as WHAs in 2004 to meet the habitat requirements of mountain caribou and to protect core all-season habitat (CCLUP 2007). All caribou WHAs in the CAA were approved in

2009 (BC Data Catalogue 2023). WHAs are not protected areas, but are designated under the FRPA where specific management practices can be applied and designed to limit the impact on the identified wildlife, in this case, caribou, for which the WHA is designated. The specific management practices are provided by the General Wildlife Measures Order – Wildlife Habitat Areas #5-00 to 5-177 Mountain Caribou – Quesnel Highlands Planning Unit, which designates some WHAs to 'no harvest' and some to 'modified harvest' areas (Government of BC [date unknown]c). No harvest areas do not permit timber harvest or road construction, while modified harvest areas impose limits on harvest practices in terms of the area of harvest, cut cycle, planting prescriptions, and limiting access (Government of BC [date unknown]c).

Threats to southern mountain caribou habitat availability include natural disturbance agents, primarily forest fire and forest insect outbreaks, and anthropogenic disturbance agents, primarily forest harvest (Cichowski et al. 2022). Forest harvest is the greatest contributor to habitat loss in approximately 25% of the woodland caribou herds across BC and Alberta, most of which fall within the southern mountain caribou herd ecotype (Nagy-Reis et al. 2020). Within the CAA, forest harvesting has been the primary source of habitat alteration for mountain caribou (Stevenson et al. 2001; MCTAC 2002; COSEWIC 2014). Historically, a combination of wet climatic conditions and infrequent wildfires resulted in forests dominated by old stands (Jull et al. 1998). Although there was active logging occurring in southeastern BC from the early 1900s, large scale logging operations did not occur in the area until the 1970s when large amounts of mountain caribou habitat were lost in the region due to forestry (Spalding 2000).

Habitat availability within the Barkerville herd boundary has been dramatically altered by forest harvest. Three timber supply areas occur within the Barkerville herd boundary, which cumulatively have contributed to 214 cutblocks within or bordering the subpopulation range (Government of BC [date unknown]a) and approximately 78,258 ha of cutblocks estimated in 2021. Wilson (2009a) reported that there are approximately 1,348 square kilometres (km^2) of early seral habitat (<40 years old) in Quesnel Highland Unit 5B, which is 2.65 times more than is expected under a natural disturbance regime (508 km^2).

Maternal penning and wolf removal has shown short-term success in recovery of some caribou herd populations (McNay et al. 2022); however, it does not solve the main issue of habitat loss. Despite federal policies and recovery strategies, woodland caribou habitat availability has continued to decline and mean annual loss has increased since these policies and strategies were put in place (Nagy-Reis et al. 2020). For example, cutblocks in the CAA included in the disturbance layer included those from the past 40 years. The year of cut data associated with the cutblocks was analyzed to produce a summary of cutblock area for five-year intervals from 1983-2023 (Table 4–2). The results indicate a greater percentage of cutblocks are from the past 20 years (58%) than the first 20 years of this time period, indicating more recent forestry disturbance in the CAA.

Table 4–2: Area of Cutblocks in the past 40 years in the Caribou Assessment Area

Five Year Interval	Area (ha)	% of Total Cutblock Area
1983-1987	9,838.1	12.1
1988-1992	10,137.3	12.5
1993-1997	9,055.2	11.1
1998-2002	5,044.7	6.2
2003-2007	12,782.9	15.7
2008-2012	9,291.1	11.4
2013-2017	11,613.1	14.3
2018-2022	13,148.9	16.2
2023	455.8	0.6
Total	81,367.0	100

Notes: % = percent; ha = hectare

In addition to forestry, other anthropogenic disturbances, including highways, towns, mining, and transmission lines have reduced habitat availability in the CAA. Surface mining results in large-scale alterations to the landscape, while underground mining has smaller footprint related impacts to habitat availability, although it is possible for it to result in sensory disturbance. There is no surface mining within the CAA, but underground mining, gravel pits, and associated infrastructure occur in the CAA, which contribute to the cumulative loss of habitat. The density of linear features within the core habitat of the Barkerville herd are greater than any other southern mountain caribou herd in BC (Cichowski et al. 2021).

In addition to direct loss of habitat over the past 50 years, mountain caribou in the region have been affected by indirect habitat loss, which has influenced habitat availability. That is, caribou may respond negatively to anthropogenic disturbance by avoiding areas of otherwise suitable habitat because of its proximity to disturbance (Weclaw and Hudson 2004). Avoidance reduces the amount of functional habitat available within a caribou range. Avoidance by caribou may vary by type and intensity of disturbance (e.g., Oberg 2001) or by season (e.g., Dyer et al. 2001, 2002; Polfus et al. 2011; Golder et al. 2016) and can occur at multiple spatial scales (e.g., Leblond et al. 2011; Apps et al. 2013).

In a literature review, Vistnes and Nellemann (2008) found that caribou and reindeer (*Rangifer tarandus*; a subspecies of caribou that occurs in Northern North America and Europe) reduced their use of areas within approximately 5 kilometres (km) of disturbances by 50% to 95%. Some studies suggest that disturbance from snowmobiles can displace mountain caribou from preferred habitats and is a contributing factor to the decline of mountain caribou in BC (Simpson 1987; Webster 1997; CCLUP 2000; Simpson and Terry 2000; Seip et al. 2007; Kinley 2008). For example, Seip et al. (2007) found that intensive snowmobile use caused mountain caribou displacement from their late winter habitat in the Hart Range in east-central BC. Predator

efficiency may also be increased during winter if packed snowmobile trails provide easier travel routes for wolves (CCLUP 2000; Simpson and Terry 2000; Kinley 2008), linking habitat condition to population structure. Since 2009, the Provincial government has closed areas to snowmobile use across the range of mountain caribou to support population recovery under the MCRIP (MOE 2009b); however, snowmobiles are still commonly used in the Quesnel Highlands. There are 655 km^2 of legal snowmobile closure areas within the Barkerville herd boundary and one snowmobile access trail that is open year-round (Government of BC [date unknown]a).

The Transmission Line ROW and access roads (including existing, upgraded, and newly built roads for construction and operations) overlap approximately 1.5 km of a legal snowmobile closure area at the north end of Mt. Tom (shown in Image 1). The overlap occurs along the boundary of the legal snowmobile closure, where the Project intends to upgrade a road to access the Transmission Line, as well as site a portion of the Transmission Line ROW.

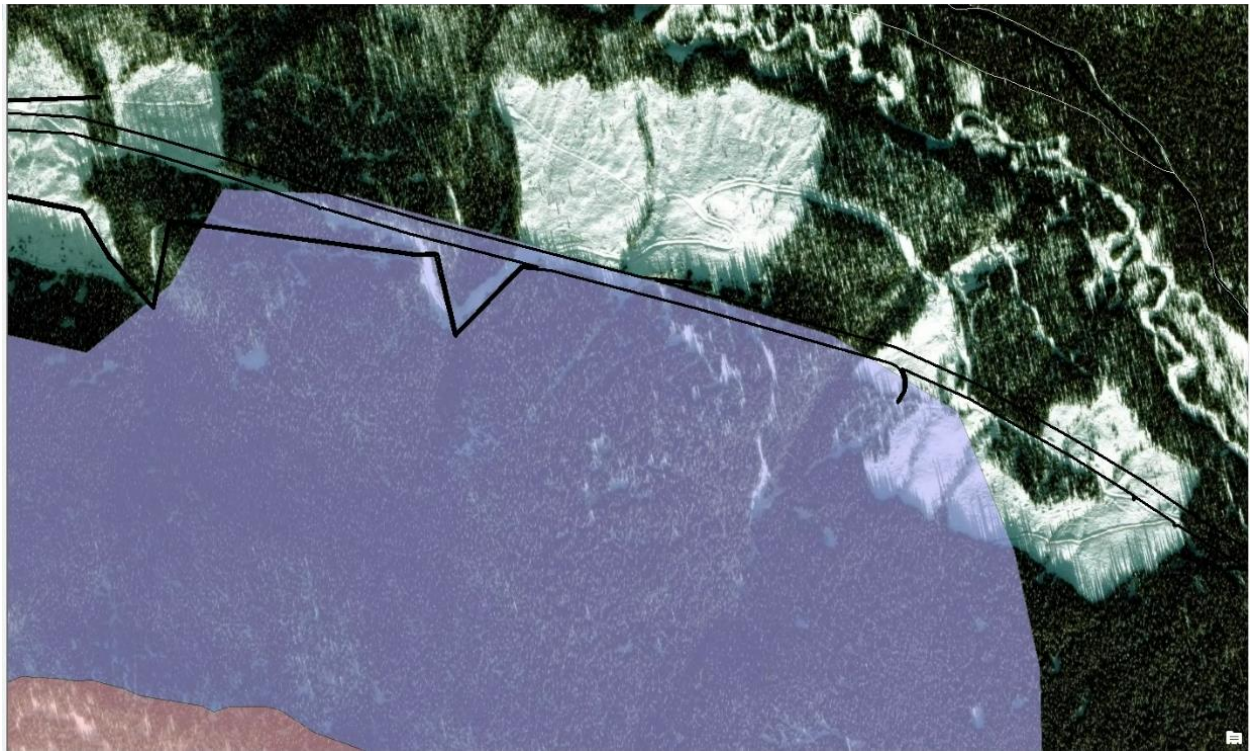

Image 1: Snowmobile closure area (purple polygon) overlap with the Project Transmission Line ROW and road identified for upgrade

Roads, in particular highways, can act as barriers to caribou movement and may restrict habitat use (Plante et al. 2018). Caribou may also alter their behaviour and move faster at road crossings (Plante et al. 2018). Avoidance of roads and anthropogenic features may also increase during the hunting season as these features provide access for humans (Plante et al. 2018). There are only

a few highways in the CAA; however, numerous forestry and mine exploration roads also occur in the CAA and, contribute to habitat loss, and may impact habitat use and the behaviour of caribou.

Research indicates that caribou are not consistent in their avoidance of anthropogenic disturbance, including mines. For example, Polfus et al. (2011) reported caribou in the Northern Mountain DU avoid mines by 2 km in summer, while in winter, when human activity was low, avoidance of mines was negligible. Similarly, Johnson et al. (2015) reported that just one of five sub-populations investigated in the Central Mountain DU avoid mines by 3 km and in the summer only. The use of habitats by caribou near mine developments (Polfus et al. 2011; Johnson et al. 2015) after construction is consistent with previous studies; caribou appear to be more sensitive to the human activities associated with construction, traffic, and noise than to the infrastructure (Curatolo and Murphy 1986; Murphy and Curatolo 1987; Nellemann and Cameron 1998; Smith et al. 2000; Dyer et al. 2001). Surrounding habitat may impact the indirect disturbance associated with anthropogenic features, with avoidance being higher in areas of open habitat where anthropogenic disturbance can be seen from further distances (Plante et al. 2018).

Similarly, sensory disturbance of caribou from transmission lines is also variable. Plante et al. (2018) found that transmission lines alone were not a major disturbance for caribou in northern Quebec and Labrador. However, in other studies, reindeer (*Rangifer tarandus tarandus*) in southern Norway exhibited reduced density within 2.5 km of transmission lines (Nellemann et al. 2001). ECCC (formerly Environment Canada; EC 2014) defines disturbed habitat as habitat showing human caused disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the human-caused disturbance, and/or fire disturbances, within the last 40 years (without buffer). ECCC found little statistical support for distinguishing different types of anthropogenic disturbances (e.g., linear and polygonal types). However, analyses of a range of buffer widths demonstrated that a 500 m buffer provided an appropriate, minimum approximation of the zone of influence of these features on caribou demography (EC 2011). In addition, the BC Ministry of Forests, Lands and Natural Resource Operations (FLNRO; 2016) recommends focusing habitat alteration or infrastructure on existing disturbance, or within the 500 m anthropogenic disturbance buffer defined by ECCC (EC 2014), which results in less overall functional habitat loss than if development occurs outside of the buffer. The application of a 500 m buffer, according to ECCC (EC 2014), is considered standard practice when developing caribou management plans (including offset plans) for industry in Canada to capture indirect effects to caribou.

A 500 m buffer around Project components was originally proposed to capture sensory disturbance and potential indirect impacts from the Project to caribou following the ECCC guidance (EC 2014). However, through development of the CMMP, recommendations provided by WLRS were to use a ZOI developed for specific disturbance types (see additional discussion in Section 1.4). A ZOI is an area outside direct disturbance, where adjacency effects or indirect impacts may limit habitat use by a species. WLRS provided guidance on recommended ZOI values for different anthropogenic disturbance types based on on-going research (Palm n.d.,

unpublished data). The summary report provided by WLRS examined telemetry data for caribou in the central group of the southern mountain caribou and calculated ZOI for eight disturbance types and analyzed data over three seasons (summer, early winter, and later winter) and two elevations (low and high). The result was a range of ZOI estimates for each disturbance type (Palm n.d., unpublished data, provided in Table 3–1, Section 3.1). To calculate indirect disturbance levels for the baseline conditions, and to identify potential Project-caribou impacts, the maximum value for each disturbance type was used as the buffer around existing disturbance for baseline conditions, and in the determination of potential Project-caribou impacts, resulting in the following ZOIs for anthropogenic disturbance:

- Fire-related disturbance: 1,500 m;
- Cutblocks: 1,300 m;
- Mines: 3,600 m;
- Well sites (e.g., oil and gas well): 1,700 m;
- Other polygon disturbance (e.g., agricultural areas, airfields, urban areas): 4,000 m;
- Roads: 800 m;
- Seismic Lines: 500 m; and
- Other linear disturbance (e.g., transmission lines and pipelines): 2,000 m.

To determine the baseline condition for disturbance in the CAA, data layers mapping existing disturbance were compiled and edited as described in Table 4–3. The data layers were then combined to create one layer. In places where overlap occurred that included multiple disturbances, the following hierarchy (in order of priority for overlap) was applied to determine which layer would be preserved, and was based on preserving the disturbance with the greatest impact to caribou based on the ZOI in Table 3–1:

1. Other Polygonal Disturbance (e.g., urban areas, agricultural fields);
2. Mines;
3. Other Linear (e.g., transmission lines, pipelines);
4. Wells;
5. Burns;
6. Cutblocks;
7. Roads; and
8. Seismic Lines.

Table 4–3: Data Layers Used to Identify Disturbance in the Caribou Assessment Area

Data Layer	Source, Year	Data Description	Data Manipulation
RESULTS – Openings	Data Catalogue 2023	Shows the boundaries of forest areas that have been harvested.	Include only those areas that were harvested in the last 40 years (1983 - 2023). Beyond 40 years, areas are assumed to be regenerating.
BC Wildfire Fire Locations - Current	Data Catalogue 2023	Provides boundaries of active and inactive fires from the current wildfire season.	Include only those areas that have been impacted by wildfire in the last 40 years (1983 - 2023). The 'current' data layer was current to 2023.
BC Wildfire Fire Locations – Historic	Data Catalogue 2023	Provides boundaries of fires from past wildfire seasons.	Include only those wildfires in the last 40 years. Beyond 40 years, areas are assumed to be regenerating.
Digital Road Atlas	Data Catalogue 2023	Provides spatial data on the location of urban, rural, and resources roads in BC.	N/A
Forest Tenure Road Segment Lines	Data Catalogue 2023	Provides additional information on roads, particularly forest service roads.	All segments attributed as 'road'.
Terrestrial Ecosystem Mapping (TEM)	WSP 2016, 2018, 2019, 2020	TEM developed for the Project that shows ecosystem types and was used to identify other anthropogenic disturbance like urban areas, agricultural fields, etc.	Extract anthropogenic areas from natural areas.
Predictive Ecosystem Mapping (PEM)	Moon et al. 2008, MOE 2018	PEM available within the CAA used in areas that did not have coverage by the TEM.	Extract anthropogenic areas from natural areas in areas not covered by the TEM.

Notes: CAA = Caribou Assessment Area; N/A = not applicable; PEM = Predictive Ecosystem Mapping; TEM = Terrestrial Ecosystem Mapping

The BC Cumulative Effects Framework – Human Disturbance – 2023 (Data BC 2022) data layer was identified by WLRS during discussions as an available layer to use for identifying disturbance in the CAA, in place of the disturbance layer developed for the Project. Based on a review of the BC Cumulative Effects Framework – Human Disturbance – 2023 (Data BC 2022), it was not used as the layer for disturbances for the following reasons:

- Cutblocks in the layer were attributed to two categories: current (<20 years old) and historic (>20 years old). The data on the age of the cutblocks was not retained in the combined dataset so historic cutblocks could not be further segregated. For caribou, cutblocks <40 years are recommended to be included for consideration for revegetation, after which the areas are considered revegetated. Using the source data for cutblocks (RESULTS - Openings) enables distinguishing based on cutblock year to include only those cutblocks < 40 years.
- The layer does not contain the location and extent of current or historic wildfires. These data layers would have to be reviewed and integrated into the layer from the source data.
- The layer was not dissolved and contained overlapping polygons, which would have to be prioritized similar to the above conducted for the disturbance layer (Table 4–3).
- Roads were poorly captured in the layer. Highway 26 leading to the Town of Wells is not captured in the layer nor are most of the FSRs in the CAA.

As a result, the CMMP proceeded with the disturbance layer created for the CAA and not the Cumulative Effects Framework – Human Disturbance – 2023 (Data BC 2022).

Using the disturbance layer, it was determined that the CAA is currently 96.1% disturbed (total disturbed area of 321,327.8 ha) (Table 4–4; Figure 4–1). Indirect disturbance (i.e., habitat within the maximum ZOI based on Palm [n.d.] for anthropogenic disturbance) constitutes 219,202.1 ha (65.6%) of the disturbed habitat total area. Direct disturbance is comprised primarily of forestry cutblocks (24.3% of the CAA) and roads (5.4% of the CAA). The disturbance from forestry in the CAA is consistent with Nagy-Reis (2020), who suggests that forestry is a leading cause of landscape change and, therefore, caribou habitat loss in the southern mountain caribou herds. Of the disturbed area within the CAA, approximately 0.6% is from fire disturbance in the last 40 years, and 0.3% is from other disturbances such as gravel pits, mines, and urban or rural areas.

The CAA contains 595,413.6 ha of caribou critical habitat, comprised of 209,119.4 ha of matrix range habitat, 78,485.0 ha of core all-season habitat, and 307,809.2 ha of unmapped range critical caribou habitat (Table 4–4; Figure 4–1). Approximately 56,240.3 ha (16.8%) of caribou critical habitat within the CAA has been legally designated as mountain caribou WHAs with restrictions on timber harvest to support recovery to a self-sustaining population.

Within the CAA, there is an Area of Environmental Concern (AEC) covering approximately 70.3 ha near the Town of Wells (SNC-Lavalin 2011). Disturbance within the AEC occurred due to the abandonment of a historic mine site, and it was well documented that mill tailings containing

metals (particularly arsenic) in excess of the Contaminated Sites Regulations standards at the time were widespread across the area (SNC-Lavalin 2011). Considering the potential for contaminants, including arsenic, in the AEC (and the associated potential for disturbance from remediation with or without the Project), this area was reviewed separately to other areas. The entire AEC occurs in existing disturbed (either directly or indirectly) caribou habitat. Where an existing direct disturbance exists (e.g., road) and overlaps the AEC, the area is counted under direct disturbance for the Project. Where the AEC overlaps indirect disturbance, this is summarized separately from other indirect disturbances in Table 4–4 for the spatial boundaries at baseline condition.

The Project footprint includes the following components: Mine Site Complex areas of new disturbance (mine site overburden, soil stockpiles, mine infrastructure, Bonanza Ledge WRSF, Bonanza Ledge stockpiles, and ventilation raises), portions of the Transmission Line ROW (includes 20 m width on either side of the centreline and associated access roads) within the CAA, portions of the Transportation Route within the CAA, and QR Mill (Section 3.1). In total, there are 979.9 ha of caribou critical habitat within the Project footprint, comprised of 220.0 ha of matrix range habitat, 149.0 ha of core all-season habitat, and 611.0 ha of unmapped critical habitat (does not total sum due to rounding; Table 4–5). Using the disturbance layer, it was determined that the Project footprint is 74.8 % (733.4 ha) directly disturbed at baseline conditions (Table 4–4). The remaining 25.2% (246.5 ha) is located on areas that fall within the ZOI of existing anthropogenic disturbance. No undisturbed habitat occurs within the Project footprint when existing disturbances plus the ZOI for indirect disturbance are considered.

The Transportation Route is included in the Project footprint calculation; however, the Transportation Route follows existing roads, including Highway 26. No new disturbance is planned for the Transportation Route. The traffic related to the Project is anticipated to be the same level as occurred during the Bonanza Ledge Phase II Project. The main disturbance to caribou from the Transportation Route will be sensory disturbance from vehicle traffic along the existing road networks.

The summary of baseline conditions and caribou habitat for disturbance for the Mine Site outside of new disturbance is presented in Table 4–4 and Table 4–5, respectively. No new disturbance is intended within this area. At baseline conditions, 56.0 % (65.6 ha) of the Mine Site outside of new disturbance is directly disturbed, and 44.0% (51.6 ha) is located in areas that fall within the ZOI of existing anthropogenic disturbance. No undisturbed habitat occurs in the Mine Site outside of new disturbance.

Table 4–4: Habitat Types within the Spatial Boundaries at Existing Conditions

Disturbance Category	Disturbance Type	Project Footprint (ha)[(a)]	Mine Site Outside of New Disturbance (ha)[(b)]	Caribou Assessment Area (ha)
Undisturbed	N/A	0	0	12,994.5
Undisturbed Habitat Subtotal		*0*	*0*	*12,994.5*
Existing Direct Disturbance	Road	479.7	40.3	17,917.9
	Cutblock	97.4	5.7	81,367.0
	Fire	<0.1	0	2,075.1
	Other[(c)]	156.4	19.6	765.7
Existing Directly Disturbed Habitat Subtotal		*733.4*	*65.6*	*102,125.7*
Existing Indirectly Disturbed Habitat	Habitat within an AEC and within ZOI of existing anthropogenic disturbance	4.3	12.2	47.6
	Habitat within ZOI of existing anthropogenic disturbance (and not within an AEC)	242.1	39.5	219,154.5
Existing Indirect Disturbance Subtotal		*246.5*	*51.6*	*219,202.1*
Total		**979.9**	**117.3**	**334,322.3**

Notes: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

AEC = Area of Environmental Concern; ha = hectare; ZOI = Zone of Influence.

(a) The Project footprint includes all areas of new disturbance at the Mine Site Complex associated with the Project (mine site overburden, soil stockpiles, mine infrastructure, Bonanza Ledge WRSF, Bonanza Ledge stockpiles, and ventilation raises), the Transmission Line (includes a 20 m width on either side of the proposed centre alignment and associated access roads), QR Mill, and portions of the Transportation Route within caribou critical habitat.

(b) The Mine Site outside of new disturbance includes areas where no new disturbance is planned, including existing access roads where no upgrades are planned, and areas of Bonanza Ledge and the Mine Site Complex outside of new disturbance.

(c) Other disturbance types include the following TEM codes: canal, gravel pit, mine, mine spoil, non-forested disturbed land, pasture, reclaimed mine, rural residential, and urban.

Table 4–5: Area totals (ha) of Caribou Critical Habitat within the Spatial Boundaries

Critical Habitat Type	Project Footprint (ha)[(a)]	Mine Site outside of New Disturbance (ha)[(b)]	CAA (ha)
Core All-Season	149.0	68.6	156,137.8
Matrix	220.0	48.7	149,632.2
Unmapped	611.0	0	28,552.3
Total	**979.9**	**117.3**	**334,322.3**

Notes: Numbers are rounded for presentation purposes. Therefore, it may appear that the total does not equal the sum of individual values.

CAA = Caribou Assessment Area; ha = hectare.

(a) The Project footprint includes all areas of new disturbance at the Mine Site Complex associated with the Project (mine site overburden, soil stockpiles, mine infrastructure, Bonanza Ledge WRSF, Bonanza Ledge stockpiles, and ventilation raises), the Transmission Line (includes a 20 m width on either side of the proposed centre alignment and associated access roads), QR Mill, and portions of the Transportation Route within caribou critical habitat.

(b) The Mine Site outside of new disturbance includes areas where no new disturbance is planned, including existing access roads where no upgrades are planned, and areas of Bonanza Ledge and the Mine Site Complex outside of new disturbance.

Indirect disturbances to caribou habitat may result due to Project activities. Habitat availability at existing conditions within the ZOI of the Project footprint and Mine Site outside of new disturbance within the CAA was assessed. The ZOI applied to Project components differed based on the disturbance type. A ZOI of 3.6 km was applied to mines (Mine Site Complex, Bonanza Ledge, and QR Mill), 2.0 km was applied to linear infrastructure (Transmission Line ROW), and 0.8 km was applied to roads (including the Transportation Route). The Project footprint and the Mine Site outside of new disturbance were not assessed separately to determine indirect impacts from Project activities because sensory disturbance may include activities such as driving on access roads, which are not located in new disturbance areas.

With the applied ZOIs, new indirect impacts from the Project would total approximately 0.7 ha. Based on existing conditions, 30.0% (17,380.1 ha) of habitat within the ZOI of the Project footprint and Mine Site outside of new disturbance is already disturbed, and the remaining 70.0% (40,515.2 ha) is considered indirectly disturbed (i.e., located within the ZOI of an existing disturbance)(Table 4–6).

Table 4–6: Habitat Types within the Zone of Influence Buffer of the Project Footprint and Mine Site Outside of New Disturbance at Existing Conditions

Habitat Type	Disturbance Type	Project Footprint and Mine Site Outside of New Disturbance (ha)[(a)]	Percent (%) of Total Area for the ZOI of the combined Project Footprint and Mine Site Outside of New Disturbance
Undisturbed	N/A	0.7	<0.1
Undisturbed Habitat Subtotal		*0.7*	*<0.1*
Existing Direct Disturbance	Road	4,267.1	7.4
	Cutblock	12,722.2	22.0
	Fire	18.6	<0.1
	Other[(c)]	372.3	0.6
Existing Directly Disturbed Habitat Subtotal		*17,380.1*	*30.0*
Existing Indirectly Disturbed Habitat	Habitat within 500 m of existing anthropogenic disturbance and within AEC	43.3	<0.1
	Habitat within ZOI of existing anthropogenic disturbance and outside AEC	40,472.0	69.9
Existing Indirect Disturbance Subtotal		*40,515.2*	*70.0*
Total		**57,896.1**	**100.0**

Notes: Numbers are rounded for presentation purposes. Therefore, it may appear that the total does not equal the sum of individual values. The habitat types within the 500 m buffer exclude habitat types within the Permit Mine Footprint and Transmission Line ROW.

AEC = Area of Environmental Concern; ha = hectare; N/A = not applicable; ZOI = Zone of Influence.

(a) The Project Footprint and Mine Site Outside of New Disturbance are not summed together to avoid double counting areas of overlap. In addition, while no new infrastructure will be built in the Mine Site Outside of New Disturbance, this area may be accessed by the Project (e.g., vehicles driving on existing roads) and is accounted for as indirect disturbance from the Project.

Narrow Lake Caribou Herd

North Cariboo Caribou Herd

Barkerville Caribou Herd

4-1.5

4-1.2

Wells

4-1.3

4-1.6

4-1.4

Nawet Creek
Wizard River
Kibbee Lake
Indianpoint Lake
Isaac Lake
Ingenika River
Ahbau Creek
Lynn Creek
Spectacle Lakes
Babcock Lake
Jack of Clubs Lake
Lanezi Lake
Sandy Lake
Caribou River
Matthew River
Ghost Lake
Swift River
Kathlyn Creek
Seller Creek
Beaver Creek
Morehead Lake
Spanish Lake
Polley Lake
Bootjack Lake

560000 580000 600000 620000 640000

5900000 5880000 5860000

LEGEND

- CARIBOU ASSESSMENT AREA
- PROJECT ASSESSMENT AREA
- CARIBOU HERD SUB-POPULATION BOUNDARY
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - NO HARVEST ZONE
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - MODIFIED HARVEST ZONE
- MOUNT TOM CALVING PERIOD RESTRICTED AREA
- CARIBOU MOVEMENT CORRIDOR OVERLAPPING TRANSMISSION LINE ROUTE
- TOWN
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY
- DETAILED FIGURE VIEWPORT

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC DISTURBANCE
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED

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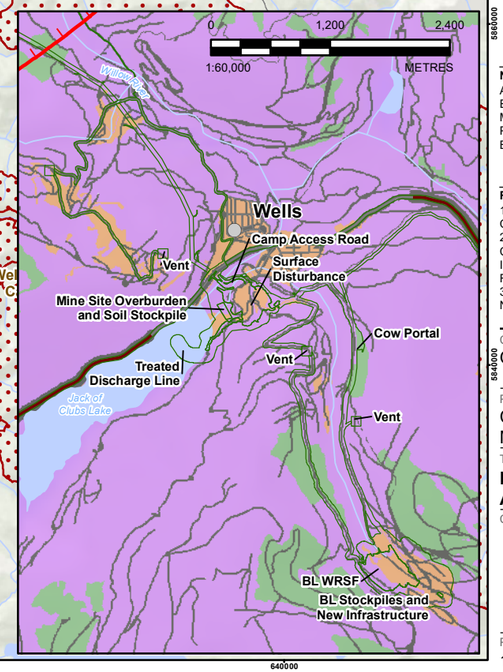

NOTE(S)

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CLIENT
OSISKO DEVELOPMENT CORP.

PROJECT
CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE
EXISTING DISTURBANCE IN THE CARIBOU ASSESSMENT AREA OVERVIEW

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	TS
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
1774160	43100	0	4-1.1

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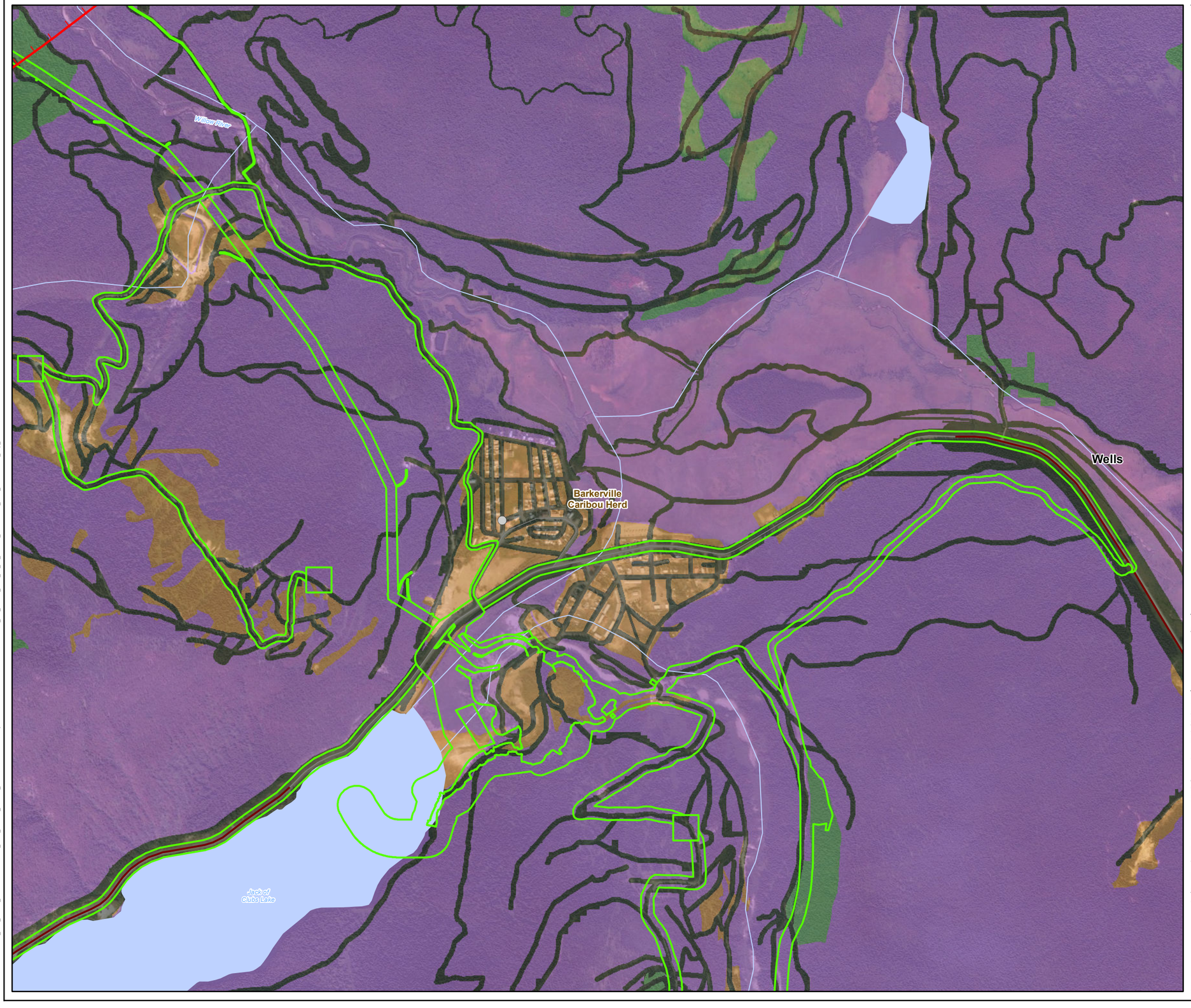

LEGEND

- CARIBOU ASSESSMENT AREA
- PROJECT ASSESSMENT AREA
- CARIBOU HERD SUB-POPULATION BOUNDARY
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - NO HARVEST ZONE
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - MODIFIED HARVEST ZONE
- MOUNT TOM CALVING PERIOD RESTRICTED AREA
- TOWN
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC DISTURBANCE
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED

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1:15,000 METRES

NOTE(S)

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NAD83 CSRS UTM ZONE 10N

CLIENT

OSISKO DEVELOPMENT CORP.

PROJECT

CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE

EXISTING DISTURBANCE IN THE CARIBOU ASSESSMENT AREA - CARIBOO GOLD MINE SITE COMPLEX

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	TS
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
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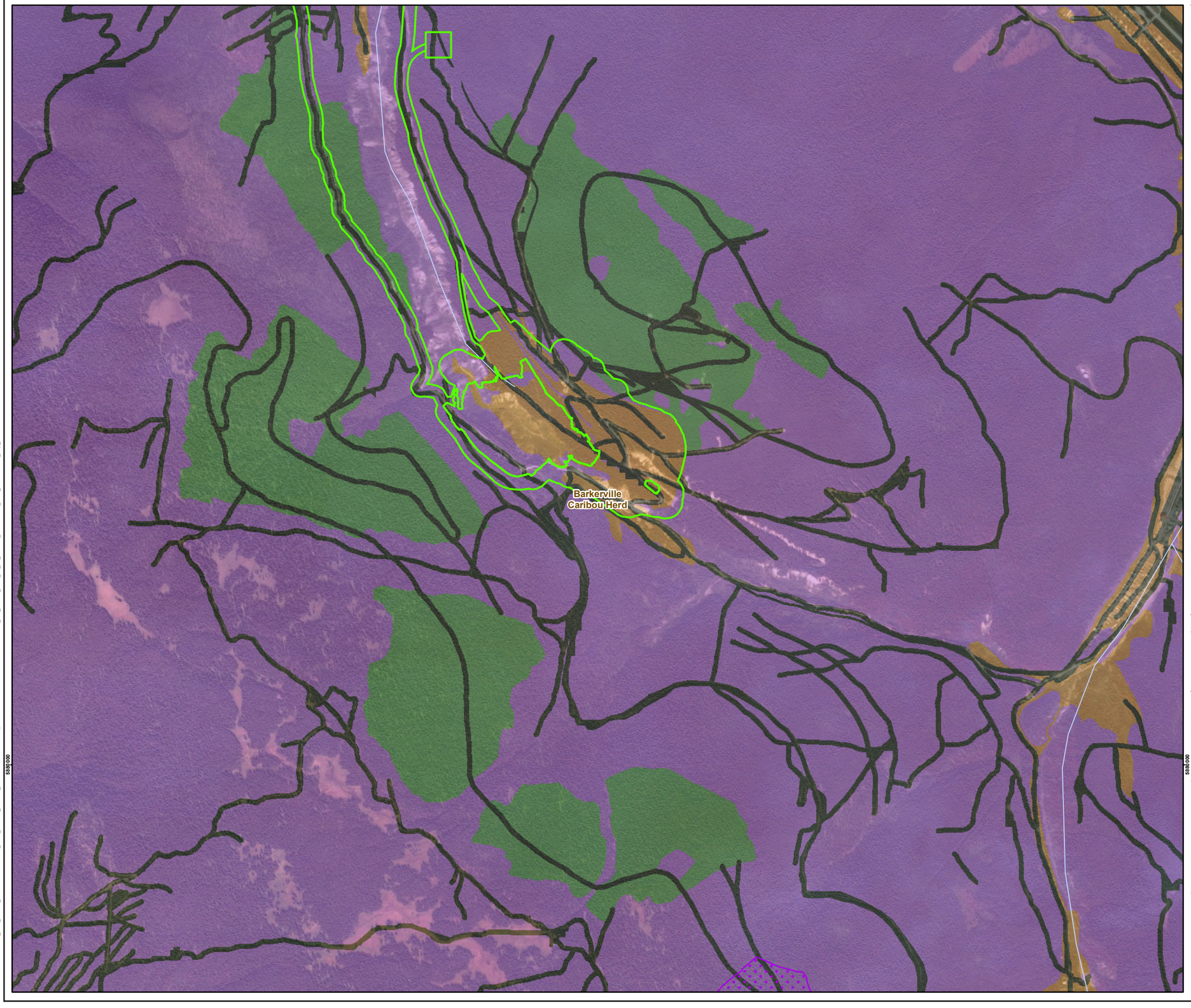

LEGEND

- CARIBOU ASSESSMENT AREA
- PROJECT ASSESSMENT AREA
- CARIBOU HERD SUB-POPULATION BOUNDARY
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - NO HARVEST ZONE
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - MODIFIED HARVEST ZONE
- MOUNT TOM CALVING PERIOD RESTRICTED AREA
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC DISTURBANCE
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED

0 300 600

1:15,000 METRES

NOTE(S)

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NAD83 CSRS UTM ZONE 10N

CLIENT

OSISKO DEVELOPMENT CORP.

PROJECT

CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE

EXISTING DISTURBANCE IN THE CARIBOU ASSESSMENT AREA - BONANZA LEDGE MINE SITE

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	TS
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
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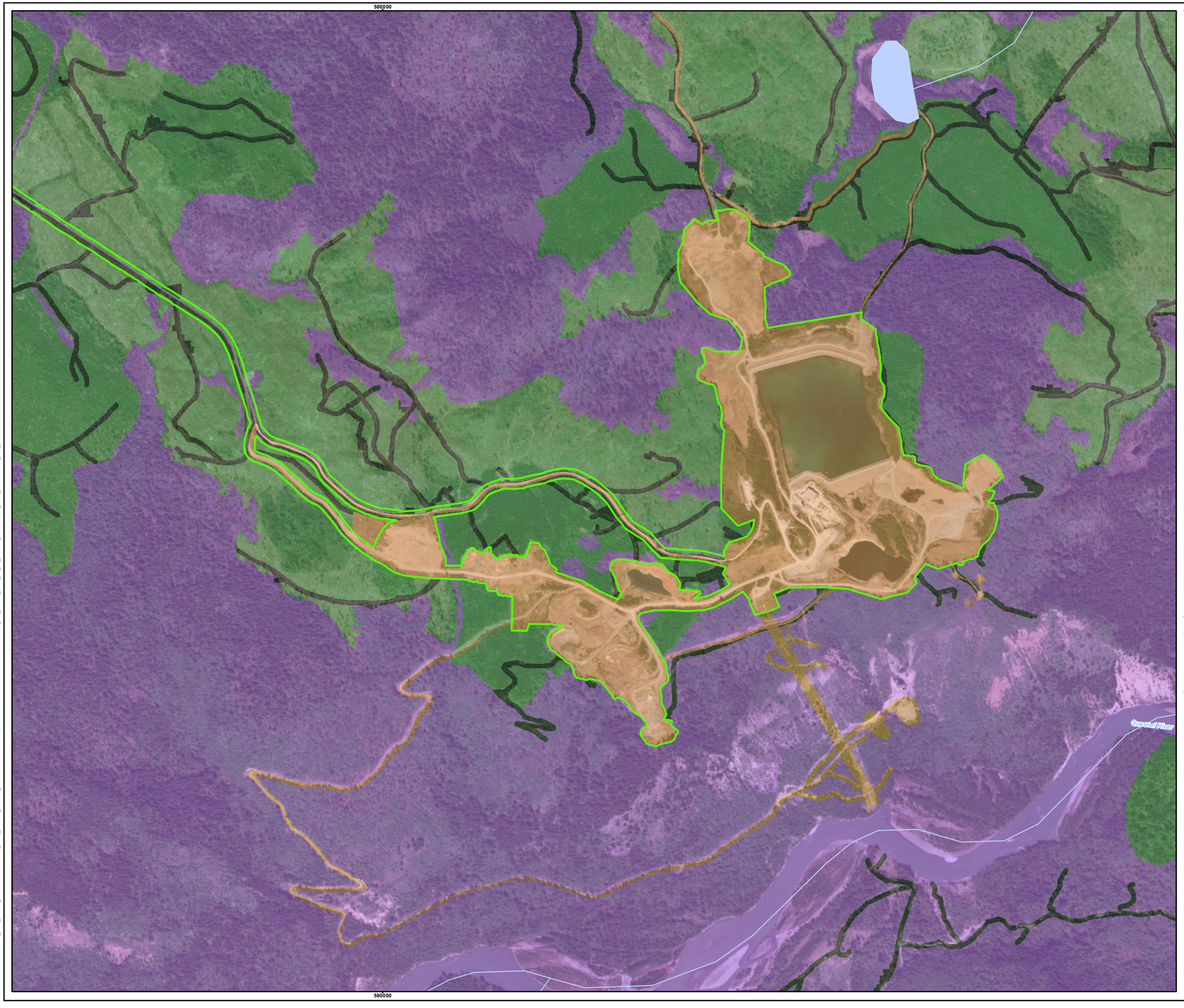

LEGEND

- CARIBOU ASSESSMENT AREA
- PROJECT ASSESSMENT AREA
- CARIBOU HERD SUB-POPULATION BOUNDARY
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - NO HARVEST ZONE
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - MODIFIED HARVEST ZONE
- MOUNT TOM CALVING PERIOD RESTRICTED AREA
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC DISTURBANCE
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED

0 300 600

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NOTE(S)

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NAD83 CSRS UTM ZONE 10N

CLIENT
OSISKO DEVELOPMENT CORP.

PROJECT
CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE
EXISTING DISTURBANCE IN THE CARIBOU ASSESSMENT AREA - QR MILL MINE SITE

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	TS
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
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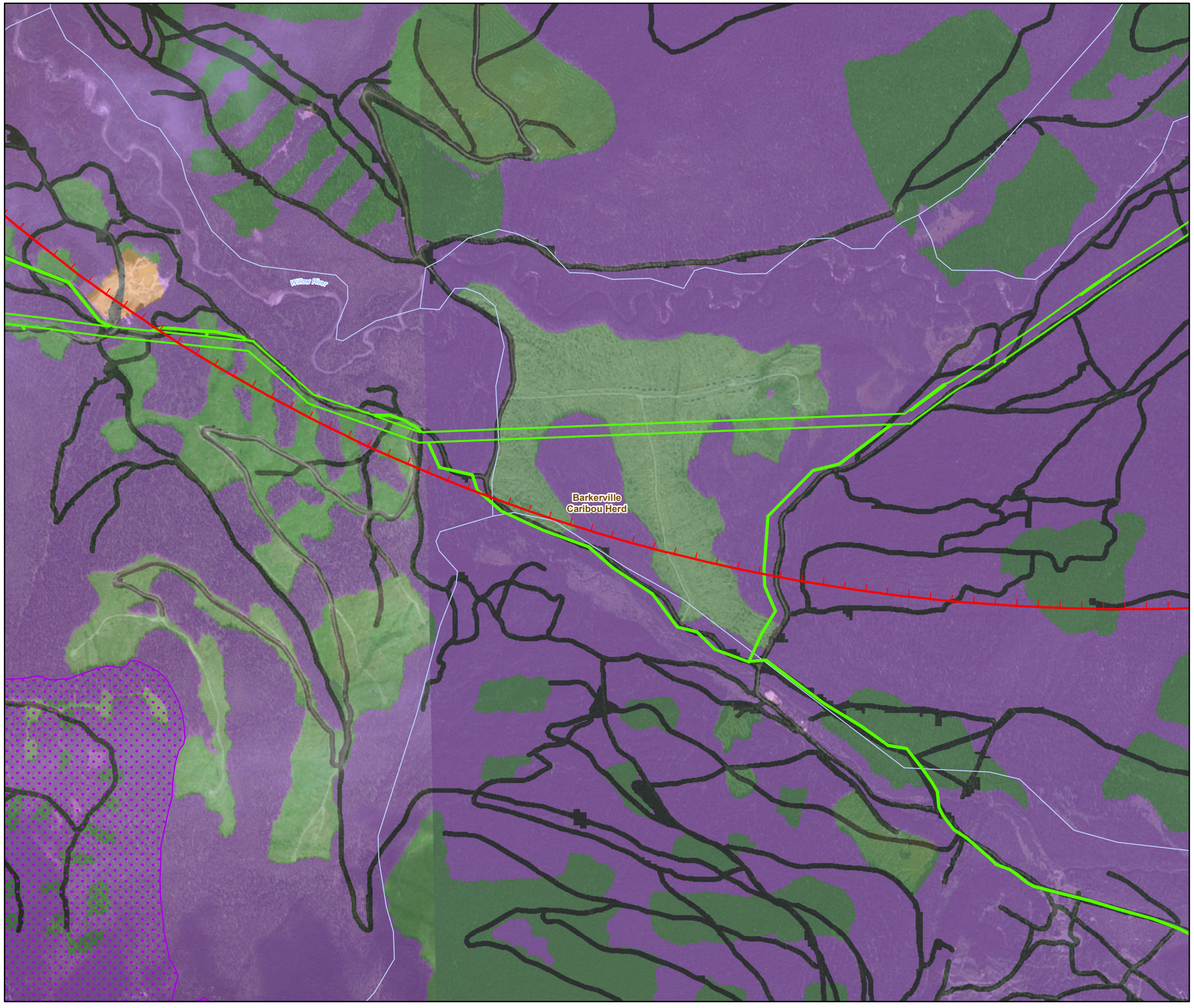

LEGEND

- CARIBOU ASSESSMENT AREA
- PROJECT ASSESSMENT AREA
- CARIBOU HERD SUB-POPULATION BOUNDARY
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - NO HARVEST ZONE
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - MODIFIED HARVEST ZONE
- MOUNT TOM CALVING PERIOD RESTRICTED AREA
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC DISTURBANCE
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED

0 300 600

1:15,000 METRES

NOTE(S)

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3. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS. NAD83 CSRS UTM ZONE 10N

CLIENT
OSISKO DEVELOPMENT CORP.

PROJECT
CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE
EXISTING DISTURBANCE IN THE CARIBOU ASSESSMENT AREA - TRANSMISSION LINE ACCESS AND RIGHT OF WAY

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	TS
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
1774160	43100	0	4-1.5

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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LEGEND

- CARIBOU ASSESSMENT AREA
- PROJECT ASSESSMENT AREA
- CARIBOU HERD SUB-POPULATION BOUNDARY
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - NO HARVEST ZONE
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - MODIFIED HARVEST ZONE
- MOUNT TOM CALVING PERIOD RESTRICTED AREA
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC DISTURBANCE
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED

0 300 600

1:15,000 METRES

NOTE(S)

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REFERENCE(S)

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3. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.
NAD83 CSRS UTM ZONE 10N

CLIENT

OSISKO DEVELOPMENT CORP.

PROJECT

CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE

EXISTING DISTURBANCE IN THE CARIBOU ASSESSMENT AREA - TRANSPORTATION ROUTE, TRANSIMISSION LINE

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	TS
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
1774160	43100	0	4-1.6

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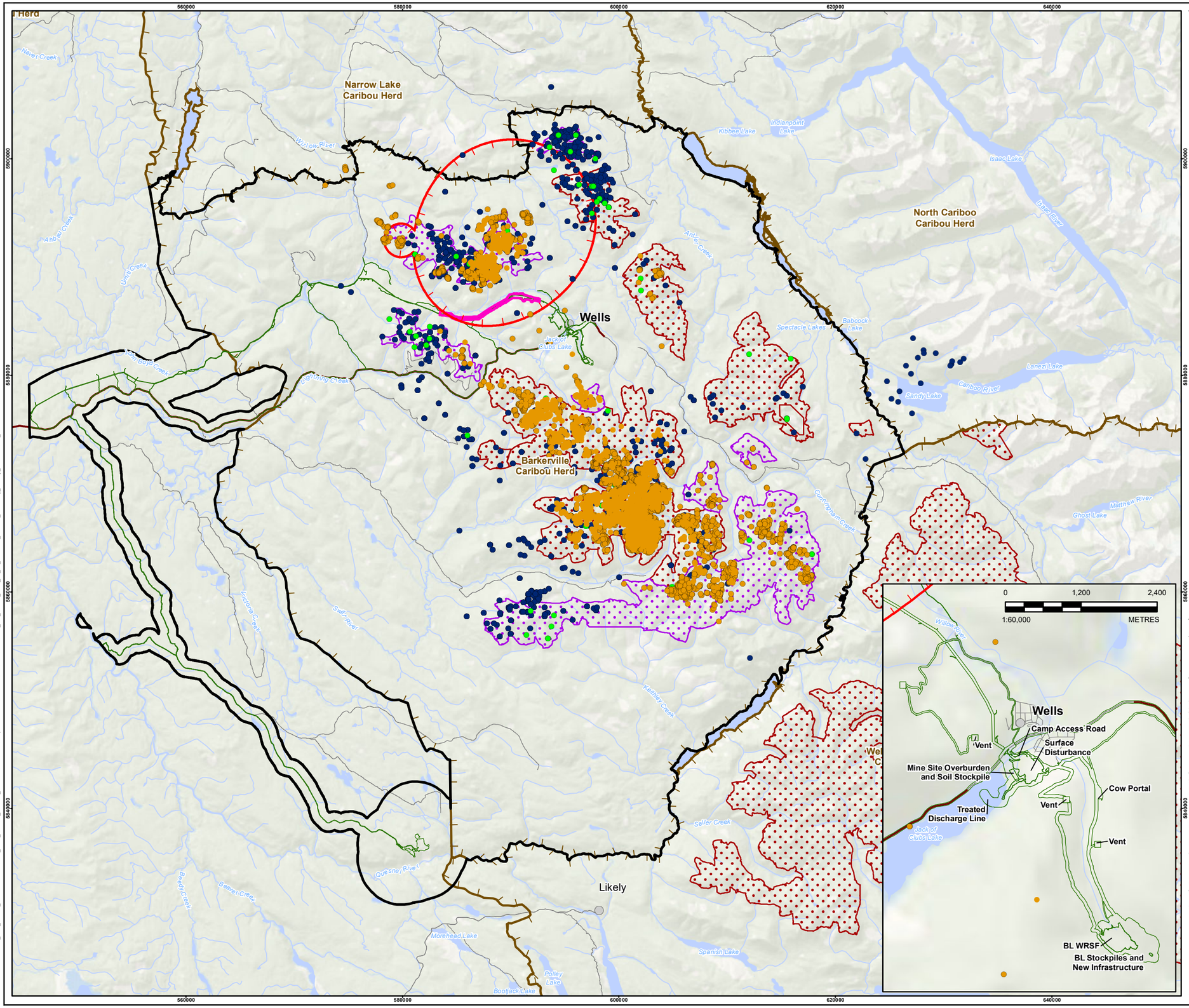
4.2.2 Habitat Distribution

In the Southern Mountain DU, migration is generally altitudinal, and mountain caribou tend to exhibit greater fidelity to calving/summer areas than they do to wintering areas (Wittmer et al. 2006). Increasing levels of habitat fragmentation in the Southern Mountain DU have resulted in several isolated sub-populations with severely restricted dispersal (COSEWIC 2014). Van Oort et al. (2011) documented no dispersal between mountain caribou sub-populations for juveniles and an adult dispersal rate between sub-populations of less than 0.5%. Those dispersal rates are considered insufficient to rescue the smaller and declining sub-populations (Van Oort et al. 2011).

For wide-ranging species such as caribou, movement is crucial to facilitate access to resources across space and time (Johnson et al. 1992; Nathan et al. 2008; Taylor et al. 1993). Restricted movement can reduce home range size (Beauchesne et al. 2014; Muhly et al. 2015) and reduce access to resources required for survival, such as predator-free space (Muhly et al. 2015). Several studies suggest that caribou avoid roads and areas of high road density (Apps et al. 2006; Faille et al. 2010; Nellemann and Cameron 1998; Polfus et al. 2011; Pinard et al. 2012; Johnson et al. 2015). For example, Polfus et al. (2011) and Johnson et al. (2015) found that caribou avoided roads during both summer and winter. Dyer et al. (2002) found that roads act as semi-permeable barriers to caribou movement; the frequency of crossing events by collared animals on actual roads was reduced relative to crossing rates on simulated road networks (i.e., road networks created randomly on the landscape for use in modelling scenarios) at the same road densities. The magnitude of this effect may vary across seasons. During late winter when road activity for industry was assumed to be high, caribou road crossing rates were six times lower than the rates calculated using simulated road networks (Dyer et al. 2002). Similarly, Wilson et al. (2016) found that some individuals cross roads more slowly, which can delay arrival of caribou at seasonal ranges (Mahoney and Schaefer 2002; Wilson et al. 2016).

Features that act as semi-permeable barriers may exacerbate indirect habitat loss caused by avoidance of disturbance features (Dyer et al. 2002). Beauchesne et al. (2014) suggested that over a certain disturbance threshold, it is likely that individuals cannot avoid using unsuitable habitats, leading to decreased movement rates and increased use of suboptimal habitats as movement becomes increasingly risky (Smith et al. 2000; Hebblewhite 2008). Reduced movement rates and restricted home ranges increase the amount of time spent in lower suitability habitats and, therefore, increase vulnerability to predation (Rettie and Messier 2000; Morales et al. 2010; Beauchesne et al. 2014; Muhly et al. 2015). Caribou confined to smaller home ranges could be forced into less suitable habitat and be more easily detected by predators (Beauchesne et al. 2014).

The Government of BC has collected telemetry data and survey observation data on the Barkerville mountain caribou sub-population since 1993 (Young and Freeman 2002; Paige et al. 2012; Dodd 2016). Telemetry data and survey observation data for the period between 1993 and 2021 are shown in Figure 4–2.



LEGEND

- CARIBOU ASSESSMENT AREA
- PROJECT ASSESSMENT AREA
- CARIBOU HERD SUB-POPULATION BOUNDARY
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - NO HARVEST ZONE
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - MODIFIED HARVEST ZONE
- MOUNT TOM CALVING PERIOD RESTRICTED
- CARIBOU MOVEMENT CORRIDOR OVERLAPPING TRANSMISSION LINE ROUTE
- CARIBOU TELEMETRY DATA (2021)
- SURVEY OBSERVATION LOCATION (1993 - 2013)
- CARIBOU TELEMETRY DATA (1993 - 2004)
- TOWN
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY

NOTE(S)

ANY PROJECTS OCCURRING IN ECCC MAPPED CRITICAL HABITAT NEED TO CAPTURE THE ENTIRE FEDERAL BOUNDARIES NOT JUST THE PROVINCIAL MAPPED BOUNDARIES. FOR THE MOUNTAIN CARIBOU LAYERS IT SEEMS THE PROVINCIAL BOUNDARIES MISS THE UNMAPPED POLYGONS THAT ARE PART OF ECCC CRITICAL HABITAT FOR THIS SPECIES – BOTH SHOULD BE REVIEWED WHEN WE LOOK AT MOUNTAIN CARIBOU HABITAT IN THE FUTURE.

REFERENCE(S)

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3. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.
NAD83 CSRS UTM ZONE 10N

CLIENT
OSISKO DEVELOPMENT CORP.

PROJECT
CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE
MOUNTAIN CARIBOU TELEMETRY LOCATIONS AND SURVEY OBSERVATIONS IN THE CARIBOU ASSESSMENT AREA (1993 TO 2013, AND 2021)

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	TS
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
1774160	43100	0	4-2

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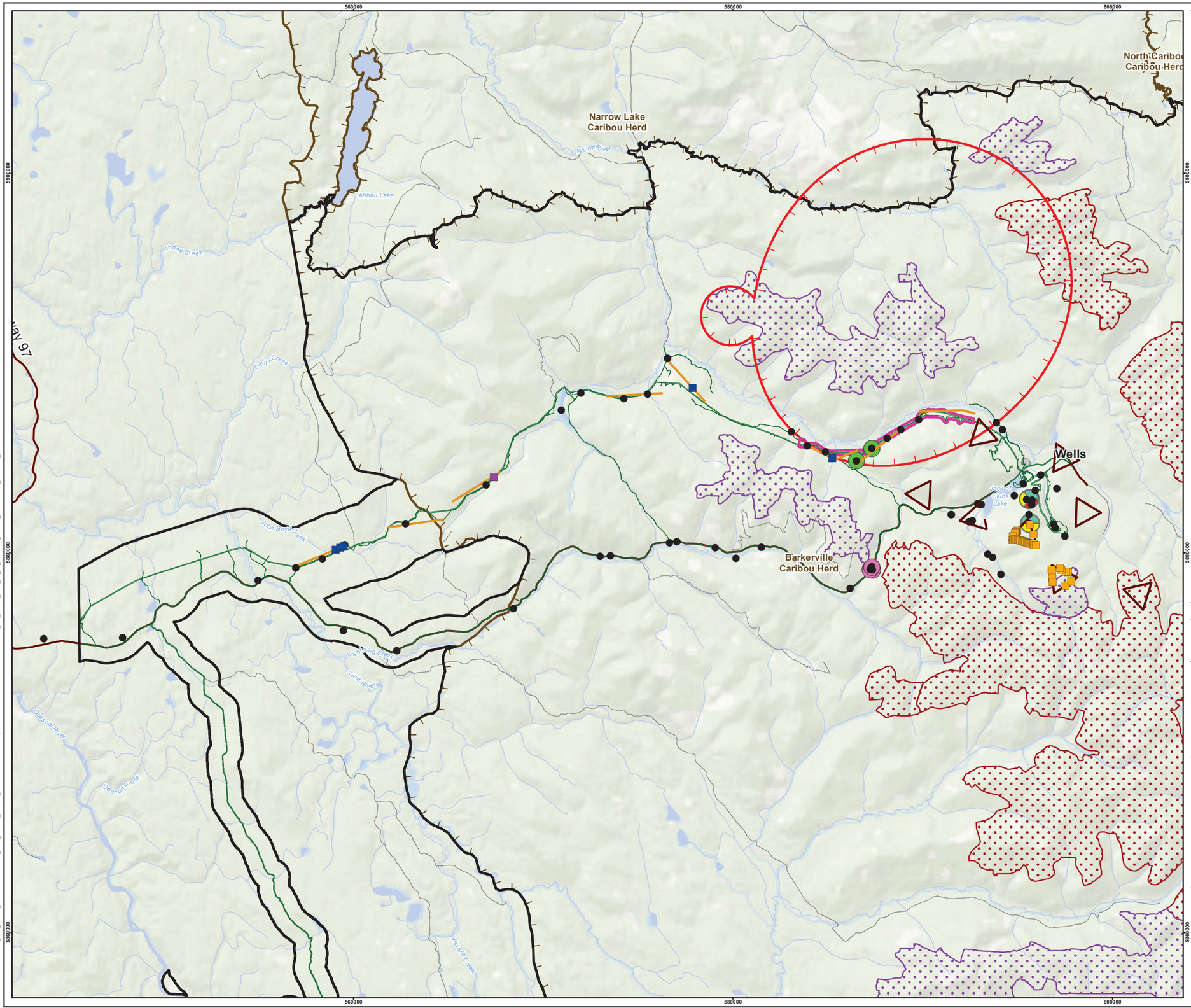
Mountain caribou observations were recorded during remote camera surveys for the Project in the vicinity of the Permit Mine Footprint during the summer; along Highway 26 during the spring, summer, and fall; and along the Transmission Line ROW in the spring and summer (Figure 4–3). Caribou were detected during winter track surveys conducted for the Project following provincial standards (RIC 1999; RISC 2006). Caribou tracks were recorded along two triangle transects in the vicinity of the Mine Site Complex in 2016. Caribou tracks were recorded along the Transmission Line alignment at two linear transects in 2020 and one linear transect in 2021. The Barkerville sub-population has been reported to use the Transmission Line corridor year-round, and forested habitats at all elevations may be used throughout summer and fall, with no well defined seasonal migration in this herd (WLRS 2024b). In addition, caribou in the Quesnel Highlands are not known to have a well-defined seasonal migration, but range generally over their home range using both high and low elevation habitats (Seip 1992). Caribou or caribou sign (e.g., scat, tracks) were incidentally observed within the CAA 14 times during existing condition surveys (Figure 4–3).

Incidental wildlife sightings have been recorded by ODV staff since 2012 (Table 4–7). ODV staff report sightings of caribou on Highway 26, in a concentrated area approximately 10 km west of the District of Wells (Jennings 2019, pers. comm.). These records indicate mountain caribou have been observed between 2013 and 2020 at Devil's Canyon, at Stanley Road, near Stanley Town, along Highway 26 between Wells and Barkerville, at the ODV main office, at the non potentially acid generating (NPAG) WRSF, at Wells to 2400, at Slough Creek, at 40 Thieves Creek, between Chisolm Creek and Devil's Canyon, and on Island Mountain (BGM 2017, 2020a). Spatial location data was not collected with these incidental observations.

Table 4–7: Caribou Incidental Observations by ODV between 2012 and 2020

Date	Observation Location	Number of Observation	Count of Individuals	Comments
2012	None observed	0	0	N/A
2013	Devil's Canyon, Highway 26 between Wells and Barkerville, Highway 26 near Stanley	7	42+	One herd observed, and one large bull observed with collar attached
2014	Devil's Canyon, near Stanley Town, Highway 26 between Wells and Barkerville, BGM main office, NPAG WRSF, Wells to 2400, Slough Creek	10	61	N/A
2015	Devil's Canyon, near Stanley Town, Slough Creek, 40 Thieves Creek, Stanley Road	12	48	N/A
2016	Devil's Canyon, 15 km west of Wells	4	36	Generally, on the road
2017	Wells-Lowhee Road intersection with Highway 26, Devil's Canyon, near Stanley, past Stanley towards Quesnel, Highway 26 between Wells and Barkerville	7	63	Generally, on the road
2018	Barkerville Highway, between Chisolm Creek and Devil's Canyon, Barkerville Highway – near the dump	3	24	Two large bulls and two juveniles, generally on road or beside
2019	Between Chisolm Creek and Devil's Canyon	3	38+	One big herd observed of all ages (males/females)
2020	Island Mountain – L-Road 1 km east of slough creek 2,103 km turnoff	1	6-8 fresh beds	Six to eight beds and tracks observed while snowmobiling

Notes: NPAG = Non Potentially Acid Generating; ODV = Osisko Development Corp.; WRSF = Waste Rock Storage Facility.



LEGEND

- CARIBOU ASSESSMENT AREA
- PROJECT ASSESSMENT AREA
- CARIBOU HERD SUB-POPULATION BOUNDARY
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - NO HARVEST ZONE
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - MODIFIED HARVEST ZONE
- MOUNT TOM CALVING PERIOD RESTRICTED
- CARIBOU MOVEMENT CORRIDOR OVERLAPPING TRANSMISSION LINE ROUTE
- TOWN
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY
- CARIBOU WINTER TRACK OBSERVATION (2016)
- CARIBOU WINTER TRACK OBSERVATION (2020)
- CARIBOU WINTER TRACK OBSERVATION (2021)
- WINTER TRACK TRANSECT (2016)
- 2020-2021 WINTER TRACKING TRANSECT
- REMOTE CAMERA SURVEY LOCATION

REMOTE CAMERA OBSERVATION

- 2012 CARIBOU OBSERVATION
- 2013 CARIBOU OBSERVATION
- 2015 CARIBOU OBSERVATION
- 2019 CARIBOU OBSERVATION
- 2020 CARIBOU OBSERVATION

0 4 8
1:200,000 KILOMETRES

NOTE(S)

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3. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS. NAD83 CSRS UTM ZONE 10N

CLIENT
OSISKO DEVELOPMENT CORP.

PROJECT
CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE
MOUNTAIN CARIBOU OBSERVATIONS RECORDED IN THE CARIBOU ASSESSMENT AREA DURING REMOTE CAMERA SURVEYS (2011 TO 2021) AND WINTER TRACK SURVEYS (2016 TO 2021)

CONSULTANT
wsp

YYYY-MM-DD	2025-06-12
DESIGNED	TS
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
1774160	43100	0	4-3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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4.2.2.1 Tactical Plan for Southern Mountain Caribou

The CMMP considers the technical report *A Tactical Plan for Restoration of Habitat for the Southern Group of Southern Mountain Caribou* (hereafter the Tactical Plan; Cichowski et al. 2021). The scope of the Tactical Plan is to guide restoration priorities and provide prioritization of restoration areas at the range level and group level over the next 20 years. The range level sets priority zones within individual herd boundaries and priorities for linear features, while the group level sets the priority among herds (Cichowski et al. 2021). The Barkerville herd was ranked as Priority 3 out of four in the Tactical Plan at the group level due to the existing high density of roads in core habitat (Cichowski et al. 2021).

The Tactical Plan identified over 40,000 km of high and moderate priority features for restoration in BC, over 6,000 km of which are in High Priority Restoration Zones. The Tactical Plan sets out next steps for prioritizing restoration within the High Priority Zones, as the cost to restoration is high; at this time, no timeline is available for when priority areas will be restored (Cichowski et al. 2021).

The Project footprint and Mine Site outside disturbance areas were spatially intersected with the priority restoration features and Priority Restoration Zones as identified by the Tactical Plan, to identify areas of overlap. Priority restoration features are individual linear features that are ranked in terms of priority for restoration based on selection criteria for an individual herd. Priority Restoration Zones combine ratings for linear feature density in each priority class, total linear feature density, proportion of habitat protection, and proportion of overlap with core habitat within each meso-watershed to develop Priority Restoration Zones. Priority Restoration Features and Priority Restoration Zones are ranked in the following hierarchy: high, moderate, low, and nil (Cichowski et al. 2021). There is no overlap of the Project with High Priority Restoration Zones.

The Project overlaps 12.1 ha of High Priority Restoration Features and 148.9 ha of Moderate Priority Restoration Features within the Barkerville herd boundary (Table 4–8). In addition, the ZOI for the Project overlaps an additional 1,320.1 ha of High Priority Restoration Areas and 13,987.0 ha of Moderate Priority Restoration Areas within the Barkerville herd boundary. Restoration priorities are to restore linear features as quickly as possible to reduce predator travel and hunting efficiency (Cichowski et al. 2021). A summary of overlap of the Project with Priority Restoration Features and Priority Restoration Zones is provided in Table 4–8.

Table 4–8: Overlap of the Project and Zones of Influence with Priority Restoration Zones and Features from the Tactical Plan

Priority Level of Restoration Zones and Features	Overlap with Project (ha)	Overlap of the Zone of Influence of the Project (ha)
Priority Restoration Zones		
High	0	0
Moderate	166.9	6,533.7
Low	191.9	12,551.4
Nil	127.5	11,219.6
Priority Restoration Features		
High	12.1	1,320.1
Moderate	148.9	13,987.0
Low	79.5	9,620.6
Nil	246.4	5,377.0

Notes: ha = hectare

4.3 Population Structure and Dynamics

4.3.1 Population Size

Evidence suggests that, historically, mountain caribou were plentiful in the Cariboo Plateau, Quesnel Highlands, and Bowron Valley. Population estimates from this time period are largely unavailable. The mountain caribou population near Quesnel likely declined in the early 1900s and disappeared in the 1930s or 1940s. In the western and northern portion of the CAA, the mountain caribou population near the Willow River and Bowron River also declined during the 1930s; however, this population remains today as part of the Barkerville Herd (Spalding 2000).

Population census surveys for the Barkerville sub-population were conducted from 1991 to 2006, 2011 to 2013, and 2016 (Dodd 2016). Population data collected in the 1990s and early 2000s indicated a relatively stable sub-population with low growth (Freeman 2012). The 2012 survey had high sightability, and a total of 75 caribou were counted in the census area, resulting in a population estimate of 90 animals (Freeman 2012). In 2016, 51 caribou were observed in the Barkerville sub-population, and the population was estimated to be 72 animals (Dodd 2016). The most recent population estimate for the Barkerville sub-population is 50 individuals in 2023 (Bsteh 2024a, pers. comm.).

Population trends for the Barkerville sub-population are conflicting. The Barkerville sub-population is declining approximately 17% annually (WLRS 2024b) and 23% annually (Bsteh 2024a, pers. comm.) by some reports. This is a result of intense disturbance within the herd boundary of the Barkerville sub-population, which has led to an increase in apparent competition and mortality (WLRS 2024b). The Barkerville herd was added to the predator reduction program for winter 2023-2024 due to continued population decline (WLRS 2024b). Wolf

control measures were implemented in the winter of 2023-2024 and 14 wolves were removed by helicopter-based aerial shooting measures (WLRS 2024b). Density estimates for wolves in the Barkerville herd boundary were estimated to be 2.2 wolves / 1000 km^2 following wolf removal in 2023-2024 (WLRS 2024b). Conversely, the Tactical Plan found the population trend for Barkerville to be stable, albeit with fewer than 100 animals, and it was ranked as one of the lowest priority among the extant herds for restoration (Cichowski et al. 2021).

Although the Federal Recovery Strategy for Southern Mountain Woodland Caribou estimated the current and long-term population trend as increasing (EC 2014), subpopulation estimates from 2020 of the Barkerville herd indicate that the herd is "decreasing," having declined by 26% from 88 individuals in 2012 to 65 individuals in 2020 (Government of BC 2021a).

Calf recruitment has also been estimated during provincial population census surveys. To ensure persistence or growth of a population, calves should make up at least 15% of the population (Bergerud 2007), and recruitment below 10% to 12% is considered below the threshold to balance natural mortality (Government of BC [date unknown]a). Calf recruitment has been variable in the Barkerville sub-population surveys, ranging from a low of 6.7% in 1996 to a high of 25.7% in 2001, but predominately has been below stable levels (Dodd 2016). In 2016, calf recruitment was estimated to be 11.8% (Dodd 2016). The 2023 Quesnel Highlands Population Survey determined the calf percentage for the Barkerville herd was 17.1%, which is above the 15% threshold for a stable caribou population (Gannon 2023).

Based on the information available, the Barkerville sub-population is a small herd that has been declining in recent years. Calf recruitment within the herd has been below stable levels to sustain natural mortality in recent years.

4.3.2 Mortality Risk

Access (e.g., roads, trails, seismic lines, pipelines, transmission lines, and mines) provides increased opportunities for humans and predators to use an area, which can result in increased caribou mortality from human hunters and poachers (Seip and Cichowski 1996; Jalkotzy et al. 1997; James and Stuart-Smith 2000; Hatter 2000), and mortality from wolf predation, as access provides ease of movement into previously less accessible areas (Horejsi 1979; Bergerud et al. 1984; James and Stuart-Smith 2000). Linear features that allow vehicular use (e.g., snowmobiles) also provide more opportunities for wildlife travel because vehicles compact snow. Accessibility for predators, specifically wolves, increases because snow compaction facilitates movement through areas with deep snow (Shideler et al. 1986; James and Stuart Smith 2000), and increased predation rates may result.

Wolf predation is the suspected cause of low caribou calf recruitment and declining caribou populations in BC, including in Quesnel Highland Unit 5B (Seip 1992, CCLUP 2000; Roorda and Wright 2010). The Quesnel Highland wolf project was initiated in 2001 to reduce the number of wolves preying on caribou to a recommended density of 6.5 wolves/1,000 km^2 (Bergerud 2007)

and used a combination of lethal control of sub-dominants and sterilization of dominant wolves (Roorda and Wright 2010). Between 2001 and 2004, 16 wolves were sterilized, and 30 wolves were removed, and there was an observed increase in caribou calf recruitment in 2004 in the Quesnel Highlands planning unit. Between 2007 and 2010, an additional 35 wolves were sterilized and 48 removed; the wolf density in 2010 was estimated to be 6.4 wolves/1,000 km^2 in the Quesnel Highland caribou core and matrix habitat study area (Roorda and Wright 2010). In addition, wolf control measures were implemented in the winter of 2023-2024 and 14 wolves were removed by helicopter-based aerial shooting measures (BC WLRS 2024b).

Telemetry data collected between 1993 and 2010 in the Barkerville sub-population range showed an overlap of wolf and caribou habitat use when caribou moved to lower elevations (below 1,500 m) during April and May (the calving period) and in October and November (Roorda and Wright 2010). Linear features may increase access and travel efficacy of predators, which increases predation risk for ungulate species. Previous studies have found that wolves select seismic lines over other available habitat and, in particular, select seismic lines with low vegetation height (Pigeon et al. 2020). Seismic lines with low vegetation height likely provide easier travel for wolves and facilitate searching for prey (Pigeon et al. 2020).

Declines in caribou populations are linked to increases in moose and deer populations, which sustain a higher density of predators (Seip 2008). In the Cariboo Region, moose did not become numerous until after the early 1900s (CCLUP 2000). In addition to wolf control, moose harvest quotas in the Quesnel Highland region were increased beginning in 2001 as a mechanism to decrease alternate prey density. Moose densities in 2008 were below average densities in adjacent parts of the province, and recruitment was estimated to be lower than that required to stabilize a population, indicating that moose populations were not a main contributor to high wolf populations (Hayes 2013).

There is a very limited risk of human-caused mortality from hunting. Recreational hunting of caribou is not permitted in Provincial Wildlife Management Unit 5-15, where the Project is located (MOF 2022). In addition, many Indigenous nations have voluntarily stopped subsistence hunting of southern mountain caribou (EC 2014). However, increased access to the region from roads may result in some limited poaching.

Vehicle mortality affects virtually all wildlife species and has been the topic of several literature reviews (Kelsall and Simpson 1987; Jalkotzy et al. 1997). Road mortalities may cause a decline in local populations, but are generally site- and species-specific. Frequencies of road mortalities are often related to type of road, location, traffic volume, and speed (Jalkotzy et al. 1997). Information available up to 2024 indicates there have been no vehicle collisions with caribou on ODV's mine roads (Dodd 2024 pers. comm.). Disturbance along the transportation route will remain at a similar level as what was experienced during the Bonanza Ledge Phase II work.

5. MITIGATION HIERARCHY

Mitigation measures for the Project follow the mitigation hierarchy outlined in the provincial Procedures for Mitigating Impacts on Environmental Values (MOE 2014b):

- Level 1: Avoid;
- Level 2: Minimize;
- Level 3: Restore on-site; and
- Level 4: Offset (off-site or on-site) or Compensate.

The mitigation measures included in this CMMP are intended to reduce potential adverse effects to caribou. The mitigation measures follow provincial and federal standards, best management practices, and guidelines. ODV will consider all practical solutions before moving down the hierarchy of mitigation options. For each mitigation level, the type of mitigation approach, the results and discussion of the effectiveness of the mitigation measures, and the rationale for moving to the next mitigation level are described.

5.1 Avoid

5.1.1 Approach

Location

Avoidance of mountain caribou matrix and core all-season habitat was considered early in the mine planning process. While full avoidance of matrix and core all-season habitat was not achieved, ODV considered siting and routing options for Project components that avoided undisturbed habitat.

No Project-related physical habitat alteration, indirect/sensory disturbance, disturbance to movement, or indirect mortality will occur along the Transportation Routes, which will use pre-existing highways and FSRs for access and material transport. Vehicle traffic is anticipated to be a similar level as what was experienced during Bonanza Ledge Phase II.

The Project footprint avoids new disturbance based on Environmental Canada's (EC 2014) definition of disturbed caribou habitat. The Project footprint is 979.9 ha, where new disturbance from the Project will occur. The Project footprint is sited in areas of existing direct disturbance (733.4 ha) and existing indirect disturbance (246.5 ha). In addition, all areas within the ZOI for the Project are also considered disturbed or indirectly disturbed at existing conditions, a part from 0.7 ha of new indirect disturbance. Given the location of the Project, avoidance of new disturbance and new indirect/sensory disturbance was high priority, and achieved through Project siting, which will reduce residual effects from the Project on caribou.

The Transmission Line ROW will parallel existing FSRs and previously disturbed areas. In selecting access roads for the Transmission Line, existing roads and upgraded roads (i.e., existing roads requiring upgrades, such as clearing and re-grading) were prioritized. The Transmission Line ROW, which is included in the Project footprint, is located in areas that are considered directly or indirectly disturbed at existing conditions, based on the ZOI recommended by WLRS from Palm ([date unknown]). The Transmission Line, including new access roads, avoids creating new indirect disturbance. In addition, spanning of watercourses by the Transmission Line will be used to avoid impacts on water crossings and surrounding riparian habitat. This will provide full habitat connectivity on either side of the Transmission Line at watercourses.

ODV will continue to seek avoidance of caribou and caribou habitat through careful planning and refinement of the Project during detailed design when pole locations and access points for the Transmission Line will be identified.

Timing

Mountain caribou sensitive periods generally occur from late winter (January) through the calving season (mid-July). The Notice of Work Permit Conditions and Operational Guidance for Mineral Exploration Activity in Mountain Caribou Habitat restricts exploration activities during the peak calving period of May 15 to June 15 in WHA 5-088 and WHA 5-117 identified mountain caribou habitat in the Quesnel Highlands (EMPR 2010). ODV's exploration plans overlap small areas of WHA 5-088 and 5-117, but ODV recognizes the importance of limiting exploration activities during important life history phases for mountain caribou. Therefore, ODV does not conduct exploration activities in mountain caribou core all-season habitat (MOE 2011) during the calving or post-calving period of May 15 to July 15, unless prior approval from WLRS is obtained.

There is no guidance to restrict mining activities in the Quesnel Highland during the calving period. Mining operations, within the currently disturbed footprint, will be ongoing during this time, including those areas used for the Project at the Mine Site Complex, Bonanza Ledge, and QR Mill.

In addition, no Project-related activities will occur within 1 km of Mt. Tom during the calving or post-calving period (May 15 to July 15) without written support from the BC Ministry of Forests (MOF) and the WLRS, including aerial flights and operations. The area of avoidance within 1 km of Mt. Tom has been provided by WLRS. Project-activities that will not occur during this time include any clearing, use of heavy equipment, and helicopter work.

The Transmission Line is predominantly located in matrix caribou habitat, which is important for seasonal caribou migration between core all-season habitat. The Transmission Line ROW is located within areas of low elevation, which may be used by caribou in late winter and early spring. However, mountain caribou in the Quesnel Highlands do not have a well-defined seasonal migration and typically range from high to low elevation habitat within their home range (Government of BC [date unknown]a, Seip 1992). This makes scheduling avoidance time periods challenging for construction. However, ODV will avoid work during the critical calving and post calving period, which extends from May 15 to July 15. Project- activities that will be avoided include any clearing, use of heavy equipment, and helicopter work. In addition, outside this period,

if caribou are encountered in active or planned construction areas or along Project roads, they will be given the ROW and provided time and space to move safely out of the area before work proceeds.

5.1.2 Results and Discussion

Project planning and design has adjusted the Project to maximize use of existing disturbance in the CAA. There is no option for additional physical avoidance of mountain caribou habitat during Project activities because of the location of underlying gold deposits. The Project will result in an increase in the amount of directly disturbed habitat relative to existing conditions that may otherwise be available for reclamation or restoration earlier. The Project will also increase or continue to cause indirect disturbance to additional habitat due to Project-related activities, including noise and light, which may otherwise be suitable habitat if no sensory disturbances were present. Forestry within the CAA accounts for 24.3% of the direct disturbance at existing conditions. Cutblocks included in the disturbance layer range in age from 1983 to 2023. For many herds of southern mountain caribou, forestry is still the leading disturbance contributing to the annual loss of caribou habitat (Nagy-Reis et al. 2020).

5.1.3 Rationale for Moving to Minimize

The option of extracting gold while avoiding all core all-season mountain caribou habitat is not possible due to the location of the resource. The Project is unable to avoid core all-season and matrix mountain caribou habitat entirely and will overlap 149.0 ha of core all-season habitat, 220.0 ha of matrix range, and 611.0 ha of unmapped range caribou critical habitat. Therefore, efforts to minimize effects to mountain caribou from the Project will be implemented and are described in the next section.

The Project will result in 0.7 ha of new indirect disturbance within the ZOI of the Mine Site Complex, Bonanza Ledge, QR Mill, the Transportation Route, and the Transmission Line ROW; however, the remaining 57,895.4 ha are disturbed or indirectly disturbed at existing conditions. However, given the life of the Project (approximately 12 years to reach closure), this will maintain indirect disturbance in areas that may be progressing towards undisturbed habitat for caribou. Therefore, additional measures to minimize potential impacts from the Project to caribou have been developed.

5.2 Minimize

5.2.1 Approach

The following mitigation measures will be implemented to minimize Project effects to mountain caribou components within the areas of the Project that overlap the CAA. Where mitigation measures cannot be implemented as indicated below, consultation with MOF and WLRS would occur to determine alternative mitigation.

Location

- The Project footprint and Mine Site outside of New Disturbance are sited in areas that are classified entirely as disturbed habitat based on the ECCC (EC 2014) definition. The Project footprint has been sited on 733.4 ha (74.8% of the Project footprint) of existing direct disturbances, such as roads and cutblocks, and 246.5 ha (25.2%) of existing indirect disturbance due to proximity (i.e., within the ZOI) to existing anthropogenic disturbances.

Vegetation Clearing

- Vegetation clearing, soil stripping, grubbing, and grading for construction, temporary workspaces, or storage areas will occur only within the Project footprint.
- ODV will continue to consider options to reduce disturbance to caribou habitat through careful planning and refinement of the Project footprint during detailed design. For example, pole locations for the Transmission Line and access points will be located and sited to maximize use of existing disturbance. Locations where clearing is to be narrowed or avoided to preserve existing vegetation will be clearly marked in the field, in the Construction Environmental Management Plan (CEMP), and on alignment sheets.
- A pre-disturbance survey will be conducted to flag vegetation patches to be retained during construction of the Transmission Line. Surveyors will identify locations where game trails cross the Transmission Line and flag the limits of clearing to retain vegetation along game trails. A QP will be on-site, during construction of the Transmission Line within the CAA to provide recommendations for site-specific mitigation and to help determine mitigation that are feasible for construction and operations.
- Vegetation clearing within the Transmission Line ROW and temporary workspaces will be limited (minimized) to what is necessary to facilitate construction and as permitted by the BC Energy Regulator.
- No vegetation clearing or maintenance within the Transmission Line ROW will occur if caribou are observed within 500 m of the construction or maintenance area,.
- Vegetation cover will be maintained in areas adjacent to road corridors, waste rock spoils, and Project activities as prescribed in the Vegetation Management Plan (ODV 2024b).
- A detailed vegetation clearing and maintenance program will be developed for the Transmission Line to minimize the amount of habitat alteration and to retain vegetation along the ROW. The objective of the vegetation clearing and maintenance program will be to maintain intact habitat patches that cross the Transmission Line ROW during construction and operations. Areas to be maintained as retained vegetation will be site-specific to focus on habitat connectivity and habitat patches that will facilitate movement to and from caribou calving areas. For example, the WLRS defined caribou movement area that intersects the Transmission Line will be a high priority location to maintain intact habitat patches across the ROW. Where new disturbance is required for construction of

the Transmission Line, clearing will be limited to the minimum areas required for new access roads and construction pads required for installation of the poles. Clear-cutting between Transmission Line poles will not be used in areas of new disturbance. Areas of retained vegetation along the Transmission Line will not be cleared to a height shorter than 3.0 m (10 feet) except where topography or construction methods require lower vegetation for safe access. Maintaining habitat patches will also decrease the potential for indirect mortality to caribou from predators. Examples of areas under consideration for vegetation retention are provided in Figure 5–1 and Figure 5–2.

Figure 5–1: Example of area under consideration for vegetation retention along the Transmission Line Right-of-Way (Google Earth Pro 2024a)

Figure 5–2: Example of area under consideration for vegetation retention along the Transmission Line Right-of-Way (Google Earth Pro 2024b)

- Habitat patch areas to be retained will consider the current forestry operations already conducted in the area. The vegetation clearing and maintenance program will be developed with inputs and feedback from MOF, WLRS, and Indigenous nations.
- Areas identified for prescriptive vegetation clearing in caribou movement areas will be delineated in the field.
- ODV will consult with West Fraser on a strategy for revegetation where forest harvest has occurred within the Transmission Line ROW, prior to construction. Where clearing for the Transmission Line results in loss of pre-existing seedlings outside of Project infrastructure footprints, ODV will initiate early habitat restoration with prescribing site preparations, such as excavator mounding or screening (i.e., to clear and expose mineral soil for seedling planting), followed by seedling planting within one growing season following construction.
- Temporary areas of vegetation clearing in caribou movement areas will be progressively revegetated, by planting conifer seedlings within the disturbance area, once construction within the area is complete. This includes planting conifer seedlings within the Transmission Line ROW. Vegetation management along the Transmission Line ROW will include topping trees if they are approaching the limits of approach. The vegetation will be maintained according to the Project Vegetation Management Plan (ODV 2024b) for the duration of operations.

- Seedling prescriptions, including species and densities, will be appropriate to the adjacent natural ecosystem (which will be determined from TEM). Dominant canopy species will include Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*). The Operational Restoration Framework – Woodland Caribou Habitat Restoration in British Columbia (FLNRORD 2021) will be followed to guide seedling prescriptions.
- Timber will be felled onto the Transmission Line ROW during clearing to minimize damage to vegetation off the ROW. Where felling cannot occur onto the Transmission Line ROW due to safety concerns, the tree will be felled and then pulled back onto the ROW. Damaged or hazard trees will only be removed to address safety concerns. Salvaged timber and coarse woody debris will be retained at locations identified for access control, for erosion control, and to enhance seed germination and seedling survival. Access control measures will reduce the potential effects of indirect mortality.
- Danger trees adjacent to the clearing boundaries that are currently wildlife trees, or have the potential to become wildlife trees, will be topped to remove the hazard while still allowing caribou to access lichen or provide a site for lichen to establish. Trees will be assessed by a Professional Forester.
- Retention of vegetation, as well as use of coarse woody debris or felled trees, will be strategically undertaken to provide an access control or line of sight barrier. Details will be included in the CEMP and alignment sheets for implementation during construction.
- Mature coniferous trees may be de-limbed, as required (e.g., for work safety), with the stumps and limbs retained on-site to provide a seed source. Where the limbs and stumps cannot be retained on-site (e.g., Mine Site), they will be moved to a useable location of recent disturbance if the timing aligns (e.g., Transmission Line or progressive reclamation). Retaining limbs and trees on site maintains cones or seeds attached to the limbs on site.
- Live trees that have been limbed and large diameter limbs left on site will be monitored and treated for relevant forest health pests. Pests rated as high or moderate for the Quesnel Natural Resource District Forest Health Strategy will be the focus of monitoring and treatment, and treatment will follow regional and district forest health strategies (Heppner and Hyam 2020). This is applicable to all mitigation measures where live trees or portions of live trees are planned to be felled and left on site. Monitoring would be conducted by a QP familiar with the identification of forest pathogens and pests, and would provide recommendations for treatment consistent with Provincial regulations and guidelines. Monitoring would occur annually for two years following construction.
- Invasive plant management techniques will be implemented according to the Invasive Plant Management Plan (ODV 2024c).
- During continuous progressive reclamation of the Mine Site disturbance area and Transmission Line ROW, grass seeding will only be used where there is an immediate need

for sediment and erosion control. This will minimize foraging-attractant and will discourage wildlife from entering the reclamation area.

- Trees and branches with arboreal lichen coverage from the Mine Site will be placed in areas to be progressively reclaimed and/or placed on the Transmission Line ROW to act as barriers to movement and slow predators down, as well as to provide nutrients to support natural recovery of vegetation following construction.
- Winter harvesting and prescription works within 1 km of Mt. Tom will not use ground scarification.

Access Management

- Measures to reduce access (human and predator) will be implemented along the Transmission Line except where access roads are required for maintenance during operations. Measures may include, but are not limited to, planting tree seedlings in select locations to facilitate rapid regeneration of natural vegetation following construction, blocking access entry points using site preparation techniques (e.g., mounding), rollback, boulder barriers, earth berms, or locked gates. The location of barriers to movement and access control measures along the Transmission Line will be determined in consideration of consultation with provincial regulatory authorities. Measures to discourage recreational use of the access roads will include gates and signage on the importance of the area for caribou.
- Access roads during operations will be limited to 4 m width and will follow a zig-zag path to limit line of site for predators. Access roads will be controlled using a barrier (e.g., locked gate) to prevent human access. Retention of vegetation, as well as use of coarse woody debris or felled trees, will be strategically undertaken to provide an access control or line of sight barrier to predators. Details will be included in the CEMP and alignment sheets during construction.
- Access control barriers will be placed in areas where progressive reclamation is underway on the Mine Site.
- Where the Transmission Line does not parallel an existing ROW, access control barriers will be created at intersections with other linear features, where access is not required for maintenance. Access control barriers may include rollback/use of coarse woody debris, excavator mounding, fencing, and/or hand cutting vegetation. ODV is committed to progressive reclamation during all phases of the Project. These access control measures will be installed during Project construction and operations (contingent on road license holders) and on access roads no longer required for ongoing access and as part of overall decommissioning of the Project.
- Line of sight breaks will be installed on the Transmission Line ROW every 20 m with the use of woody debris retained in piles at a minimum height of 1.5 m and of varying width depending on material available.

- Retention of vegetation, as well as the use of coarse woody debris or felled trees, will be strategically implemented within areas undergoing progressive reclamation to provide nutrients to support seedling establishment, access control, or line of sight barriers. The location of vegetation retention areas will be included on alignment sheets used during construction of the Transmission Line.
- Snow plowing on roads within caribou habitat will only be conducted where access is required by Project traffic to minimize predator access. Snow plowing will only be conducted if necessary for access and breaks in snow plowing will be created every 200 m.
- The Transmission Line ROW overlaps a snowmobile closure area for approximately 1.5 km. Within this area, access to the Transmission Line ROW will be along an existing road. To limit snowmobile access to the snowmobile closure area, the following access controls will be implemented:
    - Conduct snow plowing along the road segment that overlaps the snowmobile closure area will only be conducted by ODV during winter if access is required for maintenance.
    - Establish a trail camera to document snowmobile use and violations of the snowmobile closure area.
    - Deactivate the upgraded road that overlaps the snowmobile closure area at the conclusion of construction subject to rights of overlapping tenure and permit holders.

Barriers to Movement

- Snowbank height along Project roads will be managed and will include periodic gaps or escape pathways. These will be developed in consultation with a wildlife QP and will target providing gaps at wildlife trails and/or on a frequent basis.
- The Transmission Line will span watercourses maintaining intact riparian habitat that will function as barriers to movement along the ROW, as well as vegetation patches.
- Natural vegetation patches will be maintained along the Transmission Line, which will function as barriers to movement. Patches of vegetation that are maintained provide a seed source to encourage natural revegetation. The location of natural vegetation patches will be provided on alignment sheets.
- Retention of vegetation, as well as use of coarse woody debris or felled trees, will be strategically undertaken to provide an access control or line of sight barrier. In addition, mature trees may be de-limbed, as required (e.g., for work safety), with the stumps and limbs retained on-site to provide a seed source.
- Mine facilities with potential to entrap wildlife, such as ponds or ditches, will be designed to allow for the safe passage of wildlife.
- Barriers, such as fencing or wire barricades, will be installed during construction to prevent caribou from entering active construction areas.

- If mining activities appear to be interfering with wildlife movement through the Mine Site, the General Manager will temporarily suspend activities until the animals have safely departed the area, unless it poses a safety to risk to workers or wildlife. Temporary suspension of work in one area will not affect work sited away from the wildlife observation.

Spill Prevention

- Employees and contractors working with machinery will be trained in proper fuel transfer procedures and standard operating procedures for spill prevention.
- Equipment will be inspected and maintained as required to minimize losses of hydraulic fluids, lubricants, or fuels.
- Waste streams will be managed so as not to create a wildlife attractant.
- Hazardous materials, including batteries, petroleum products, sewage, or contaminated soil will be transported off-site and disposed of in accordance with the Transportation of *Dangerous Goods Act*.

Aerial Operations

- Aerial operations during construction and operations will maintain a 2 km horizontal distance from mineral licks (FLNRO 2014).
- Aerial operations will maintain a 2 km horizontal separation distance from caribou. If a caribou is observed during aerial operations, the aircraft will re-route to maintain a 2 km horizontal separation distance (WLRS 2024b).
- Helicopter and fixed-wing flights will be limited to 500 m above ground level over-flight elevation and no circling for all winter range (November 15 to May 14), mineral licks (year-round), or birthing areas (May 15 to July 15) (FLNRO 2014, WLRS 2024b).
- No direct flight approaches will be made to aggregations of caribou, animals with young, or special features, such as mineral licks (FLNRO 2014).
- WLRS will be notified prior to ODV conducting wildlife monitoring surveys (aerial or ground) within the Barkerville herd boundary.
- Aerial wildlife surveys will not be conducted within the Barkerville caribou herd boundary for the purposes of monitoring related to the Project. However, aerial wildlife surveys are required to meet EA conditions and will be conducted to meet these conditions. The following mitigation will be applied and pre-construction aerial monitoring surveys have been approved by WLRS for the Project (Watters 2025, pers. comm.).
    - Aerial wildlife surveys will be conducted in the Barkerville herd boundary, but will not occur during the critical calving periods (May 15 to July 15) within 1 km of Mt. Tom.
    - If caribou are observed during arial wildlife surveys, the machine will move out of the vicinity and WLRS will be notified of the observation.

- If further aerial wildlife surveys are required for the Project, ODV will seek approval from WLRS and follow the above mitigation.

Mineral Licks

- Pre-construction ground surveys will be conducted to identify site-specific habitat features, such as mineral licks. Setback and/or timing windows will be implemented for identified habitat features (as will be defined in the Wildlife Management Plan; ODV 2024d). Mineral licks that are identified will be marked. Additional details on mineral lick surveys are provided below:
  - Mineral licks will be identified in the field during aerial-based surveys or opportunistically during other ground-based wildlife surveys. A mineral lick can be generally recognized as one of three types (ENV 2019):
    - Wet or mucky mineral licks found in seepage areas;
    - Dry earth exposures such as clay or lacustrine deposits found above river cutbanks; and
    - Rock face mineral licks.
  - Surveys for mineral licks will be conducted by QPs familiar with the identification of mineral licks, and the guidelines for identification of mineral licks provided in ENV (2019) will be followed. Buffers for mineral licks would be maintained year-round.
  - In the event that a buffer for a mineral lick cannot be maintained year-round, a QP will develop feature/site-specific mitigation measures to avoid, minimize, or offset disturbance to a mineral lick. This mitigation plan will be implemented during construction.
- Use of identified mineral licks by wildlife will be monitored before and during construction and operations using remote cameras. Cameras will be checked, and photos downloaded once every three months.
- A 500 m buffer around known mineral licks will be retained, in which no construction or operation activities will occur, to reduce sensory disturbance. Natural drainage leading to the mineral lick will be maintained. If there are circumstances where a 500 m buffer cannot be maintained, consultation with a QP will be required to identify alternative mitigation measures.
- An undisturbed path for ungulate access will be maintained from existing game trails to identified mineral licks. If a mineral lick is compromised by Project Activities, ODV will consult with the appropriate regulating bodies (i.e., WLRS) on the method of management.
- Locations of mineral licks will not be made available to the public.

- A contractor will be retained on-site during pre-construction ground surveys to address the need for site-specific decisions that may be required to account for operational feasibility of the mitigation.
- No aerial operations will be conducted around confirmed mineral licks.

Sensory Disturbance

- Vegetation cover will be maintained in areas adjacent to road corridors, waste rock spoils, and Project facilities as prescribed in the Vegetation Management Plan (ODV 2024b).
- ODV will comply with appropriate regulatory requirements related to noise during Project construction and operations to minimize disturbance related to noise.
- If caribou are encountered in active construction areas or along Project roads, they will be given the ROW and provided time and space to move safely out of the area. Project personnel will be required to turn off high-beams and will not be allowed to use vehicles or horns to encourage the caribou to leave the area. The observation will be reported to WLRS (i.e., The Caribou Recovery Program). Temporary suspension of work in one area for caribou sitings will not affect work in areas sited away from the observation.
- No vehicle alarms will be armed if caribou are in the vicinity of the vehicle.
- The use of off-road or recreational vehicles (e.g., All Terrain Vehicles, snowmobiles) will be prohibited at the Project unless appropriate approvals have been obtained.
- Light mitigation will be prepared as part of the lighting plan. Mitigation measures proposed for caribou include: low lighting and/or task lighting (e.g., downturned shaded fixtures to prevent sky-lighting) will be used, building lighting will be put on sensors, and a higher lumen/watt ratio will be used on all new buildings or building expansions.

Traffic Management

- Speed limits will be implemented and posted on all non-highway access roads to reduce the risk of wildlife-vehicle collisions and to suppress dust, minimizing potential impact on adjacent vegetation. Maximum allowable speed limits are outlined in ODV's Road Use Policy.
- Signage will be posted at known high-use areas to reduce the risk of wildlife-vehicle collisions, and along access roads, to highlight the importance of the area for caribou to discourage recreational use of the area.
- Roadside vegetation will be mowed to increase visibility of wildlife.
- The Traffic Management Plan will incorporate wildlife mitigation measures, including mowing roadside vegetation.
- Use of salt for road traction will be prohibited.

Worker Education

- Project personnel will receive a mandatory site orientation, which will address specific education on mountain caribou. This will include specific procedures for minimizing harassment of caribou, immediate reporting of encounters, and methods to minimize caribou-vehicle collisions.
- A no wildlife harassment policy will be implemented at the Project.
- Hunting and the possession or use of firearms, including carrying personal firearms in vehicles, will be prohibited on-site.
- Pets will be prohibited on or in the vicinity of the Project.
- Project personnel will report caribou observations using Wildlife Sightings Cards.

Project Construction and Mine Operations

- Implement measures to manage fugitive dust, including:
  - Regularly maintaining roads in good repair;
  - Installing wind breaks or fences around problem areas known to generate fugitive dust;
  - Reducing drop heights during material transfer;
  - Optimizing the operation of equipment to reduce dust generation (e.g., reducing vehicle speeds);
  - Optimizing site layout to reduce travel distances; and
  - Using dust suppressants, as needed and if temperatures permit, to mitigate dust generation at work areas, along unpaved roads, for tailings, and at storage piles.
- If mining activities appear to be interfering with wildlife movement through the Project area, the General Manager will temporarily suspend activities until the animals have safely departed the area. Temporary suspension of activities in one work area will not impact work in areas sited away from the observation.
- Explosives will be stored on-site in approved explosive magazines, and any handling of explosives or blasting activities will follow relevant standard operating procedures to prevent the potential for ammonium contamination.

5.2.2 Results and Discussion

Mitigation measures that minimize Project effects are based on provincial guidelines, best management practices, or regulatory requirements, and are generally considered effective (Section 7.8.5.3 of the EAC Application; ODV 2022). However, residual effects to caribou components are still anticipated following implementation of mitigation, as described in Section 6, due to residual direct impacts and indirect impacts, such as sensory disturbance, that will persist for the life of the Project.

5.2.3 Rationale for Moving to Restore On-site

Despite mitigation measures to minimize Project effects to mountain caribou components, the Project is still predicted to affect caribou habitat. Therefore, mitigation measures will be implemented to restore the affected mountain caribou habitat in the Project footprint and offsetting options in the CAA will be identified to address time lags and uncertainties with restoration on-site.

5.3 Restore On-site

5.3.1 Approach

The restore on-site approach for this CMMP uses the framework provided in the Open Standards for the Practice of Conservation (CMP 2020). The Open Standards bring together common concepts and approaches in restoration design, management, and monitoring from over two decades of research on principles and best practice in adaptive management-based restoration (CMP 2020). In addition, the CMMP uses guidance from the Provincial Operational Framework for Woodland Caribou Habitat Restoration (FLNRORD 2021), which seeks to provide a common approach to the planning, implementing, and monitoring of restoration for woodland caribou in BC. The Provincial Operational Framework (FLNRORD 2021) focuses on highlighting approaches that have proven successful in caribou restoration.

As discussed above (Section 4.2.2.1), the CMMP considered the Tactical Plan for Southern Mountain caribou that outlines high, moderate, low, and nil priority areas for restoration (Cichowski et al. 2021). The Project does not overlap any High Priority Restoration Zones. Where the Transmission Line or new build access roads overlap with High or Moderate Priority Restoration Features based on the Tactical Plan, ODV will prioritize these areas to be restored following construction. Those areas that were not identified as a priority feature, or were rated as low and nil priority features for restoration, will be prioritized as access areas during operations . Restore on-site will follow progressive reclamation within the portions of the Project that overlap the CAA.

ODV will conduct reclamation research programs, and work with Indigenous nations and/or other organizations to implement successful reclamation and closure prescriptions. Within the CAA, ODV will restore the Project footprint, including the Transmission Line ROW, where understory vegetation clearing and grubbing occurs, to suitable habitat for caribou. Progressive reclamation activities for the Mine Site Complex, Bonanza Ledge, and QR Mill will be reported to the MCM annually in the Annual Reclamation Reports. Progressive reclamation activities conducted within the Project footprint relevant to caribou are described in Section 5.3.5.

5.3.2 Reclamation Research Planned

The objective of reclamation research is to improve knowledge around potential limiting factors for reclamation success, which can be used to improve overall reclamation for the Project.

Reclamation research is still in the planning stages; however, ODV is committed to advancing reclamation related research to reduce uncertainties in knowledge gaps and to improve the outcomes of reclamation success. The reclamation research program and progressive reclamation activities will be undertaken by mine personnel or management under the direction of ODV's Environmental Department. This will be supported by use of reclamation specialists, biologists, geochemists, hydrologists, and water resource civil/geotechnical engineering consultants. Results from other reclamation activities within the region will be reviewed to improve knowledge and the advice of Indigenous partners and suppliers will be sought out.

Reclamation research planned that will help improve the success of final on-site restoration of both core all-season and matrix habitat for caribou includes:

- The design of soil cover systems and cover trials to evaluate decompaction, soil replacement depths, nutrient availability, and supplement requirements. This will be investigated at the C Road borrow pit now that the non-potentially acid generating (NPAG) backhaul and contouring are complete. Suitable soil and growing medium will be required to successfully establish trees and understorey vegetation during final restoration of habitat for caribou.
- Vegetation success monitoring to evaluate the viability of revegetation with native species, including culturally important species, and to develop monitoring performance criteria. Progressive reclamation provides an opportunity to experiment with initial stocking amounts to determine whether the prescribed stocking level, described in Section 5.3.5, will establish the desired outcome for mountain caribou habitat. In addition, progressive reclamation provides an opportunity to experiment with planting a variety of understorey species.
- Arboreal lichen transplant research to evaluate the success of transplanting lichen onto standing trees.
- The implementation of a vegetation study to assess metal uptake in target terrestrial ecosystems of reference sites and sites within the Bonanza Ledge Mine footprint (Note: this was conducted in September 2018 by Golder).
- The design of studies to evaluate and restore habitat suitable for caribou in collaboration with ENV, MOF, and WLRS.
- Human Health and Ecological Risk Assessment as part of the larger Cariboo Gold Project EAC Application (ODV 2022).

Reclamation research studies will be undertaken, including soil and vegetation studies at reference locations within and outside of the Project footprint. Reference communities will be selected outside the Project footprint for monitoring site conditions in core all-season mountain caribou habitat to inform restoration prescriptions. Monitoring of reference communities will include characterizing the soil and vegetation community, including species and percent cover, conducting lichen density surveys, and determining the volume of coarse woody debris and standing dead trees within survey areas. These reference communities will be used as reclamation targets. Reference sites will be selected in mountain caribou habitat outside the Project footprint and outside of other disturbance (e.g., recent logging or fire). Simultaneously measuring performance criteria in the reference communities can help determine if the reclamation sites are progressing toward the target reference community.

The caribou habitat restoration strategy is a dynamic strategy that will be adapted over time as new techniques and systems become available through on-site and external revegetation research programs. Progressive revegetation within the Project footprint allows for the opportunity to develop research strategies specific to the site and local environment. Permanent restoration research plots will be established within the Project footprint to monitor the restoration and are described in Section 8.3.

5.3.3 Scope, Vision, and the Conservation Target

In any restoration project, it is important to define the scope, vision, and conservation target (CMP 2020). The scope is what the project intends to affect, the vision is the desired state or ultimate condition to be achieved, and the conservation target is the focus of the restoration work.

- Scope: The scope of the CMMP is place-based and pertains to the areas of overlap between surface disturbance resulting from the Project within the CAA, which includes the Mine Site disturbance areas (Mine Site Complex, Bonanza Ledge New Disturbance, ventilation raises, and camp access road), the Transmission Line ROW, QR Mill, and associated access roads. The scope does not include the Transportation Route as the existing roads, such as Highway 26, will not be restored at the end of the Project.
- Vision: To restore the Project footprint that overlap the CAA, including disturbance from exploration activities, to suitable habitat for mountain caribou, in line with the recovery actions identified in the Mountain Caribou Recovery Implementation Plan (MOE 2009b). Restoration will focus on the Mine Site disturbance area and QR Mill, as well as the Transmission Line ROW and associated access roads, where understory vegetation clearing and grubbing occurs.
- Conservation Target: To restore 100% of core all-season mountain caribou habitat and matrix habitat disturbed by ODV for the Project within the CAA.

Where restoration on-site cannot be achieved within the original core all-season mountain caribou habitat at the end of mine life (i.e., A, B, and C Roads, and the WRSF), opportunities to restore habitat within the CAA will be prioritized as part of offsetting. This may mean looking for

opportunities to restore matrix habitat adjacent to core all-season mountain caribou habitat, which is in line with the goals set in FLNRORD (2021). Habitat loss from disturbance and human activities has been identified as a threat to the Barkerville herd (Government of BC [date unknown]a) and restoration of habitat works to counter this loss. The end land use target for portions of the Project which overlap the CAA is the restoration of mountain caribou habitat.

Habitat Requirements

The minimum habitat requirements to meet the conservation target are based on multiple guidance documents and are outlined below (MCTS 2006; Hamilton 2011; EC 2014):

- Mature coniferous forest (ODV recognizes there will be a time-lag between the completion of restoration activities and the establishment of suitable mature coniferous forest for mountain caribou).
- Sufficient abundance (≥ Lichen Class 3, with some Class 4 and 5; Armleder et al. 1992) of arboreal lichen forage, the primary food source of mountain caribou. Arboreal lichens occur in mature systems and are slow to develop.
- Within lower elevation habitat (e.g., Sub-Boreal Spruce [SBS]), moderate density tree canopy (>35%, achieved by planting 1,400 stems/ha) will be the target to provide the level of openness required for arboreal lichen growth, with a mix of both live and dead standing trees. Higher elevation habitat within the Engelmann Spruce Subalpine Fir (ESSF) biogeoclimatic zone will be managed with a lower stocking density to target 400-500 stems/ha (<35% canopy density), including 25-30 standing dead stems/ha distributed in variable sized clumps/clusters and spacing densities. Revegetation prescriptions will be ultimately selected based on the proposed land use of each area; however, prescriptions will be adjusted at the time of planting to suit site conditions.
- Habitat characteristics that minimize habitat preferred by other ungulate species, such as moose and deer, which are prey species for wolves. This includes limiting the abundance of grass, forb, shrub, or young forest habitat within the Project footprint that overlaps the CAA, and limiting certain understorey species.
- Establishment of line-of-sight barriers (e.g., debris piles or tree bending/falling) to reduce the potential for predator movements.

Human Well-being Targets

A key component to achieving a successful restoration project is to incorporate key personal, cultural, social-economic, and ecological values (Gann et al. 2019). The primary interests of the local Indigenous nations, governments, and key stakeholder groups will be integrated into restoration planning. The key communities of interest, and their primary interests are:

- Indigenous nations: Opportunities for traditional use activities (e.g., gathering food and medicinal plants, trapping).

- ENV, MOF, Lhtako Dene Nation (LDN), ECCC, and WLRS: Resilient, self-sustaining mountain caribou populations (MCST 2006; EC 2014).
- ODV: Social responsibility and commitment as residents in the community to restore land post-development to suitable mountain caribou habitat.

ODV's vision for restoring surface disturbance from the Project to suitable mountain caribou habitat is in alignment with the above key communities' interests. Habitat availability is a limiting factor to the Barkerville herd, so on-site restoration within the CAA will focus on restoring habitat.

5.3.4 Action Plan

5.3.4.1 Goal

The goal of a restoration project is the desired long-term status of the conservation target (CMP 2020). Restoration of mountain caribou habitat is expected to take approximately 100 years post-closure. As indicated in Table 4–4, 246.5 ha of the Project footprint are not directly disturbed at existing conditions. The goal for this Project is, by the year 2140, 246.5 ha of disturbance in the Project footprint that overlaps the CAA will be restored to coniferous forest suitable as core all-season mountain caribou habitat. Disturbance is not planned within the Mine Site outside of new disturbance areas, so no additional disturbance will occur. Restoration of past disturbance within the Mine Site outside of new disturbance areas is not within the scope of this CMMP. ODV recognizes there will be a time-lag between the conclusion of monitoring activities and the establishment of suitable mature coniferous forest for mountain caribou.

5.3.4.2 Schedule

A high-level schedule for implementation of on-site restoration of caribou habitat for the Project is summarized in Table 5–1. The schedule provides a summary of reclamation milestones associated with the major phases of mining.

All major Project activities will cease following the end of mine production in 2036. Decommissioning of mine facilities and structures (i.e., storage facilities, mine office and administration buildings, laydown areas, portals, roads, Transmission Line infrastructure, sediment control ponds, water management infrastructure, waste rock storage facilities, underground development waste, and ancillary structures) will occur at this time, with the exception of the A, B, and C Roads, and the WRSF at the Bonanza Ledge Site. Progressive reclamation will be undertaken during the life of the Project at locations that are no longer required for operations. Active reclamation and closure are planned to begin in 2037. Planting will take place within the first year of active closure along the Transmission Line ROW as it is decommissioned, where understory vegetation clearing and grubbing has occurred. Planting within the Mine Site disturbance areas and QR Mill will occur once stable landforms and site preparation is complete. The proposed schedule is provided in Table 5–1.

Table 5–1: Cariboo Gold Project Mine Reclamation and Closure Schedule

Phase	Years	Reclamation Milestone
Construction – Phase 1	Year -1	Bonanza Ledge and QR Mill Construction. Construction of the Transmission Line. Progressive reclamation of Transmission Line to reduce access and control line-of-sight. Commissioning of the Transmission Line.
Construction – Phase 2	Year 2	Construction of the Mine Site Complex.
Operation	Years 1 to 12	Following completion of construction, the Transmission Line, areas of understory vegetation clearing and grubbing will be revegetated with vegetation at heights that provide cover and block access / line-of-sight, but which also allow access and lines of sight for maintenance. The Transmission Line will be site prepped and planted with ecologically appropriate tree seedlings based on the adjacent ecosystems, where understory vegetation clearing and grubbing occurs. Progressive reclamation of areas, as practical with operational activities. Monitoring/maintenance – operations.
Closure	Years 13 to 14	Decommissioning and removing surface infrastructure. Decommissioning of the Transmission Line will occur within the first year of active closure. Establishing debris piles of minimum height of 1.5 m at 20 m intervals (at maximum) and planting trees along the Transmission Line, where understory vegetation clearing and grubbing occurs, will commence within the first year of active closure. Debris piles will be placed in a zig zag pattern to minimize line of sight. Construction of engineered cover on the Bonanza Ledge WRSF. Surface preparation, soil placement, and revegetation, including planting of disturbed areas. Erosion control measures for remaining disturbed areas. Monitoring and maintenance – post operations.
Post-closure Active Care, Monitoring and Maintenance	Years 15 to 17	Year 1: Monitoring and maintenance. Year 2: Monitoring and maintenance.
Post-closure Passive Care, Monitoring and Maintenance	Year 17+	Year 3: Monitoring and maintenance (see Section 8.0). Removal of sediment control structures and contact water ditches (pending water quality monitoring performance and Section 8.0). Re-sloping and revegetating temporary roads no longer required for monitoring and maintenance. Year 6: Monitoring and maintenance (see Section 8.0). Post-closure reporting. Year 11: Monitoring and maintenance (see Section 8.0). Year 16: Monitoring and maintenance (see Section 8.0). Year 26: Monitoring and maintenance (see Section 8.0). Year 46: Monitoring and maintenance (see Section 8.0). Year 86: Monitoring and maintenance (see Section 8.0). Year 100: Monitoring and maintenance (see Section 8.0).

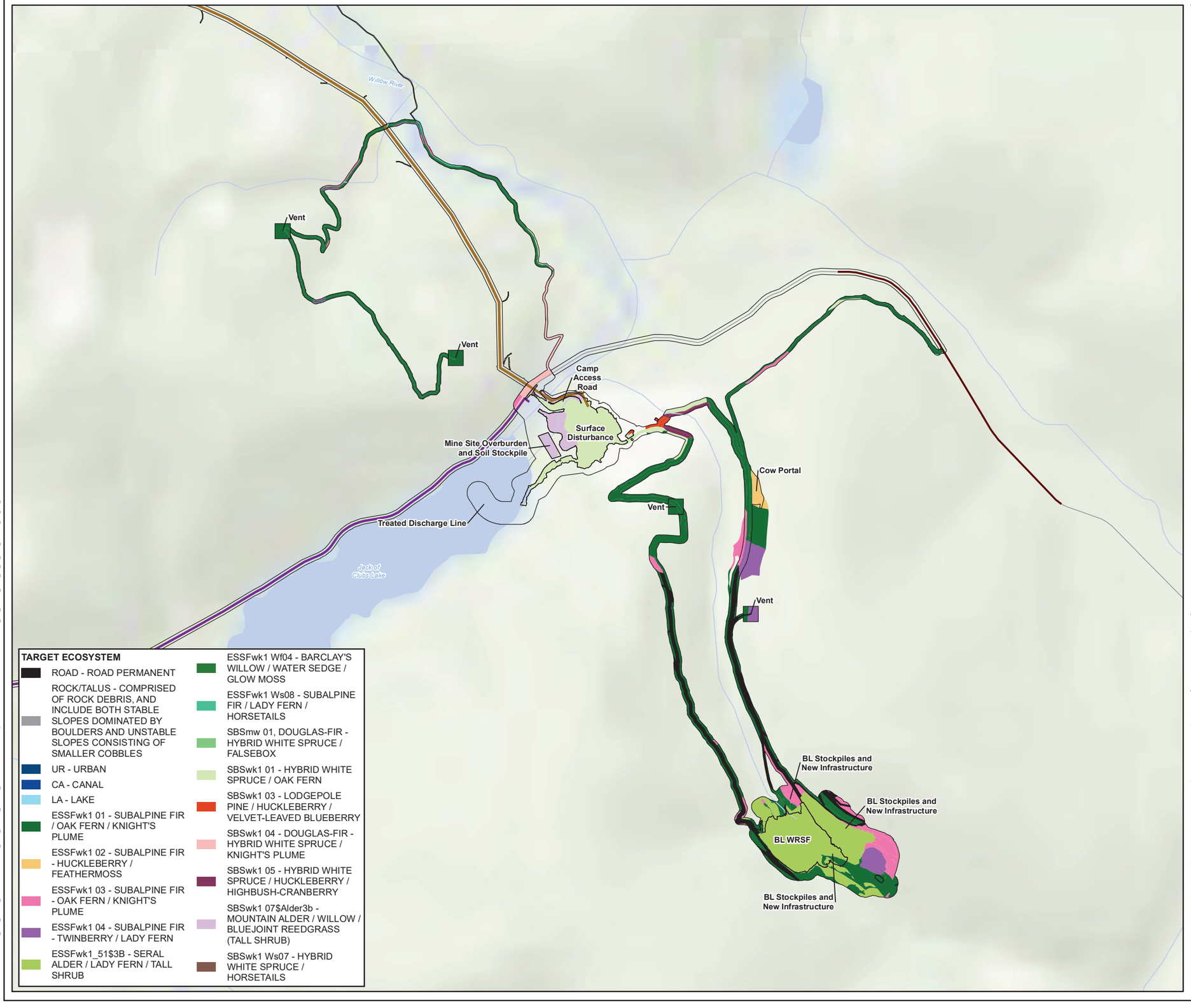
Notes: m = metre; WRSF = Waste Rock Storage Facility.

The assumed timeline for establishment of mountain caribou habitat is pole/sapling coniferous forest by 2080 (i.e., approximately 40 years post-planting), young coniferous forest by 2120 (i.e., approximately 80 years post-planting), and mature coniferous forest by 2140 (i.e., approximately 100 years post-planting), based on the natural disturbance interval of the Engelmann Spruce Subalpine Fir wet cool subzone, Cariboo variant (ESSFwk1; BC Forest Service 1995). Lichen has a slow growth rate at high elevations, so it is likely that the conservation target will not be met until at least 100 years post mine closure (Goward and Campbell 2005; Waterhouse et al. 2006; Wilson and Nyberg 2009b).

5.3.4.3 Restore On-Site Measures

To minimize the potential net effects of Project activities on mountain caribou, ODV is committed to undertaking restoration starting during operations, as described in Table 5–1. The habitat to be restored is identified in Figure 5–3. Progressive on-site restoration will be conducted within the Project footprint that overlaps the CAA, to establish mountain caribou habitat in the long-term. Progressive reclamation will also be used in areas of the Project footprint outside the CAA; however, these areas are not covered by this CMMP.

Monitoring the progressively restored areas will provide direction and guidance on improvements to the methodology outlined herein, to be applied during restoration activities at closure. On-site restoration measures will occur progressively throughout the life-of-mine and will continue post-closure until the conservation target is achieved. Areas of core all season mountain caribou habitat and matrix habitat disturbed during construction and operations will be the focus of the on-site restoration.



TARGET ECOSYSTEM

- ROAD - ROAD PERMANENT
- ROCK/TALUS - COMPRISED OF ROCK DEBRIS, AND INCLUDE BOTH STABLE SLOPES DOMINATED BY BOULDERS AND UNSTABLE SLOPES CONSISTING OF SMALLER COBBLES
- UR - URBAN
- CA - CANAL
- LA - LAKE
- ESSFwk1 01 - SUBALPINE FIR / OAK FERN / KNIGHT'S PLUME
- ESSFwk1 02 - SUBALPINE FIR - HUCKLEBERRY / FEATHERMOSS
- ESSFwk1 03 - SUBALPINE FIR - OAK FERN / KNIGHT'S PLUME
- ESSFwk1 04 - SUBALPINE FIR - TWINBERRY / LADY FERN
- ESSFwk1_51$3B - SERAL ALDER / LADY FERN / TALL SHRUB
- ESSFwk1 Wf04 - BARCLAY'S WILLOW / WATER SEDGE / GLOW MOSS
- ESSFwk1 Ws08 - SUBALPINE FIR / LADY FERN / HORSETAILS
- SBSmw 01, DOUGLAS-FIR - HYBRID WHITE SPRUCE / FALSEBOX
- SBSwk1 01 - HYBRID WHITE SPRUCE / OAK FERN
- SBSwk1 03 - LODGEPOLE PINE / HUCKLEBERRY / VELVET-LEAVED BLUEBERRY
- SBSwk1 04 - DOUGLAS-FIR - HYBRID WHITE SPRUCE / KNIGHT'S PLUME
- SBSwk1 05 - HYBRID WHITE SPRUCE / HUCKLEBERRY / HIGHBUSH-CRANBERRY
- SBSwk1 07$Alder3b - MOUNTAIN ALDER / WILLOW / BLUEJOINT REEDGRASS (TALL SHRUB)
- SBSwk1 Ws07 - HYBRID WHITE SPRUCE / HORSETAILS

LEGEND

- PROJECT ASSESSMENT AREA
- TRANSPORTATION ROUTES
- TRANSMISSION LINE ROUTE
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY

0 500 1,000

1:25,000 METRES

NOTE(S)

ANY PROJECTS OCCURRING IN ECCC MAPPED CRITICAL HABITAT NEED TO CAPTURE THE ENTIRE FEDERAL BOUNDARIES NOT JUST THE PROVINCIAL MAPPED BOUNDARIES. FOR THE MOUNTAIN CARIBOU LAYERS IT SEEMS THE PROVINCIAL BOUNDARIES MISS THE UNMAPPED POLYGONS THAT ARE PART OF ECCC CRITICAL HABITAT FOR THIS SPECIES – BOTH SHOULD BE REVIEWED WHEN WE LOOK AT MOUNTAIN CARIBOU HABITAT IN THE FUTURE.

REFERENCE(S)

1.WATER FEATURES, TRANSPORTATION FEATURES OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. MOUNTAIN CARIBOU CORE ALL-SEASON HABITAT, MOUNTAIN CARIBOU MATRIX RANGE, CITIES/TOWNS, INDIAN RESERVES AND PARK/PROTECTED AREAS OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
3. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.
NAD83 CSRS UTM ZONE 10N

CLIENT
OSISKO DEVELOPMENT CORP.

PROJECT
CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE
POST-CLOSURE TARGET ECOSYSTEMS

CONSULTANT
wsp

YYYY-MM-DD	2024-03-12
DESIGNED	GH
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
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PATH: W:\Client\BGM\BGM_Cow_Mtn\9_PROJECTS\1774160_BGM_Cariboo_Gold\02_PRODUCTION\MXD\Report\Wildlife\CMMP\2024\Redacted\1774160_CG_CMMP_2024_05_03_Post_Closure_Targets_Redacted.mxd PRINTED ON: 2025-06-12 AT: 3:41:16 PM

For the purposes of this CMMP, it is assumed that all areas of temporary new disturbance for the Transmission Line ROW, where understory vegetation clearing and grubbing occurs, will be restored within the first year of construction. Areas of the Transmission Line where understory vegetation clearing and grubbing has occurred and that are not required for maintenance will be site prepped and planted with ecologically-appropriate conifer species based on the surrounding ecosystems following the guidance for restoration treatments provided by FLNRORD (2021). For target habitats, the ecosystem present at existing conditions will be used as the target ecosystem along the Transmission Line. This includes areas of existing anthropogenic disturbance, such as roads and urban areas. Following restoration, vegetation maintenance will occur for safety if vegetation encroaches into the limits of approach.

The Transmission Line will be decommissioned and removed at the end of closure. During decommissioning of the Transmission Line, debris piles (minimum height of 1.5 m) will be established at 20 m intervals (at maximum) in a zig zag pattern along the Transmission Line corridor to minimize access (human) and slow predators. Areas of the Mine Site disturbance area and QR Mill will be reclaimed according to the End Land Use Plan (ODV 2024a). All areas of the Mine Site will be restored except for the A, B, and C Roads, which may remain for access and recreation. A summary of post-closure target ecosystems for the Project footprint is provided in Table 5–2, separated based on reclamation areas that will provide suitable caribou habitat and those that will not provide suitable caribou habitat. Finally, it is assumed that no new direct disturbance will occur along the Transportation Routes and in the Mine Site Area outside new disturbance as ODV will use existing roads and will not be conducting any upgrades. Therefore, no restoration is planned for these areas.

Table 5–2: Post-closure Target Ecosystems for the Cariboo Gold Project

Site Series / Site Association Target	Ecosystem Description
Suitable Caribou Habitat	
ESSFwk1 01	Subalpine fir / Oak fern / *Brachythecium*
ESSFwk1 02	Subalpine fir / Huckleberry / Feathermoss
ESSFwk1 03	Subalpine fir / Oak fern / Knight's plume
ESSFwk1 04	Subalpine fir / Twinberry / Lady fern
ESSFwk1 05	Subalpine fir / Devil's club / Lady fern
SBSwk1 01	Hybrid white spruce / Oak fern
SBSwk1 03	Lodgepole pine / Black huckleberry – Velvet-leaved blueberry
SBSwk1 04	Douglas-fir – Hybrid white spruce / Knight's plume
SBSwk1 05	Hybrid white spruce / Black huckleberry – high-bush cranberry
SBSwk1 08	Hybrid white spruce / Devil's club
SBSmw1 01	Hybrid white spruce - Douglas-fir - falsebox
SBSmw1 03	Lodgepole pine - Huckleberry - Velvet-leaved blueberry
SBSmw1 04	Hybrid white spruce - Douglas-fir - Knight's plume

Site Series / Site Association Target	Ecosystem Description
SBSmw1 05	Hybrid white spruce - Pink spirea
SBSmw1 06	Hybrid white spruce - Oak fern
SBSmw1 07	Hybrid white spruce - Twinberry - Oak fern
SBSmw1 01	Hybrid white spruce - Douglas-fir - falsebox
Ws07	Hybrid white spruce / Horsetails
Ws08	Subalpine fir – Sitka valerian – Common horsetail
Non-suitable Caribou Habitat	
CA	Canal
ESSFwk1 51$3B	Seral alder / lady fern (tall shrub)
LA	Lake
RP	Permanent Road
Rt	Rock/Talus
SBSwk1 07$Alder3b	Mountain Alder / Willow / Bluejoint Reedgrass (tall shrub)
UR	Urban
Wf04	Barclay's willow – Water sedge – Glow moss
Wm02	Horsetail - Beaked sedge
Ws05	MacCalla's willow- Beaked sedge

Notes: ESSF = Engelmann Spruce Subalpine Fir Biogeoclimatic zone: SBS = Sub Boreal Spruce; wk1 = Cariboo wet cool variant.

The restoration of mountain caribou habitat is a long-term achievement bound by natural forest succession and the extended timeframe required for sites to support the growth of arboreal lichens, which is required for establishing quality mountain caribou foraging habitat and predator evasion habitat (MCST 2005; Hamilton 2011). Restoration of the post-mining environment will re-establish basic ecological processes, plant communities, and structural diversity, but it could take decades to centuries to re-establish the complexity of ecosystems, such as mature or old growth forests. Short-term restoration measures will be used to create self-sustaining landscapes that establish a trajectory towards viable, long-term, functional ecosystems. ODV commits to conducting the necessary post-mine site preparation activities (e.g., soil replacement/capping, soil scarifying, soil rough and loose treatment, hydrological regime alterations, erosion and sediment control measures) to provide suitable conditions for restoration (i.e., elevation, aspect, substrate, exposure, soils). This CMMP focuses on site-specific silviculture restoration prescriptions designed to meet the conservation target. The following subsections present an overview of these restore on-site measures.

5.3.4.4 Tree and Understory Planting Plan

Re-vegetation activities will proceed as areas become available for restoration through the life-of-mine and at closure. These areas will be re-vegetated following the Biogeoclimatic Ecosystem Classification (BEC) system and silviculture considerations presented in Steen and Coupé (1997)

for the Engelmann Spruce Subalpine Fir wet cool subzone, Cariboo variant (ESSFwk1) and, where appropriate, the Sub-Boreal Spruce wet cool subzone, willow variant (SBSwk1), as well as the recommendations for mountain caribou habitat restoration presented in Hamilton (2011) and FLNRORD (2021). The revegetation strategy uses the BEC system to identify appropriate restoration targets (i.e., late succession ecosystems) by matching predicted edaphic conditions of areas to be reclaimed to their respective site series. Once target ecosystems have been identified, appropriate plant species can be chosen for prescribed planting that will assist the successional trajectory toward the target ecosystem. Restoration treatments from the Operational Restoration Framework for Woodland Caribou Habitat in BC (FLNRORD 2021) are integrated into the restoration prescription. Post-closure target ecosystems were developed as part of the End Land Use Plan (ODV 2024a) and are provided in Figure 5–3.

Dominant canopy species planted during restoration will include:

- Engelmann spruce, a shade tolerant species with high longevity (up to 600 years; Government of BC 2022b); and
- Subalpine fir, a shade tolerant species with moderate longevity (up to 250 years; Government of BC 2022b).

Specific planting requirements will be directed by the elevation, aspect, slope, and substrate of the surface to be planted. The regenerating forest will contain shade tolerant coniferous trees with varying longevity (Hamilton 2011). Shade-intolerant species, such as lodgepole pine (*Pinus contorta*), western larch (*Larix occidentalis*), and hardwoods, will not be planted because the silvics (i.e., life history characteristics, growth, behaviour, and ecology) produced by these trees are inconsistent with achieving the conservation target (Hamilton 2011). If the survival rate of conifer seedlings is less than 80% over one-year, additional planting will be undertaken.

The following seral shrub species will not be planted in the Project footprint that overlaps the CAA, as they are preferred by moose and deer, resulting in increased risk of predation to mountain caribou (see Section 3.2 and 3.3): willow (*Salix* spp.), red-osier dogwood (*Cornus stolonifera*), elderberry (*Sambucus* sp.), and Douglas maple (*Acer glabrum* var. *douglasii*) (Hamilton 2011). Likewise, herbicide will not be used as it promotes the growth of these shrub species (Hamilton 2011).

Natural regeneration in the ESSFwk1 generally supports the proliferation of undesirable non-ericaceous shrubs (as listed above) and a variety of forbs and grasses. Survival and growth of planted trees and shrubs will be improved if this type of vegetation is controlled at the planting site (Steen and Coupé 1997). Final planting prescriptions will depend on actual post-closure soil conditions and landform features, as determined by soil analysis and site inspection; a QP will use the results of the soil analysis to refine final planting prescriptions to maximize survivorship of planted stock. Restoration implementation will be supervised by the QP.

The QP will supervise conifer planting to check that reclamation goals are being met and implement adaptive management, if necessary. Vegetation planting programs will meet the following minimum requirements:

- Tree/shrub/herb species are of guaranteed nursery stock.
- Coniferous trees comprise not less than 10%, and not more than 25%, of the tree stock planted in riparian areas.
- Conifer tree stock will be planted at least 1.5 m apart.
- Conifer trees seedlings will be planted at a density of 1,400 stems/ha, which is considered medium density (1,001 to 2,000 stems/ha) according to the Operational Restoration Framework for Woodland Caribou Habitat Restoration in British Columbia (FLNRORD 2021), or at a suitable density to achieve the proposed land use.
- Seedling prescriptions, including species and densities, will be appropriate to the TEM polygon adjacent to the reclamation area, or which fits the site conditions of the reclamation site in terms of elevation, aspect, and soil conditions. Dominant canopy species will include Engelmann spruce and subalpine fir.
- Salvaged structural materials (i.e., downed wood, stumps, mossy rocks, vascular plants, non-vascular plants) will be reused to provide structural diversity, microclimate features, and habitat for small wildlife and amphibians.
- Lichens on branches and trees will be collected from approved disturbance areas outside of core all-season caribou habitat and transplanted to progressive reclamation areas for use as an immediate food source and spore dispersal source.

During reclamation within the Project footprint, cleared areas will first be treated with site preparation. Areas will be mounded with an excavator, or another site preparation technique will be employed, when appropriate. These other site preparation techniques include scarification, ripping, or disc trenching, and will be used based on the site and soil conditions (FLNRORD 2021).

Prior to planting conifer seedlings, soil surveys will be conducted to confirm that soil properties (i.e., texture and pH) are conducive to growth of coniferous seedlings at the selected locations. For example, Engelmann spruce prefer fine and medium textured loamy soils and can tolerate a pH range from 6.0 to 8.0, and subalpine fir require medium to coarse textured soils and can tolerate a pH range from 4.0 to 6.5 (USDA NRCS 2022). Conifer seedlings will be planted throughout the site if soil conditions are conducive to growth. Where soil conditions are not conducive to growth, conifer “islands” will be used.

In areas of the Bonanza Ledge site, it has previously been challenging to establish conifer seedling due to soil conditions. In these areas, the planting plan will be adjusted to establish vegetation. The layout for upland areas with poor soil conditions will include seeding with locally collected red alder and creating “islands” of late successional native species plantings, as listed in Table 5–3. Alder have been shown to benefit conifer tree species when planted in mixed stands (Tarrant 1968) by increasing soil organic matter, which improves structure, water holding

capacity, cation exchange capacity, and fertility of the soil (Tarrant, 1971; Taylor et al., 1989). Alder density will not exceed 500 stems/ha as it has been shown that densities greater than this may slow conifer growth (Cortini and Comeau 2008). In areas where late successional species islands are used due to poor soil conditions, the late successional islands will occupy 20% of target ecosystem areas in evenly spaced 20 m × 20 m (400 square metres [m^2]) planting areas.

At least four understory species expected to occur in nearby mature natural areas with similar physical and environmental conditions will be planted interspersed between conifer seedlings. Spacing of plantings will be 1.5 m for trees and 1 m for shrubs and herbs. Trees will be planted at a density 20% more than the target density to account for tree mortality.

To create a heterogeneous vegetation structure (e.g., a mix of herb, shrub, and tree layers) salvaged coarse woody debris, such as logs (larger than 20 cm diameter) and stumps, will be placed at a rate of approximately 60 to 100 cubic metres per hectare (m^3/ha) (Vinge and Pyper 2012) within progressive reclamation areas. In areas of late successional islands, coarse woody debris will be placed around the conifer islands. A minimum of 18 pieces of coarse woody debris will have a large diameter (i.e., greater than 20 centimetres [cm]) (Chief Forester 2010). Coarse woody debris used on site will include both large and small pieces as the ecological functions provided differ. For example, large diameter woody debris holds more moisture and provides greater nutrients to the soil (MOFR and MOE 2010). This woody debris will help establish microsites for vegetation and provide perching sites for birds and cover for small mammals, both of which help disperse native seeds.

The openness of the forest stand, stable sun exposure, relatively low canopy closure, and sufficient airflow to frequently dry arboreal lichens are important factors in the growth of arboreal lichens (Hamilton 2011). Trees will be planted in variable size clumps/clusters and spacing densities to mimic the open-stand structural conditions favoured by mountain caribou (i.e., based on the habitat requirements for caribou in Section 5.3.3). Native seedlings will be cluster-planted in groups of four to six trees, 5 to 7 m apart, as recommended in Hamilton (2011).

Densely stocked stands may reduce mountain caribou movement (Hamilton 2011) and prevent the establishment of microclimatic conditions suitable to support abundant arboreal hair lichen (*Bryoria* spp.), the primary winter food source of mountain caribou that occurs lower in the canopy (Hamilton 2011). Moderate tree density will discourage browse species for moose and deer (Hamilton 2011) and will encourage the die back of lower branches, which enhances tree inner core lichen conditions and sightlines (Hamilton 2011). Trees will be planted at a density 20% more than the target density, based on provincial stocking standards (Government of BC 2021b), to account for tree mortality. Planting conifer islands will encourage lower branch growth and allow nitrogen fixing species like alder to improve soil nutrient and pH conditions over the long term, thereby helping the stand mature faster. ODV will also consider techniques, such as thinning of pioneer species, underplanting of secondary species, and addition of standing and downed woody debris to accelerate successional processes.

Table 5–3: Example Proposed Tree Layer Planting Prescriptions for Target Ecosystems

Unit	ESSFwk(a)									SBSwk(a)			
Site Series	01	02	03	04	05	Ws08	Ws07	Ws05	Wf04	01	03	04	05
Description	Subalpine fir – Oak fern- Brachythecium	Subalpine fir – Huckleberry / Feathermoss	Subalpine fir – Oak fern – Knight's fern	Subalpine fir – Twinberry / Lady Fern	Subalpine fir / Devil's club / Lady fern	Subalpine fir – Sitka valerian – Common horsetail	Hybrid White Spruce / Horsetails	MacCalla's willow-Beaked sedge	Barclay's willow – Water sedge – Glow moss	Hybrid white spruce – Oak fern	Lodgepole pine / Black huckleberry – Velvet-leaved blueberry	Douglas-fir – Hybrid White Spruce / Knight's plume	Hybrid white spruce / Black huckleberry – high-bush cranberry
Moisture	Submesic to Subhygric	Xeric	Subxeric to Mesic	Subhygric	Subhygric	Hygric to Subhydric	Hygric	Wet	Wet	Mesic	Subxeric to Mesic	Subxeric to Submesic	Submesic to Mesic
Nutrients	Poor to Rich	Very poor to Rich	Poor to Rich	Poor to Medium	Rich to Very Rich	Poor to Rich	Poor to Rich	Medium	Medium	Poor to Rich	Very Poor to Medium	Poor to Rich	Poor to Rich
Slope Position	Mid to lower slope, on gentle to moderate slopes	Crests and steep upper slopes	Upper to mid-slopes, Slope crests and ridge tops	Lower and toe slope positions often near streams or wetlands	Mid to lower slopes where soils are wetted by persistent seepage water	Wet depressions with a near-surface water table.	Toe of slope or depressions on level to gently sloping sites	Occur in basins, hollows, and stream edges. Complex microtopography	Subalpine seepage areas along glacier-fed creeks and frost-prone basins	Gentle slope	Dry sands, including glaciofluvial terraces and on dry upper and crest slopes	Mid- to upper slope on warm aspects, on moderate slopes	Upper slope positions and on broad rounded hill crests with deep soils
Soil Profile	Deep soils	Thin soil, bedrock often present at surface	Shallow to deep, coarse (sandy)	Persistent seepage	Persistent seepage	Water table at or near the surface	Loamy or silty soil with the water table near the surface (<50 cm)	Variable soils ranging from deep mesic peat to thin layers of humic soil. Standing water in depressions	Shallow peat	Deep medium-textured soils	Shallow soil	Deep, loamy soils with high coarse fragments	Deep soils with coarse fragments
Coarse Woody Debris	60 to 100 m^3/ha[(b)] surrounding conifer islands or scattered throughout the site where conifer islands are not required												
Coniferous Trees (proportional %)[(c)]	Subalpine fir (*Abies lasiocarpa*) (60%) Engelmann spruce (*Picea engelmannii*) (40%)	Lodgepole pine (*Pinus contorta*) (50%) Subalpine fir (*Abies lasiocarpa*) (25%) Engelmann spruce (*Picea engelmannii*) (25%)	Engelmann spruce (*Picea engelmannii*) (60%) Subalpine fir (*Abies lasiocarpa*) (40%)	Subalpine fir (*Abies lasiocarpa*) (60%) Engelmann spruce (*Picea engelmannii*) (40%)	Subalpine fir (*Abies lasiocarpa*) (60%) Engelmann spruce (*Picea engelmannii*) (40%)	Subalpine fir (*Abies lasiocarpa*) (60%) Engelmann spruce (*Picea engelmannii*) (40%)	Hybrid white spruce (*Picea glauca* x *engelmannii*) (100%)	No conifer planting	No conifer planting	Douglas-fir (*Pseudotsuga menziesii*) (45%) Hybrid spruce (*Picea glauca x engelmannii*) (38%) Subalpine fir (*Abies lasiocarpa*) (16%)	Douglas-fir (*Pseudotsuga menziesii*) (50%) Lodgepole pine (*Pinus contorta*) (50%)	Lodgepole pine (*Pinus contorta*) (28%) Douglas-fir (*Pseudotsuga menziesii*) (28%) Hybrid spruce (*Picea glauca* x *engelmannii*) (22%) Subalpine fir (*Abies lasiocarpa*) (22%)	Lodgepole pine (*Pinus contorta*) (39%) Hybrid spruce (*Picea glauca* x *engelmannii*) (39%) Subalpine fir (*Abies lasiocarpa*) (23%)
Shrub Notes	Control naturally regenerating shrubs that provide forage for moose and deer and limit drying of arboreal lichens. Alder seeding to a maximum of 500 stems per ha to build soil nutrient and balance soil pH where soil conditions are not conducive to conifer seedling establishment.												

Notes: (a) Site descriptions from MacKenzie and Moran (2004) and MOF (2023).

(b) Vinge and Pyper (2012).

(c) Government of BC (2021d) and FLNRORD (2021).

% = percent; cm = centimetre; m^3/ha = metres cubed per hectare; ha = hectare

5.3.4.5 Standing Dead Tree or Snag Installation

Standing dead trees and artificial snags of Engelmann spruce and subalpine fir will be staked a minimum of 25 snags/ha, with 5 snags/ha using trees that are greater than 50 cm diameter at breast height (DBH), to provide some structural complexity, bird habitat, and, potentially, future attachment sites for arboreal hair lichen and *Alectoria* species (Hamilton 2011).

5.3.4.6 Log, Rock Pile, Stump, and Coarse Wood Debris Placement

Rock piles, stumps, large logs, and coarse woody debris will be placed to provide micro-habitats for vegetative re-establishment, conserve soil moisture, moderate soil temperatures, prevent soil erosion, provide nutrients to the soil, provide a source of seed for natural regeneration, protect seedlings from wildlife trampling, and provide habitat for wildlife. Large logs, rock piles, stumps, and other coarse woody debris also provide micro-habitats for small mammals. Woody debris used will be native species from the local area. Vinge and Pyper (2012) recommend applying between 60 to 100 m^3/ha of native woody material to restored sites to mimic the natural range of variability for woody material in a mature forest.

Additional reclamation enhancement features to be constructed that will promote wildlife establishment include (BGM 2020b):

- Creating shallow “islands” of NPAG cobble/gravel on the final landform following vegetation to promote cover for small mammals and insects;
- Spreading logs, stumps, and other coarse woody debris stockpiled during construction to provide organic matter and nutrients to the soil as the wood decays, and also to provide microsites for vegetation and habitats for small mammals and insects; and
- Creating an irregular land surface to slow overland flow and to create microsites that provide moisture retention, shade, and wind protection for young trees and shrubs.

Rollback and coarse woody debris will also be placed to manage access, provide erosion control, and enhance habitat. Sufficient supply will be set aside during clearing of the Project footprint for final reclamation and clean-up. Slash rollback can enhance natural regeneration of linear features, such as roads and the Transmission Line, and native woody material can enhance site variability and provide microsites for regenerating plants (Vinge and Pyper 2012). Following decommissioning of the Transmission Line, coarse woody debris will be spread along the ROW to act as a barrier to access. Debris piles (minimum height 1.5 m) will be placed along the decommissioned Transmission Line at intervals of 20 m or less in a zig zag pattern to act as barriers to access and decrease lines of sight.

5.3.4.7 Barrier Installation

Measures will be undertaken to hinder the movement of wolves across the Project footprint, on deactivated trails/roads, and along the Transmission Line ROW, and to decrease their line-of-sight along linear features (MCST 2005). These measures will also serve to prevent access for motorized recreational users while vegetation cover is regenerating. Minimization measures described in Section 5.2 will be applied during operations. Barrier installations will also be placed on areas within the Mine Site disturbance area and Transmission Line ROW undergoing progressive reclamation and at closure to prevent unauthorized access.

The A, B, and C Roads hold value for local trail systems. Closure plans for these roads will be determined following consultation with EMLI, MOF, and WLRS, who will consult with other local stakeholders and Indigenous nations. If it is determined that part or all of the A, B, and C Roads (10.5 ha) should be restored to the conservation target, the restoration prescriptions described in the Plan will be implemented.

Measures to establish barriers along deactivated roads and the Transmission Line at closure include:

- Placing long segments of native woody material along the width of the road or Transmission Line (Vinge and Pyper 2012) or bending and/or felling trees over the road or Transmission Line (Neufeld 2006).
- Establishing debris piles (minimum height 1.5 m) at 20 m intervals or less along the Transmission Line at decommissioning in a zig zag pattern.
- Blocking access entry points using site preparation such as mounding, rollback, boulder barriers, and earth berms. Where necessary, locked gates or fencing will be used to secure entry points. Signage will also be installed to inform on importance of habitat for caribou.
- Providing vegetative screening by planting Engelmann spruce and subalpine fir seedlings on deactivated roads and the decommissioned Transmission Line where understory vegetation clearing and grubbing has occurred. Tree seedlings will be planted in select locations to facilitate rapid regeneration of natural vegetation. Planting will occur on the Transmission Line within one year of active closure.
- Removing culverts that do not form part of the permanent water management system.
- Placing a minimum of 0.1 m of topsoil on decompacted road surfaces.
- Installing fences at road intersections to block access to the road (CRRP 2007).
- All new build roads for the Transmission Line, under control of ODV, will be decommissioned at closure and restored.

The locations of access control measures along the Transmission Line and roads will be determined in consultation with MOF and WLRS.

5.3.4.8 Key Intervention Points

Once a coniferous forest of the target density has established, the following interventions will be considered to assist in achieving the conservation objective (Hamilton 2011):

- Thinning or spacing homogenous stands to encourage the development of a multi-layered stand structure and heterogeneous spacing.
- Promoting open-growing conditions for individual trees and tree clumps/clusters (e.g., removing competing non-native invasive species).
- Under planting with later successional floral species.
- Removing selected shrubs that are preferred by moose and deer if they begin to dominant the understorey.
- Controlling the spread and extent of non-native invasive species infestations.
- Transplanting *Bryoria* and *Alectoria* species to provide a spore source.
- Planting additional conifer seedlings if the initial seedlings do not meet an 80% survival target during Years 1, 2, 3, and 6 of monitoring.

5.3.5 Progressive Reclamation

The end land use for the portions of the Project footprint within the CAA is caribou habitat. Therefore, the objective of progressive reclamation for disturbance from the portions of the Project footprint within the CAA is to establish ecosystems on a trajectory to core all-season mountain caribou habitat or matrix habitat.

Progressive reclamation is planned within the Mine Site disturbance area and QR Mill where mine related activities are no longer required. Progressive reclamation is also planned along the Transmission Line ROW where understory vegetation clearing and grubbing has occurred following construction in areas that are not required for maintenance. Progressive reclamation provides information on the performance of reclamation success and can be used to help guide future works and inform reclamation and closure design requirements.

Progressive reclamation activities involving re-contouring, scarification, soil placement, revegetation, and erosion control will be ongoing within the Project footprint.

Progressive reclamation activities conducted to date by ODV on other sites that will be implemented to support the establishment of caribou habitat include:

- 2014 and 2015: test treatment using rolled erosion control matting and planting seedlings on an area beside a potentially acid generating (PAG) WRSF at the Bonanza Ledge Site, which can inform the success of seedling survival following site preparation. Caribou habitat will require the successful establishment of trees to set a trajectory to mature forest.

- 2018: assessment of the suitability of soil stockpiles for reclamation in 2018 at the Bonanza Ledge Site. Suitable planting substrate is required to facilitate growth of planted seedlings during caribou habitat restoration.
- 2018: metal uptake sampling around the Bonanza Ledge site, which provides information on background metal concentrations in soil and plant tissues compared to the Mine Site.
- Ongoing: salvaging topsoil and subsoil and stockpiling for future use in reclamation, which will be required to provide a suitable substrate for planting seedlings during progressive and final reclamation for the Project.
- 2020: reclamation of six exploration drill pads and two exploration roads in the Grouse Creek area at Proserpine Mountain.
- 2022: reclamation of the C Road Borrow pit, with seeding to be completed in 2023. Trial plots will be established at the C Road Borrow pit.

ODV is committed to restoring all new disturbance associated with the Project. In addition, surface exploration and mining activities will not occur within 1 km of Mt. Tom during the calving and post-calving period (May 15 to July 15). The Transmission Line is the only piece of Project infrastructure within 1 km of Mt. Tom. Construction of the Transmission Line will not occur during the calving or post-calving period (May 15 to July 15) within 1 km of Mt. Tom.

The following mitigation measures will be undertaken within areas of progressive reclamation for portions of the Project footprint that overlap the CAA:

- Planting native shrubs and trees suitable for caribou habitat restoration, except in limited circumstances, where seeding of grass or forb species is needed for immediate erosion prevention and sediment control. This strategy manages sedimentation while avoiding establishing areas dominated by high forage vegetation that attracts moose and deer, which in turn attract predatory wolves. Areas within core all-season mountain caribou habitat that are seeded for erosion prevention and sediment control will be planted following the restore on-site plan during final reclamation to restore suitable core all-season and matrix mountain caribou habitat.
- Salvaging trees and branches with arboreal lichen coverage from the Mine Site and Transmission Line. The trees will be replanted, or, if not possible, the salvaged trees will be used as coarse woody debris supply. The branches will be placed in areas to be progressively reclaimed and on the Transmission Line to reduce predator movement.
- Cleared areas will be site prepped with soil mounding using an excavator, or another site preparation technique employed when appropriate, prior to planting. Site preparation techniques create micro-sites within the landscape and help to increase soil moisture and reduce erosion. Mechanical site preparation conducted prior to planting can increase tree growth rates and density (Filicetti et al. 2019). Restoring trees which ultimately grow into a mature forest is fundamental for mountain caribou habitat restoration.

- Selecting ecologically appropriate conifer seedlings based on the adjacent TEM polygon to be planted on reclamation sites will help establish a vegetation community reflective of the natural communities. Dominant canopy species will include Engelmann spruce and subalpine fir, which are a suitable substrate for arboreal lichen.
- Planting trees at a tree density that encourages rapid site regeneration and is appropriate to site elevation, while discouraging other ungulate species from browsing, to reduce sightlines, and to provide a suitable environment for lichen establishment.
- The following seral shrub species will not be planted as they are preferred by moose and deer: willow, red-osier dogwood, Douglas maple, and elderberry.

6. RESIDUAL EFFECTS BEFORE OFFSETTING

The Project footprint overlaps 979.9 ha of caribou critical habitat, comprised of 220.0 ha of matrix range habitat, 149.0 ha of core all-season habitat, and 611.0 ha of unmapped critical habitat (Table 4–5). All 979.9 ha of the Project footprint are classified as disturbed habitat under baseline conditions based on applying ECCC's (2014) definition of disturbed habitat to the ZOIs created for each disturbance type (described in Section 4.2.1; Palm n.d.). The Project footprint overlaps 733.4 ha (74.8%) of existing direct disturbances, such as roads and cutblocks, and 246.5 ha (25.2%) of indirect disturbance due to proximity (i.e., within the ZOI) to existing anthropogenic disturbances (Table 6–1).

To calculate residual impacts for caribou habitat (condition and availability), the Project footprint was broken out into individual Project components to better understand residual impacts from the Project. The individual components were mine components in the Project footprint (those areas of new disturbance at Bonanza Ledge, QR Mill, and the Mine Site Complex), Transmission Line components (Transmission line ROW and access roads including existing, upgraded, and new build roads outside of the ROW required for construction and operations), and the Transportation Route components. A summary of disturbance within each component of the Project footprint is provided in Table 6–1. No new disturbance will occur in the Mine Site area outside new disturbance; therefore, there are no new direct disturbances from this component of the Project.

Table 6–1: Existing Disturbances in Project Components of the Project Footprint

Disturbance Category	Disturbance Type	Mine Components in the PF (ha)	Transmission Line Components in the PF (ha)	Transportation Route Components in the PF (ha)	Total Project Footprint (ha)
Undisturbed	Undisturbed	0	0	0	0
Undisturbed Total		*0*	*0*	*0*	*0*
Direct Disturbance	Road	8.2	64.0	407.5	479.7
	Cutblock	0	68.5	28.9	97.4
	Fire	0	0	<0.1	<0.1
	Other[(a)]	151.0	0.9	4.5	156.4
Disturbed Total		*159.2*	*133.4*	*440.9*	*733.4*
Indirect Disturbance	Habitat within an AEC and within ZOI of existing anthropogenic disturbance	4.3	0	0	4.3

Disturbance Category	Disturbance Type	Mine Components in the PF (ha)	Transmission Line Components in the PF (ha)	Transportation Route Components in the PF (ha)	Total Project Footprint (ha)
	Habitat within ZOI of existing anthropogenic disturbance (and not within an AEC)	11.4	143.1	87.7	242.1
Indirect Total		*15.7*	*143.1*	*87.7*	*246.5*
Total		**159.2**	**276.5**	**440.9**	**979.9**

Notes: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

AEC = Area of Environmental Concern; ha = hectare; PF = Project footprint; ZOI = Zone of Influence.

(a) Other disturbance types include the following TEM codes: canal, gravel pit, mine, mine spoil, non-forested disturbed land, pasture, reclaimed mine, rural residential, and urban.

The Transportation Route accounts for 440.9 ha of the Project footprint. The Project will utilize existing roads, without upgrades, and the Project will not result in new disturbance areas within the Transportation Route. Therefore, disturbance from the Transportation Route is not carried forward to residual impacts. In addition, through design and siting, the mine and Transmission Line components have used existing disturbance, where feasible while remaining within the Certified Project Footprint, to minimize new disturbance. Areas where the mine and Transmission Line components are located on existing direct disturbance are not carried forward to residual impacts.

Residual impacts to caribou habitat are primarily due to new direct impacts within areas that are indirectly impacted at existing conditions. Impacts from the mine and Transmission Line components are anticipated to results in 158.8 ha of new direct disturbance that are characterized as indirectly disturbed at existing conditions (Table 4–4). Due to the Project, these areas will be cleared, resulting in new direct impacts. Of the 158.8 ha of new disturbance, 4.3 ha are located within an AEC and are unlikely to provide suitable caribou habitat due to the presence of potential contaminants, including arsenic (SNC-Lavalin 2011). The new direct impacts from the Project footprint (excluding the Transportation Route) is comprised of 32.4 ha of core all-season habitat, 64.4 ha of matrix range, and 62.0 ha of unmapped critical habitat (158.8 total; Figure 6–1 to Figure 6-1.11). The caribou habitat (i.e., core and matrix habitat) within the range boundaries are not displayed in Figure 6-1 to Figure 6-1.11 as they are confidential (WLRS data). This was carried forward as direct disturbance to consider for residual effects.

Based on consultation with WLRS, a segment of the Transmission Line (approximately 9.9 km in length) overlaps a movement corridor identified by recent telemetry data (WLRS 2023b). The movement corridor is located between Mt. Tom and Eaglenest Mountain. Due to the potential ecological significance of this area for caribou in comparison to other areas the Project overlaps, residual impacts in this area are quantified separately from the remaining Transmission Line and

shown in Figure 6–2. The area of existing indirect impacts (22.8 ha; Table 6–2) may be directly impacted by the Project and has been carried forward as a residual impact separate from the remaining portions of the Transmission Line components.

Table 6–2: Existing Disturbance in the Movement Corridor overlapping the Transmission Line Components in the Project Footprint

Disturbance Category	Disturbance Type	Movement Corridor overlapping the Transmission Line Components in the Project Footprint (ha)	Remaining Portion of the Transmission Line Components in the Project Footprint (ha)
Undisturbed	Undisturbed	0.0	0.0
Undisturbed Total		*0.0*	*0.0*
Direct Disturbance	Road	10.9	53.1
	Cutblock	12.3	56.2
	Fire	0.0	0.0
	Other[(c)]	0.1	0.8
Disturbed Total		*23.4*	*110.0*
Indirect Disturbance	Habitat within an AEC and within ZOI of existing anthropogenic disturbance	0.0	0.0
	Habitat within ZOI of existing anthropogenic disturbance (and not within an AEC)	22.8	120.3
Indirect Total		*22.8*	*120.3*
Total		**46.2**	**230.3**

Notes: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.
AEC = Area of Environmental Concern; ha = hectare; PF = Project footprint; ZOI = Zone of Influence.
(a) Other disturbance types include the following TEM codes: canal, gravel pit, mine, mine spoil, non-forested disturbed land, pasture, reclaimed mine, rural residential, and urban.

Mountain caribou can also be affected by indirect habitat loss. Caribou may avoid areas of otherwise suitable habitat because of its proximity to anthropogenic disturbance (Weclaw and Hudson 2004), which, therefore, reduces the amount of functional habitat available within a caribou range. Applying the ZOI to the Project footprint and Mine Site outside disturbance areas, 0.7 ha of the ZOI would result in new indirect impacts from the Project based on ECCC's (2014) definition of disturbed habitat (Table 4-5). The remaining portions of the ZOI are already directly and indirectly disturbed at existing conditions. Sensory disturbance from the Project will continue to indirectly impact caribou through the life of the Project, until decommissioning, which is approximately 15 years. Once the Project is decommissioned, sensory disturbance from the Project is assumed to be removed and the areas indirectly impacted by the Project are

immediately available for caribou use without a time lag. The 0.7 ha of new indirect impacts from the Project have been carried forward to calculate residual effects.

In addition to the total area of impact associated with disturbance, residual effects must also take into consideration the time lag for restoration to reach measurable targets and the potential risk of restoration uncertainty or failure. The areas of new direct disturbance from the mine components of the Project footprint have been included as a residual effect for offsetting to account for the time lag for on-site restoration to reach measurable targets, since most disturbed areas may not be restored until after closure (Table 6-1). The time lag for areas of new direct disturbance from mine components is estimated to be 115 years. This is based on approximately 15 years from Project construction to decommissioning and restoration, plus an additional 100 years for restoration areas to meet the post-closure target of mature forest.

Mitigation measures have been developed to avoid and minimize the direct disturbance (143.1 ha) associated with clearing for construction of the Transmission Line ROW (Section 5). Minimization measures include retaining natural vegetation, clear spanning sections of natural vegetation such as riparian areas, which will further reduce the amount of new direct disturbance associated with the Transmission Line ROW, but detailed design is not yet available. Revegetation will occur immediately following construction of segments of the Transmission Line ROW, and planting of conifer seedlings will occur where disturbance to understory vegetation occurs (thus reducing time lag). It is estimated that approximately 25% of the direct disturbance will be required for operations and 75% of the direct disturbance from Transmission Line ROW construction would be actively or passively allowed to restore. Decommissioning of the Transmission Line ROW is planned at the end of the Project, after approximately 15 years, but progressive restoration may involve restoration of certain areas sooner. Therefore, the time lag for the Transmission Line ROW ranges from 100-115 years to account for this variability.

Population level residual impacts to caribou are challenging to quantify. Mitigation measures have been developed following the mitigation hierarchy (avoid, minimize, restore on-site); however, even with the mitigation identified for the Transmission Line, this will be a new development within the Barkerville herd boundary and predation risk along linear infrastructure remains as a residual impact to caribou. Linear infrastructure improves predator access and movement efficiency within a landscape, which can facilitate increased predation on prey species (Pigeon et al. 2020). For species with low populations, such as the Barkerville herd, small changes to predation can lead to population level impacts. For this reason, predation risk is carried forward as a residual effect. Offset ratios to account for the disturbance (habitat loss and population level impacts) and time lag will be determined through the development of the offsetting plan.

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Willow River

Jack of Clubs Lake

Vent

Vent

Camp Access Road

Surface Disturbance

Mine Site Overburden and Soil Stockpile

Cow Portal

Vent

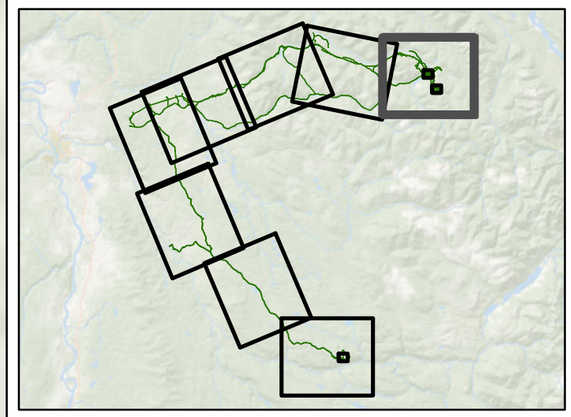
Vent

LEGEND

- PROJECT ASSESSMENT AREA
- TRANSPORTATION ROUTES
- TRANSMISSION LINE ROUTE
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY
- CARIBOU MOVEMENT CORRIDOR OVERLAPPING TRANSMISSION LINE ROUTE

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED



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CLIENT

OSISKO DEVELOPMENT CORP.

PROJECT

CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE

PROJECT IMPACTS TO CARIBOU HABITAT - DETAIL

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	GH
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
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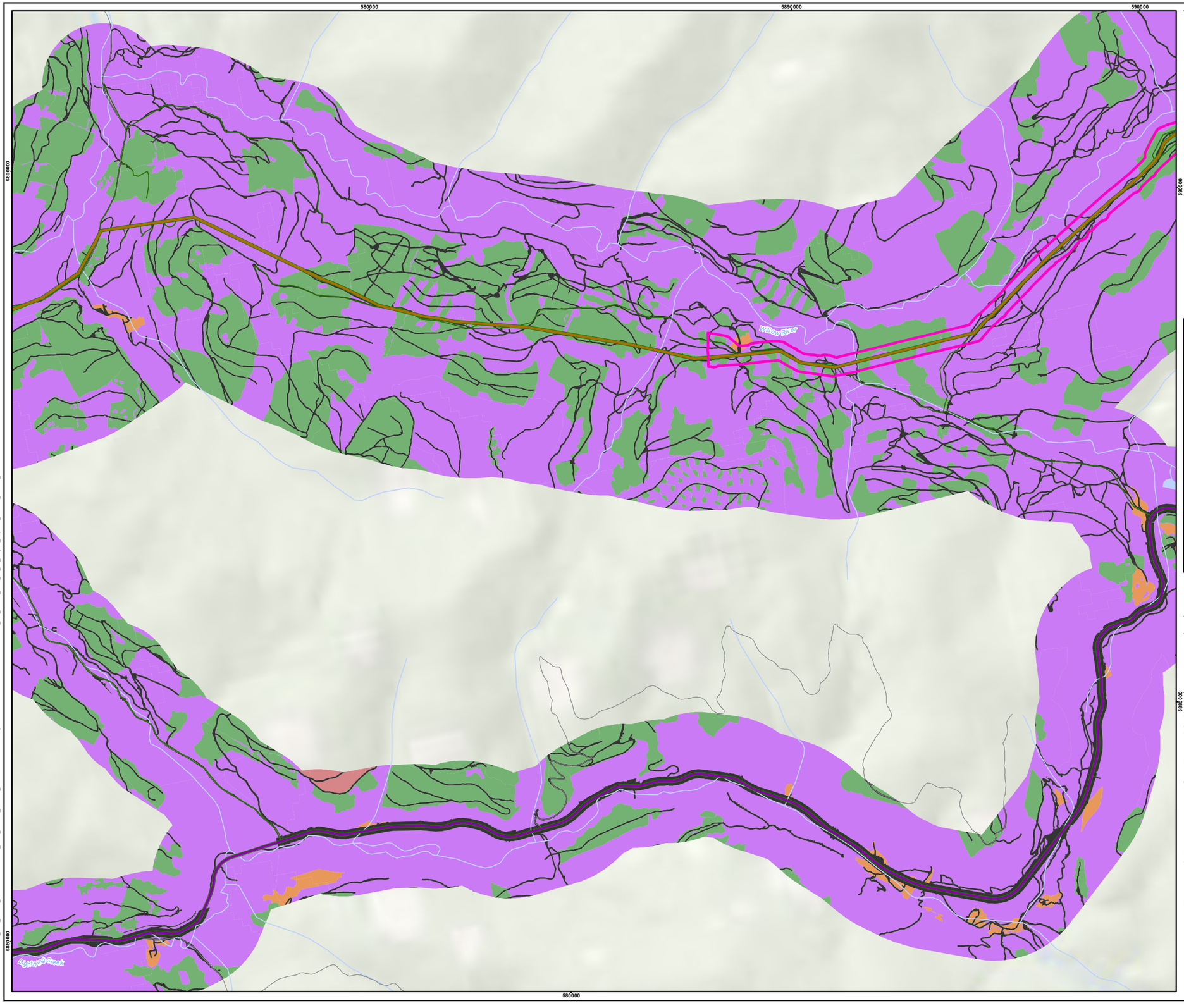

LEGEND

- PROJECT ASSESSMENT AREA
- TRANSPORTATION ROUTES
- TRANSMISSION LINE ROUTE
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY
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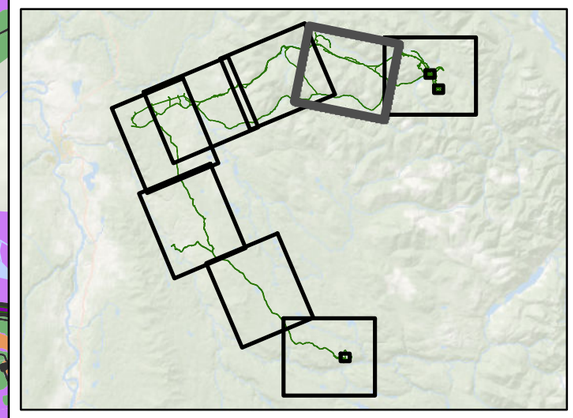

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CLIENT

OSISKO DEVELOPMENT CORP.

PROJECT

CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE

PROJECT IMPACTS TO CARIBOU HABITAT - DETAIL

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	GH
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
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Lightning Creek

LEGEND

- PROJECT ASSESSMENT AREA
- TRANSPORTATION ROUTES
- TRANSMISSION LINE ROUTE
- HIGHWAY
- ROAD
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- WATERBODY
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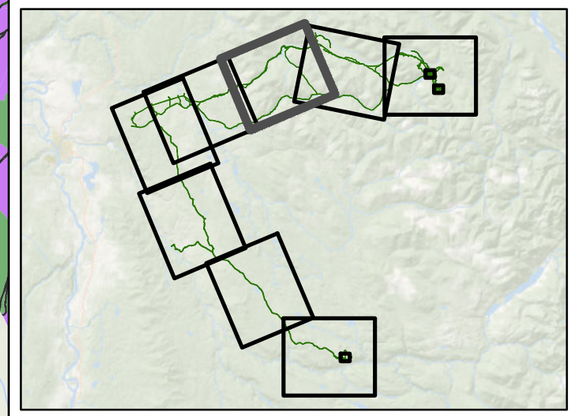

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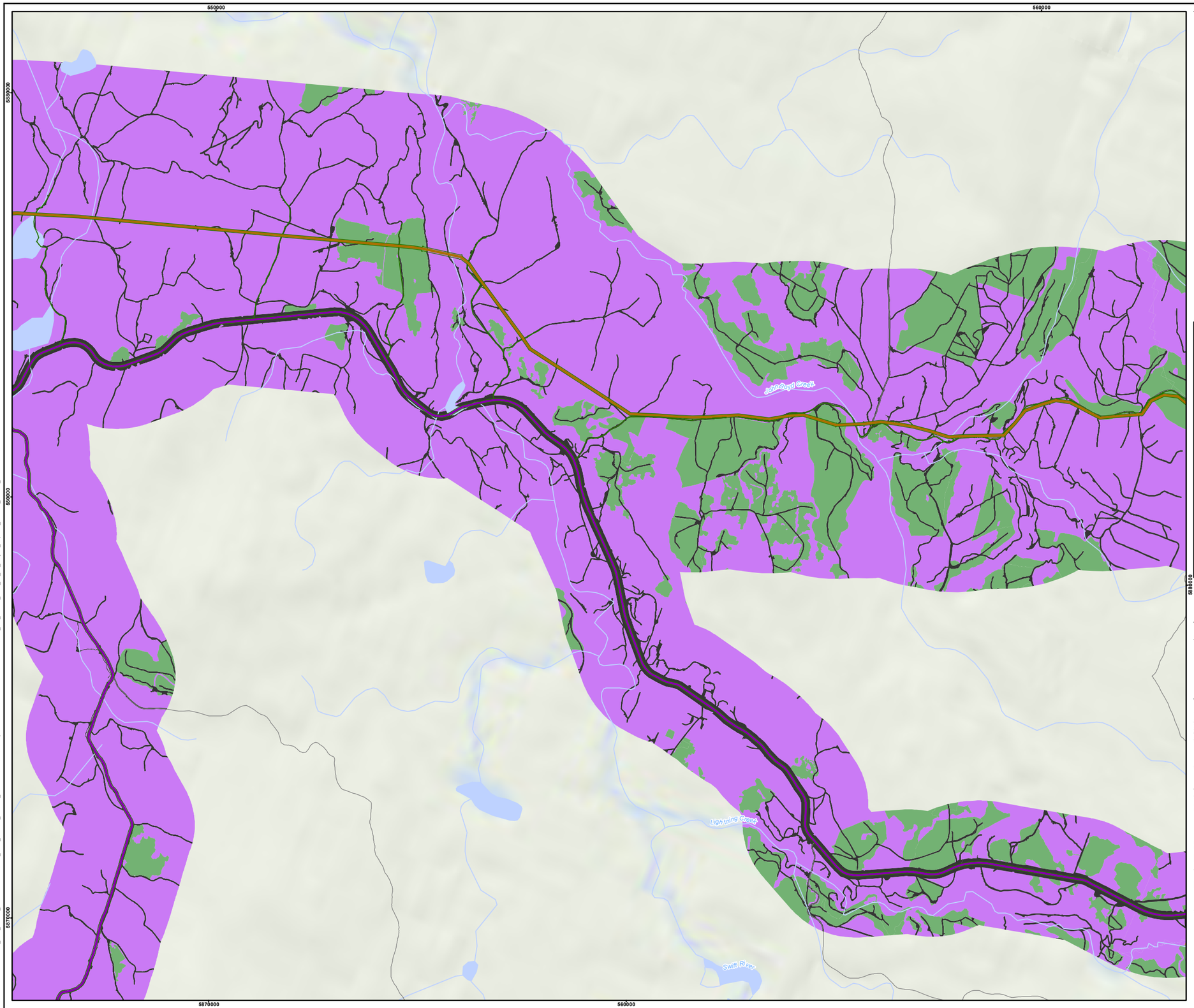

LEGEND

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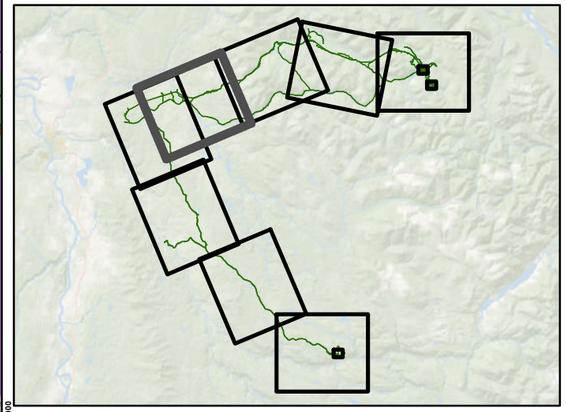
- ROADS
- OTHER ANTHROPOGENIC
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED



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NOTE(S)

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3. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS. NAD83 CSRS UTM ZONE 10N

CLIENT

OSISKO DEVELOPMENT CORP.

PROJECT

CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE

PROJECT IMPACTS TO CARIBOU HABITAT - DETAIL

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	GH
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
1774160	43100	0	6-1.4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

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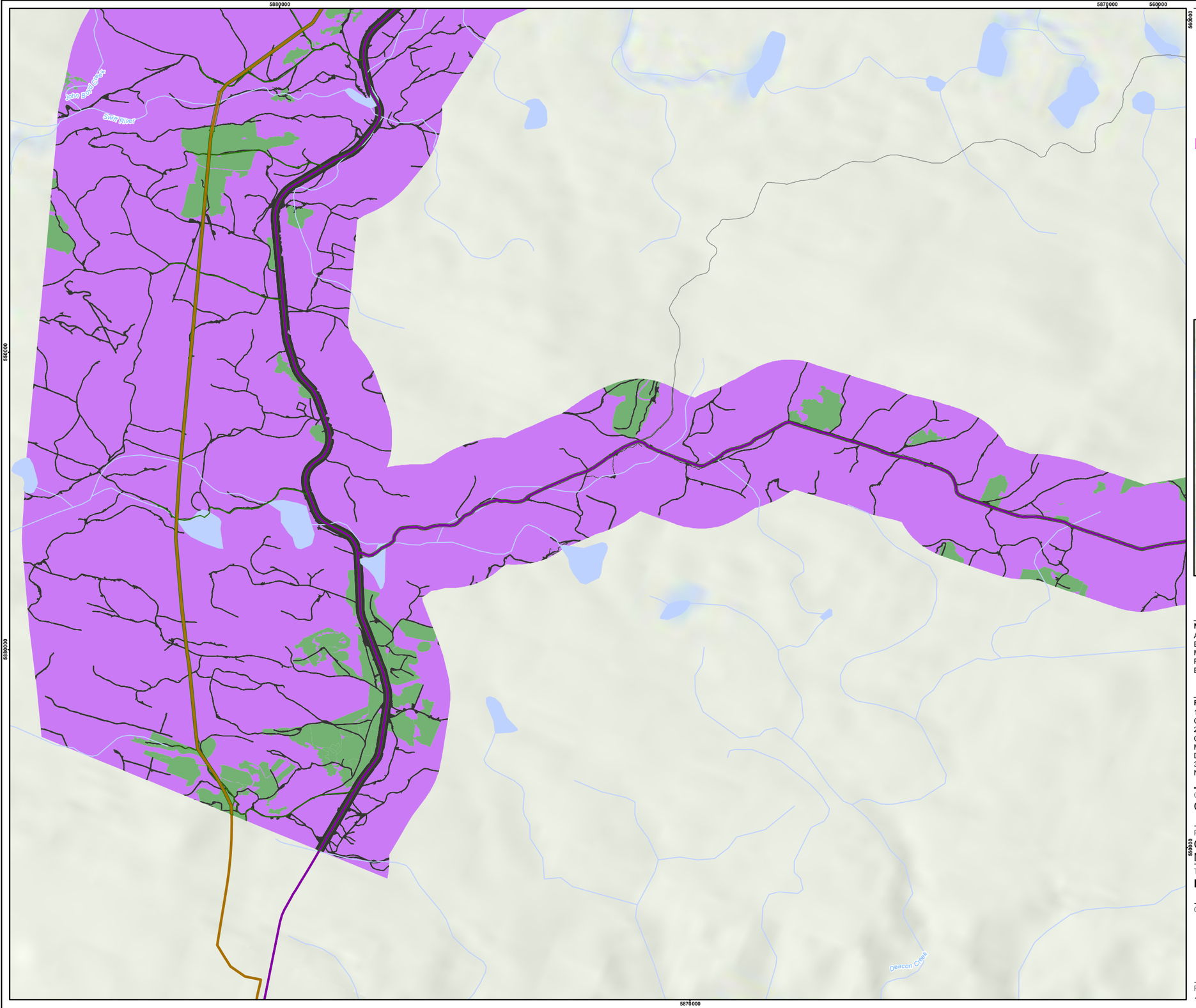
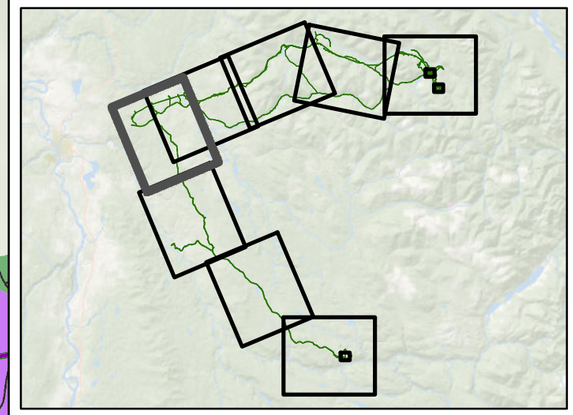


LEGEND

- PROJECT ASSESSMENT AREA
- TRANSPORTATION ROUTES
- TRANSMISSION LINE ROUTE
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY
- CARIBOU MOVEMENT CORRIDOR OVERLAPPING TRANSMISSION LINE ROUTE

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED



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NAD83 CSRS UTM ZONE 10N

CLIENT
OSISKO DEVELOPMENT CORP.

PROJECT
CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE
PROJECT IMPACTS TO CARIBOU HABITAT - DETAIL

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	GH
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
1774160	43100	0	6-1.5

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25mm

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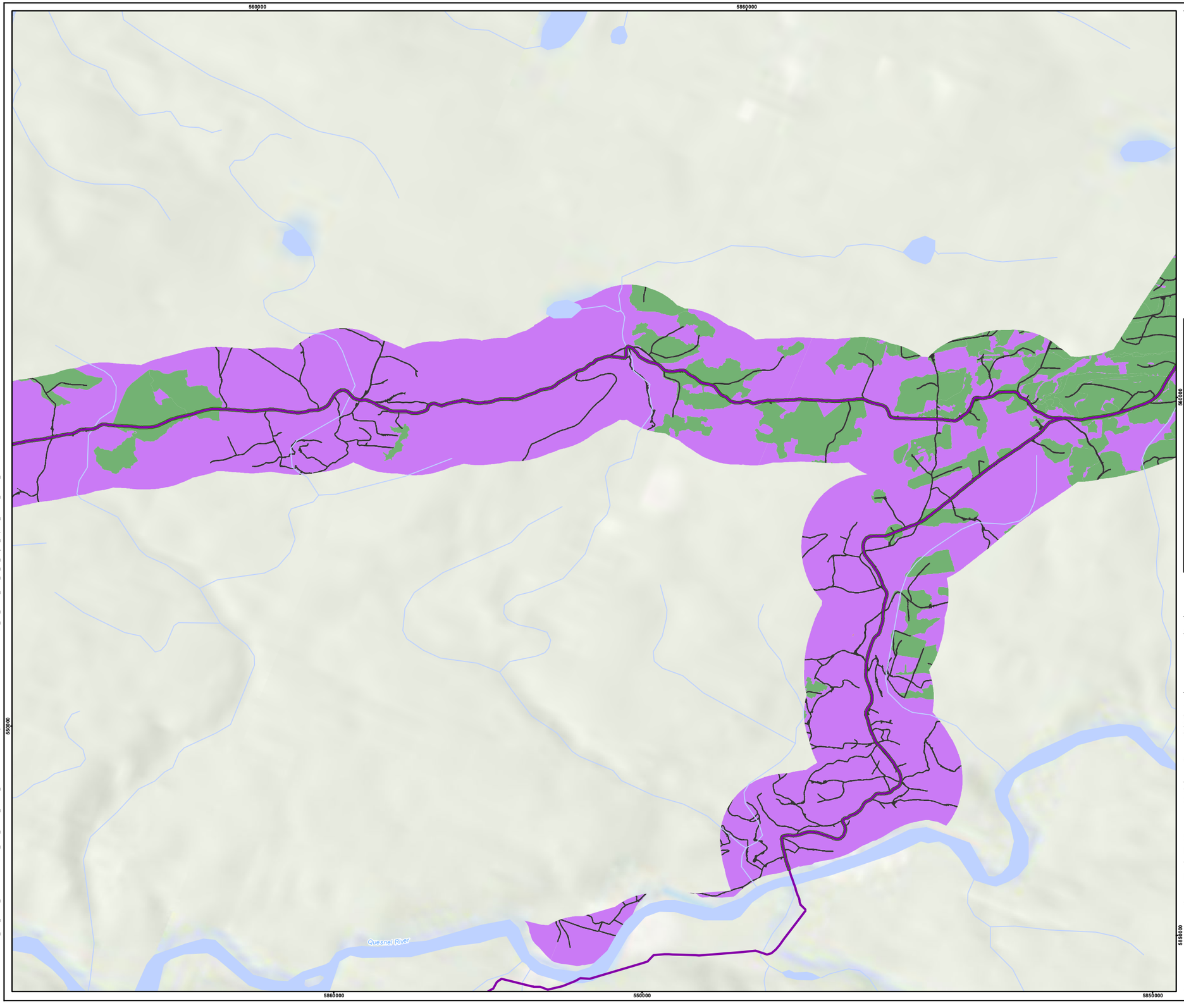
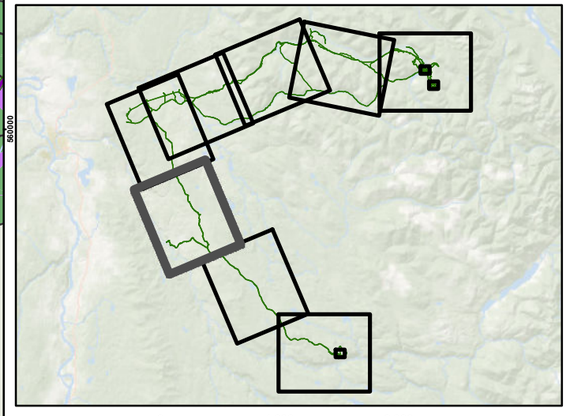


LEGEND

- PROJECT ASSESSMENT AREA
- TRANSPORTATION ROUTES
- TRANSMISSION LINE ROUTE
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY
- CARIBOU MOVEMENT CORRIDOR OVERLAPPING TRANSMISSION LINE ROUTE

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED



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NAD83 CSRS UTM ZONE 10N

CLIENT
OSISKO DEVELOPMENT CORP.

PROJECT
CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

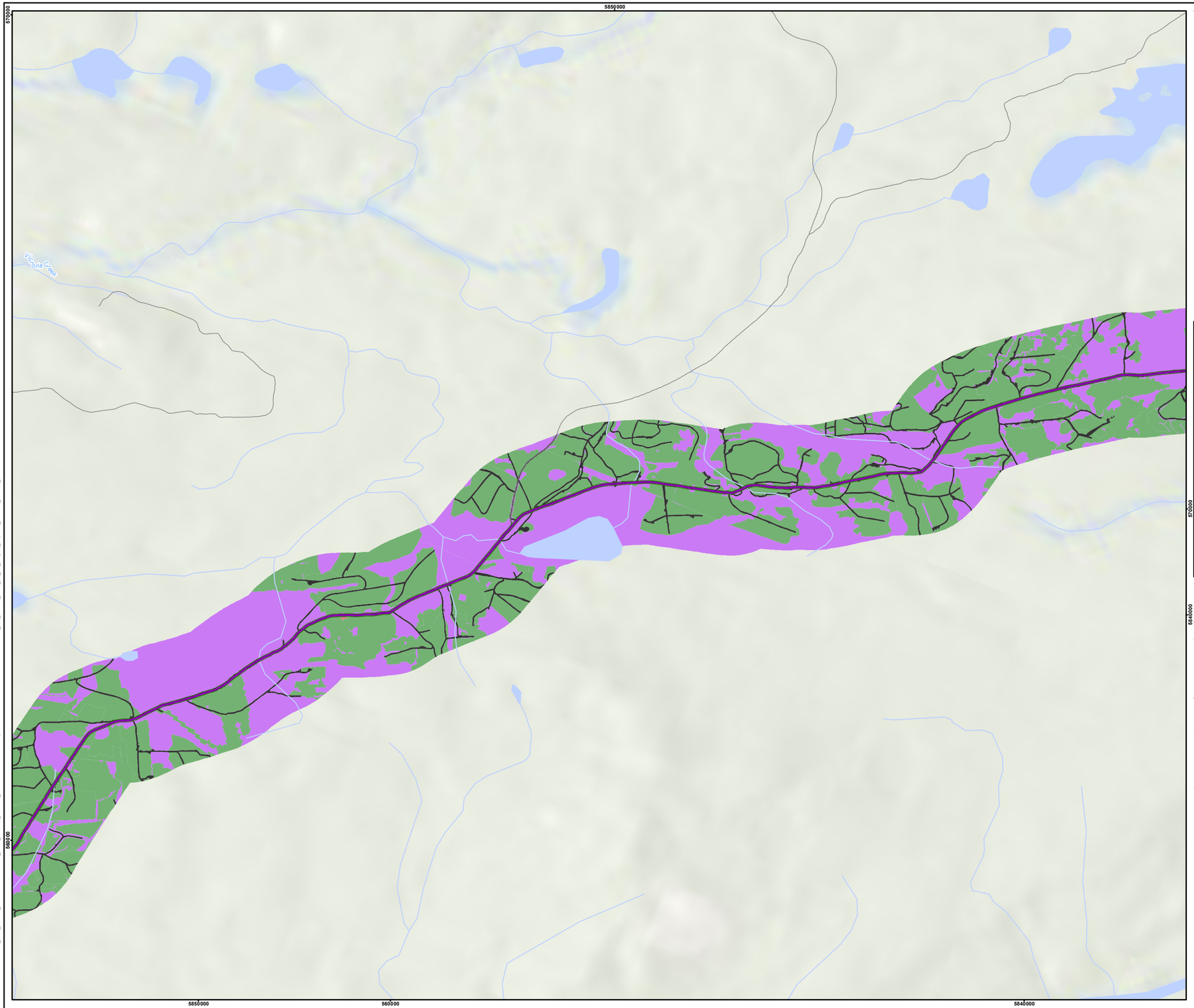
TITLE
PROJECT IMPACTS TO CARIBOU HABITAT - DETAIL

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	GH
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
1774160	43100	0	6-1.6

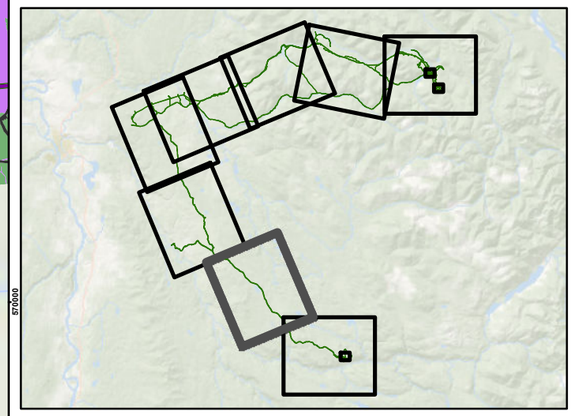


LEGEND

- PROJECT ASSESSMENT AREA
- TRANSPORTATION ROUTES
- TRANSMISSION LINE ROUTE
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY
- CARIBOU MOVEMENT CORRIDOR OVERLAPPING TRANSMISSION LINE ROUTE

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED



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1:50,000 METRES

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3. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.
NAD83 CSRS UTM ZONE 10N

CLIENT

OSISKO DEVELOPMENT CORP.

PROJECT

CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE

PROJECT IMPACTS TO CARIBOU HABITAT - DETAIL

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	GH
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
1774160	43100	0	6-1.7

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

0 25mm

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580000

5840000

Mesilinka River

Quaaneal River

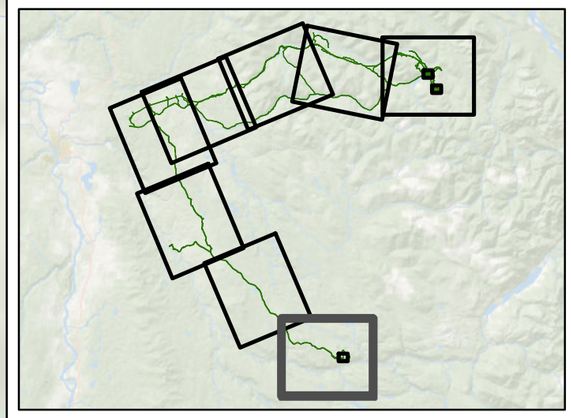
580000

LEGEND

- PROJECT ASSESSMENT AREA
- TRANSPORTATION ROUTES
- TRANSMISSION LINE ROUTE
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY
- CARIBOU MOVEMENT CORRIDOR OVERLAPPING TRANSMISSION LINE ROUTE

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED



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CLIENT

OSISKO DEVELOPMENT CORP.

PROJECT

CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE

PROJECT IMPACTS TO CARIBOU HABITAT - DETAIL

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	GH
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
1774160	43100	0	6-1.8

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

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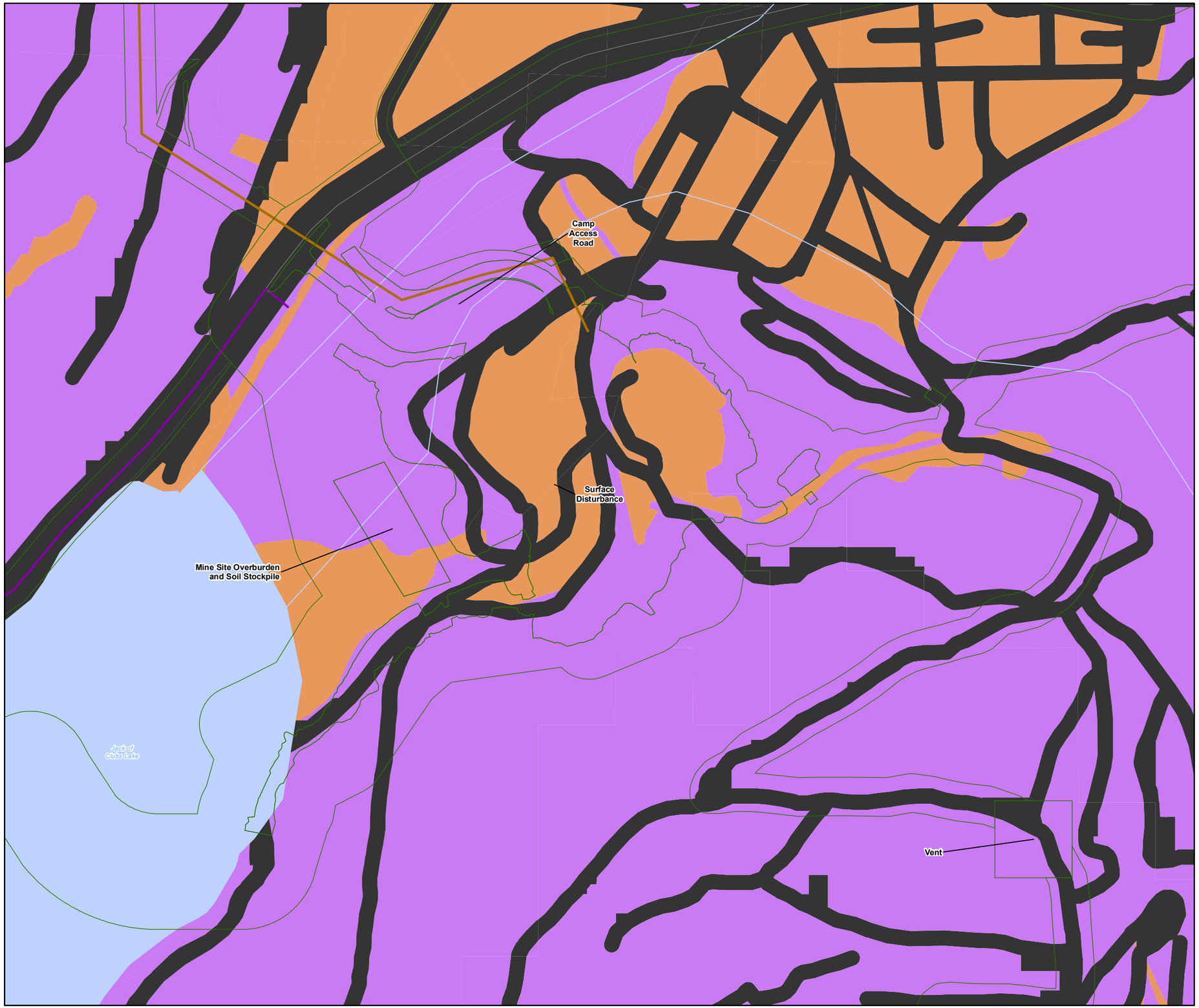
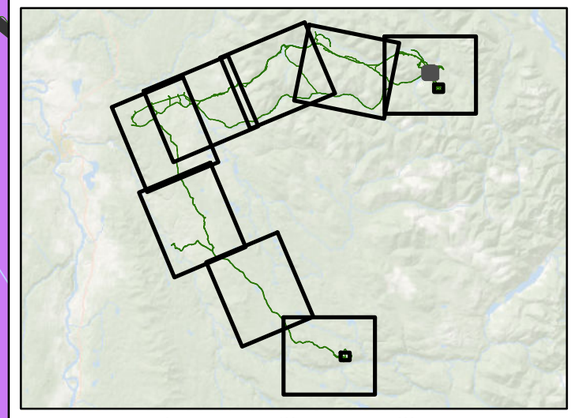


LEGEND

- PROJECT ASSESSMENT AREA
- TRANSPORTATION ROUTES
- TRANSMISSION LINE ROUTE
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY
- CARIBOU MOVEMENT CORRIDOR OVERLAPPING TRANSMISSION LINE ROUTE

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED



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NAD83 CSRS UTM ZONE 10N

CLIENT
OSISKO DEVELOPMENT CORP.

PROJECT
CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE
PROJECT IMPACTS TO CARIBOU HABITAT - DETAIL

CONSULTANT
wsp

YYYY-MM-DD	2025-06-12
DESIGNED	GH
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
1774160	43100	0	6-1.9

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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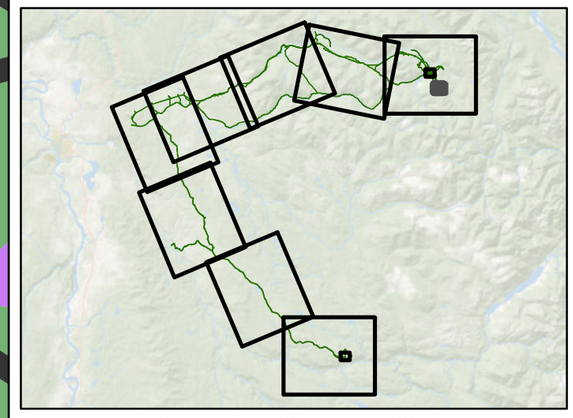
LEGEND

- PROJECT ASSESSMENT AREA
- TRANSPORTATION ROUTES
- TRANSMISSION LINE ROUTE
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY
- CARIBOU MOVEMENT CORRIDOR OVERLAPPING TRANSMISSION LINE ROUTE

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED



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NAD83 CSRS UTM ZONE 10N

CLIENT
OSISKO DEVELOPMENT CORP.

PROJECT
CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE
PROJECT IMPACTS TO CARIBOU HABITAT - DETAIL

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	GH
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APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
1774160	43100	0	6-1.10

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25mm

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580000

580000

Quesnel River

LEGEND

- PROJECT ASSESSMENT AREA
- TRANSPORTATION ROUTES
- TRANSMISSION LINE ROUTE
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY
- CARIBOU MOVEMENT CORRIDOR OVERLAPPING TRANSMISSION LINE ROUTE

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
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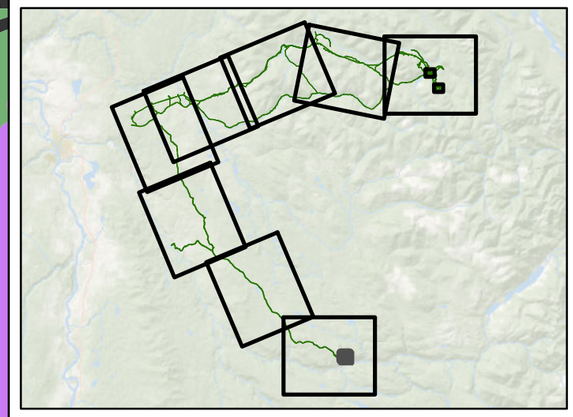

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NAD83 CSRS UTM ZONE 10N

CLIENT

OSISKO DEVELOPMENT CORP.

PROJECT

CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE

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CONSULTANT

wsp

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PROJECT NO.	CONTROL	REV.	FIGURE
1774160	43100	0	6-1.10

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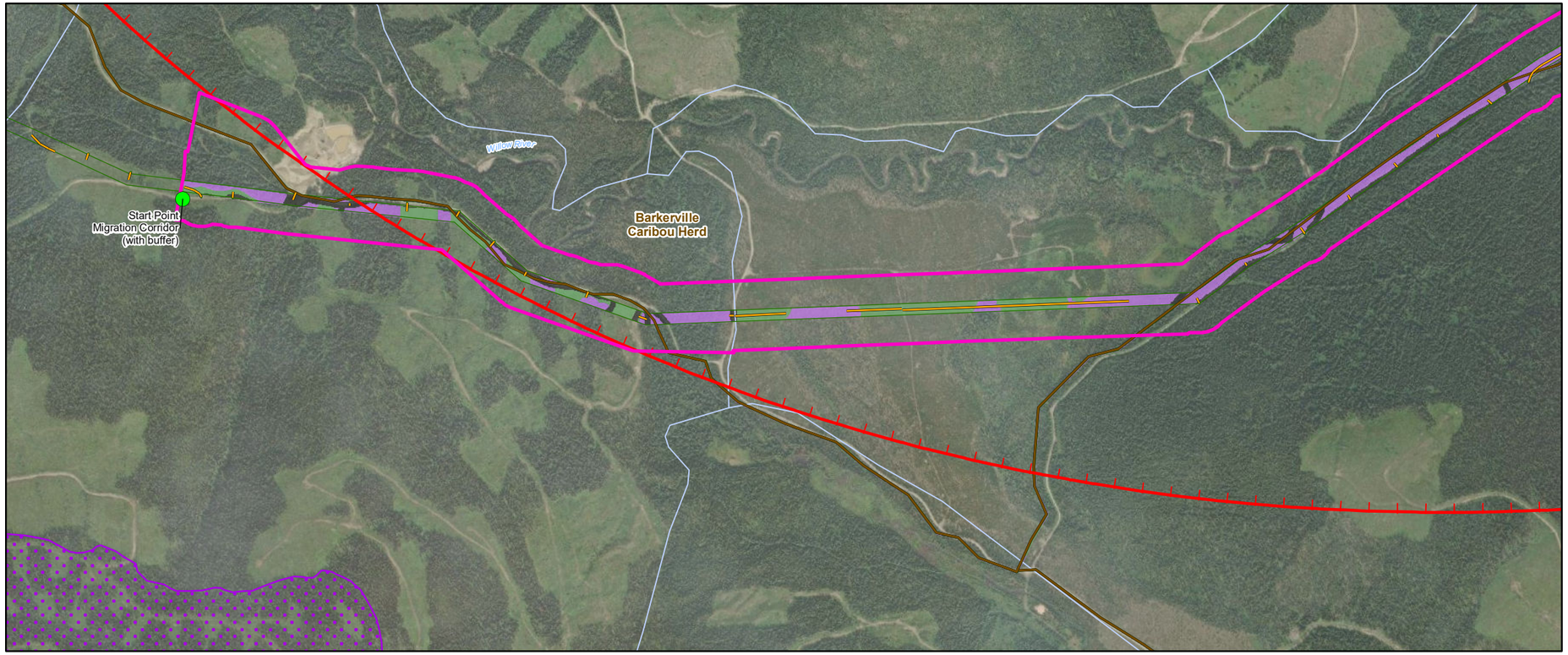
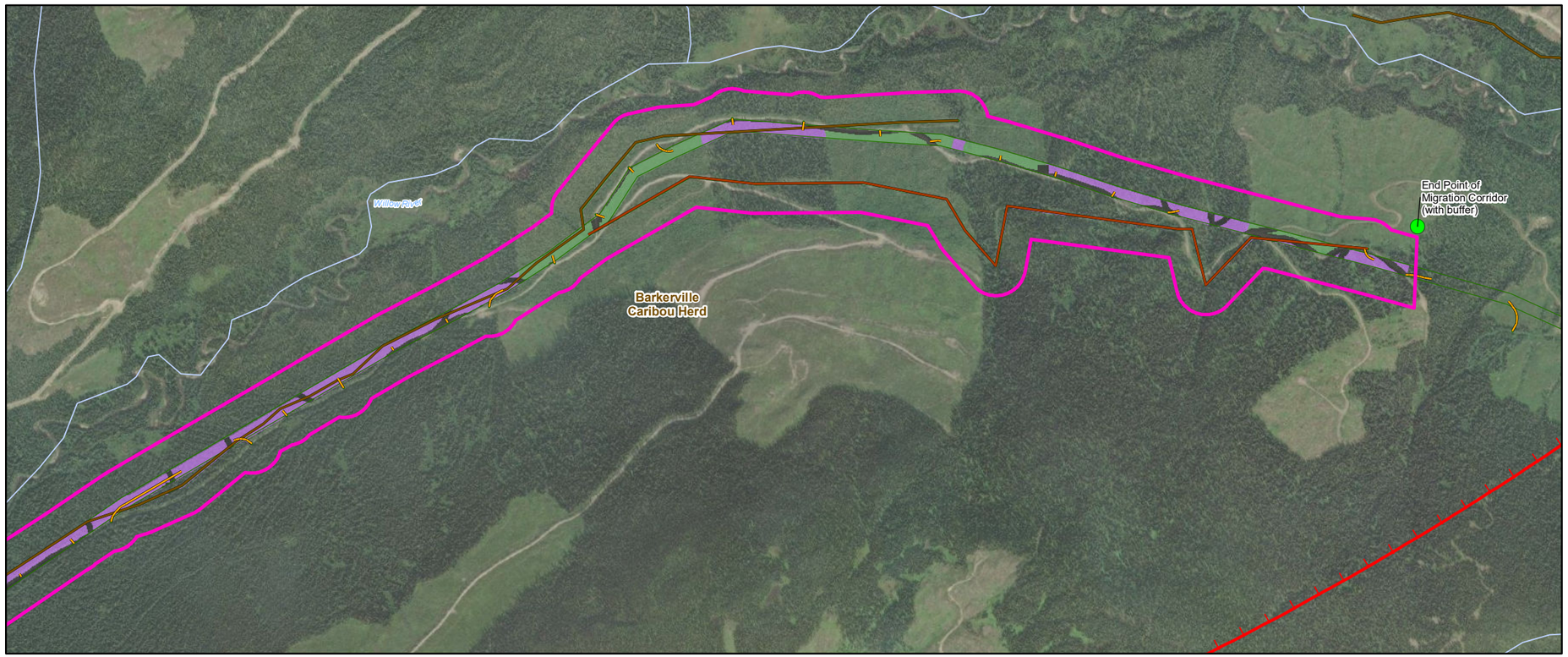


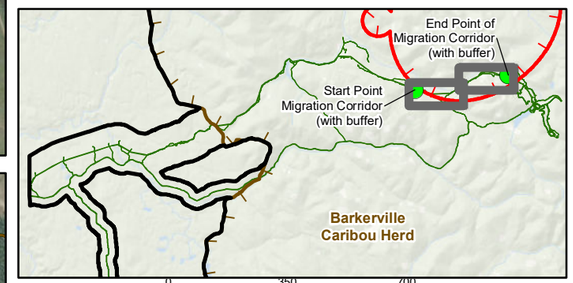


LEGEND

- CARIBOU ASSESSMENT AREA
- START/END MIGRATION CORRIDOR (WITH BUFFER)
- CARIBOU MOVEMENT CORRIDOR OVERLAPPING TRANSMISSION LINE ROUTE
- PROJECT ASSESSMENT AREA
- TRANSMISSION LINE ACCESS ROAD - EXISTING
- TRANSMISSION LINE ACCESS ROAD - UPGRADE
- PROPOSED TRANSMISSION LINE ACCESS ROAD (NEW)
- CARIBOU HERD SUB-POPULATION BOUNDARY
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - NO HARVEST ZONE
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA - MODIFIED HARVEST ZONE
- MOUNT TOM CALVING PERIOD RESTRICTED AREA
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY

DISTURBANCE TYPE

- CUTBLOCK
- FOREST FIRES
- ROADS
- OTHER ANTHROPOGENIC DISTURBANCE
- HABITAT WITHIN A ZOI OF ANTHROPOGENIC DISTURBANCE
- UNDISTURBED



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NOTE(S)

ANY PROJECTS OCCURRING IN ECCC MAPPED CRITICAL HABITAT NEED TO CAPTURE THE ENTIRE FEDERAL BOUNDARIES NOT JUST THE PROVINCIAL MAPPED BOUNDARIES. FOR THE MOUNTAIN CARIBOU LAYERS IT SEEMS THE PROVINCIAL BOUNDARIES MISS THE UNMAPPED POLYGONS THAT ARE PART OF ECCC CRITICAL HABITAT FOR THIS SPECIES – BOTH SHOULD BE REVIEWED WHEN WE LOOK AT MOUNTAIN CARIBOU HABITAT IN THE FUTURE.

REFERENCE(S)

1.WATER FEATURES, TRANSPORTATION FEATURES OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. CARIBOU HERD BOUNDARIES, MOUNTAIN CRAIBOU WILDLIFE HABITAT AREAS, MOUNTAIN CARIBOU CORE ALL-SEASON HABITAT, MOUNTAIN CARIBOU MATRIX RANGE, CITIES/TOWNS, INDIAN RESERVES AND PARK/PROTECTED AREAS OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
3. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS. NAD83 CSRS UTM ZONE 10N

CLIENT
OSISKO DEVELOPMENT CORP.

PROJECT
CARIBOO GOLD PROJECT - CARIBOU MITIGATION AND MONITORING PLAN

TITLE
EXISTING DISTURBANCE IN THE CARIBOU MOVEMENT CORRIDOR

CONSULTANT

wsp

YYYY-MM-DD	2025-06-12
DESIGNED	TS
PREPARED	JP
REVIEWED	GH
APPROVED	PB

PROJECT NO.	CONTROL	REV.	FIGURE
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6.1 Rationale for Moving to Offsets

Mountain caribou populations in BC are currently in decline. Primary threats include habitat alteration that impacts predator-prey relationships and increases predation risk (Government of BC [date unknown]a, [date unknown]b; MCTAC 2002; EC 2014). Therefore, any additional anthropogenic changes will negatively compromise the resilience and ecological thresholds of the caribou population. The Project is predicted to result in a loss of caribou critical habitat, which is quantified in Table 6–3. However, loss of habitat is not the only predicted residual effect and population level effects are considered a residual effect before offsetting. Predator-prey relationships are altered by habitat loss, and new linear features are expected to facilitate wolf movement through caribou habitat that could increase predation risk for Barkerville caribou (EC 2014, Mumma et al. 2019).

While industrial activities may not result in direct mortality of caribou, indirect mortality may result through indirect impacts, such as altering predator-prey relationship or increasing predator movement (EC 2014). To account for these indirect impacts, anthropogenic disturbances are recommended to be buffered by 500 m to capture the combined effects of increased predation and avoidance on caribou from anthropogenic disturbance (EC 2014). Through discussion with WLRS, the Project opted to use larger ZOI specific to different disturbance types to identify new indirect impacts. New indirect impacts from the Project were carried forward as a residual impact before offsetting to quantify the new indirect impacts from the Project in terms of habitat as a standard unit.

ODV also recognizes that the time-lag and uncertainty associated with on-site habitat restoration measures will be considered in terms of mountain caribou residual effects from predation and habitat. A time lag of 115 years has been included as a residual impact for the mine components, 100-115 years for the Transmission Line ROW, and 15 years for the new indirect impacts in the ZOI for areas of restore on-site to take effect. The residual impact to caribou critical habitat will require an offset because the impact cannot be further mitigated through measures to avoid, minimize, or restore on-site within an acceptable timeframe. Approximately 13.5 ha of core habitat, 22.4 ha of matrix habitat, and 16.3 ha of unmapped caribou critical habitat would be carried forward as residual effects. Of the 22.4 ha of matrix caribou habitat, 4.3 ha is located within the AEC, which may require offsetting, but is assumed to be marginal caribou habitat due to past anthropogenic disturbance (SNC-Lavalin 2011).

Based on discussions with WLRS, caribou habitat has been quantified for a movement corridor located within the Transmission Line ROW separate from residual impacts associated with the rest of the Project footprint. There are 22.8 ha of new direct impacts within the movement corridor; there are no areas of undisturbed habitat. The movement corridor is a mix of core (15.8 ha) and matrix (7.0 ha) habitat. A break down of the predicted residual impacts is provided in Table 6–3.

In addition to habitat loss, predation risk has also been identified as a residual impact from the Transmission Line ROW and will require offsetting. As mentioned, predation risk is challenging to quantify, but has potential population level consequences. This impact will be carried forward to offsetting. The residual effects of the Project are anticipated to limit mountain caribou habitat and have the potential to effect population numbers, and ODV is committed to offset measures aimed at reversing these factors.

The estimates on residual effects before offsetting are conservative and do not factor in areas of vegetation retention that are proposed along the Transmission Line that will be retained (examples provided in Figure 5–1 and Figure 5–2), as well as other mitigation that will be applied to minimize disturbance. The calculated numbers assume loss of all vegetation along the Transmission Line where direct impacts do not already occur.

Table 6–3: Residual Effects to Mountain Caribou Critical Habitat from the Project

Existing Disturbance	Project-related Disturbance	Caribou Habitat Type	Movement Corridor along Transmission Line	Mine and Transmission Line Components outside the movement Corridor	Project ZOI	Total (ha)	Residual Impact (ha)
Direct	Direct	Core	15.5	32.0	0.0	47.5	0.0
Direct	Direct	Matrix	7.8	68.8	0.0	76.6	0.0
Direct	Direct	Unmapped	0.0	168.5	0.0	168.5	0.0
Direct	Indirect	Core	-	-	4,364.9	4,364.9	0
Direct	Indirect	Matrix	-	-	4,722.7	4,722.7	0
Direct	Indirect	Unmapped	-	-	8,292.5	8,292.5	0
Indirect	Direct	Core	15.8	16.6	0.0	32.4	32.4
Indirect in AEC	Direct	Matrix	0.0	4.3	-	4.3	4.3
Indirect	Direct	Matrix	7.0	53.0	0.0	60.0	60.0
Indirect	Direct	Unmapped	0.0	62.0	0.0	62.0	62.0
Indirect	Indirect	Core	-	-	11,151.7	11,151.7	0
Indirect	Indirect	Matrix	-	-	9,715.5	9,715.5	0
Indirect	Indirect	Unmapped	-	-	19,648.0	19,648.0	0
Undisturbed	Indirect	Unmapped	-	-	0.7	0.73	0.7
		Total	**46.2**	**405.1**	**57,896.0**	**58,351.7**	**159.4**

Notes: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

ha = hectare; AEC = Area of Environmental Concern; ZOI = Zone of Influence; - = not applicable.

7. OFFSET STRATEGY

The final level of the mitigation hierarchy is offsetting (MOE 2014b). The purpose of offsets is to provide habitat compensation to address the time-lag between the effect occurring and the positive effects of implementing the mitigation measures to avoid, minimize, and restore on-site. In addition, offsets must be protected for, at minimum, the length of time of the initial effect. ODV is committed to working with MOF, WLRS, and Indigenous nations to provide offsetting measures that have the most conservation value to mountain caribou and their habitat. Habitat securement and financial offsets as conservation mechanisms to offset the remaining residual effects from the proposed Project are being considered and are discussed below. ODV is committed to meeting and/or exceeding standard practice for mitigating effects to mountain caribou.

7.1 Habitat Offset Decision Support Tool

The BC Habitat Offset DST (Government of BC 2019) is a workbook that was developed to help facilitate discussions and negotiations around habitat offsets for species in BC. Offsetting is the final step in the mitigation hierarchy and is implemented once preceding steps (i.e., avoid, minimize, and restore on site) have been exhausted (Government of BC 2019). The DST workbook includes formulas and weightings that compare the impact site to a proposed restoration site, considering time lag and other factors. These inputs are used to determine an offset ratio that is then used to guide negotiations between proponents, WLRS, and Indigenous nations to determine a fair offset ratio for the residual impacts before offsetting.

The BC Habitat Offset DST was developed recognizing that there is uncertainty in the success of restoration efforts and that offsets must consider the time lag for restoration to be initiated (Government of BC 2019). Therefore, there are built in multipliers to the workbook. In addition, caribou have been identified as a highly sensitive species, and a specific workbook has been created for caribou. As such, the baseline offset ratio for caribou is set at 10:1 instead of the default 8:1, which is meant to take into consideration the vulnerable state of caribou in BC (Government BC 2019). A second difference is that the caribou specific DST includes additional modifiers that relate to caribou habitat.

As part of the offsetting strategy, the BC Habitat Offset DST was used to calculate initial offset estimates for two different scenarios: 1) for the movement corridor (22.8 ha), recognizing this area has been identified by WLRS as of greater ecological value to caribou and 2) for the Project footprint outside the movement corridor (136.6 ha). One limitation of the BC Habitat Offset DST is that the tool requires input variables for both the impact site and offset site. While variables are generally known for the impact site, an offset site has not been identified to date. Assumptions were made regarding the offset site, or in the case of in lieu payment, the offset site that would be funded by the payment, to determine an offset ratio. Based on the BC Habitat

Offset DST and assumptions regarding the offset site, it is anticipated that the Project would be required to offset approximately 1,359.7 ha (Table 7–1). A summary of the assumptions and inputs used in the DST is provided in Appendix B; Table 1, and is assumed will be the starting point for negotiations on offsets for the Project.

Table 7–1: Key Inputs for BC Habitat Decision Support Tool and Output Ratio for Determining Offset Area

Key Inputs	Movement Corridor	Project footprint outside Movement Corridor
Impact Area (ha)	22.8	136.6
Impact Site - Ecological Quality	Medium	Low
Time Lag (years)	15	15
Ratio without conservation actions	13.11:1	7.77:1
Total Offset Area (ha)	298.9	1,060.8

Notes: ha = hectare

7.2 Off-Site Habitat Securement and Restoration

Residual effects from the Project to caribou are anticipated and offsets will be required. Off-site habitat securement and restoration is one option for offset. Off-site habitat securement and restoration would involve identifying habitat parcels to be acquired and/or conducting restoration on habitat parcels to improve or increase suitable caribou habitat.

Off-site habitat securement and restoration would be identified within the Barkerville herd boundary. Three objectives will be used to identify and prioritize caribou habitat restoration (FLNRORD 2021):

1. Control access to caribou habitat by predators and humans.
2. Accelerate the rate of recovery of native vegetation.
3. Provide habitat that supports the life processes required by caribou as much as undisturbed areas, over the long-term.

Habitat securement and restoration projects being considered for the Project are provided below. Opportunities for habitat securement and restoration would be determined in consultation with MOF, WLRS, and Indigenous nations to compliment other restoration projects within the Barkerville herd boundary. Off-site habitat offsets will be preferentially selected within or adjacent to WHAs with ‘no harvest’ designation and in locations caribou are known to use.

- Restore linear features such as abandoned roads to control access to caribou habitat. This may involve installing barriers (e.g., slash piles or tree bending/falling) to human access and/or predator movement and planting ecologically appropriate seedlings to set the site on a trajectory to natural forested ecosystems. Restoring linear features not only restores caribou habitat within the road ROW, but will improve the functionality of adjacent caribou habitat.

- Install wildlife crossing structures on Highway 26 to reduce wildlife-vehicle interactions and mortality.
- Restore areas impacted by mountain pine beetle. Mountain pine beetle has had a large impact, and there is little area within the Barkerville herd boundary that has not been impacted by mountain pine beetle (Government of BC [date unknown]a). Planting seedlings can help reduce the time lag for forest to grow back on the landscape.
- Restore areas where wildfire has impacted caribou habitat. Restoration efforts, such as planting seedlings, can reduce the time lag for areas impacted by wildfire to return to a forested state.

Monitoring of off-site habitat restoration for caribou will be conducted by ODV. Monitoring will be used to identify and measure key indicators to determine the response of the restoration treatment. The monitoring plan would be Project-specific to determine whether the goals of restoration have been met. Monitoring is discussed further in Section 8.

Alternatively, ODV could return lands currently held under their lease agreement or defer development on leased land in perpetuity, in particular where ODV holds lease agreements within WHAs. WHAs are high value habitat for caribou and deferring lease in perpetuity would provide habitat securement for caribou.

For direct impacts from the Project, based on the assumptions in the current DST workbook, an offset area of approximately 1,361 ha may be required to offset and would be used as part of the negotiation on offsets for the Project (Table 1, Appendix B). This is considered to be a maximum as it does not consider any of the mitigation measures outlined in the CMMP. This number will be discussed further with WLRS. The land within the Barkerville herd boundary is predominantly Crown land and opportunity for ODV to acquire this land to restore and protect is limited. Based on conversations with WLRS, it was agreed that a financial offset for the Project would make the most sense (Watters 2024b, pers. comm.).

7.3 Financial Offset

Financial offset involves providing compensation in place of offset areas. Compensation may be provided directly to WLRS, or compensation may be provided to Indigenous nations or other non-government organization to fund restoration projects or for population enhancement measures, such as maternal pens. Financial offset would preferentially target restoration projects within the Barkerville herd boundary where habitat degradation is occurring.

Limited opportunities are available within the Barkerville Herd Boundary for ODV to conduct off-site habitat restoration and securement. Therefore, in lieu payment is likely the preferred option for this Project. Financial offset would require negotiation of the offset ratio for the impact site and a dollar value conversion factor for area of restoration to determine a total sum payment required as offset for the Project. In working through the BC Habitat DST, considering the

movement corridor and the Project footprint outside the movement corridor separately, it is anticipated that the Project would be required to offset approximately 1,361 ha (Table 7–1).

To determine a financial offset, it was assumed that linear feature restoration would be prioritized with the funds. The cost of conducting linear feature restoration is variable. Limited information is available for restoration costs in the Southern Mountain Caribou regions. Estimates for restoring linear features for woodland caribou in the boreal region range from $4,000 to $16,000 per km (Anieleski 2019; Pyper et al. 2021). A value per km would be negotiated for financial offset for the Project with WLRS.

Restoration of linear features would also remove indirect impacts to adjacent areas impacted by roads and other linear features. Therefore, calculations on area gained by linear restoration typically assume a net benefit of the surrounding areas proportional to the indirect impacts from that feature. The ZOI for roads and linear features according to Palm ([data unknown]) are 800 m and 2000 m, respectively, though other distances, such as 500 m (based on EC 2014), may be used to estimate net gain. A 500 m distance was conservatively applied over the ZOI for roads and linear features (800 to 2000 m) used given the level of disturbance in the surrounding area. This would mean for every km restored, 100 ha of habitat would be restored. This approach has been applied on other Projects occurring within mountain caribou range (BW Gold Ltd. 2022).

Three main avenues were provided by WLRS as being explored for financial offset payment options:

1. Payment of financial offset to a stewardship or mutli-stakeholder committee (to be determined) that would include participating Indigenous nations to be used to fund restoration initiatives for the Barkerville Herd.
2. Establish a trust with the Habitat Conservation Trust Foundation with the financial offset funds that would require the funds be allocated to restoration projects in the Barkerville Herd.
3. Provide in lieu payment to WLRS. This option is least preferred as there may not be a mechanism to ensure the funds are allocated to the Barkerville Herd.

ODV will continue to consult with WLRS to determine the next steps for providing in lieu payment.

7.4 Timeline

The current CMMP has identified that in lieu payment is the preferred option for offsetting for the Project. Details on initial habitat multiplier ratio calculations to begin negotiations with WLRS are provided in Appendix B, Table 1. ODV will prepare an offsetting plan that identifies the final offset quantity and avenue in which in lieu payment will be provided. The offsetting plan will be prepared in consultation with WLRS, MOF, and Indigenous nations. Payment timeline will be determined in the offsetting plan, which will be provided 90 days prior to construction of the Transmission Line.

If the Project identifies a suitable off-site offsetting area for restoration and the land can be secured, or if ODV identifies suitable options for lease deferral, a detailed restoration plan will be included in the offsetting plan for the offset site. This will be developed in consultation with MOF, WLRS, and Indigenous nations. The purpose is to align the offsetting plan with other habitat restoration and caribou enhancement projects to achieve the most benefit to the Barkerville Herd. ODV will make available a preliminary offset plan 90 days prior to construction of the Transmission Line. The preliminary offset plan will incorporate feedback from participating Indigenous nations and WLRS, and will include the final in lieu payment and avenue for providing financial offset.

8. MONITORING AND REPORTING

The conservation target is to restore 100% of core all-season mountain caribou habitat and matrix habitat disturbed by the Project through on-site restoration and offsets.

The minimum habitat requirements to meet the conservation target are based on multiple guidance documents and are outlined below (MCTS 2006; Hamilton 2011; EC 2014):

- Mature coniferous forest (ODV recognize there will be a time-lag between the completion of monitoring activities and the establishment of suitable mature coniferous forest for mountain caribou).
- Sufficient abundance (≥ Lichen Class 3, with some Class 4 and 5; Armleder et al. 1992) of arboreal lichen forage, the primary food source of mountain caribou. Arboreal lichens occur in mature systems and are slow to develop.
- Moderate density tree canopy (>35%, achieved by planting 1,400 stems/ha) to provide the level of openness required for arboreal lichen growth. Forests will support both live and dead standing trees.
- Habitat characteristics that minimize habitat preferred by other ungulate species, such as moose and deer, which are prey species for wolves. This includes limiting the abundance of grass, forb, shrub, or young forest habitat within the Project footprint that overlaps the CAA and limiting certain understorey species.

ODV recognizes the value of implementing a monitoring program to measure the success of mitigation and restoration measures. The provincial Procedures for Mitigating Impacts on Environmental Values (MOE 2014b) outlines two types of monitoring that will be conducted following mitigation measures: implementation monitoring and effectiveness monitoring. Implementation monitoring is assessing whether the activities identified in the CMMP were implemented as planned or directed. Effectiveness monitoring is evaluating environmental components based on the performance of the restoration plan and the progress towards the conservation target (i.e., did the restoration treatments achieve the conservation target).

ODV is committed to conducting annual monitoring inspections of progressive reclamation treatments during operations for the first five years after restoration. In addition, ODV will conduct annual monitoring inspections during the Post-closure / Monitoring and Maintenance Phase of the Project, starting in 2039, and in post-closure starting in 2041, until ODV's lease expires. ODV will provide associated summary reports to MOF, EMLI, and WLRS on monitoring activities during this time.

Survival surveys are recommended to occur 1 to 5 years after restoration to confirm sufficient seedlings have survived (FLNRORD 2021). Survival surveys will be conducted in Years 1, 2, 3, and 65 after planting during progressive reclamation (i.e., Operation Phase) and during the Post-closure / Monitoring and Maintenance Phase (after Active Reclamation) to confirm that seedlings are surviving after planting. A minimum 80% survival of planted seedlings will be achieved after Year 5. If the survival criteria are not met, supplemental planting will be undertaken.

Establishment surveys are recommended in years 11, 16, 26, 46, 86, and 100 after restoration to confirm whether the site is on a trajectory to the desired ecosystems and end land use target (FLNRORD 2021). Establishment surveys will be conducted for progressive reclamation during the Operations Phase and during the Post-Closure Phase of the Project to measure performance.

8.1 Implementation Monitoring

The intent of implementation monitoring is to determine if ODV's restoration and offset programs are being implemented according to the guidance outlined in this document. Implementation of the "avoid" and "minimize" components of this CMMP will be monitored by ODV supervisory personnel and will be incorporated into appropriate environmental management plans. Summary reports of monitoring activities will be generated by ODV, as required, and reports will be readily available for distribution to provincial government representatives upon request. Monitoring results will be assessed, and summary reports prepared and distributed to MOF, WLRS, and EMLI, on an annual basis for years one to five for progressive reclamation during the Operations Phase and during the Monitoring and Maintenance Phase (approximately year 2039 to 2044).

Mitigation and restoration implementation monitoring will include:

- Measuring and documenting (including photographic documentation) the survival, growth, stocking density, and vigour of herbaceous and woody species and vegetative species composition of restored areas annually from years one to five post planting. Measuring and documenting the density of coarse woody debris on reclamation sites. Comparing against the performance criteria and supplementing stocking, as required. This will be conducted after the 1st, 2nd, 3rd, 6th, and 11th growing seasons.
- Documenting evidence of human use (including ATVs and snowmobiles) on blocked linear features.
- Installing remote cameras and recording wildlife sightings to demonstrate mountain caribou use; documenting wildlife injured or trapped in facilities or infrastructure on site.
- Recording the number of Project personnel who receive mountain caribou specific education and awareness training.
- Documenting the implementation of mitigation measures included in Section 5.1 (Avoid) and Section 5.2 (Minimize) of the Plan during mining operations and post-mining (e.g., instances when activities are suspended to allow caribou to move through the Mine Site).

8.2 Effectiveness Monitoring

The intent of effectiveness monitoring is to determine if ODV's caribou habitat restoration program is meeting the conservation target. Monitoring the effectiveness of restoration measures is also required by the Health, Safety and Reclamation Code for Mines in BC (EMLI 2021). Within the CAA, restoration success on progressively restored sites will be evaluated based on the effectiveness of the vegetative cover to prevent soil erosion and invasive plant establishment, as well as to establish a self-sustaining cover capable of meeting the conservation target of mountain caribou habitat. The assessment of restoration success will be conducted during the Operations Phase, on progressively restored sites, and during the Post-Closure Phase.

Where restoration has been conducted on-site within the CAA, effectiveness monitoring data collection protocols will follow those outlined in Appendix F of the Operational Restoration Framework for Woodland Caribou Habitat Restoration in British Columbia (FLNRORD 2021). The data collection protocols include measurable targets and data collection procedures that will be followed for consistent data collection methods.

Vegetation growth and survival will be measured annually for five years during the growing season and compared to recommended conservation targets to assess the establishment and effectiveness of restoration activities. Monitoring after the first growing season helps to identify immediate issues, such as seedling mortality and/or poor seed germination. Monitoring after the fifth growing season helps to identify poor seedling growth and site conditions that may prohibit proper growth and indicates if the recommended targets will be achieved over time or if remedial measures are required (Golder 2016). Management actions may be altered and improved upon to assist in reaching targets.

Effectiveness monitoring will include:

- Documenting vehicle-wildlife collisions.
- Collecting effectiveness monitoring data based on Appendix F of the Operational Restoration Framework for Woodland Caribou Habitat Restoration in British Columbia (FLNRORD 2021).
- Measuring and documenting (including photographic documentation) the survival, forage biomass, growth, stocking density, and vigour of herbaceous and woody species and vegetative species composition of the Project footprint starting during the Post-closure / Monitoring and Maintenance Phase in 2039 in years 1, 2, 3, 6, and 11 following closure or until ODV's lease expires.
- Documenting stand modifications (e.g., supplementary planting, pruning, spacing, thinning) or other habitat interventions undertaken over time.
- Documenting the effectiveness of human and predator barriers, through use of remote cameras Fifteen remote cameras will be installed for the Project prior to construction. Of

the 15 cameras, five will be installed within known caribou movement corridors, two will be installed at the Mine Site, six will be installed along the Transmission Line, and the final 2 will be installed at areas nearby with known caribou activity.

  - Cameras will be placed to target areas where vegetation retention is expected to occur, and will target game trails that are identified in the field. Cameras will also be installed in areas with proposed access controls to document effectiveness.
  - Cameras will be installed prior to construction and remain in place for at minimum one year post-clearing, allowing for before and after construction comparison to occur.
  - A control camera will be placed 500 m off the Transmission Line in the movement corridor to act as a control to monitor movement in an area that is not disturbed by the Project.

- In addition to camera surveys, winter track surveys will occur at target locations along the Transmission Line ROW. Target locations would include areas surveyed during the baseline data collection in order to compare observations pre- and post-construction of the Transmission Line. The purpose of the winter track surveys will be to document caribou signs (e.g., tracks, scat). Winter track surveys will be conducted twice per winter in the early and late winter season. Winter track surveys will occur during construction and for a minimum one year post-clearing, to allow for before and after construction comparisons to occur.

A detailed list of measurable targets for effectiveness monitoring for areas within the CAA and how data will be collected is provided in Appendix C and is based on FLNRORD (2021).

Restoration performance criteria for soil and vegetation in upland reclamation areas are described in the Project Vegetation Management Plan (ODV 2024b) and in the End Land Use Plan (ODV 2024a). The Vegetation Management Plan (ODV 2024b) describes the plot measurements that will be used during monitoring to determine whether the vegetation performance criteria have been met. In addition to vegetation performance criteria, the performance criteria outlined in Table 8–1 will apply in the caribou restoration areas.

Table 8–1: Performance Criteria specific to the Caribou Restoration Area of the Project Footprint Area that overlaps the Caribou Assessment Area

Category	Indicator	Plot Measure	Target	Plot Scale	Success Thresholds
Caribou Conservation Target	Tree Density	Count the number of trees within the survey plot to determine the stems per hectare. Average over reclamation areas that are planted to the same target ecosystem.	Conservation target stem density for trees in caribou restoration areas is minimum medium density (1,001 to 2,000 stems/ha) based on FLNRORD (2021) and 400 stems/ha for high elevation sites.	400 m^2 circular plot	Minimum stem density achieved based on elevation (1,001 stems/ha for lower elevation sites and 400 stems/ha for high elevation sites) averaged over plots with the same target forest site series.
Caribou Conservation Target	Understory Vegetation	For dominant understory vegetation (>1% cover), identify to species, and record estimated percent cover in the survey plot.	Conservation target is to minimize overlap between moose and caribou habitat use. Willow (*Salix* spp.), red-osier dogwood (*Cornus stolonifera*), Douglas maple (*Acer glabrum* var. *douglasii*), and elderberry (*Sambucus* sp.) are preferred by moose and deer. These species will be absent or limited to <10% in caribou restoration areas.	400 m^2 circular plot	Cover of willow, red-osier dogwood, Douglas maple, and/or elderberry will be cumulatively <10% in 80% of plots in the caribou restoration area.

Notes: % = percent; < = less than; > = greater than; ha = hectare; m^2 = square metres

Monitoring results will be assessed, and monitoring reports distributed to MOF, WLRS, and EMLI, starting in the first year following reclamation and repeated in year 2, 3, and 6 for progressive reclamation during operations. Monitoring will be assessed and reported on for the Post-Closure / Monitoring and Maintenance Phase, starting in year 2039, with assessments in year 1, 2, 3, and 6. Monitoring will continue in years 11, 16, 26, 46, 86, and 100 following closure (approximately years 2049 and 2139) or until ODV's lease expires to evaluate the success of the restoration prescriptions in meeting the conservation target.

The potential effects of climate change on mountain caribou habitat are not well understood (MCST 2005). Potential effects related to climate change will be monitored over time to determine if the Project scope requires amending (MCST 2005; MOE 2009a).

8.3 Permanent Restoration Research Plots

Permanent research plots will be established in the Mine Site disturbance area where revegetation trials will be conducted to assess the success of initial revegetation prescriptions. Findings from the permanent research plots will be used to inform final caribou habitat restoration, which will be applied to the areas of Mine Site disturbance area that overlap the CAA during final reclamation and closure. A stratified random approach will be used to sample the plant communities in reclamation areas that encompass the range of moisture regimes while minimizing the variability due to disturbance. From the outlined stratified polygons, a random selection of circular sample plots (one to three per stratified polygon), with an area of 400 m^2 (11.28 m radius) and located at least 30 m from the polygon edge and 50 m from another plot center, will be created, where possible. Some polygons, by nature of the terrain and ecosystems, are long and skinny and a distance of 30 m from a polygon edge and 50 m from another plot may not be achievable. In these cases, plots will be located within the polygon centre and at a maximum distance from other plots. Specific aspects of the revegetation strategy to be tested to improve success rates at closure, include:

- Seed mixture;
- Species composition;
- Structural diversity (i.e., tree, shrub, forb, fern, and grasses);
- Density and arrangement of plantings;
- Varying combinations of surface treatments;
- Soil amendments (e.g., mulch types); and
- Vigour and height of plantings over time.

Permanent research plots established for reclamation research will be monitored during reclamation monitoring. Vegetation monitoring within permanent research plots will provide information on the success of the implemented treatments, based on the defined success criteria and measurable indicators as outlined in the End Land Use Plan (ODV 2024a) and Project Vegetation Management Plan (ODV 2024b). Conifer tree seedling survival will be assessed using a 50 m^2 (3.99 m radius) stocking survey and free growing survey plots as per provincial standards (MOF 2002; FLNRORD 2020). Changes may be necessary if trials indicate more suitable species or methods for certain areas. Conversely, change may be required if methods or species prove to be unsuitable for particular areas. Experimentation with different methods of planting alder species for the achievement of short-term physical and visual obstructions beneficial for caribou, soil improvement, and potential winter forage will be undertaken. Planting of alder will be limited to areas where soil conditions are poor to promote conifer establishment.

Maintenance is planned for, and is included in, ODV's long term reclamation planning. Long-term monitoring and maintenance will be conducted until the Project footprint area is ready for certification. If, during monitoring, sites are found that are not performing as expected, mitigation may be applied, including infill planting, fertilization, mulching, weed control, pest control, watering, and, where required, further investigation into soil and foliar chemistry.

Results from research programs will be incorporated where opportunities exist. ODV relies upon past experience, topic specific experts, and research findings to identify methods for achieving reclamation and closure objectives.

8.4 Adaptive Management

There is a lack of long-term caribou habitat restoration monitoring in Canada, resulting in uncertainty surrounding the long-term success of restoration treatments (Golder 2016). Thus, adaptive management "will increase the probability of achieving mitigation commitments" (MOE 2014b, p. 48). The CMMP is intended to be a living document and will be updated as site conditions change and following evaluation of monitoring activities. Restoration strategies and monitoring methods will be adapted or revised over time, where necessary, based on the monitoring results or advancements in the field of caribou habitat restoration. The CMMP may also be updated with changes to legislation, policy, and provincial stocking standards.

The objectives of the adaptive management are to address the circumstances that will require ODV to implement alternative or additional mitigation measures to address the effects of the Project. Based on the monitoring plan for reclamation areas, reasons for implementing adaptive management for the CMMP include:

- The effects to caribou are not being mitigated to the extent indicated in the EAC Application.
- The effects to caribou are different than what was predicted in the EAC Application.
- The effects to caribou have exceeded triggers identified below.

Triggers are monitoring end points that, once reached, will require adaptive management protocols to be followed. Triggers and the associated adaptive management actions are identified in Table 8–2. If targets are not being met, adaptive management actions will be applied, and the monitoring plan would include implementation and effectiveness monitoring as described above.

Table 8–2: Mitigation Program Objectives, Metrics, Targets, and Adaptive Management

Objective	Metric	Target / Trigger	Adaptive Management
Avoid impacts to undisturbed caribou critical habitat as defined by ECCC (2014)	Area of the Permit Mine Footprint and Transmission Line ROW that falls into undisturbed caribou critical habitat	Site the Project such that 0 ha of the Permit Mine Footprint and Transmission Line ROW occur in undisturbed caribou critical habitat (i.e., not already disturbed by other anthropogenic activities or sensory disturbance) based on ECCC (2014).	Habitat offset will be required for areas where Project avoidance cannot be achieved.
Avoid mining activities within 1 km of Mt. Tom during the calving and post-calving season (May 15 to July 15)	Distance of mining activities (i.e., the Mine Site) from Mt. Tom Timing of construction activities	Mine Site to be located greater than 1 km from Mt Tom. Construction activities related to the Transmission Line within 1 km of Mt. Tom will occur outside the calving and post-calving season (May 15 to July 15).	If calving is observed to be occurring at alternate dates other than the peak calving season, adjust work schedules to avoid construction within 1 km of Mt. Tom until calves have left the area.
Minimize vegetation disturbance resulting from the Project	Determine total area of new disturbance within the Mine Site disturbance area and Transmission Line ROW	Based on the current plan, 159.4 ha of residual impacts are estimated, with 22.8 ha located within the movement corridor.	Evaluate the construction plans to determine areas of further minimization to vegetation disturbance and calculate as built disturbance to compare to the plans. Use visual aids, such as flagging tape, to identify the limits of construction.
Prevent Human Access	Percentage of survey locations that show signs of human access, both pedestrian and motorized.	Less than 35% of overall treatment areas show signs of human or predator access.	Implement new access barriers, such as locked gates at locations where access is observed over multiple years of monitoring.
Create Barriers to Predator Movement	Width of access roads.	New access roads no more than 4 m in width and follow a zig zag pattern.	Install barriers at greater frequency or height or use alternative techniques (roll back or coarse woody debris piles) to deter and limit predator movement. The location and size of barriers will be documented following implementation, and some will be monitored using wildlife cameras to determine effectiveness. In addition, measurements of debris pile height during deep snow events will be collected and documented. Adjustments to the size will be made if the monitoring determines the barriers are ineffective at creating barriers to predator movement.
	Line of site down the Transmission Line.	Transmission Line has coarse woody debris piles of minimum height 1.5 m installed every 20 m (in zig zag pattern) where vegetation removal occurs along the Transmission Line.	
	Use of the Transmission Line by predators.	Establish wildlife cameras to monitor wildlife use along the Transmission Line.	

Objective	Metric	Target / Trigger	Adaptive Management
Control Aerial Operations	No low flying operations used in the CAA for Project construction or operation. A 2 km horizontal distance will be maintained from caribou.	100% compliance measured annually. If caribou are observed, the flight path will be adjusted to maintain a 2 km horizontal distance.	If aerial operations are deemed necessary, they will be conducted outside of the calving window (May 15 to June 15) and with approval from MOF and WLRS.
Protect Mineral Licks	Identify mineral licks prior to disturbance.	Identify 100% of mineral licks prior to disturbance.	If a mineral lick is encountered during construction that was not previously identified, work will stop immediately, and a minimum 500 m buffer will be established. Any areas of disturbance will be immediately restored. Where wildlife monitoring of mineral licks suggests a reduction in use by caribou, A QP will assess the need for larger buffer areas. If there are circumstances where a 500 m buffer cannot be maintained around a mineral lick, consultation with a QP will be required to identify alternative mitigation measures.
	Maintain 500 m buffer around all mineral licks.	Maintain 100% of vegetation intact within a 500 m buffer around mineral licks.	
	Protect water sources associated with mineral licks during construction	Protect 100% of water sources to mineral licks from construction activities.	
	Wildlife cameras to be established near mineral licks to document wildlife use.	Determine wildlife use within the mineral licks.	
Minimize vehicle-caribou collision	Number of caribou-vehicle collisions reported to staff on an annual basis.	Zero vehicle-caribou collisions.	If vehicle-caribou collisions occur, assess the speed limit, road conditions, road mitigations, and operator compliance, and make amendments.
Educate Workers	Percentage of workers to receive caribou specific education for the Project.	All workers (100%) on site during construction and operations to have completed worker education on caribou.	Workers will be required to show proof of successful completion or will be required to complete the worker education course. Where workers are observed to be non-compliant with the mitigation measures for caribou or the worker education course, workers will be required to repeat the training before returning to site.
Initiate caribou habitat restoration along the Transmission Line	Area in hectares of caribou restoration	Restore 5.7 ha on a trajectory to provide caribou habitat, except for areas required for maintenance access.	Use the as-built plans from Project construction to determine the final area of direct disturbance by the Project and adjust the offset amount.
Caribou habitat restoration areas in the Project footprint area	Ground Plot Survival surveys	80% survival in Year 5 of monitoring.	If 80% survival is not achieved by Year 5, conduct supplemental planting or conduct soil sampling to determine whether soil amendments may be required.

Objective	Metric	Target / Trigger	Adaptive Management
Caribou Conservation Target – Understory Vegetation	Abundance as percent cover of understory shrubs preferred by moose and deer.	Conservation target is to reduce overlap between moose and caribou habitat use. Willow (*Salix* spp.), red-osier dogwood (*Cornus stolonifera*), Douglas maple (*Acer glabrum* var. *douglasii*), and elderberry (*Sambucus* sp.) are preferred by moose and deer. These species will be <10% of cover in caribou restoration areas.	Cover of willow, red-osier dogwood, Douglas maple, and/or elderberry will be cumulatively <10% in 80% of plots in the caribou restoration area. If cover is cumulative >10% in 80% of plots in the caribou restoration area, targeted removal would occur with replacement with other understory plant species.
Caribou Conservation Target - Tree Density in Habitat Restoration Areas	Count the number of trees within the survey plot to determine the stems per hectare. Average over reclamation areas that are planted to the same target ecosystem.	Minimum stem density targets will vary depending on elevation. Conservation target stem density for trees in caribou restoration areas is minimum medium density (1,001 to 2,000 stems/ha) based on FLNRORD (2021) at lower elevation sites and low density at higher elevation (400-500 stems per ha).	Minimum stem density target not achieved. If stem density is less than the minimum target per ha, supplemental planting will be undertaken. If conditions persist, soil sampling will be conducted to determine whether soil conditions are suitable for tree species will be undertaken.

Notes: % = percent; > = greater than; ECCC = Environment and Climate Change Canada; FLNRORD = BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development; ha = hectare; km = kilometre; MOF = BC Ministry of Forests; QP = Qualified Professional; WLRS = BC Ministry of Water, Land and Resource Stewardship

8.5 Reporting

ODV will share information on mitigation measures and restoration activities with ENV, MOF, WLRS, Indigenous nations, and other interested parties per timelines identified in the Plan. Monitoring reports will be prepared and distributed in Years 1, 3, and 5 post-planting (for progressive reclamation) during the Operations Phase and starting in 2039 for the Post-closure / Monitoring and Maintenance Phase. Reporting will also be conducted following monitoring events in the Post-closure Phase at minimum in years 10 and 15 after the Closure Phase (approximately 2049 and 2054) or until ODV's lease expires. Reporting as outlined in the Plan will be provided as a stand-alone report and will be appended to the annual reclamation report in years monitoring and reporting are identified as required in the CMMP.

Information to be reported on includes:

- The implementation, successes, and failures of mitigation measures;
- The implementation, successes, and failures of restoration activities;
- Key learnings from monitoring activities; and
- Proposed changes to mitigation measures or restoration prescriptions (i.e., adaptive management).

9. CONSULTATION

ODV has consulted with BC Environmental Assessment Office (EAO), regulators, and participating Indigenous nations on the CMMP through the permitting process. As part of ODV's commitments to consultation, ODV has completed the following steps:

- Provided a written notice to each party that includes:
  - A draft version of this CMMP;
  - An invitation for parties to provide views on the contents of the CMMP; and
  - A written timeframe for views to be provided to ODV on the CMMP.
- Undertaken a full and impartial consideration of the views and of the information provided by each party.
- Provided a written response to each party that provided views as to how the views and information have been considered and addressed in the revised CMMP or why the views and information have not been addressed in the revised CMMP.
- Maintained a record of consultation with each party regarding the CMMP.
- Provided a copy of the consultation record to the EAO at the same time the associated final CMMP is submitted to the EAO.

Going forward, ODV will continue to work with WLRS and participating Indigenous Nations on determining the final offset requirement for the Project. Offset options for the Project will be considered based on those that are within the control of ODV and which are economically feasible. The outcome of final negotiations on the offset requirement for the Project and the steps that will be taken by ODV to implement the offset option will be outlined in the Offset Plan.

10. NEXT STEPS

The CMMP is designed to be a living document that will be updated. The CMMP outlines the proposed mitigation measures for minimizing impacts to woodland caribou and a plan for on-site restoration. In addition, through consultation with WLRS, an estimate of offset ratios has been prepared for the Project. A detailed offsetting plan will be prepared outlining final in lieu payment and/or off-site restoration plans to offset the Project. Next steps are as follows:

- Continue consultation with provincial caribou experts, regional stakeholders, participating Indigenous nations, and the EAO regarding the CMMP, offset opportunities, and in lieu payment options that align with regional management and monitoring programs for the Barkerville herd. ODV will continue to document consultation through the environmental assessment process as outlined in Section 9.
- Final calculations of matrix and core habitat loss will be based on the final approved plan and the best available caribou habitat mapping at the time of approval based on consultation with provincial caribou experts, regional stakeholders, and participating Indigenous nations.
- For off-site habitat securement and restoration, identify areas where habitat restoration would improve caribou habitat. Develop restoration prescriptions for offset areas. Where possible, incorporate the findings of reclamation research conducted on-site to inform the restoration prescriptions.
- For financial offsets, determine in consultation with the applicable regulatory authorities, regional stakeholders, and participating Indigenous nations what financial offsets will be used to support and the monetary requirement to achieve offset.
- Determine whether offsets will be provided by off-site habitat securement and restoration, financial offsets, or a combination of both.
- Confirm whether the monitoring and reporting plan in the CMMP is sufficient to monitor the final offset plan and update as needed.
- Establish an Environmental Monitoring Board to monitor Project-related effects and make recommendations related to adaptive management.

The CMMP will be reviewed and updated at the following milestones:

- Identification of offset areas based on the offset strategy in Section 7.
- Transition of the Transmission Line ROW from construction to operations to confirm final disturbance numbers and to document where avoidance and minimization was achieved.

- Transition of the final Mine Site disturbance areas for the Project from construction to operations to confirm final disturbance numbers and to document where avoidance minimization was achieved.
- If adaptive management requires updates to mitigation or monitoring programs.

If annual review of the Plan identifies updates required to mitigation or monitoring programs participating Indigenous Nations, and MOF. These parties will be able to provide feedback regarding the proposed revisions. ODV will revise the Plan according to the feedback or provide rationale for feedback that was not incorporated.

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APPENDIX A DECLARATION OF COMPETENCY FORM

Ministry of Environment and Climate Change Strategy

Declaration of Competency

The Ministry of Environment and Climate Change Strategy relies on the work, advice, recommendations and in some cases decision making of qualified professionals[1], under government's professional reliance regime. With this comes an assumption that professionals who undertake work in relation to ministry legislation, regulations and codes of practice have the knowledge, experience and objectivity necessary to fulfill this role.

1. Name of Qualified Professional: Paula Bentham

   Title: Principal Senior Ecologist

2. Are you a registered member of a professional association in B.C.? ☒ Yes ☐ No

   Name of Association: College of Applied Biology Registration # 3218

3. Brief description of professional services:
   Impact assessment, wildlife/caribou mitigation and monitoring

This declaration of competency is collected under section 26(c) of the *Freedom of Information and Protection of Privacy Act* for the purposes of increasing government transparency and ensuring professional ethics and accountability. By signing and submitting this statement you consent to its publication and its disclosure outside of Canada. This consent is valid from the date submitted and cannot be revoked. If you have any questions about the collection, use or disclosure of your personal information please contact the Ministry of Environment and Climate Change Strategy Headquarters Office at 1-800-663-7867.

Declaration

I am a qualified professional with the knowledge, skills and experience to provide expert information, advice and/or recommendations in relation to the specific work described above.

Signature: X

Print Name: Paula Bentham

Witnessed by: X

Print Name: Sean Weston

Date signed: April 3, 2024

[1] *Qualified Professional, in relation to a duty or function under ministry legislation, means an individual who*

a) is registered in British Columbia with a professional association, is acting under that organization's code of ethics, and is subject to disciplinary action by that association, and

b) *through suitable education, experience, accreditation and knowledge, may reasonably be relied on to provide advice within his or her area of expertise, which area of expertise is applicable to the duty or function.*

APPENDIX B SUMMARY OF INPUT DATA USED IN THE DECISION SUPPORT TOOL

Table B-1: Summary of Input Data used in the Decision Support Tool for the Movement Corridor and Project footprint outside the Movement Corridor with the Associated Assumptions and Rationale

DST Input Cell	Movement Corridor	Project footprint outside the Movement Corridor	Assumptions/ Rationale
Impact Site			
Area of direct and indirect residual impact (ha)	22.8	136.6	Based on the calculation of residual impacts in Section 8.0 of the CMMP for the movement corridor and Project footprint outside the Movement Corridor. Based on discussions with the BC Ministry of Water, Lands and Resource Stewardship (WLRS), the Movement Corridor was requested to be assessed separately.
Ecological Quality	Medium quality	Low quality	The Movement Corridor is rated medium ecological quality based on the following factors: it is an important area for caribou movement but falls within an area that is 100% existing direct or indirect disturbance primarily of existing cutblocks and forestry logging roads (refer to Figure 7-2 of the CMMP for a visual representation of the existing habitat condition). The Movement Corridor is a mix of core (15.8 ha) and matrix habitat (7.0 ha). The Project footprint outside the Movement Corridor is rated low ecological quality based on the following factors: area is all existing indirect disturbance surrounded by areas of direct disturbance. The Project footprint is comprised of 16.6 ha core habitat, 53.0 ha matrix, 4.3 ha matrix habitat in an area of environmental concern, and 62.0 ha unmapped caribou critical habitat (federal) not currently being managed by the province as caribou habitat.
Critical Habitat (SARA)	Yes – 100%	Yes – 100%	All areas fall within provincial or federally designated caribou critical habitat.
Red-listed Sensitive Ecosystems	Yes – 10%	Yes – 10%	Sensitive ecosystems are known to occur within the vicinity of the Project but do not constitute a large portion of the areas of direct impact. The LAA was found to be approximately 30% ecological communities at risk (both red- and blue-listed ecological communities at risk) in the baseline and assessment for the Project. However, direct disturbance is limited to the SBSwk1 and ESSFwk1, which only represent about 1% of the 30% of red- or blue-listed ecosystems in the CAA. Conservatively ranked as 10%.

DST Input Cell	Movement Corridor	Project footprint outside the Movement Corridor	Assumptions/ Rationale
Habitat currently occupied by species/ ecosystem under consideration	Yes – 100%	Yes – 30%	The movement corridor is known to be used by caribou and has been rated as 100% use as it is assumed all areas may be used for movement. Data available on caribou (including telemetry data) for the Project footprint outside the movement corridor indicate caribou may occasionally use portions of the transmission line. Therefore, caribou are known to occur in portions of the area. However, caribou do not typically occur in areas immediately adjacent to the existing mines (Mine Site Complex and Bonanza Ledge), where new disturbance are concentrated. In addition, the area of unmapped caribou habitat (62 ha or 45.6%) is not currently known to be occupied by caribou and is included as historic range (EC 2014). Due to these factors 30% was estimated as currently occupied.
Habitat suitable for species/ ecosystem under consideration	Yes – 100%	No	The movement corridor was rated as suitable for use by caribou based on known movement in the area as provided by WLRS. Most of the Project footprint outside of the movement corridor is a mosaic of cutblocks and roads. The unmapped critical habitat outside the Barkerville herd boundary (62 ha) is currently not managed by the province for caribou. In addition, areas adjacent to the existing mine, existing highways, townsite and within the area of environmental concern are not considered suitable habitat.
Habitat occupied by other listed species	Yes – 50%	Yes – 50%	Additional species at risk are known to occur in the area; however, the area has a high degree of anthropogenic disturbance, primarily from logging and public highways. This reduced the likelihood that the entire area supports species at risk and was approximated as 50%.
Impact on other listed species or First Nations species of importance	Yes – 100%	Yes – 100%	This was rated yes - other listed species and First Nations species of concern occur in the area.
Impact on species of Concern	Yes – 100%	Yes – 100%	Both the movement corridor and the Project footprint outside the movement corridor have the potential for indirect impacts beyond the Project footprint. This captures the multiplier for indirect impacts.

DST Input Cell	Movement Corridor	Project footprint outside the Movement Corridor	Assumptions/ Rationale
Localized rarity or scarcity of ecosystem or species	Yes – 100%	Yes – 100%	Caribou in the Barkerville herd have low population numbers (<100) which increases their vulnerability and have been recognized as locally scarce.
High Elevation Winter Range (HEWR)	Yes – 30%	No	The core habitat in the mapping for the Barkerville herd is described as high elevation summer/winter range and cannot be further differentiated. Assumptions were made on the amount of high elevation winter range and high elevation summer range for each category. For the movement corridor, all core areas were assumed to be a mix of high elevation winter and summer range. Approximately 70% of the movement corridor is core habitat and this was split between high elevation winter range (30%) and high elevation summer range (40%) as the movement corridor is used to access calving areas near Mt. Tom. For the Project footprint outside the movement corridor, 12% of the area is core habitat. This was rounded to 10% and applied to high elevation summer range to acknowledge areas of overlap within the vicinity of Mt. Tom.
High Elevation Summer Range (HESR)	Yes – 40%	Yes – 10%	The core habitat in the mapping for the Barkerville herd is described as high elevation summer/winter range and cannot be further differentiated. For the movement corridor, all core areas were assumed to be a mix of high elevation winter and summer range. Approximately 70% of the movement corridor is core habitat and this was split between high elevation winter range (30%) and high elevation summer range (40%) as the movement corridor is used to access calving areas near Mt. Tom. For the Project footprint outside the movement corridor, 12% of the area is core habitat. This was rounded to 10% and applied to high elevation summer range to acknowledge overlap of areas within the vicinity of Mt. Tom.

DST Input Cell	Movement Corridor	Project footprint outside the Movement Corridor	Assumptions/ Rationale
Low Elevation Winter Range (LEWR) / Matrix 1	No	No	Not applicable to the Barkerville Herd as the LEWR is for the Narraway, Quintettte, and Kennedy Siding caribou in winter. As per the DST Manual, matrix range is not explicitly included as a modifier in the Offset Tool, as it may be captured through selection of SARA critical habitat, or as general habitat not encompassed by the caribou-specific modifiers (e.g., matrix range may be captured by the initial number of hectares of residual impact).
Core Areas (Boreal Caribou)	No	No	Not applicable to southern mountain caribou.
Provincial Park	No	No	The Project residual effects before offsetting do not overlap a Park.
Wildlife Management Area (WMA)	No	No	The Project residual effects before offsetting do not overlap WMAs.
Ungulate Winter Range (UWR) / Wildlife Habitat Areas (WHAs)	No	No	The Project residual effects before offsetting do not overlap UWR or WHAs.
Land Act Reserves	No	No	The Project residual effects before offsetting do not overlap Land Act Reserves.
Proximity to Land with Designations or Conservation	No	No	The Project residual effects before offsetting do not overlap land with designations or conservation.
Lands under Conservation Covenant	No	No	The Project residual effects before offsetting do not overlap land under conservation covenant.
Invasive Species Risk	Present – 100%	Present – 100%	The Project residual effects before offsetting occur in an area of high disturbance from roads and cutblocks. Invasive species are known to be present in the area.
Functionality	Medium – 100%	Low – 100%	The movement corridor was identified as medium functionality. WLRS has indicated that caribou are known to use this movement corridor and other movement corridor options are limited. The movement corridor was not ranked as providing high functionality, as movement of caribou to reach the corridor includes crossing a permanent highway, as well as several cutblocks and forestry logging roads. Functionality of the Project footprint outside the movement corridor was rated as low. This area is highly disturbed and remaining areas of impacts are adjacent to existing direct disturbance and anticipated to be low functioning habitat.

DST Input Cell	Movement Corridor	Project footprint outside the Movement Corridor	Assumptions/ Rationale
Special Features	Yes – 100%	No	The movement corridor was identified as a special feature for movement to Mt. Tom calving areas and the DST assessment of the movement corridor assigned 100% special features to the impact site. No additional special features were identified for the Project footprint outside the movement corridor and special features was assigned 'No'.
Cumulative Effects	Yes, above benchmark	Yes, above benchmark	The Barkerville herd boundary is highly disturbed from both direct and indirect disturbances. Cumulative effects are high particularly due to forestry operations in the area and the level of disturbance is above the high benchmark.
Offset Site			
Ecological Quality	Highest Quality	Highest Quality	The Project is most likely to seek in lieu payment for the Project as the most appropriate offset action as per discussions with WLRS. The assumption used based on discussions with WLRS caribou experts is that monetary funds would be directed to restoration within the Barkerville as the priority; with an additional option that a committee comprised of the Caribou Restoration Team (WLRS) and First Nations such as the Stewardship Committee, where WLRS and First Nations work together to identify restoration or other mechanisms that would have the greatest benefit to the Barkerville Herd. Highest ecological quality was selected as it is assumed funds would be directed towards restoring sites with the highest ecological quality.
Critical Habitat (SARA)	Yes – 100%	Yes – 100%	In lieu payment would be established under the condition that the money is used towards activities to restore the Barkerville herd and would be required to occur within the Barkerville herd boundary, which is all critical habitat for caribou.
Red-listed Sensitive Ecosystem	Yes – 10%	Yes – 10%	The LAA and RAA were both approximately 30% listed ecological communities at risk. A value of 10% was applied to recognize some work may be done in areas with red-listed ecological communities at risk.

DST Input Cell	Movement Corridor	Project footprint outside the Movement Corridor	Assumptions/ Rationale
Habitat Currently Occupied by Species / Ecosystem under consideration	Yes – 100%	Yes – 100%	In lieu payment will be sought for the Project and it is assumed that funds for restoration efforts from the in lieu payment would be focused on objectives that would provide the greatest benefit to the Barkerville Herd. This is assumed to involve implementing restoration in habitats currently occupied by the species.
Habitat suitable for species/ ecosystem under consideration	Yes – 100%	Yes – 100%	In lieu payment will be sought for the Project. The funds would be provided for restoration of habitat for caribou or population level interventions, whichever is deemed most important for the Barkerville herd by WLRS caribou team and other interested parties, to be determined. Therefore, the highest value is provided as it is assumed restoration efforts would occur in habitat suitable for the Barkerville herd caribou.
Habitat occupied by other listed species	Unknown – 100%	Unknown – 100%	As an offset location is not presently identified and the use by other federally or provincially listed species or ecosystems is not yet known.
Impact on other listed species or First Nations species of importance	Yes – 100%	Yes – 100%	Restoration of caribou critical habitat is anticipated to have benefits for other listed species in the region as well as First Nations species of concern.
Localized rarity or scarcity of ecosystem or species	Yes – 100%	Yes – 100%	Caribou in the Barkerville herd have low population numbers (<100) which increases their vulnerability.
High Elevation Winter Range (HESR)	Yes – 50%	Yes – 50%	In lieu payment is assumed to be the method for offset. The funds would be allocated to WLRS and/or a committee that involves WLRS or First Nations, who would be in charge of directing the funding to the objectives that provide the most benefit to the Barkerville herd. Restoration of high value habitat (i.e., core habitat) is assumed and was split between HEWR and HESR for the purpose of the workbook.
High Elevation Summer Range (HEWR)	Yes – 50%	Yes – 50%	In lieu payment is assumed to be the method for offset. The funds would be allocated to WLRS and/or a committee that involves WLRS or First Nations, who would be in charge of directing the funding to the objectives that provide the most benefit to the Barkerville herd. Restoration of high value habitat (i.e., core habitat) is assumed and was split between HEWR and HESR for the purpose of the workbook.

DST Input Cell	Movement Corridor	Project footprint outside the Movement Corridor	Assumptions/ Rationale
Low Elevation Winter Range (LEWR)	No	No	Not applicable to the Barkerville herd and in lieu payment would focus funds to this herd.
Core Areas (boreal caribou)	No	No	Not applicable to southern mountain caribou and in lieu payment would focus funds to this group.
Provincial Park	No	No	Limited area of Park is available in the Barkerville herd boundary for in lieu payment of funds to contribute to restoration. It was conservatively assumed funds may not go towards improvements in Parks.
Wildlife Management Area (WMA)	No	No	Assumed the site would not be located in a WMA.
Ungulate Winter Range (UWR) / Wildlife Habitat Areas (WHAs)	Yes – 50%	Yes – 50%	WHAs occur in the Barkerville herd boundary. These areas have been designated as important for caribou and are likely to be the focus of initiatives for the restoration. A value of 50% has been included as there are several WHAs in the Barkerville herd boundary but some conservation actions may target areas adjacent or outside a WHA.
Land Act Reserves	No	No	Assumed the site would not be located within a Land Act Reserve.
Proximity to Land with Designations or Conservation	No	No	Assumed the site would not be located in proximity to land with designations or conservation.
Lands Under Conservation Covenant	No	No	Few areas available in the Barkerville herd boundary under conservation covenant. Assumed the site would not meet these criteria.
Invasive Species Risk	Not present but high risk – 100%	Not present but high risk – 100%	Assumed the offset site would target linear disturbance. It is unknown where the restoration would occur at this time, but assumed disturbance would have at minimum high risk of invasive species due to current level of disturbance in the Barkerville herd boundary.
Functionality	High -100%	High -100%	In lieu payment for restoration would be provided for use in the Barkerville Herd boundary. It is assumed the funds would be directed to areas identified as high priority for restoration for the Barkerville Herd, in areas or adjacent to areas of high functionality for caribou. This herd is currently low priority for restoration projects funded by the Province, due to high degree of disturbance, and the funds would help provide some immediate action to restore habitat function in the herd boundary.

DST Input Cell	Movement Corridor	Project footprint outside the Movement Corridor	Assumptions/ Rationale
Special Features	Yes – 20%	Yes – 20%	Conservatively assumed the restoration site funded by the Project would target a portion of special features (e.g., within the identified movement corridor).
Cumulative Effects	Yes, above high benchmark	Yes, above high benchmark	The in lieu payment would be for restoration within the Barkerville herd boundary which has a high degree of disturbance (direct and indirect) and is above high benchmark.
Conservation Actions			
Is there a plan for conservation action on the offset site?	Yes	Yes	In lieu payment would be provided for restoration efforts in the Barkerville herd boundary and any action to improve ecological quality is a conservation action plan. Funds could be allocated to WLRS (or other party to be determined) and the WLRS caribou team and participating Nations would develop and implement the restoration at the offset location.
Conservation Action 1	Restoration – proven track record with approach 100%	Restoration – proven track record with approach 100%	Assumed the restoration would use proven techniques that have shown good success in the past.
Offset Arrangement	Low Risk	Low Risk	Assuming WLRS and First Nations are involved in determining the restoration efforts the offset arrangement is assumed to be low risk.
Offset Duration	Permanent	Permanent	Assume the offset restoration area would be permanently protected.
Discount rate	Low	Low	In lieu payment would be provided immediately with restoration implementation to follow.
Number of Years of Time Lag	15	15	In lieu payment will be sought for the Project and the funds could be provided to WLRS (or other party to be determined) at the time of effect. Assuming there would need to be time to establish a working group of WLRS and First Nations, prioritize areas for restoration, select an offset site, develop a restoration plan, and implement the work, a value of 5 years was selected between the onset of the effect and when restoration is implemented. It is assumed that functional restoration will be implemented to provide the most immediate effect to slow/reduce predator and human access within the Barkerville herd, which is the primary residual effect of the project. It is acknowledged that time lag for planted trees to grow exists and is assumed at 10 years to reach heights to influence predator movements to natural levels. Therefore, a time lag of 15 years was selected.

DST Input Cell	Movement Corridor	Project footprint outside the Movement Corridor	Assumptions/ Rationale
Results Offset Ratio No Conservation Actions and Risk	13.11:1	7.77:1	
Results Offset Ratio Adjusted for Conservation Actions and Risk	10.49:1	4.00:1	
Total Offset Area with Conservation Actions and Risk (ha)	239.2	546.4	
Total Offset Area without Conservation Actions and Risk (ha)	298.9	1,060.8	

DST = Decision Support Tool

Note: Two separate DST workbooks were prepared: one for the movement corridor and one for the Project footprint outside the movement corridor based on consultation with WLRS and in recognition of the importance of the movement corridor to caribou in comparison to other areas affected by the Project.

REFERENCES

EC (Environment Canada). 2014. Recovery Strategy for the Woodland Caribou, Southern Mountain population (*Rangifer tarandus caribou*) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. viii + 103 pp.

APPENDIX C MEASURABLE TARGETS DATA COLLECTION PROCEDURES (FLNRORD 2021)

Appendix C: Measurable Targets Data Collection Procedures (BC FLNRORD 2021)

Measurable Target	Description of Data Collection Method	Frequency and Location of Data Collection
Terrestrial Ecosystem Mapping Ground Inspection or Full Plot	Methods for data collection will follow RIC (1998), Canadian System of Soil Classification (Agriculture Canada 1998), and BC MOFR and MOE (2010). Record the following information at a minimum: Biogecolimatic zone, subzone, site series, slope, aspect, mesoslope position, elevation, describe organic and mineral soil layers including mottles and texture, soil classification, drainage class, soil moisture regime, soil nutrient regime, disturbance types, substrate cover, full vegetation species list.	Years 1, 3, 5, 10, 15; all sites in the Project Footprint Area (PFA)
Line/trail width	Record the width of each linear disturbance by measuring a straight line from on edge to the other. Edges to be determined by the start of the first tree with DBH>10 cm. Record in metres.	Years 1, 3, 5, 10, 15; all sites in the PFA
Age of line	Approximate age of the line/trail based on vegetation regrowth or known age based on disturbance marker. Use age categories: < 5 year, 5-10 years, 10-20 years, 20-40 years, and >40 years.	Years 1, 3, 5, 10, 15; all sites in the PFA
Line of Sight Distance	Estimate the distance an observer can visually see down the linear disturbance in both directions with their bare eye. One observer stands at plot centre and the second walks down the line until the observer can no longer see them. Use the following categories: < 50 m, 50 - 200 m, 200- 500 m, and >500m.	Years 1, 3, 5, 10, 15; all sites in the PFA
Average height and vertical density of standing vegetation	This measurement can determine the amount of standing vegetation remaining in an area after use and can be interpreted as hiding cover for wildlife. Measure in both directions of the linear disturbance and take two measurements in both directions. Robel poles should be set up 5 m from plot centre, and observer records measurement at 1 m to assess the band on the pole at the top of the vegetation to record height.	Years 1, 3, 5, 10, 15; all sites in the PFA
Evidence of human line use	Assess whether there is evidence of human use on the linear disturbance. Indicate if access is foot or motorized. Assess the level of use using the following categories: • Absent • Low (track/trail evident but difficult to discern or used infrequently) • High (track/trails evident and well used with vegetation trampled and bare ground may be visible)	Years 1, 3, 5, 10, 15; all sites in the PFA
Evidence of game trail	Assess linear disturbance for evidence of wildlife game trail: Game trail are pathways and routes formed by animals treading on top of them over the years. The category for assessing access level is the same as the Evidence of human line use.	Years 1, 3, 5, 10, 15; all sites in the PFA
Wildlife sign	Search and record signs of scat, tracks, trails, tunnels, nests, beds, burrows, dens, and any signs of compacted or foraged vegetation and wildlife remains.	Years 1, 3, 5, 10, 15; all sites in the PFA

Appendix C: Measurable Targets Data Collection Procedures (BC FLNRORD 2021)

Measurable Target	Description of Data Collection Method	Frequency and Location of Data Collection
Height of trees in treatment/reference plot	Height measurements of individual trees should be recorded in cm, along the stem from high side ground. Record by tree species type.	Years 1, 3, 5, 10, 15; all sites in the PFA
Root collar diameter (rcd) of trees in treatment/reference plots	Stem diameter should be measured 1 cm below cotyledon nodes and below obvious swellings. Take two measurements (average) for each tree within the treatment/reference plot .	Years 1, 3, 5, 10, 15; all sites in the PFA
Age of trees in treatment/reference plot	Record age based on species. Count the number of whorls on coniferous trees within plot.	Years 1, 3, 5, 10, 15; all sites in the PFA
Lead growth (cm)	Measure height of leader for current year and record leader growth by species type. Measurement should be made from the point of germination to the top of the terminal bud of the dominant leader.	Years 1, 3, 5, 10, 15; all sites in the PFA
Percentage cover of vegetation and invasive/non-invasive species in treatment/reference plot	Record in TEM form	Years 1, 3, 5, 10, 15; all sites in the PFA
Density of Vegetation in Treatment/reference plot	Density class is determined by using fixed plot area classification: • low: 1 – 1000 stems/ha • medium: 1,001 - 2000 stems/ha • high: 2,001 - 5000 stems/ha • dense: > 5,000 stems/ha.	Years 1, 3, 5, 10, 15; all sites in the PFA
Soil litter layer description	Record in TEM form	Years 1, 3, 5, 10, 15; all sites in the PFA
Survival of planted seedlings	Record the number of live seedlings within plot (Enough foliage, live cambium and rooted into the ground) and the number of dead seedlings (trees are dead/roots are separated from ground).	Years 1, 3, 5, 10, 15; all sites in the PFA
Vigour of planted seedlings	Describe general condition of seedlings using classification system 0 to 4: • 0 = dead • 1 = poor; yellow • 2 = fair; pale green • 3 = good; green • 4 = excellent; dark green	Years 1, 3, 5, 10, 15; all sites in the PFA