

WEBEQUIE SUPPLY ROAD FINAL ENVIRONMENTAL ASSESSMENT REPORT / IMPACT STATEMENT

January 30, 2026

AtkinsRéalis Ref: 661910

SECTION 13: Assessment of Effects on Species at Risk



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13. Assessment of Effects on Species at Risk

The Species at Risk (SAR) valued component (VC) was identified during the VC scoping and selection process as part of the EA/IA process. This section describes and assesses the potential effects that the Project may have on the Species at Risk VC.

Existing conditions for SAR have been established through the field work programs, desktop studies and engagement and consultation activities completed by the Project Team. This includes, but not limited to, background information review, internet research, field surveys, engagement with Indigenous communities and stakeholders, and expert opinion. The existing conditions are being used as baseline conditions to assess and determine the potential effects of the Project. The results of the baseline studies are provided in Appendix F –Natural Environment Existing Conditions (NEEC) Report.

The assessment of potential effects on the Species at Risk VC is presented in the following manner:

- Scope of the Assessment;
- Existing Conditions Summary;
- Potential Effects, Pathways, and Indicators;
- Mitigation and Enhancement Measures;
- Characterization of Net Effects;
- Determination of Significance;
- Cumulative Effects;
- Prediction of Confidence in the Assessment;
- Predicted future Condition of the Environment if the Project does not proceed;
- Follow-up and Monitoring Programs; and
- References.

13.1 Scope of the Assessment

13.1.1 Regulatory and Policy Setting

The Species at Risk VC is assessed in accordance with the requirements of the *Impact Assessment Act* (IA Act), the Ontario *Environmental Assessment Act* (EA Act, 1990), the Tailored Impact Statement Guidelines (TISG) for the Project, dated February 24, 2020 (IA Act, 2020), the provincial approved Environmental Assessment (EA) Terms of Reference, dated October 8, 2021 (ToR), and EA/IA guidance documents. Concordance tables for the TISG and the ToR are provided in Appendix A-1 and Appendix A-2, respectively. The concordance tables indicate where the requirements and commitments of the TISG and the ToR are addressed in the EAR/IS.

Table 13-1 outlines the key regulations, legislation and policies relevant to the assessment of the Species at Risk VC for construction and operations of the Project.



Table 13-1: Key Regulation, Legislation, Policy Relevant to Species at Risk Assessment for the Project

Regulatory Agency	Regulation, Legislation, or Policy	Project Relevance
Federal		
Environment and Climate Change Canada (ECCC) and Fisheries and Oceans Canada (DFO)	<i>Species At Risk Act (SARA)</i> (S.C. 2002, c. 29) (Current as of 2023-05-03)	<p>Species at risk and their habitats occur within the spatial boundaries of the Project. The purpose of SARA is to prevent species native to Canada from becoming extinct; to provide for recovery of species that are extirpated, endangered and threatened as a result of human activity; and to encourage management of special concern and other species to prevent them from becoming at risk.</p> <p>SARA lists wildlife species considered at risk: threatened, endangered, extirpated or of special concern, and prohibits a number of specific activities related to listed species, including killing or harming the species, as well as the destruction of identified critical habitat.</p> <p>Aquatic species and migratory birds are protected throughout Canada, regardless of whether they are found on federal, provincial, public or private land. If a species is listed under SARA and is either an aquatic or a migratory bird, there is a prohibition against harming it, or its residence. For all other listed species, SARA protections only apply on federal lands. SARA makes it an offence to kill, harm, harass, capture, or take a listed species that is extirpated, endangered, or threatened or damage such as a species' residence.</p> <p>Department of Fisheries and Oceans (DFO) specifically oversees SARA protected aquatic species, such as fish, shellfish, crustaceans, and marine animals and plants. All other SARA protected species are managed by ECCC.</p>
Impact Assessment Agency of Canada (IAAC)	<i>Impact Assessment Act (IAA)</i> , (S.C. 2019, c. 28, s. 1) (Current as of 2023-05-03)	<p>The Project Footprint includes federal lands. Pursuant to s. 82 of the IAA, an authority must not carry out a project on federal lands or exercise any power or perform any duty or function that would permit a project to be carried out, in whole or in part, on federal lands unless the authority first considers the likelihood of significant adverse environmental effects occurring as a result of carrying out the project. For the project to proceed, an environmental assessment must result in one of two outcomes. The authority determines that the carrying out of the project is:</p> <ol style="list-style-type: none"> 1. Not likely to cause significant adverse environmental effects; or 2. Likely to cause significant adverse environmental effects, but the Governor in Council decides, under ss 90(3), that those effects are justified in the circumstances.



Regulatory Agency	Regulation, Legislation, or Policy	Project Relevance
Provincial		
Ministry of the Environment, Conservation and Parks (MECP)	<i>Endangered Species Act</i> (S.O. 2007, c. 6) (Current as of 2021-10-19)	<p>The <i>Endangered Species Act</i>, 2007 protects endangered or threatened species in the province of Ontario. The Act prohibits the killing, harm and harassment of protected species and damage or destruction to their habitat. The purpose of this Act is to identify species at risk, create measures for their protection, and promote recovery and stewardship for endangered species. Endangered species are identified and designated by the Committee on the Status of Species at Risk in Ontario. Once a species is designated under the Act, it may not be harmed, captured, killed, sold or possessed. Damaging the habitat of an endangered species is prohibited. Enforcement provisions under the Legislation include issuing a stop order, fines and imprisonment for offences. Regulations under the Act provide for the Species at Risk in Ontario List, as well as exemptions applicable to specific species, activities and industries. Some exemptions require a Notice of Activity on the registry. Authorizations under the Endangered Species Act are not required if the activity can be carried out without having adverse effects on protected species and habitats.</p> <p>Key amendments to the <i>Endangered Species Act</i> were introduced by Bill 5: Protect Ontario by Unleashing Our Economy Act, 2025, before its full repeal and replacement by the <i>Species Conservation Act</i> (SCA). Key amendments include purpose revised to include social and economic considerations, emphasizing sustainable economic growth alongside species protection; new habitat definition that is more narrow and limited; removal of “Harass as a prohibition under the Act; elimination of requirements for government to develop recover plans; and Cabinet discretion to add or remove listed species.</p> <p>An interim <i>Endangered Species Act</i> framework is currently in place until SCA is proclaimed with supporting regulations. The amendments to the <i>Endangered Species Act</i> and SCA are relevant to the Project, including requirement for an authorization for impacts to species at risk.</p>
MECP	<i>Environmental Assessment Act, R.S.O. 1990, c.E.18</i> (Current as of 2024-05-16)	<p>The Act sets out a planning and decision-making process so that potential environmental effects are considered before a project begins. As part of this process, consultation with the public and Indigenous communities is mandatory.</p>



Regulatory Agency	Regulation, Legislation, or Policy	Project Relevance
Ministry of Natural Resources (MNR)	<i>Fish and Wildlife Conservation Act</i> (S.O. 1997, c. 41) (Current as of 2024-10-01)	<p>The Act governs the lawful hunting and trapping of wildlife (mammals, birds, reptiles, and amphibians) and fish in the province of Ontario and aids the conservation and protection of wildlife and the environment that inhabit. Further, nests and eggs of most birds not subject to the federal <i>Migratory Birds Convention Act, 1994</i> are protected under Section 7 (1) which states “A person shall not destroy, take or possess the nest or eggs of a bird that belongs to a species that is wild by nature.”</p> <p>The Act further prohibits keeping live game wildlife or live specially protected wildlife in captivity unless under the authority of a license and in accordance with the regulations. Licences are available for scientific collection purposes for fish and wildlife. Collection of wildlife for scientific purposes is overseen by the Wildlife Animal Care Committee in Ontario. All approvals are valid for up to one year.</p>
MNR	Significant Wildlife Habitat Criteria Schedules for Ecoregion 3E, January 2015	Provides regionally relevant criteria for identifying Significant Wildlife Habitat (SWH) as identified by the MNR, including descriptions of wildlife habitat, wildlife species, and defining criteria to confirm SWH.
Other		
MECP	Range Management Policy in Support of Woodland Caribou Conservation and Recovery	The policy provides a transparent and evidence-based approach to planning and decision-making in caribou habitat that maintains or improves the condition of caribou ranges in Ontario. It directs the implementation of the Range Management Approach and enables industry to proceed with development in a way that complies with the <i>Endangered Species Act</i> (ESA).

13.1.2 Selection of Key Species and Species Groups

In order to assess the potential effects of the Project on the SAR VC, several key species and species groups were selected to represent the two VC subcomponents (mammals and birds). The initial list of SAR species considered was outlined in the Tailored Impact Statement Guidelines. The list was refined following based on feedback from communities, organizations and government agencies; review of existing literature; and results from baseline surveys. The chosen key species and species groups were selected because they represent SAR use in the range of habitats found in the Regional Study Area (RSA), represent use of the RSA at wide range of spatial scales, and use the RSA at a range of temporal scales including summer, winter, and spring/fall migration.

13.1.2.1 Species at Risk Not Included in Assessment

The following species were considered for inclusion in the assessment but were not selected. Their removal was based on a lack of interaction with the project, a lack of suitable habitat, or their absence from the study area.

Barn Swallow (*Hirundo rustica*) records do exist for the RSA as the bird has been recorded within the town of Webequie (eBird, 2024). Barn Swallow nests are commonly built on human-made structures that either provide a ledge or a vertical face where a nest made of mud and grass can be attached. Structures include buildings, piers and bridges (GOC, 2019). Construction of the road is not anticipated to affect any structures within the community. Barn Swallows do naturally nest on vertical structures such as cliffs or caves, but these features are not located within the study area. For these reasons Barn Swallows were not included in the assessment.

Bank Swallow (*Riparia riparia*) was not selected as there are no known occurrences within the RSA. Ontario Breeding Bird Atlas (OBBA) data indicate that Bank Swallow does not occur in proximity to the proposed WSR corridor. The closest records are along the Winisk River approximately 75 km north of the RSA. The closest records on eBird are in Lansdowne House about 75 km to the southwest. No formal Bank Swallow surveys were conducted in the RSA, but no suitable habitat (*i.e.*, natural exposed banks) was recorded in the RSA. For these reasons Bank Swallows were not included in the assessment. However, the proposed Project includes the construction and operation aggregate sites, which have the potential for these activities to create suitable nesting habitat for Bank Swallow. However, the proposed Project includes the construction and operation of aggregate sites, which have the potential for these activities to create suitable nesting habitat for Bank Swallow. For this reason mitigations are discussed in **Section 13.4.6.4**.

Canada Warbler (*Cardellina canadensis*) was not selected as a SAR VC subcomponent since background data indicates it does not use this area of the Hudson Bay Lowlands (OBBA, 2005). One record from OBBA data indicates that Canada Warbler has been detected near the Eagle's Nest Mine at the eastern extent of the proposed WSR corridor. The Canada Warbler is most commonly found in wet, mixed deciduous-coniferous forest types and prefers older forest and the distribution of the Canada Warbler is generally limited by the availability of mature forest (Roberto-Charron, 2018). These habitats are extremely limited across the LSA and RSA. No Canada Warbler were detected during targeted baseline surveys. For these reasons Canada Warbler were not included in the SAR VC assessment.

Chimney Swift (*Chaetura pelagica*) was not selected as there are no known occurrences within the RSA. Most range maps identify the northern extent of their range ending in Ontario in the Thunder Bay region. Some records do indicate they have been heard farther along the coast of Lake Superior (eBird, 2024) but still over 200 km farther south. In addition, while historically Chimney Swifts did roost in cavities of large trees, presently they are primarily found nesting and using man-made structures with large chimneys (Cadman et al. 2007) which are not present in the RSA. For these reasons Chimney Swifts were not included in the assessment.

Black Tern (*Chilidonias niger*) was not selected as there are no known occurrences within the RSA. OBBA data indicates that Black Tern does not occur in proximity to the proposed WSR corridor. The closest records are along the near Nibinamik approximately 75 km west of the RSA. Black Terns prefer marshes with extensive emergent vegetation. Marsh habitats are extremely limited across the LSA and RSA. Additionally, Black Terns avoid marshes less than 5 ha (Brown and Dinsmore, 1986) and no marshes this size or larger are found within the study area. For these reasons Black Terns were not included in the assessment.



Yellow Rail (*Coturnicops noveboracensis*) was not selected as there are no known occurrences within the RSA. OBBA data indicate that Yellow Rail does not occur in proximity to the proposed WSR corridor. A single record is 200 km northeast of the RSA near Sutton Lake, but records only become common near the Hudson Bay Shoreline. Yellow Rails prefer marshes with short dense emergent vegetation and marsh habitats are extremely limited across the LSA and RSA. For these reasons Yellow Rails were not included in the assessment.

Eastern Whip-poor-will (*Antrostomus vociferous*) was not selected as there are no known occurrences within the RSA. Most range maps identify the northern extent of their range ending in Ontario on the north shore of Lake Superior. Some records do indicate they have been heard north of Lake Nipigon (eBird, 2024) but still over 200 km farther south. In addition, preferred breeding habitat for Eastern Whip-poor-will is dry open coniferous or mixedwood forests which are ecosites that are extremely limited across the LSA and RSA. No Eastern Whip-poor-will were detected during targeted baseline surveys. For these reasons Eastern Whip-poor-will were not included in the assessment.

13.1.2.2 Species at Risk Included in Assessment

Based on the review of available habitats, information on the distribution of SAR within the RSA, and potential for interaction with the project, the SAR species and species groups described below were used in the assessment for SAR. Detailed sources for the background information reviews on species, populations and habitats can be found in Appendix F of this EAR/IS – NEEC Report. Their status under SARA, Species at Risk in Ontario (SARO) and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) are summarised in **Table 13-5**.

13.1.2.2.1 Mammal – Caribou (Boreal population) (*Rangifer tarandus caribou*)

Population Overview (Boreal and Eastern Migratory)

There are two (2) distinct populations of Caribou in Ontario: the Boreal population (Threatened under the ESA) which receives species and habitat protection (regulated by MECP), and Eastern Migratory population (Special Concern under the ESA) which does not provide special protections and is only managed by the MNR for species conservation. The Boreal population is distributed broadly across Northern Ontario from the Québec to the Manitoba border. The northern boundary for the Boreal population occurs along the southern boundary of the Northern Taiga Ecoregion (1E) (Crins et al., 2009). The Eastern Migratory population uses tundra and forest-tundra transitional zones along the Hudson Bay coast during the spring and summer periods. In the Far North, it is recognized that Caribou movements across this zonal boundary do occur (Berglund et al., 2014; MNR, 2014a). In the fall and winter, the Eastern Migratory population moves south to boreal forest habitat within the Big Trout Lake (2W) and Hudson Bay Lowlands (2E) Ecoregions, which includes James Bay. Movement and habitat use by this population is complex, but males are thought to remain in the forest and forest-tundra areas during the spring calving season, while females move further north to the calving grounds.

Forest-associated Boreal Caribou moving north will intermingle with tundra-associated Eastern Migratory Caribou that have moved south (Abraham et al., 2012; COSEWIC, 2014). Members of both the Boreal and Eastern Migratory populations of Caribou may occur within the Project Footprint for the proposed WSR; however, individual Caribou from either population are indistinguishable in the field based on physical characteristics.



Caribou have sensitive periods throughout the year, where activities that result in sensory disturbance of the species are restricted (Ontario Woodland Caribou Recovery Team, 2008). Sensitive periods are associated with Caribou life-stages such as calving, wintering, and travel. Ontario has specific sensitive time periods for Caribou that are used in the identification, delineation, and consideration of habitat features, which include nursery areas (May 1 to July 14 – very low tolerance, July 15 to September 15 – low tolerance), winter use areas (December 1 to March 31), and travel corridors (April and/or November).

Boreal Population Ranges

The preliminary proposed WSR corridor and associated route alternatives traverse the centre of the Missisa range. The Missisa Caribou range is the largest range within Ontario's Continuous Range for Caribou, covering 70,000 km² and spanning the ecotone between the Ontario Shield Ecozone and Hudson Bay Lowland Ecozone (MNRF, 2014a; 2014b; 2014c). The landscape is composed predominantly of Ecoregions 2E (James Bay Ecoregion) within the Hudson Bay Lowland Ecozone and 2W (Big Trout Lake Ecoregion) within the Ontario Shield Ecozone. This particular range has a demonstrated ecological significance as both winter and summer habitat by supporting calving and nursery functions and may be important as a conduit for travel (Berglund et al., 2014). The minimum Caribou population in this range was estimated at 745, based on winter distribution surveys completed from 2009 through 2013 (MNRF, 2014a). A combined low mean annual survival estimate (80%) and low calf recruitment indicates the population was on a declining trend at the time of data collection (MNRF, 2014a). Integrated range assessments conducted by MNRF (2014a) determined that the Missisa range condition may be insufficient to sustain Caribou.

The Ozhiski range is immediately to the west of the preliminary proposed WSR corridor and within the Caribou RSA. This range covers 38,700 km² and is within the Ontario Shield Ecozone (MNRF, 2014a; 2014b; 2014c). It consists of the eastern portion of the ecoregion 2W (Big Trout Lake Ecoregion), specifically 2W-3. Current knowledge of Caribou distribution and movement data is limited. The range is expected to have high capability for production of the forest conditions required to sustain Caribou but is the most disturbed of the Far North Ranges (MNRF, 2014a). The minimum Caribou population in this range was estimated at 148, based on winter distribution surveys completed from 2010 through 2011 (MNRF, 2014a). No estimate of trend was calculated due to a lack of collaring data (MNRF, 2014a). Due to current data limitations, caution is warranted in interpretation of the range assessment. Integrated range assessments conducted by MNRF (2014a) determined that the Ozhiski range condition is likely sufficient to sustain Caribou, although annual population trend data is required.

The Ministry of Natural Resources (MNR) Science and Research Branch recently updated estimates of adult female survival rates, annual recruitment rates, and population growth rates (i.e., trend) for Boreal Caribou in the Missisa and Ozhiski Ranges (MECP, *pers. comm.*, 2026). The updated rates are shown in **Table 13-2**. Based on the updated rates, adult female survival in the Missisa Range (86%) and Ozhiski Range (88%) are above the estimated 85% adult survival rate that is necessary for a stable to increasing population (EC 2011) and estimates of annual recruitment rates in the Missisa Range and Ozhiski Range are above the "persistence threshold" of 28.9 calves per 100 adult females generally considered necessary for a stable or increasing population assuming an adult survival rate of 85% (EC, 2008).



Table 13-2: Updated MNR Recruitment and Survivorship Estimates for the Caribou Ranges Within the Regional Study Area

Provincial Range	Survey Years	Survival Estimate for Adult females (%)	Recruitment Estimate (calves per 100 adult females)	Population Growth Rate (I)
Missisa	2020-2023	86	50	1.14
Ozhiski	2019-2023	85	33.7-35.2	1-1.10

Both of these ranges are part of the federal Far North Range (ECCC, 2020), which is comprised of six Ontario Caribou ranges: Missisa, Ozhiski, Swan, Spirit, Kinloch and James Bay. Federal population estimates for the Far North Range state that each range is above the 100-animal minimum used to evaluate vulnerability to local extinction; however, all ranges, except the Ozhiski range which has insufficient data, show a declining population trend (ECCC, 2017). The Far North Range is considered to be self-sustaining, with fire and anthropogenic disturbance explaining approximately 70% of variation in recruitment (Environment Canada (EC), 2011a).

Caribou Habitat

Caribou (Boreal population) are generally far-ranging animals that require large, undisturbed areas of old or mature conifer upland forest and lowlands dominated by Jack Pine (*Pinus banksiana*) and/or Black Spruce (*Picea mariana*). Female Caribou in eastern Ontario were found to have mean annual home range sizes of 4,026 km² (Brown et al., 2003); however, these ranges are used variably throughout the year, and from year to year.

Caribou (Boreal population) use habitat at different spatial scales. Predator avoidance is a primary driver of habitat selection on a coarser scale, as Caribou use geographic isolation as their primary predator avoidance strategy. Regional studies in Northern Ontario have shown that Caribou occurrence is negatively correlated with deciduous forest and presence of wolves and moose (Bowman et al., 2010; Poley et al., 2014). Caribou also avoid forest stands that have recently burned. A variety of studies have indicated that it takes approximately 50 to 75 years for an area burnt by forest fires to transition to a state that is once again selected by Caribou (Schaefer and Pruitt, 1991; Joly et al., 2003; Dalerum et al., 2007; Thomas et al., 1996; Shepherd et al., 2007).

Caribou habitat selection at a finer scale is driven by foraging or calving. The General Habitat Description¹ (GHD) for the Forest-dwelling Caribou (MNR 2013) distinguishes three habitat categorizations:

- Category 1 (Red): Nursery areas, winter use areas, travel corridors;
- Category 2 (Orange): Seasonal ranges; and
- Category 3 (Yellow): Remaining areas within the Caribou's range.

Category 1 habitats are high use areas that exhibit repeated, intensive use by Caribou and for which fidelity is typically shown over multiple years. A total of 486,857 ha or 4.6% of the combined Missisa and Ozhiski Caribou Ranges are classified as Category 1, which include nursery areas, winter use areas, and

¹ General Habitat Descriptions are documents that outline the habitat requirements of SAR, providing details on the types of environments that are essential for the species' survival and recovery.

travel corridors. Nursery Areas are “generalized features in which individual or multiple adult female Caribou select during late parturition, give birth, and raise their calves during the spring, summer and early fall” (MNRF, 2020). Nursery areas are selected by Caribou for refuge and security and can be comprised of lakes and wetland complexes dominated by fens and bogs, particularly those interspersed with upland islands and peninsulas (Carr et al., 2011).

Peak calving activity in Northwestern Ontario occurs around June 1, and the calving season is considered to occur between May 7 and July 14 (Ferguson and Elkie, 2004a). The post-calving season occurs between July 15 and November 14 (Ferguson and Elkie, 2004). Calves are most vulnerable to mortality during the first 50 days following birth, predominantly by predation (Pinard et al., 2012). Calves become more mobile by mid-summer and females and calves disperse within the Nursery Area at this time to reduce detection by predators (Ferguson and Elkie, 2004).

Winter use areas are typically landscape features that provide abundant ground lichen (*Cladina* and *Cladonia* species) for winter forage and exhibit lower average snow depths, which provide easier movement (MNRF, 2020). Within the northern portion of the Ontario Shield Ecozone, winter use areas typically consist of open Jack Pine and Black Spruce habitat greater than 40 years old with abundant ground lichen (MNRF, 2020). Areas that are continuously used may also offer protection from predators. The forest-dwelling ecotype is relatively sedentary, forming relatively small groups (10-50 animals) during the winter.

Category 2 habitats encompass most of the current Caribou distribution during all seasons with 71.79% or approximately 7.6 million ha classified as Category 2 within the Missisa and Ozhiski Caribou Ranges. Category 3 areas within the Missisa and Ozhiski Caribou Ranges total 23.6% of the range, or 2.5 million ha. These areas may be young areas with appropriate characteristics for future utilization or may have features that are not consistent with Seasonal Ranges. These areas are generally not occupied for long periods of time, but Caribou may travel through them (MNRF, 2020).

GHD sub-range habitat feature mapping for the Missisa and Ozhiski Caribou Ranges was provided by MECP. The majority of the proposed route alternatives fall within Category 2 – Seasonal range. Overall, 80.4% or 202,882 ha of the Caribou LSA is classified as Season Range (**Table 13-3**). The LSA Provincial mapping does not indicate that the Project occurs within any Category 1 features. Two Category 1 features (both nursery areas), totaling 759 ha, or 0.3% of the LSA, are present within the Caribou LSA. 19.3% of the LSA is classified as Category 3. It is anticipated that the habitat mapping will be updated following a review from MECP SARB of relevant information. AtkinsRéalis is committed to include and consider this updated information for the Final EAR/IS.

Table 13-3: Caribou Habitat Categories within the Caribou Local Study Area and Regional Study Area Based on Known Habitat Categories

Habitat Category	LSA		RSA	
	Area (ha)	%	Area (ha)	%
Category 1 – High Use Area (Nursery Use Area)	759	0.3	381,417	3.5
Category 1 – High Use Area (Winter Use Area)	0	0	517,357	4.7
Category 2 – Seasonal Range	202,883	80.4	7,605,460	69.1
Category 3 – Remaining Areas within the Range	48,756	19.3	2,502,739	22.7



Disturbance

The amount of disturbance within the project RSA has been calculated by both the federal and provincial governments. Variation in calculation methods results in different levels of disturbance reported within the ranges. Disturbance analysis is intended to reflect the loss of functional habitat and to be a predictor for recruitment, and population growth (MNRF, 2014c). For the provincial assessment the analysis combined natural disturbances (fire, weather, unknown causes) sourced from various data sources and anthropogenic disturbance types including:

- Infrastructure (airports, roads, rail, transmission lines, dams);
- Industrial and resource extraction (cutblocks, mines, factories, agriculture land, wind farms); and
- Recreational (recreational and commercial camps and cottages).

The published provincial analysis found for the Ozhiski Range, total disturbance within the range was calculated at 27.6% with 20% having natural origins and 7.6% being anthropogenic (includes 500 m buffer) (MNRF, 2014d). For the Missisa Range, total disturbance within the range was calculated at 14.4% with 5% having natural origins and 9.4% being anthropogenic (includes 500 m buffer) (MNRF, 2014d). The relatively high level of anthropogenic disturbance in the Missisa Range is largely due to the mining claims associated with the Ring of Fire (MNRF, 2014d). For the combined Far North Ranges total disturbance within the ranges was calculated at 18.4% with 12.9% having natural origins and 5.5% being anthropogenic. The relatively high level of anthropogenic disturbance in the Missisa Range is largely due to the mining claims associated with the Ring of Fire (MNRF, 2014d). These estimates have undergone refinement as generalized mineral claims data used for the earlier estimates over-inflated cumulative disturbance estimates in 2013 and 2015. Estimates generated between 2017 to 2022 incorporated more detailed “operational cell claim” data which represents an improvement to the earlier estimates (MECP, *pers. comm.*, 2026). The changes in disturbance estimates can be seen in **Table 13-4** with the cumulative disturbance estimate dropping 6% in the Missisa Range between 2013 and 2022.

Table 13-4: Provincial Estimates of Disturbed Habitat within the two Caribou Ranges that are Part of the Caribou Regional Study Area (2013 to 2022).

Provincial Range	Estimate of Cumulative Disturbance (%)							
	2013	2015	2017	2018	2019	2020	2021	2022
Missisa	14.41	11.31	8.5	8.5	8.4	8.4	8.4	8.4
Ozhiski	27.61	27.01	20.6	21.5	20.9	20.7	20.6	20.5

Federally, Environment Canada mapped total disturbance levels on Boreal Caribou ranges across their distribution in Canada (EC, 2012; ECCC, 2020). Much like the provincial methodology, total disturbance footprint was measured as the combined effects of fire that has occurred in the past 40 years and buffered (500 m) anthropogenic disturbance. However, anthropogenic disturbance was defined as any human-caused disturbance to the landscape that could be visually identified from Landsat imagery at a scale of 1:50,000 (EC, 2012). This difference results in methodology results in lower disturbance levels, particularly in relation to mining claims as it maps identifiable disturbances within the claims.

The federal government also identifies 65% undisturbed habitat in a range as the critical disturbance management threshold (ECCC, 2020). This level of disturbance provides a measurable probability (60%) for a local population to be self-sustaining. Across the Far North Range, the federal government assessed



total disturbance within the range was 15% with 14% having natural origins and 1% being anthropogenic, with calculated anthropogenic disturbances being much lower than the provincial calculation.

Regional Caribou Data

Preliminary inspection of MNR Caribou collaring data from the Missisa and Ozhiski Caribou Ranges indicate that the WSR LSA occurs across a zone of transition, where Boreal (sedentary) and Eastern Migratory populations intermingle during the winter. Movement paths of a subset of individuals between inland areas of northern Ontario and the Hudson Bay coastline is typically indicative of Eastern Migratory individuals moving from wintering areas to calving areas in the spring. Other individuals appear to stay in the same general location all year-round. Such movement patterns would typically be indicative of a member of the Boreal population.

Based on the 2010 Provincial Land Cover dataset, land cover class measures the amount of landscape components within an area that provides life requirements for Caribou, such as open water habitats or treed habitats (MNRF, 2014a). The Missisa range is represented by approximately 9% water, 3% disturbed or developed land, 59% bog and fen habitat, 17% swamp habitat, and 12% treed habitat. The Ozhiski range is represented by approximately 15% water, 14% disturbed or developed land, 14% bog and fen habitat, 15% swamp habitat, 1% peatland habitat and 42% treed habitat.

13.1.2.2.2 Mammal – Wolverine (*Gulo gulo*)

In Ontario, wolverines are provincially listed as Threatened and are protected under the ESA. They are primarily found in the northwest area of the province and occur in remote regions over large home ranges, but recent aerial surveys and trapper reports suggest a potential eastward range reoccupation of areas in northeastern Ontario, towards James Bay and Québec (Ontario, 2016).

Distribution

Wolverines are most active at night and are solitary animals, except for during mating season and when females are raising their young. They are generalist carnivores that scavenge for food in winter and eat small game prey in summer although they are capable of taking down large ungulates. Wolverine densities vary across ecological areas, to a maximum of about ten (10) wolverines per 1,000 km² in North America (COSEWIC, 2014). The highest densities occur in Northern Mountain, northern Boreal and eastern Southern Mountain ecological areas and in the Southern Arctic Ecozone (5 to 10 per 1,000 km²). Moderate densities occur in the southern Boreal ecological area (1 to 3 per 1,000 km²; COSEWIC, 2014). The population estimate for wolverines in Ontario is currently 780 – 960 mature individuals, with 878 mature individuals considered to be the most accurate estimate based on different adult/sub-adult class ratios in high and low occupancy areas of Ontario (Scrafford and Ray, Unpublished Report 2023 cited in ECCC, 2024b). Earlier population density estimates in Ontario identified a minimum density of 1.4 wolverines per 1,000 km² in a 7,626 km² study area, where a DNA mark-capture study was undertaken (Dawson et al. unpublished data, cited in COSEWIC, 2014). Results from aerial surveys suggest that densities are not uniform, and this estimate was assumed to be representative of the higher end of the spectrum in the province (Ontario Wolverine Recovery Team, 2013). Lower density portions of the province were estimated to be 0.7/1,000 km² (COSEWIC, 2014). There are no confidence limits on this estimate (COSEWIC, 2014).

Average home range sizes vary greatly and are known to range from 73 to 3,513 km², depending on age and sex (Hornocker and Hash, 1981; Gardner, 1985; Magoun, 1985; Whitman et al., 1986; Banci, 1987; Copeland, 1996; Mulders, 2000; Squires et al., 2007; Inman et al., 2007; Krebs et al., 2007). Winter home



range areas for wolverines in Ontario are considered to be at the high end of reported ranges for North America. Ontario home ranges average 2,563 km² for males and 428 km² for females (Dawson et al., 2010). Home ranges may overlap within the same sex or between different sexes, except for reproductive females (COSEWIC, 2014).

The provincial Recovery Strategy (Ontario Wolverine Recovery Team, 2013) proposes dividing the Wolverine distribution into three (3) recovery zones:

- Northern recovery zone – 226,600 km², comprised of portions of the Hudson Bay Lowland ecozone (Ecoregions 0e, 1E) (54% of the area) and Boreal Shield ecozone (Ecoregion 2W) (46% of the area). The population is believed to be stable or increasing.
- Western recovery zone – 195,500 km², lies entirely within the Boreal Shield ecozone (S2, 3S, 3W, 4S). Wolverine are primarily concentrated in the northern and western portions of the zone with increasing evidence of colonization of the east side.
- Eastern recovery zone – 177,400 km², primarily within the Hudson Bay Lowland ecozone (Ecoregion 2E) (68% of the area) and the southern portion of the Boreal Shield ecozone (Ecoregion 3E) (32% of the area). Wolverine occupancy is concentrated in the northern portion and estimated to be lower than the other two zones.

Habitat

Wolverines are habitat generalists, utilizing many different types of habitats for foraging and hunting (May et al 2006). Habitat for this species is best defined by year-round food availability, rather than topography and vegetation community types (Hornocker and Hash, 1981); however, regions with higher Wolverine densities tend to be those with the greatest variety and abundance of both prey and habitat types (Banci, 1994). Wolverine observations have commonly been on the shores of lakes, where they are seen allegedly scavenging for food. Their highly sensitive sense of smell allows them to detect carrion, and likely also prey, over long distances and beneath 1 to 2 m of snow (Hornocker and Hash, 1981).

While regulated habitat in the form of a general habitat description is not currently available for this species, MECP has identified that known, active dens and the area within a radius of four km around the den is a critical habitat feature and that project activities are to be avoided in therein. Wolverine dens can be found in a variety of habitats throughout the landscape but are generally associated with boulder complexes and downed trees in lowland boreal forests (Dawson et al. 2010). Dens are typically dug in areas with a snow depth of 1-5 m, either evenly distributed or drifted, and present by February and persisting until May (Magoun and Copeland, 1998). Snow cover depths influence the location of wolverine dens and tend to be inconsistent from year to year. Wolverines require specific physical habitat attributes for den sites, such as the location and substrate (in boulders, along eskers, under logs/deadfall, or in snow tunnels) and adequate insulating snow cover (≥ 1.0 m deep) throughout the denning period, which is likely the most critical feature of denning habitat (Magoun and Copeland, 1998). Reproductive dens of five collared females near Red Lake, Ontario included use of slash piles (n = 4), rocks or boulders (n = 2), and down trees or root balls (n = 6; Scrafford et al. 2022).

Reproduction

Most Wolverines become sexually mature at two (2) years of age, but few breed at this age (Banci 1994). Most females do not breed until the age of three (COSEWIC, 2104). The proportion of adult females that become pregnant ranges from 74% (Banci and Harestad 1988) to 92% (Rausch and Pearson 1972), based on studies in Yukon and Alaska. Pregnancy rate in adult females has been found to decline with



age. Rausch and Pearson (1972) found that pregnancy rate declined from 92% for 2-3 year-olds to 53% for 5–6-year-olds and 37% for combined 6-year-old and older age classes. Analyses of wolverine carcasses from the Yukon showed a pregnancy rate of 0% for juveniles, 31% for yearlings, and 80% for adults (Rausch and Pearson 1972). The highest pregnancy rates (90%) were in 3–5-year-old animals (Jung and Kukka 2013).

The average number of fetuses per breeding female ranged from 2.8 (2–3-year-olds) to 3.4 (6+) in a 1980s Yukon study (Banci and Harestad 1988). Litter size was greatest for females over the age of 6 (Banci and Harestad 1988; Rauset 2013), but the pregnancy rate for that age class was lower. Overall reproductive rates observed in Alaska and Idaho were 0.69 and 0.89 kits per female per year, respectively (Magoun 1985; Copeland 1996); the low values reflect that females often breed every other year.

13.1.2.2.3 Mammal – Little Brown Myotis (*Myotis lucifugus*) and Northern Myotis (*Myotis septentrionalis*)

Little Brown Myotis and Northern Myotis are nationally listed as Endangered and are protected under the *Species at Risk Act, 2002* (SARA). Similarly, these species are both listed as Endangered under the ESA.

Population Overview

The Little Brown Myotis is a widely distributed bat that is found from Newfoundland to British Columbia and in northern Canada to the treeline (COSEWIC, 2013). The Little Brown Myotis is historically one of the most common and widely distributed bats in Canada (COSSARO, 2012a). Its distribution in northern Ontario has been positively correlated to forest cover (Layng et al. 2019). This species forages aerially for small insects, especially flies and beetles, and often hunts over water or along edges. It roosts during the day inside buildings, under bark, in tree cavities, under bridges, in rock crevices, and occasionally in the open (COSEWIC, 2013; Humphrey and Fotherby, 2019). In Virginia, U.S.A., home ranges for females during the maternity roosting period (typically June and July) range from 90 ha to 8,136 ha (Yates et al., 2011), while males tend to have smaller home ranges between 52 ha and 661 ha (Broders et al., 2006; Yates et al., 2011).

Northern Myotis is also widely distributed bat that is found from Newfoundland to BC although it is smaller than Little Brown Myotis and located more eastward (COSEWIC, 2013). Northern Myotis is typically found with or near groups of Little Brown Myotis, although this species is never as common and can be difficult to identify. This species rarely uses human-made structures for roosting and are more strongly associated with the density and other characteristics (e.g., height, diameter, age, decay class) of trees (COSEWIC, 2013). In West Virginia, U.S.A., home ranges for female Northern Myotis during the maternity roosting period (typically June and July) range from 17.7 to 97.5 ha (Owen et al., 2003), while males tend to have smaller home ranges between 13.5 ha and 46.2 ha (Broders et al., 2006).

A disease called White-nose Syndrome (WNS), spread by a fungus, attacks bats during hibernation and can cause very high mortality rates at hibernacula (Frick et al. 2010). Little Brown Myotis populations in eastern Canada, including Ontario, have declined dramatically due to spread of WNS (COSEWIC, 2013). The same pattern is seen in northern myotis, with the mortality rate of Northern Myotis in infected caves for two years or more greater than 90% in Ontario (COSEWIC, 2012b). Provincially, a 92% decline of bat populations in hibernacula exposed to WNS in Ontario has been reported (COSSARO, 2012a,b).



The reproductive rate for Little Brown Myotis and Northern Myotis is low: both species produce only one (1) young annually. In the northeastern U.S., predicted population growth rates for Little Brown Myotis following the WNS outbreak is 0.95 (Malso et al., 2015). Pre-WNS, population growth rates for Northern Myotis were estimated to be 1.03 (Langwig et al., 2012).

Range maps for Ontario bat species were examined during the background information review, revealing that the proposed ROW for the WSR overlaps the Little Brown Myotis range (BCI, 2018; Dobbyn, 1994), but is beyond the northern limit of the Ontario Northern Myotis range. Results from an acoustic monitoring study conducted in northern Ontario suggest Little Brown Myotis and Northern Myotis are likely to occur near Webequie First Nation and the Ring of Fire area (Layng et al., 2019). The closest confirmed locations were to the south and west of Webequie in upland boreal shield areas which are limited within the RSA; however, there were bat passes identified as a *Myotis* species, suggesting the potential for Northern Myotis to be present within the LSA/RSA.

Habitat Description

To date, no habitat for Little Brown Myotis or Northern Myotis has been regulated under Ontario Regulation 242/08. Similarly, critical habitat has only been partially identified in the federal and provincial recovery strategy (Humphrey and Fotherby, 2019). In the absence of a specific habitat regulation, the ESA defines SAR habitat as “...any area on which the species depends, directly or indirectly, to carry on its life processes, including life processes such as reproduction, rearing, hibernation, migration, or feeding”. For bats, such habitat includes roosting habitat, maternity roosting habitat, foraging habitat, and hibernacula and swarming sites. Through the Significant Wildlife Habitat Criteria Schedules for Ecoregions 3E and 3W (south of the RSA), MNR identifies and provides criteria for the identification of two (2) significant habitat types for bats, including Bat Maternity Colonies and Bat Hibernacula (MNR, 2015a; MNR, 2017a).

Hibernation sites (hibernacula) include mines, caves, rock crevices, talus and boulder fields, and underground in well-drained rocky soils. In eastern Canada, the two species often overwinter in the same hibernacula, but not in mixed-species clusters. Individuals may travel several hundred kilometres between summer ranges and suitable hibernation sites (Thorne, 2017). In a study of abandoned mines in northern Michigan, Northern Myotis and Little Brown Myotis co-occurred in 92% of the mines occupied by *Myotis* species (Ontario, 2019). A review of Abandoned Mine Information System (AMIS) data indicated that no abandoned mine sites occur within 100 km of the preliminary proposed WSR corridor.

Little Brown myotis roost during the day inside buildings, under bark, in tree cavities, under bridges, in rock crevices or caves, and occasionally in the open (COSEWIC, 2013; Humphrey and Fotherby, 2019). Roost-switching is frequent, though a stable roost site such as a building may be used for many years. Females establish summer maternal roosting colonies, often in buildings or large-diameter trees (CWS, 2014). Reproductive females roost colonially, numbering up to hundreds of individuals, while males and non-breeding females are solitary (Thorne, 2017). Females congregate in the summer in maternity colonies in buildings, tree cavities, and rock crevices to give birth and raise singleton pups. Warm sites are preferred to speed development of the pups. Tree roost sites are most commonly found in relatively tall, large-diameter snags situated in open areas and exposed to the sun (COSEWIC, 2013). At the stand level, roost selection may be a function of canopy gaps, number of available snags, tree density and proximity to water (Kalcounis-Rüppell et al. 2005). Feeding habitat is typically strongly associated with water (Thorne, 2017).

Northern Myotis roost singly or in small groups and favour tree roosts more than Little Brown Myotis but they can occasionally also be found in anthropogenic structures (Environment Canada, 2015). They commonly roost in trees (COSSARO, 2012b) but have also been documented in holes, under shingles,



behind shutters, and in barns (Gerson, 1984). Reproductive females form small maternity colonies in habitat similar to Little Brown Myotis, and males and non-reproductive females are solitary (Thorne, 2017).

Both coniferous and deciduous tree species are used by Little Brown Myotis and Northern Myotis (COSEWIC, 2013). Deciduous roosts are more common in southern Ontario but roost preferences in northern Ontario are not well known (Humphrey and Fotherby 2019).

In Northern Ontario, the bat active season, which includes the maternity roosting (breeding) period (June and July), is generally understood to occur between May 1 and August 31, after which species will either migrate or move to hibernation sites (hibernacula) (MECP, 2023).

13.1.2.2.4 Upland Songbirds – Evening Grosbeak (*Coccothraustes vespertinus*)

Evening Grosbeaks are songbirds that are largely found in the Boreal region, breeding primarily in second growth and mature coniferous woodland and also mixed forest (COSEWIC, 2016; Gillihan and Byers, 2020). Adult males are bright yellow and black, with a brown head, while females and juveniles are mostly grey-brown with black and white wings and tail and yellow markings. Both sexes have a heavy bill that is used to crush conifer seeds that form the bulk of the species' diet during the winter. Spruce budworm larvae and other defoliating insects are the main prey during the breeding season, and Evening Grosbeak breeding densities and distributions are dependent on spatial-temporal patterns of insect outbreaks (COSEWIC, 2016). Their diet also includes small fruits and seeds (Gillihan and Byers, 2020). According to the Management Plan for the Evening Grosbeak (ECCC, 2022), the North American breeding range for the species is within Boreal or other conifer dominated forests. The species is classified as nomadic with irruptive migratory movements (COSEWIC, 2016). Banding data indicates that birds banded in Ontario, overwinter from Michigan east to the Atlantic coast (COSEWIC, 2016). Winter habitats are associated with availability of berries and seeds (COSEWIC, 2016).

According to COSSARO (2017a), the Evening Grosbeak has been determined to meet decline criteria for 'Threatened' in Ontario based on significant population declines, yet it has been designated as Special Concern. This status is based on the "potential for rescue" given that the species population levels are closely linked with Spruce Budworm cycles and a future Ontario outbreak of this insect is predicted to be imminent (COSSARO, 2017a).

Population Overview

In the Boreal Softwood Shield (BCR 8), according to OBBA data, the Evening Grosbeak population trend shows a decrease of 3% or more (Birds Canada, 2024). OBBA data indicate that the Project occurs along the northernmost extent of Evening Grosbeak range in Ontario (Birds Canada, 2024). It is unlikely that this species currently breeds in notable numbers in the RSA. Evening Grosbeak was not recorded during field surveys for the Noront Eagle's Nest Project EA (Noront, 2013) at the mine site.

Habitat Description

This species breeds in secondary growth and mature mixed forests (Peck and James, 1987); however, habitat selection is likely influenced by food availability, rather than habitat structure. Presence is most likely based on the presence of spruce budworm, a primary food source for this species. Nests are constructed at least 5 m above the ground on tall conifers, sometimes also paper birch (*Betula papyrifera*) and beech (*Fagus* sp.) (Gillihan and Byers, 2020).



13.1.2.2.5 Wetland Songbirds – Olive-sided Flycatcher (*Contopus cooperi*)

Olive-sided Flycatcher is a grey-brown insectivorous migratory songbird that is widely distributed across forested Canada during the breeding season (COSEWIC, 2018). This species is associated with edge habitats, primarily forests with tall trees and snags adjacent to burns, waterbodies or cutblocks (COSEWIC, 2018). Olive-sided Flycatchers forage from a perch in a tall live or dead tree, watching for flying prey and making short flights to capture it before returning to the perch. Males also sing from tall perches in territorial defence.

The Olive-sided Flycatcher is nationally listed as Threatened and is protected under the SARA. In Ontario, this species is listed as Special Concern and does not receive protection under Ontario's ESA; however, they are protected under the *Migratory Birds Convention Act, 1994* (MBCA).

Population Overview

OBBA abundance data indicate that areas of high Olive-sided Flycatcher abundance occur across the area of the WSR. The Noront Eagle's Nest Project EA (2013) indicates that 13 Olive-sided Flycatchers were recorded at the mine site during 2011 and 2012 field surveys (Noront, 2013). Based on Breeding Bird Survey data, between 1989 and 2016, the population of Olive-sided Flycatcher has decreased annually at -2.8%, amounting to a total decline of 72% since 1970 (COSEWIC, 2018).

Habitat Description

This species typically occurs in open areas containing tall trees or snags for perching (COSEWIC, 2007a). Such open areas include forest openings; forest edges near natural openings including rivers, muskeg, bogs or swamps; burned forest or open to semi-open mature forest stands; or human-made openings, such as logged areas (COSEWIC, 2007a). Typical forest habitat is coniferous or mixed and, in boreal forests, suitable habitat is more likely to occur in or near wetland areas (COSEWIC, 2007a).

OBBA abundance data indicates that areas of high Olive-sided Flycatcher abundance occur across the LSA. Thirteen Olive-sided Flycatcher detections were recorded at the Noront Eagle's Nest mine site during 2011 and 2012 field surveys (Noront, 2013).

13.1.2.2.6 Wetland Songbirds – Rusty Blackbird (*Euphagus carolinus*)

The Rusty Blackbird is a passerine species that inhabits forest wetlands in boreal forests during the breeding season. Adult male plumage is black while females have brown-grey plumage, and both have pale yellow eyes. Unlike other native blackbird species, Rusty Blackbirds nest in isolated pairs rather than in groups. Woodlands and cultivated fields are used on the winter range, which is primarily located on the Mississippi River valley floodplain (COSEWIC 2006).

Rusty Blackbird is listed as Special Concern both provincially and federally. Rusty Blackbirds are not protected under the MBCA, but they are protected under the provincial *Fish and Wildlife Conservation Act, 1997* (FWCA).

Population Overview

OBBA data indicate that Rusty Blackbird occurs in proximity to the Project (Birds Canada, 2024). Provincial concentrations of this species are located between the RSA and Hudson Bay and James Bay. The modelled relative abundance of Rusty Blackbird is presented in Figure 11.39. The Noront Eagle's Nest Project EA (2013) recorded Rusty Blackbird at most survey locations during migration and recorded



this species during the breeding season (Noront, 2013). This species was not detected during the breeding season in the southern portions of the RSA, and OBBA data indicate that they are either absent or at very low densities in those areas (Birds Canada, 2024). Rusty Blackbird is one of North America's most rapidly declining songbird species: based on BBS data, Rusty Blackbird populations have declined at a rate of 5.5 to 6.3% annually with an overall reduction in population of around 90%.

Habitat Description

The breeding range of the Rusty Blackbird is closely linked to the boreal forest and taiga terrestrial ecozones (COSEWIC, 2006). Breeding habitat for this species is generally characterized as conifer forest wetlands, but more specifically includes wetlands associated with recent burns, wooded heathland and peat bogs with or without ponds, as well as in riparian scrub, alder and willow thickets, open moss and lichen-spruce woodlands and areas dominated by conifer forest edges, lakes and bogs (COSEWIC, 2006). This species also occurs in sedge meadows, marshes, muskegs, swamps and estuaries. In the boreal ecozones it prefers wet ecosites including fens, bogs, and ponds. In forested areas, the Rusty Blackbird is strictly riparian and rarely uses the forest interior (COSEWIC, 2006). Breeding within this species is considered loosely colonial.

13.1.2.2.7 Shorebirds – Lesser Yellowlegs (*Tringa flavipes*)

Lesser Yellowlegs is a medium-sized, grey shorebird characterized by a long neck, straight black bill (approximately the same length as the head), and long bright-yellow legs (COSEWIC 2020). This shorebird has 80% of its breeding range in Canada's boreal region, migrates through the United States and Caribbean and winters mostly in South America (COSEWIC 2020). This species nests on dry ground near peatlands, marshes, ponds, and other wetlands in the boreal forest and taiga (COSEWIC 2020).

Lesser Yellowlegs is not listed in Schedule 1 of SARA, but is designated as Threatened under COSEWIC, making this species eligible for addition to Schedule 1 (COSEWIC 2020). In Ontario, this species is listed as Threatened and is protected under the provincial ESA.

Population Overview

OBBA indicate that Lesser Yellowlegs possibly breeds in proximity to the Project (Birds Canada, 2024). The Noront Eagle's Nest Project EA (2013) indicates that Lesser Yellowlegs have the third highest percentage of occurrence in the region, occurring at 6.8% of point count locations (Noront, 2013). Since 1980, populations of Lesser Yellowlegs in Canada have experienced a large decrease, declining by 3.76% each year and staying well below the population goal range since the late 1990's (Birds Canada and ECC, 2024).

Habitat Description

This species typically breeds in open boreal forest and forest/tundra transition habitats (Tibbitts and Moskoff, 1998). Lesser Yellowlegs are ground-nesting shorebirds, constructing nests on dry ground near peatlands, marshes, ponds, and other wetlands in the boreal forest and taiga (COSEWIC, 2020).

The Noront Eagle's Nest Project EA (2013) found that Lesser Yellowlegs were observed in treed bog and treed fen habitat, but not in forested or open bog and fen habitats during the combined upland breeding bird and shorebird surveys in 2012 (Noront, 2013). Lesser Yellowlegs were also incidentally observed during other wildlife surveys.



13.1.2.2.8 Nightjars – Common Nighthawk (*Chordeiles minor*)

Common Nighthawk is a mottled grey-and-brown crepuscular, aerial insectivore and member of nightjar family Caprimulgidae. It occurs throughout Ontario except for the coastal regions of James Bay and Hudson Bay between spring and fall, and is a long-distance migrant, wintering in South America (COSEWIC, 2018). This species is listed as Special Concern both provincially and federally.

Population Overview

According to OBBA data, Common Nighthawk is widespread in suitable habitat across northern Ontario (Birds Canada, 2024). Studies conducted for the Noront Eagle's Nest Project EA (2013) indicated that this species was recorded at the Mine Study Site, where "several" nests were located along cleared areas, including pathway, roads, and old drilling sites. Since 1970, populations of Common Nighthawk in Canada have experienced a large decrease, declining by 2.21% each year and staying well below the population goal range since 1975 (Birds Canada and ECCO, 2024). In Ontario, the species was estimated to have declined by 12% over the 10-year period between 2005 and 2015 (COSEWIC, 2018).

Habitat Description

Common Nighthawks nest in open habitats across northern Ontario, and it is assumed that this species is found wherever suitable habitat is present. Across northern Ontario and particularly in the vicinity of the Project, nighthawk habitat includes areas where ground cover is sparse or has been disturbed or removed, leaving an open vegetation structure with low shrub or tree cover and areas of bare ground or rock, sparse ground cover, and woody debris for perching and roosting. Such habitats include sand dunes, beaches, recently logged or burned-over areas, forest clearings, short-grass prairies, pastures, open forests, peat bogs, marshes, lakeshores, gravel roads, riverbanks, rocky outcrops or barrens, railways, mine tailings, quarries, mines and urban parks (COSEWIC, 2007b). While nighthawks will use urban habitats, natural sites are preferred (COSEWIC, 2007b). Nighthawks nest on the ground, usually in the open near logs, boulders, grass clumps, shrubs or small patches of sandy gravel surrounded by scattered debris. Common Nighthawks require well-drained areas for nesting (Ng 2009; COSEWIC 2019). Eggs are laid directly on the ground and nesting sites must contain some shade in order for young to shelter from the sun and predators (COSEWIC, 2018). In the boreal, post-burn areas habitats and rocky areas may provide important nesting habitats (COSSARO, 2020).

This species is highly territorial, with males seldom crossing territorial boundaries. In natural environments, territory size is estimated at approximately 28 ha (Poulin et al. 1996). Common Nighthawk also shows high nest fidelity but low fidelity for foraging (McGuire et al., 2021).

13.1.2.2.9 Raptor – Bald Eagle (*Haliaeetus leucocephalus*)

Bald Eagle is a large and powerful diurnal raptor. Adults have a brown body and white head, while young birds are uniformly brownish. Bald Eagles have a diverse diet and are both scavengers and predators. They consume ungulate carcasses and capture fish, waterfowl, and seabirds as well as opportunistically feed on a wide variety of other prey.

Some Bald Eagles overwinter in Ontario along major drainage systems where open water is available (Armstrong 2014). The Bald Eagle and its nest are protected under the provincial FWCA. On January 29, 2024, the Bald Eagle was removed from the Species at Risk in Ontario List under the ESA and is also considered Not at Risk federally. However, given its status at the start of the Project and its importance in Indigenous communities, it was kept in the SAR section of the Report.



Population Overview

The Noront Eagle's Nest Project EA (Noront 2013) indicates that Bald Eagles are known to nest in the vicinity of the Project and that Bald Eagles migrate through the LSA (Noront 2013). Spring migration surveys in 2011 and 2012 noted high numbers of eagles (92 and 215 counted in three-day survey periods in 2011 and 2012) migrating north. It is suggested that in the spring, the eagles may be following the chain of streams where suckers are spawning (Roy Spence, personal communication, 2012). Fall migration surveys conducted in support of the Noront Eagle's Nest Project EA (Noront 2013) did not report strong movement by eagles; however, raptor movement is strongly associated with weather conditions and may have been confounded by a variety of factors during the chosen survey window. Since 1970, populations of Bald Eagle in Canada have experienced a large increase, rising by 4.39% each year and recently (c. 2020) reaching the population goal range (Birds Canada and ECCO, 2024).

Habitat Description

Bald Eagles are predominantly fish-eating birds that use shoreline habitat associated with large lakes and large rivers for nesting and foraging (MNR, 2000). This species requires productive areas of open water or deep-water marshes supporting large quantities of fish in order to feed their young (MNR, 2000). They construct large stick nests in tall live or dead trees or on anthropogenic structures such as transmission towers. Nests are usually close to large lakes or rivers (Armstrong 2014) where fish and waterfowl are abundant. Nests are typically built in large trees near shorelines or over water as well as on islands. In Northern Ontario, tree species that generally reach a diameter at breast-height (DBH) greater than 60 cm with crotches large enough to support an eagle nest generally include White Pine and Trembling Aspen. Bald Eagles typically show high fidelity to nesting locations and nests are often reused, becoming extremely large as new nest material is added each year (MNR, 2000).

Bald Eagles roost in large trees growing in shoreline forest stands or on cliffs (MNR, 2000). The location of winter roosting sites changes within and among winters, depending upon ice conditions and fish distribution, but the same general areas are used traditionally and often the same trees will be used year after year (MNR, 2000).

13.1.2.2.10 Raptor – Short-eared Owl (*Asio flammeus*)

Short-eared Owl is a medium-sized owl that inhabits open areas such as grasslands, marshes and tundra where it nests on the ground. Adult males and females are both mottled brown, giving them excellent camouflage, but females are slightly larger and darker in colour (COSEWIC, 2021). Short-eared Owls are crepuscular in nature, primarily hunting at night for voles, lemmings, and other small mammals. Short-eared Owls have low breeding site fidelity, are considered to be nomadic, traveling long distances to areas that have a high abundance of rodents (COSEWIC, 2021). Prey predominantly consists of voles (*Microtus* sp.) but includes a wide variety of small mammals (Wiggins et al., 2020). The nomadic nature of Short-eared Owls makes it difficult to calculate abundance at local and regional scales.

Short-eared Owl is nationally listed as Special Concern but has been assessed as Threatened by COSEWIC (2021) and COSSARO (2021). Provincially, the status of Short-eared Owls was changed from Special Concern to Threatened on January 23, 2023, meaning that both this species and its habitat will receive protection under Ontario's ESA. Short-eared Owls are not protected under the MBCA; however, in Ontario they are protected from hunting and trapping as "any bird that belongs to a species that is wild by nature and is not a game bird" under Section 5 of the FWCA.



Population Overview

OBBA data indicate that Short-eared Owl possibly breeds in proximity to the Project (Birds Canada, 2024). Provincial concentrations of this species are located between the RSA and Hudson Bay and James Bay. Studies conducted for the Noront Eagle's Nest Project EA (Noront, 2013) did not identify this species at the Mine Study Site. Since 1970, populations of Short-eared Owl in Canada have experienced a large decrease, declining by 1.59% each year and staying well below the population goal range since 1975 (Birds Canada and ECCC, 2024). In Ontario, there was an inferred decline of greater than 30% of mature individuals over three generations, between 2007 and 2019, with declines expected to continue in the future (COSSARO, 2021).

Habitat Description

Short-eared Owls are highly sensitive to habitat fragmentation and require an area of at least 50-100 ha to breed (Austen et al., 1994). Breeding habitat includes a wide variety of open habitats, which in the Boreal region include wetlands, bogs and marshes (COSEWIC, 2021). Nests are constructed on the ground typically on a dry knoll, ridge or hummock, with enough vegetation to conceal the incubating female (Wiggins et al., 2020). In the winter, they roost in conifer trees next to open areas where they hunt, or they take cover on the ground in dense grasses or shrubs (COSEWIC 2021).

13.1.2.2.11 Fish – Lake Sturgeon (Southern Hudson Bay – James Bay population) (*Acipenser fulvescens*)

Lake Sturgeon are the largest freshwater fish species that occurs in Ontario, and Ontario's only member of the sturgeon family. They are Ontario's longest-lived fish and exhibit physical characteristics that have remained unchanged for over 200 million years (Golder, 2011). Lake Sturgeon have a ventral mouth, a pointed snout and four barbels that are used to sense the environment and to locate food. They are also characterized by a heterocercal tail. Generally, Lake Sturgeon are dark to light brown or grey in colour on the back and sides, with a lighter coloured belly (COSEWIC, 2017b). Lake Sturgeon are potamodromous (i.e., migratory and live strictly within freshwater). They are a large, slow-growing, and late maturing, migratory species that move extensively between habitats to fulfil seasonal and life history stage requirements.

The Southern Hudson Bay/James Bay population of Lake Sturgeon can be found within the Project Footprint (MECP, 2024) and is currently listed as a species of Special Concern by COSSARO (2017b), COSEWIC (2017) and under the federal SARA. Lake Sturgeon are also considered a delicacy by the Webequie community and are occasionally consumed (University of Northern British Columbia and Universite de Montreal 2013; Hopper and Power, 1991).

Population Overview

The MNR NHIC database did not yield any results for presence of this species in the Project Footprint. From the review of the provincial SARO list (MECP, 2024) and federal "Distribution of Aquatic Species at Risk" (DFO, 2021) mapping that includes the LSA, Lake Sturgeon is the only designated aquatic SAR that has occurrences within the LSA and RSA. This species was identified in the Winisk River system (including Winisk Lake, the Winiskisis Channel and the Muketei River). However, no critical habitat for Lake Sturgeon or other fish species was identified in the LSA or RSA. Studies conducted for the Noront Eagle's Nest Product EA (Noront, 2013) identified Lake Sturgeon as potentially occurring at the Mine Study Site, which overlaps with the LSA and RSA. Based on known habitat requirements and geographic distribution, the Lake Sturgeon is the only aquatic SAR that has a reasonable potential to



occur within the Mine Study Site (Noront, 2013). During the Noront aquatic surveys conducted from 2010 to 2013, Lake Sturgeon were sampled within the Muketei River (Noront, 2013). Previous studies (Southee et al 2021; University of Northern British Columbia and Universite de Montreal 2013; Hopper and Power, 1991; Noront, 2013) have determined that Lake Sturgeon are likely present, although rare, within at least the Winisk Lake, the Winisk River, the Winiskis Channel, and the Muketei River.

Habitat Description

The quantity and quality of habitat needed to support the life functions of reproduction, feeding and growth, refugia and movement varies during its extended life history (COSEWIC, 2017). Sturgeon will move upstream in the spring to the furthest impassable barrier, natural or artificial, to spawn in swift flowing water often at the base of waterfalls (Scott and Crossman, 1998). Previous studies of Lake Sturgeon spawning habitat across North America have indicated that sturgeon prefer to spawn over cobble substrates with depth-averaged velocities of 0.6 m/s with depths in water temperatures around 10.5 °C in northern portions of its range (Bruch and Binkowski 2002, Baril et al., 2017). The Winiskis channel likely represents one of the most likely potential spawning locations based on this description. Suitable habitat for spawning is likely also present near the Muketei River crossings as well, as the cobble/gravel habitat is also present in this location. Suitable non-spawning habitat is likely found within the main channels of all these major rivers. No major barriers, such as hydroelectric dams, are present along these rivers within the LSA and RSA (Ontario Geohub, 2024). As a result, it is expected that these major rivers should be able to support a population of Lake Sturgeon. Smaller bog/creek systems within the LSA and RSA are unlikely to contain suitable spawning habitat for the fish.

13.1.2.2.12 Summary of SAR Species VC Sub-components

Table 13-5: List the SAR Species their Current Status and Summarizes the Rationale for their Selection

Species	SARO Status ^a	SARA Status ^b	COSEWIC Status ^c	Rationale
Caribou (Boreal Population)	Threatened	Threatened	Threatened	<ul style="list-style-type: none"> Highly sensitive to disturbance Missisa range condition may not be sufficient to sustain Caribou
Wolverine	Threatened	Special Concern	Special Concern	<ul style="list-style-type: none"> Eastern recovery zone population is low Sensitive to anthropogenic disturbance and cumulative impacts
Northern Myotis	Endangered	Endangered	Endangered	<ul style="list-style-type: none"> Population dramatically reduced by 92% due to WNS Low reproductive rate
Little Brown Myotis	Endangered	Endangered	Endangered	<ul style="list-style-type: none"> Population dramatically reduced by 92% due to WNS Low reproductive rate
Evening Grosbeak	Special Concern	Special Concern	Special Concern	<ul style="list-style-type: none"> Significant population declines in Ontario in recent decades Indicator of spruce budworm outbreaks
Olive-sided Flycatcher	Special Concern	Special Concern	Special Concern	<ul style="list-style-type: none"> Indicator of disturbed habitats (burns, logging)



Species	SARO Status ^a	SARA Status ^b	COSEWIC Status ^c	Rationale
				<ul style="list-style-type: none"> Population has steeply declined in recent decades
Rusty Blackbird	Special Concern	Special Concern	Special Concern	<ul style="list-style-type: none"> Population has steeply declined in recent decades
Lesser Yellowlegs	Threatened	No status	Threatened	<ul style="list-style-type: none"> Over 80% of breeding range in Canada's boreal Indicator for open wetlands
Common Nighthawk	Special Concern	Special Concern	Special Concern	<ul style="list-style-type: none"> Indicator of aerial insect food availability Experiencing long-term population declines
Short-eared Owl	Threatened	Special Concern	Threatened	<ul style="list-style-type: none"> Population has steeply declined in recent decades Threatened by collisions with vehicles
Bald Eagle	Not at Risk ^d	No Status	Not at Risk	<ul style="list-style-type: none"> Importance to Indigenous communities
Lake Sturgeon	Special Concern	Special Concern	Special Concern	<ul style="list-style-type: none"> Importance to Indigenous communities

a Species at Risk in Ontario (Government of Ontario, 2024)

b Species at Risk Act (Government of Canada, 2002)

c Committee on the Status of Endangered Wildlife in Canada (COSEWIC, 2024)

13.1.3 Consideration of Input from Engagement and Consultation Activities

Table 13-6 summarizes the input related to SAR and SAR Habitat received during the engagement and consultation for the EA/IA and how inputs are addressed in the EAR/IS. This input includes key concerns raised by Indigenous communities and groups, the public, government agencies, and stakeholders prior to the formal commencement of the federal IA and provincial EA, during the Planning Phase of the IA and ToR phase of the EA. The Project Team considered the comments received on the Draft EAR/IS in finalizing the EAR/IS. Details of responses and how the comments have been addressed are provided in the Record of Engagement and Consultation.

Table 13-6: Species at Risk – Summary of Inputs Received During Engagement and Consultation

Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
Requested that caribou travel routes be considered in the evaluation of alternatives, especially as areas that favour constructability (areas of high ground) can also be used by caribou as travel routes.	Caribou habitat, known caribou travel corridors and nursery areas were included as criteria in the evaluation of alternatives as described in Section 3 of this EAR/IS.	Attawapiskat First Nation



Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
<p>Attawapiskat First Nation does not support aerial surveys for caribou as these are disruptive to the animals, especially during the calving season, and an aerial survey would yield little information that would be relevant to the road EA. Attawapiskat First Nation prefers the EA to rely on knowledge and information provided by hunters and other land users for establishing population trends. Attawapiskat First Nation suggests the use of aerial photography together with land cover mapping from the MNRF's Far North Land Cover Dataset to identify suitable habitat types in the study area.</p> <p>Mushkegowuk Council is concerned that the additional survey should be carried out by drones as opposed to helicopters due to the invasive impacts of the motor noise which creates undue hardship and stressors of the caribou population.</p>	<p>A number of data collection methods and tools have been used to inform the EA/IA, including: aerial surveys (developed with input from MNR and MECP biologists), WSR collaring data, MNR collaring data, NHIC caribou occurrence data, caribou habitat mapping, Far North Land Cover Data, aerial photography and Indigenous Knowledge. Section 13.2 includes a summary of data collection methods. Detailed description of data collection methods is provided in Appendix F of this EAR/IS – Natural Environment Existing Conditions Report (NEEC Report).</p>	<p>Attawapiskat First Nation Mushkegowuk Council</p>
<p>Concerned that as part of the evaluation of dust (deposition of particulate matter) on vegetation, the impact on caribou must be studied, as caribou are known to avoid areas impacted by dustfall from developments such as mines.</p>	<p>The extent of dustfall from construction activities including aggregate production at the proposed quarry was predicted by using an air dispersion model as summarized in Section 9.3.1 and detailed in the Air Quality Impact Assessment Report (Appendix G).</p> <p>The potential effects of dustfall to Caribou are assessed in this EAR/IS section (Section 13). An Air Quality and Dust Control Management Plan will be developed and implemented to manage and reduce air contaminant emissions during construction and operation phases. The plan will integrate a monitoring procedure for dustfall effects.</p>	<p>Attawapiskat First Nation</p>
<p>Concerns on caribou crossing the WSR and impacts to Caribou.</p> <p>Constance Lake First Nation is concerned that provincial legislation intended to protect species at risk in Ontario (including caribou) is not being upheld in practice. These concerns are further emphasized through recent changes weakening environmental legislation in the province. Constance Lake First Nation expects to see the highest level of environmental protections and monitoring in place throughout the life of this project.</p>	<p>Proposed mitigation measures and monitoring approach to address potential effects of the Project to Caribou are outlined in Section 13.4 and Section 13.10.</p>	<p>Constance Lake First Nation</p>
<p>Concerned that the indicators provided for Federal or Provincial Species at Risk, Wildlife and Wildlife Habitat and Migratory Birds in the draft ToR do not</p>	<p>Indicators for the assessment of potential effects on SAR have been refined and are outlined in Section 13.1.5. Potential disturbance, avoidance, changes to movement</p>	<p>Fort Albany First Nation</p>



Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
seem to capture disturbance, avoidance, changes to movement corridors, and species distribution.	corridors, and species distribution are assessed based on results of habitat modelling conducted for the Project.	
Mitigation for impacts to caribou for design and operation of the road, e.g., to prevent mortality from drivers, allow caribou to cross the road corridor	Sections 13.4.3.2 and 13.4.3.4 outline proposed mitigation measures to reduce the risk of injury and death of Caribou during the construction and operations phases of the Project.	Kasabonika Lake First Nation
Expressed concerns about the impacts of the Project on caribou migration routes.	To assess the movement of caribou (Boreal and Eastern Migratory populations), the Project Team has reviewed background studies and Indigenous Knowledge shared by communities and conducted field investigations that include aerial surveys and caribou collaring. The results of the assessment of the Project's potential impacts to caribou are described in Section 13.3.3 . Proposed mitigation measures and monitoring approach to address potential effects of the Project to Caribou are outlined in Section 13.4 and Section 13.10 .	Kitchenuhmaykoosib Inninuwug First Nation
Mushkegowuk Council recommends the completion of analysis of caribou crossing data to determine appropriate mitigation measures and design criteria for the road.	As with other caribou-related data, the Caribou collaring study results are included in Section 13.2.2 for review by Indigenous communities as part of the draft and final EAR/IS. Input from those reviews will help inform Detail Design of the WSR, as appropriate.	Mushkegowuk Council
The assessment area must be large enough to assess the accumulated environmental conditions and to capture stressors from actions other than the proposed Project. For example, this will require an assessment of impacts on caribou based on the entire herd ranges.	Potential effects to Caribou have been assessed at Project, Local and Regional scales. Assessment at the regional scale includes the Ozhiski and Missisa Caribou Ranges. Section 13.1.6.1 describes spatial boundaries of the assessment.	Attawapiskat First Nation Neskantaga First Nation
Concerns about including impacts to all species at risk and their respective habitats during consultation with Public/Stakeholder/Indigenous.	Engagement and consultation activities for the Project during the EA/IA process have presented information on SAR and their habitat considered in the evaluation of alternatives and potential effects to all species at risk and their respective habitats.	MECP
Concerns about being informed about any areas considered for vegetation removal (at all stages of the project) in order to enable MECP to provide advice on potential involved SAR in those areas.	Vegetation removals for the Project are described in detail in Section 11 of the EAR/IS, and have been used to inform on the assessment of impacts to SAR and/or their habitat. This information will enable the MECP to provide specific advice on avoidance, mitigation and whether an authorization under the <i>Endangered Species Act</i> will be required.	MECP
Concerns about conformity of the items to be assessed under Biological Environment with the stated assessment methodologies/techniques in the ToR.	The scope and intensity of the field studies, and associated data collection methodologies have been established during the EA/IA process through consultation with Indigenous communities, federal/provincial agencies and	MECP Ministry of Natural Resources (MNR)



Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
	stakeholders. This included the development of Study Plans at the outset of the EA/IA related to the biological environment (e.g., species at risk, vegetation and wetlands, wildlife, etc.), including the opportunity for federal and provincial agencies to review the plans and provide guidance.	
Concerns regarding consideration of all activities, including prep work, for impacts to SAR and their habitat and outlining it in the EA.	All project components and activities have been considered in the assessment of the Project's potential effects, including in the context of potential effects to SAR.	MECP
Concerns about obtaining more information on planned "field surveys" and having input or review into Species at Risk Survey (SAR) methodology.	A SAR Study Plan was prepared at the outset of the EA phase for MECP review and guidance on the detailed field methodologies to be used and specific data that will be collected for the purpose of the EA/IA.	MECP
Concerns about considering application of radio satellite collars as an effective monitoring tool that could provide important baseline information and contribute towards assessing impacts of the Project on caribou habitat movement and habitat selection/use.	MNR collaring data is currently available for caribou within the Missisa Range and other surrounding ranges and has been used for the EA/IA (refer to Section 13.2.1).	MECP
Concerns about updating the ToR to include an assessment of potential sensory impacts to caribou within 10 km of each alternative.	Sensory noise levels for construction and operations of the proposed WSR were not known at the time of the screening of alternative conceptual corridors. A noise and vibration impact assessment was completed as part of the EA/IA for the preliminary recommended preferred route (refer to Section 9 and Appendix J of this EAR/IS). Potential sensory impacts to Caribou are assessed in this EAR/IS (Section 13).	MECP
Concerns about consideration of potential disturbance and impacts to SAR during operation and maintenance, including any solutions or mitigation measures made in the agreement for the operator of Webequie Supply Road (WSR).	An assessment of potential disturbance and impacts to SAR as a result of the operation phase of the Project has been included in this section of the EAR/IS (Section 13). Proposed mitigation measures and monitoring approach to address potential effects of the Project to SAR are outlined in Section 13.4 and Section 13.10 .	MECP
Concerns about obtaining more information on road controls as it is considered important to some SAR and also consideration of SAR while making related decisions.	Preliminary information on road controls has been included in Section 4 (Project Description). Potential effects to SAR have been assessed in this section of the EAR/IS (Section 13). Inputs from ongoing engagement and consultation activities will be incorporated in the final EAR/IS where applicable.	MECP



Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
Concerns including reference to SAR, biodiversity, candidate ANSI's (natural heritage areas), habitat fragmentation, carbon sequestration, and the social and economic interest of Ontario in the list of investigations and assessments to facilitate <i>Far North Act</i> authorization (after EA completion).	Species at Risk has been added as a valued component to the list of detailed technical investigations and assessments that have been undertaken and documented in this section of the EAR/IS (Section 13).	MNR
Provide detail on how engagement with Indigenous groups and the public will inform the effects assessment, as well as the selection of mitigation measures and follow-up program measures.	Please refer to Section 2 (Engagement and Consultation) of the EAR/IS for the detailed information on engagement and consultation activities conducted. Sections 13.1.3 and 13.1.4 provide a summary of inputs received, with reference to the Species at Risk VC.	IAAC

13.1.4 Incorporation of Indigenous Knowledge and Land and Resource Use Information

To date, the following First Nations have provided Indigenous Knowledge and Land and Resource Use (IKLRU) information to the Project Team:

- Webequie First Nation;
- Marten Falls First Nation;
- Weenusk First Nation;
- Kashechewan First Nation; and
- Fort Albany First Nation.

Table 13-7 summarizes key information and concerns relating to Species at Risk VC and indicates where inputs from consultation and engagement are incorporated in the EAR/IS.

Table 13-7: Species at Risk VC – Summary of Indigenous Knowledge and Land and Resource Use Information

Topic	Key Information and Concerns	Relevant EAR/IS Section
Increase Human/Wildlife Interactions	<ul style="list-style-type: none"> ▪ Weenusk First Nation members are concerned that an increase in public access will impact wildlife survival and reproduction as a result of hunting or vehicle strikes. Increased mortality may impact the availability of harvestable species. Increased access by non-Weenusk harvesters may impact Weenusk harvesting preferences. Members of Weenusk First Nation identified caribou and geese as the most commonly harvested wildlife, with moose as well. ▪ First Nation respondents expressed concern that increased vehicle traffic could raise the risk of accidents or wildlife-vehicle collisions. ▪ According to First Nation respondents, previous experience with the Victor Mine suggests that noise from construction and road traffic during operations could drive animals away. 	Potential project net effects on injury and death of harvestable species (Caribou, wolverine and Lake Sturgeon) are described in Sections 13.5.2.1.4, 13.5.2.2.4 and 13.5.2.11.5 .



Topic	Key Information and Concerns	Relevant EAR/IS Section
Change in Movement	<ul style="list-style-type: none"> ▪ Disturbances to migratory animals by construction activities have impacted migratory routes and changed the availability of harvested species in Weenusk’s traditional areas. ▪ Concerns were raised by regarding elevated noise levels in the LSA, RSA, and PDA, which may disrupt animal movements, impact resource availability, and hinder traditional harvesting practices. ▪ Noise from aircraft presence at De Beers has been identified as a source of wildlife disturbance, alongside effects on air quality. ▪ Wildlife in the area may decline and that significant changes are anticipated for animal populations. One of the most notable impacts expected from the Project is the alteration of species’ migration patterns which could lead to harvesters unable to find game in preferred harvesting areas. ▪ First Nation community members’ observations included changes in the environment due to new species not usually present and altered availability of native species. Respondents were unsure of the reasons but associated these changes with climate change. 	Potential project net effects on movement of migratory harvestable species (Caribou and Lake Sturgeon) are described in Sections 13.5.2.1.3 and 13.5.2.11.3.
Species habitat	<ul style="list-style-type: none"> ▪ Respondents noted that First Nation territory contains critical habitats for caribou, moose, and Canada geese, as well as calving and breeding areas, migration routes, and fish spawning sites for species such as sturgeon and trout. ▪ First Nation community members identified harvesting sites for species such as moose, geese, caribou, ducks, waterfowl, partridge, beaver, rabbit, snipes, wavies, godwits, marten, black bear, fox, lynx, muskrat, otter, pintails, wolf, deer, and ptarmigan. ▪ Contamination and pollution may impact wildlife including ducks, Canada geese and moose. ▪ Community members are concerned regarding the effects of removing muskeg habitat and mossy areas which provide habitat for small mammals ▪ Community members caribou hunt along the Pagashi Lake and Kapiskau River ▪ The Project may cause wildlife to move to different areas in search of suitable habitat and water sources. 	
Cumulative Effects	<ul style="list-style-type: none"> ▪ Members of Weenusk First Nation noted that the number of caribou in Weenusk’s traditional areas have decreased in their lifetime. When the river suddenly thaws it is more difficult to access caribou and climate change may be causing caribou numbers to decrease from Weenusk traditional areas. 	Cumulative effects on Caribou, including climate change, are discussed in Section 21.

13.1.5 Valued Component and Indicators

VCs, including SAR Habitat and Wildlife, were identified in the TISG and by the Project Team and are, in part, based on what Indigenous communities and groups, the public, government agencies, and stakeholders have identified as valuable to them in the EA/IA process to date. Subcomponents are used in this VC assessment to provide structure and facilitate the assessment. Subcomponents are assessed using the same methodology outlined in Section 5 (Environmental Assessment / Impact Assessment Approach and Methods) of this EAR/IS. The identified subcomponents of the Species at Risk VC are:

- Terrestrial SAR populations;
- Terrestrial SAR habitat;
- SAR Fish habitat quantity and quality:
 - Harmful alteration and disruption, and/or destruction of instream fish habitat;
 - Harmful alteration and disruption, and/or destruction of riparian habitat; and
 - Changes in fish access to habitat.
- SAR Fish populations:
 - Injury or death of fish; and
 - Changes to public access to fish habitats.

The Project has the potential to result in changes in SAR habitat, injury and mortality risk, reproduction, and movement. Therefore, both terrestrial and aquatic SAR and SAR habitat are considered in this assessment.

As discussed in **Section 13.1.2**, the following species and species groups were considered in the SAR Habitat and Wildlife assessment:

Terrestrial Species at Risk

- Caribou (Boreal Population);
- Wolverine;
- Bats:
 - Northern Myotis; and
 - Little Brown Myotis.
- Upland Forest Songbirds:
 - Evening Grosbeak.
- Wetland Songbirds:
 - Olive-sided Flycatcher; and
 - Rusty Blackbird.
- Shorebirds:
 - Lesser Yellowlegs.
- Nightjars:
 - Common Nighthawk.
- Raptors:
 - Short-eared Owl; and
 - Bald Eagle.



Aquatic Species at Risk

- Lake Sturgeon (Hudson Bay – James Bay population).

The Project has the potential to result in changes in SAR wildlife habitat, mortality risk, reproduction, and movement. "Indicators" are used to assess potential effects to a VC. In general, indicators represent a resource, feature or issue related to a VC that if changed from the existing conditions may demonstrate a positive or negative effect. **Table 13-8** shows the subcomponents and indicators identified for the Species at Risk VC.



Indigenous community members are concerned that the indicators provided for Federal or Provincial Species at Risk, Wildlife and Wildlife Habitat and Migratory Birds in the draft ToR do not seem to capture disturbance, avoidance, changes to movement corridors, and species distribution. Indicators for the assessment of potential effects on SAR have been refined and are outlined in Table 13-8.

Table 13-8: Species at Risk VC – Subcomponents, Indicators, and Rationale

Subcomponent(s)	Indicators	Rationale
Terrestrial SAR Habitat	<ul style="list-style-type: none"> ▪ Wildlife Habitat Loss/Destruction (Changes to SAR habitat availability (quantity – hectare and quality); and ▪ Wildlife Habitat Alteration/Degradation (Changes to abundance and distribution of SAR habitat (number/ha). 	<ul style="list-style-type: none"> ▪ The construction of the road could reduce available habitat, changing SAR habitat and populations. ▪ Social and cultural importance to Indigenous communities. ▪ From IKLRU information, on wildlife and wildlife habitat are considered an important element in the livelihood, cultural and economic resources for Indigenous communities. ▪ The construction and operation of the road may cause changes to habitat available, even if it is not destroyed. ▪ Altered habitat could cause changes in which SAR species use areas adjacent to the road.
Terrestrial SAR Populations	<ul style="list-style-type: none"> ▪ Wildlife Injury or Death (Changes in SAR populations or SAR mortality); and ▪ Alteration in Wildlife Movement (Changes to distribution of SAR species (i.e., configuration and connectivity) or changes in predator access, habitat use and populations). 	<ul style="list-style-type: none"> ▪ Construction activities may cause sensory disturbance to some terrestrial SAR species altering movement patterns. ▪ The road may act as a hard or soft barrier for some species and act as a travel corridor for other species during the short and long-term. ▪ Wildlife may be killed during construction activities. ▪ Wildlife could be killed by vehicles during construction and operations. ▪ Important harvested species (country foods) ▪ Social and cultural importance to Indigenous communities.

Subcomponent(s)	Indicators	Rationale
SAR Fish Habitat Quantity and Quality	<ul style="list-style-type: none"> ▪ Water quality guideline exceedances; ▪ Quality and quantity of aquatic (instream) habitat (by fish species & life stage); ▪ Quality and quantity of riparian habitat (by fish species & life stage); ▪ Quality and quantity of habitat for fish food species (e.g., benthic invertebrates); and ▪ Changes in fish access to habitats. 	<ul style="list-style-type: none"> ▪ Project activities and/or components have potential for short-term and long-term effect on fish and fish habitat. ▪ Social and cultural importance to Indigenous communities. ▪ From IKLRU information, fish and fish habitat are considered an important element in the livelihood, cultural and economic resources for Indigenous communities.
SAR Fish Populations	<ul style="list-style-type: none"> ▪ Fish abundance; ▪ Fish distribution; ▪ Fish mortality and/or injury; and ▪ Quality and quantity of food species (e.g., benthic invertebrate abundance and diversity). 	<ul style="list-style-type: none"> ▪ Bridges, culverts and earth embankments will be used to construct the road, which may prevent fish from crossing under the road and accessing upstream habitats. ▪ Fish may be killed during in-water work or via releases of sediment and other deleterious substances (e.g., from a fuel spill). ▪ Representative recreational species are present and may be harvested by angling. ▪ Important harvested species (country foods) are present. ▪ Social and cultural importance to Indigenous communities.

The TOR defines the Terrestrial SAR indicators as Habitat Availability, Habitat Distribution, and Survival and Reproduction. For the Study Plan additional indicators were considered in addition to the TOR with Abundance and Distribution, Species Richness, Relative Overlap, Species Habitat Specificity, Predation/Habitat usage (other wildlife) added as Indicators. For the EAR/IS these were reduced to Wildlife Habitat Loss/Destruction, Wildlife Habitat Alteration/Degradation, Alteration in Wildlife Movement and Wildlife Injury or Death. The preliminary indicators inform the indicators used in the EAR/IS, with Habitat Availability and Habitat Distribution informing Wildlife Habitat Loss/Destruction, Wildlife Habitat Alteration/Degradation and Alteration in Wildlife Movement, and Survival and Reproduction comparable to Wildlife Injury or Death.

13.1.6 Spatial and Temporal Boundaries

The following assessment boundaries have been defined for the Species at Risk VC.

13.1.6.1 Spatial Boundaries

The spatial boundaries for the Species at Risk VC are shown on **Figure 13.1** for SAR birds and bats and **Figure 13.2** for Caribou and Wolverine and include the following study areas:

- **Project Footprint** – the area of direct disturbance (i.e., the physical area required for project construction and operations). The Project Footprint is defined as the 35-metre wide Webequie Supply Road Right-of-Way (ROW); and temporary or permanent areas needed to support the Project that



include laydown yards, storage yards, construction camps, access roads and aggregate extraction sites. As a conservative approach during the assessment the entire project footprint will be considered as cleared by project activities.

- **Local Study Area (LSA)** – the area where potential largely direct and indirect effects of the Project are likely to occur and can be predicted or measured for assessment. The LSA, which is specific to each Species at Risk/Guild, includes the Project Footprint (i.e., extends from the centreline of the preliminary recommended preferred route) and is selected in consideration of the geographic extent of potential effects on the given Species at Risk/Guild. (refer to **Table 13-9**).
- **Regional Study Area (RSA)** – the area where potential largely indirect and cumulative effects of the Project in the broader, regional context may occur. The RSA includes the LSA and further extends on either side of the LSA to include the geographical extent to which potential effects from the Project may be expected on the given Species at Risk/Guild (refer to **Table 13-9**).



Indigenous community members noted that the assessment area must be large enough to assess the accumulated environmental conditions and to capture stressors from actions other than the proposed Project. For example, this will require an assessment of impacts on caribou based on the entire herd ranges. As noted in Table 13-9, the Regional Study Area for the assessment of potential effects of the Project on Caribou is defined as the Missisa and Ozhiski Caribou Ranges.

Table 13-9: Local and Regional Study Areas for SAR

Species/ Guild	Local Study Area (LSA) ¹	Regional Study Area (RSA) ²	Rationale
Caribou (Boreal and Eastern Migratory Populations)	11 km (2,513 km ²) from the centreline of the preferred route, and from supportive infrastructure	Missisa and Ozhiski Caribou Ranges (108,600 km ²)	<ul style="list-style-type: none"> ▪ Caribou (Boreal and Eastern Migratory populations) are Species at Risk (SAR) and study areas should reflect defined or regulated habitat. ▪ The minimum LSA and RSA for this species were prescribed in Section 7.4.1 of the TISG for the Project. ▪ The 11 km buffer used for the local study area is consistent with the general habitat description for the Forest-dwelling Woodland Caribou and critical thresholds for disturbance in category 1 areas. ▪ Eastern Migratory Caribou are not listed on SARA yet, but are endangered as determined by COSEWIC, and are therefore included in the baseline analysis for species at risk.
Wolverine (Western Population)	11 km (2,513 km ²) from the centreline of preferred route, and from supportive infrastructure	75 km (37,986 km ²) buffer from either of LSA boundaries	<ul style="list-style-type: none"> ▪ Wolverine is a SAR and study areas should reflect defined or regulated habitat. ▪ The minimum LSA for this species was prescribed in Section 7.4.1 of the TISG for the Project. ▪ RSA calculated using maximum home range size for male wolverines of 4109 km² in Ontario (based on Dawson et al. [2010]). Under the assumption of a circular home range of 4000 km² in area, the approximate diameter is 75 km.

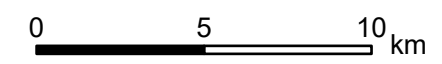


Species/ Guild	Local Study Area (LSA) ¹	Regional Study Area (RSA) ²	Rationale
Bats <ul style="list-style-type: none"> ▪ Little Brown Myotis ▪ Northern Myotis 	1 km (276 km ²) from the centreline of preferred route, and 500 metres (m) from temporary or permanent supportive infrastructure.	5 km (1,285 km ²) buffer from either of LSA boundaries	<ul style="list-style-type: none"> ▪ Maternity colony Significant Wildlife Habitat (SWH) includes the entire woodland/forest stand Ecological Land Classification (ELC) ecosite or an ecoelement containing the maternity colony. In lieu of conducting roost searches, all treed ecosites are being considered SWH. ▪ Bat hibernacula and maternity roost SWH include the site and 1 km radius around the entrance. ▪ Little brown myotis is a SAR and study areas should reflect defined or regulated habitat. ▪ Maternity sites include any feature where two or more bat SAR individuals have been observed between May 15 and July 31 (MECP, 2021). ▪ Foraging areas within 2,400 m of the boundary of a maternity site for little brown myotis and within 450 m of the boundary of a maternal site for northern myotis (MECP, 2021). ▪ Road distance buffer recommendations, 200m for foraging, and 2km for maternity and hibernacula sites (PCAP, 2020). ▪ Standard Project RSA.
Migratory Birds & SAR <ul style="list-style-type: none"> ▪ Bald Eagle ▪ Common Nighthawk ▪ Evening Grosbeak ▪ Olive-sided Flycatcher ▪ Lesser Yellow Legs ▪ Rusty Blackbird ▪ Short-eared Owl 	1 km (276 km ²) from the centreline of preferred route, and 500 metres (m) from temporary or permanent supportive infrastructure.	5 km (1,285 km ²) buffer from either of LSA boundaries	<ul style="list-style-type: none"> ▪ Standard Project LSA and RSA. ▪ Habitat criteria for bird SWH types in Ecoregions 3E and 3W include the ELC Ecosite code or habitat feature plus maximum of 800m radius. ▪ Meta-analysis found that bird populations decline within 1km of human infrastructure, including roads (Benitez-Lopez et al. 2010).
Fish <ul style="list-style-type: none"> ▪ Lake Sturgeon (Hudson Bay – James Bay population) 	1 km (276 km ²) from the centreline of preferred route, and 500 metres (m) from temporary or permanent supportive infrastructure.	Tertiary watersheds that intersect the preferred route. These watersheds include: <ul style="list-style-type: none"> ▪ Upper Winisk Watershed; ▪ Middle Winisk Watershed; Upper Ekwan Watershed; and ▪ Lower Attawapiskat Watershed. 	<ul style="list-style-type: none"> ▪ LSA is the area where potential largely direct and indirect effects of the Project are likely to occur and can be predicted or measured for assessment. ▪ RSA is the area where potential largely indirect and cumulative effects of the Project in the broader, regional context may occur.





- Legend:**
- Preferred Route
 - Species at Risk VC Local Study Area (LSA 1km from Preferred Route)
 - Species at Risk VC Regional Study Area (RSA 5km from either side of LSA boundary)
 - First Nation Reserve
 - Provincial Park
 - Waterbody



Webeque Supply Road

Species at Risk VC Study Areas

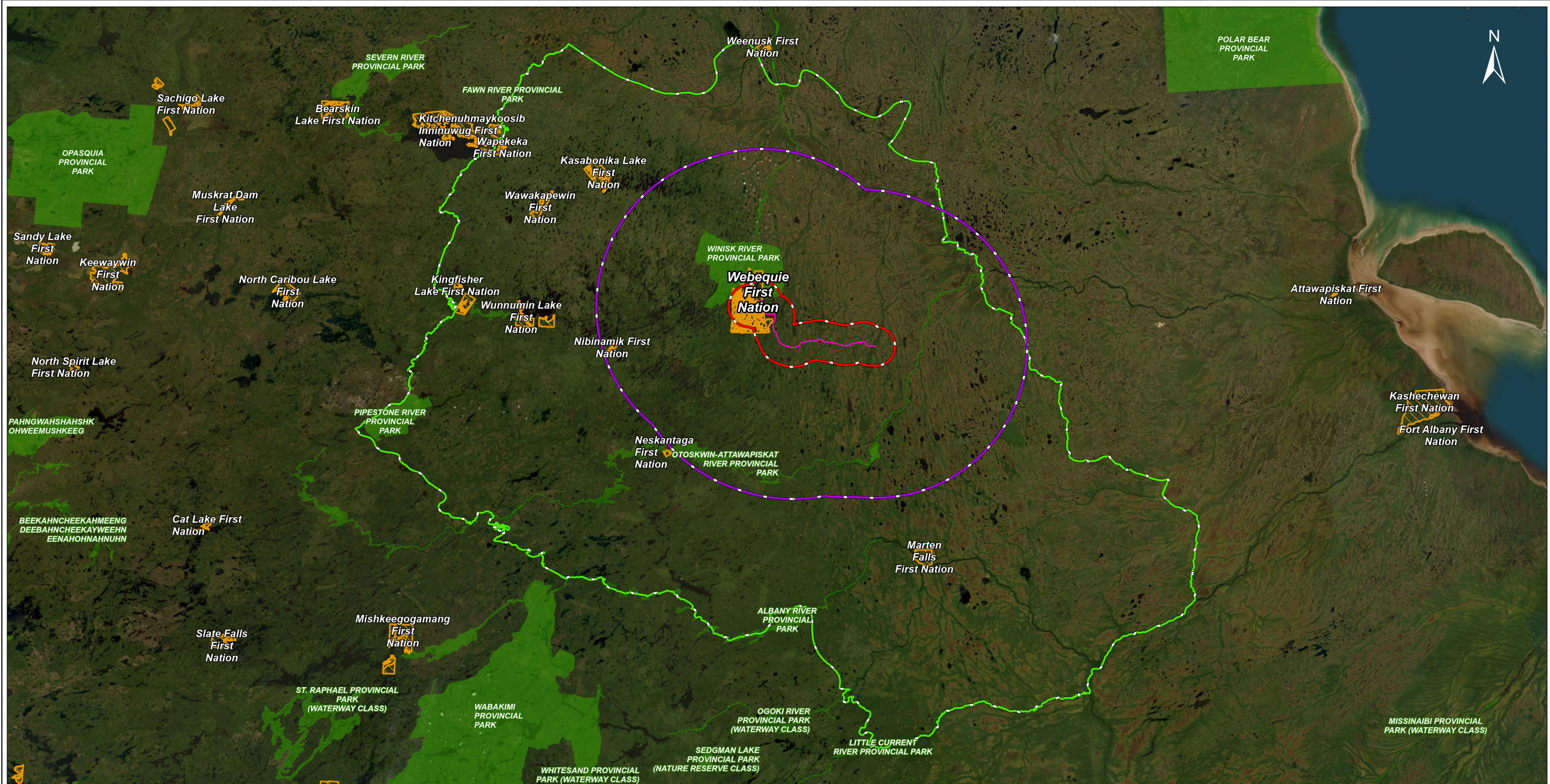
NOTES

1. Coordinate System: NAD 1983 UTM Zone 16N.
2. Cadastral boundaries are for informational purposes only and should not be considered suitable for legal, engineering, or surveying purposes.
3. Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information, and Land Information Ontario (LIO) Warehouse Open Data (<https://geohub.lio.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNRF)
4. Service Layer Credits: Earthstar Geographics

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Figure Number: 13-1		REV: PA		
Client: Webeque First Nation	Project Number: 661910	Date: 5/8/2025		
DSC		DRN	CHK	APP
		TE	GS	GS



- Legend:**
- Preferred Route
 - Caribou/Wolverine Local Study Area (LSA 11km from Preferred Route)
 - Wolverine Regional Study Area (RSA 75km from either side of LSA boundary)
 - Caribou Regional Study Area (RSA Includes the Missisa and Ozhiski Ranges)
 - First Nation Reserve
 - Provincial Park

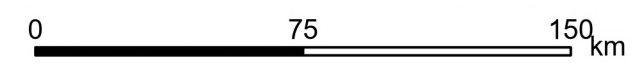


NOTES

1. Coordinate System: NAD 1983 UTM Zone 18N.
2. Cadastral boundaries are for informational purposes only and should not be considered suitable for legal, engineering, or surveying purposes.
3. Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information, and Land Information Ontario (LIO) Warehouse Open Data (<https://geohub.lio.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNRF)
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Webeque Supply Road

Caribou and Wolverine Study Areas

Figure Number: 13-2		REV: PA		
Client: Webeque First Nation	Project Number: 661910	Date: 5/27/2025		
DSC		DRN	CHK	APP
		TE	GS	GS

13.1.6.2 Temporal Boundaries

Temporal boundaries for the assessment address the potential effects of the Project over relevant timescales. The temporal boundaries for the Project consist of two main phases:

- **Construction Phase:** All the activities associated with the initial development of the road and supportive infrastructure from the start of construction to the start of operation and maintenance of the Project, which is estimated to be approximately five to six years in duration; and
- **Operations Phase:** All activities associated with operation and maintenance of the road and permanent supportive infrastructure (e.g., operations and maintenance yard, aggregate extraction, and processing areas) that will start after construction activities are complete, including site restoration of temporary infrastructure (e.g., access roads). The operations phase of the Project is anticipated to be 75 years based on the expected timeline for when major refurbishment of road components (e.g., bridges) is deemed necessary.

The Project is proposed to be operated for an indeterminate period; therefore, future suspension, decommissioning and eventual abandonment is not evaluated in the EA/IA (refer to Project Description, Section 4.4).

13.1.7 Identification of Project Interactions with Species at Risk

13.1.7.1 Terrestrial Species at Risk

Table 13-10 identifies the project activities that may interact with the Terrestrial Species at Risk VC to result in a potential effect.

13.1.7.2 Aquatic Species at Risk

Table 13-11 identifies the project activities that may interact with the Aquatic Species at Risk VC to result in a potential effect.

Table 13-10: Project Interactions with Terrestrial Species at Risk VC and Indicators

Project Activities	Indicators			
	Species at Risk Habitat Loss/Destruction	Species at Risk Habitat Alteration or Degradation	Alteration in Species at Risk Movement	Species at Risk Injury or Death
Construction				
Mobilization of Equipment and Supplies: Transport of equipment, materials and supplies to the Project site area using the winter road network and airport in Webeque First Nation Reserve.	-	-	✓	✓
Surveying: Ground surveys are conducted to stake (physically delineate) the road right-of-way (ROW) and supportive infrastructure components of the Project (i.e., construction camps, access roads, laydown/storage areas, and aggregate extraction and processing areas).	-	✓	✓	-
Vegetation Clearing and Grubbing: Clearing and grubbing of vegetation (forest & wetland), including removal, disposal and /or chipping.	✓	✓	✓	✓
Construction and Use of Supportive Infrastructure: This includes temporary construction camps, access roads and watercourse crossings, laydown/storage areas, aggregate extraction (pits & quarries) and processing areas (screening, crushing), including blasting.	✓	✓	✓	✓
Construction of Road: removal and stockpiling of organics, subgrade excavation, placement of fill and gravel, grading and drainage work (e.g., road ditches, erosion protection, etc.).	✓	✓	✓	✓
Construction of Structures at Waterbody Crossings: Culverts and bridges – foundations (e.g., pile driving and concrete works), bridge girders, bridge decks, installation of culverts.	✓	✓	✓	✓
Decommissioning / Closure of Temporary Aggregate Extraction and Processing Areas (pits and quarries): Demobilization of extracting and processing equipment, grading and site reclamation/revegetation. This also includes formalizing / re-purposing select pits and quarries proposed as permanent Project components during operations.	✓	✓	✓	✓
Decommissioning of Temporary Construction Camps, Access Roads, and Laydown / Storage Areas: Grading and site reclamation/revegetation. This also includes formalizing / re-purposing select access roads to permanent pits and quarries and a construction camp to an operations and maintenance facility as Project components for use during operations.	✓	✓	✓	✓



Project Activities	Indicators			
	Species at Risk Habitat Loss/Destruction	Species at Risk Habitat Alteration or Degradation	Alteration in Species at Risk Movement	Species at Risk Injury or Death
Emissions, Discharges and Wastes ¹ : Noise, air emissions / greenhouse gases, water discharge, and hazardous and non-hazardous wastes.	-	✓	✓	✓
Completion of Project-Wide Clean-up, Site Restoration / Reclamation and Demobilization : Clean-up of excess materials, site revegetation and demobilization of equipment and materials.	✓	✓	✓	-
Potential for Accidents and Malfunctions ² : Spills, vehicle collisions, flooding, forest fire and vandalism.	✓	✓	✓	✓
Employment and Expenditures ³	-	-	-	-
Operations				
Road Use : Light and heavy vehicles and maintenance equipment with average annual daily traffic volume of less than 500 vehicles.	-	✓	✓	✓
Operation, Maintenance and Repair of Road : Includes vegetation management control within the road ROW, repairs/resurfacing of road granular surface and shoulders, dust control, winter/seasonal maintenance (i.e., snow clearing), road drainage system cleanout/repairs to culverts, ditches and drainage outfalls, rehabilitation and repairs to structural culverts and bridges, and road patrols for inspection.	-	✓	✓	✓
Operation of Pits, Quarries, and Maintenance Yard/Facility : Includes periodic extraction and blasting and processing operations (i.e., crushing, screening) and stockpiling of rock and aggregate materials. Also includes operation and repairs of the Maintenance Yard (Facility) and components within (office buildings, parking, storage of equipment and materials).	-	✓	✓	✓
Emissions, Discharges and Wastes ¹ : Noise, air emissions / greenhouse gases, water discharge, and hazardous and non-hazardous wastes.	-	✓	✓	✓
Potential for Accidents and Malfunctions ² : Spills, vehicle collisions, flooding, forest fire and vandalism.	✓	✓	✓	✓
Employment and Expenditures ³ .	-	-	-	-

Notes:

✓ = Potential interaction

- = No interaction



- ¹ Emissions, Discharges, and Wastes (e.g., air, noise, light, solid wastes, and liquid effluents) are generated by many project activities. Rather than acknowledging this by placing a checkmark against each of these activities, “Wastes and Emissions” is an additional component under each project phase.
- ² Accidents and Malfunctions including spills, vehicle collisions, flooding, forest fire and vandalism may occur at any time during construction and operations of the Project. Rather than acknowledging this by placing a checkmark against each of these activities, “Potential for Accidents and Malfunctions” is an additional component under each project phase. The potential effects of accidental spills are assessed in Section 23 – Accidents and Malfunctions.
- ³ Project employment and expenditures are generated by most project activities and components and are the main drivers of many socio-economic effects. Rather than acknowledging this by placing a checkmark against each of these activities, “Employment and Expenditures” is an additional component under each project phase.



Table 13-11: Project Interactions with Fish and Fish Habitat VC and Potential Effects

Project Activities	Potential Effects					
	Changes to Quantity and/or Quality of Fish Habitat				Changes to Fish Populations	
	Alteration, Disruption and/or Destruction/Loss of Instream Aquatic Habitat	Alteration, Disruption and/or Destruction/Loss of Riparian Habitat	Change in Fish Access to Habitat (Barriers to Fish Passage)	Change to Water and/or Sediment Quality and Quantity	Injury/Death of Fish	Change in Public Access to Fish/Fish Habitat (Increase in Harvesting)
Construction						
Mobilization of Equipment and Supplies: Transport of equipment, materials and supplies to the Project site area using the winter road network and airport in Webequie First Nation Reserve.	✓	✓	✓	-	✓	-
Surveying: Ground surveys are conducted to stake (physically delineate) the road right-of-way (ROW) and supportive infrastructure components of the Project (i.e., construction camps, access roads, laydown/storage areas, and aggregate extraction and processing areas).	-	-	-	-	✓	-
Vegetation Clearing and Grubbing: Clearing and grubbing of vegetation (forest & wetland), including removal, disposal and/or chipping.	✓	✓	✓	✓	✓	✓
Construction and Use of Supportive Infrastructure: This includes temporary construction camps, access roads and watercourse crossings, laydown/storage areas, and aggregate extraction (pits & quarries) and processing areas (screening, crushing), including blasting.	✓	✓	✓	✓	✓	✓



Project Activities	Potential Effects					
	Changes to Quantity and/or Quality of Fish Habitat				Changes to Fish Populations	
	Alteration, Disruption and/or Destruction/Loss of Instream Aquatic Habitat	Alteration, Disruption and/or Destruction/Loss of Riparian Habitat	Change in Fish Access to Habitat (Barriers to Fish Passage)	Change to Water and/or Sediment Quality and Quantity	Injury/Death of Fish	Change in Public Access to Fish/Fish Habitat (Increase in Harvesting)
Construction of Road: removal and stockpiling of organics, subgrade excavation, placement of fill and gravel, grading and drainage work (e.g., road ditches, erosion protection, etc.).	✓	✓	✓	✓	✓	✓
Construction of Structures at Waterbody Crossings: Culverts and bridges – foundations (e.g., pile driving and concrete works), bridge girders, bridge decks, install of culverts.	✓	✓	✓	✓	✓	✓
Decommissioning / Closure of Temporary Aggregate Extraction and Processing Areas (pits and quarries): Demobilization of extracting and processing equipment, grading and site reclamation/revegetation. This also includes formalizing / re-purposing select pits and quarries proposed as permanent Project components during operations.	-	-	-	✓	-	✓
Decommissioning of Temporary Construction Camps, Access Roads and Laydown / Storage Areas: Grading and site reclamation/revegetation. This also includes formalizing / re-purposing select access roads to permanent pits and quarries and a construction camp to an operations and maintenance facility as Project components for use during operations.	✓	✓	✓	✓	✓	✓
Emissions, Discharges and Wastes ¹ : Noise, air emissions / greenhouse gases (GHGs), water discharge, and hazardous and non-hazardous wastes.	✓	✓	✓	✓	✓	✓



Project Activities	Potential Effects					
	Changes to Quantity and/or Quality of Fish Habitat				Changes to Fish Populations	
	Alteration, Disruption and/or Destruction/Loss of Instream Aquatic Habitat	Alteration, Disruption and/or Destruction/Loss of Riparian Habitat	Change in Fish Access to Habitat (Barriers to Fish Passage)	Change to Water and/or Sediment Quality and Quantity	Injury/Death of Fish	Change in Public Access to Fish/Fish Habitat (Increase in Harvesting)
Completion of Project-Wide Clean-up, Site Restoration / Reclamation and Demobilization: Clean-up of excess materials, site revegetation and demobilization of equipment and materials.	✓	✓	✓	-	✓	✓
Potential for Accidents and Malfunctions ² : Spills, vehicle collisions, flooding, forest fire and vandalism.	✓	✓	✓	✓	✓	-
Employment and Expenditures ³	-	-	-	-	-	-
Operations						
Road Use ⁴ : Light and heavy vehicles and maintenance equipment with average annual daily traffic volume of less than 500 vehicles.	-	-	-	✓	✓	✓
Operation, Maintenance and Repair of Road ⁴ : Includes: vegetation management control within road ROW; repairs/resurfacing of road granular surface and shoulders; dust control; winter/seasonal maintenance (i.e., snow clearing); road drainage system cleanout/repairs to culverts, ditches and drainage outfalls; rehabilitation and repairs to structural culverts and bridges; and road patrols for inspection.	✓	✓	✓	✓	✓	✓
Operation of Pits, Quarries and Maintenance Yard/Facility: Includes periodic extraction and blasting and processing operations (i.e., crushing, screening) and stockpiling of rock and aggregate materials. Also includes operation and repairs of	✓	✓	✓	✓	✓	-



Project Activities	Potential Effects					
	Changes to Quantity and/or Quality of Fish Habitat				Changes to Fish Populations	
	Alteration, Disruption and/or Destruction/Loss of Instream Aquatic Habitat	Alteration, Disruption and/or Destruction/Loss of Riparian Habitat	Change in Fish Access to Habitat (Barriers to Fish Passage)	Change to Water and/or Sediment Quality and Quantity	Injury/Death of Fish	Change in Public Access to Fish/Fish Habitat (Increase in Harvesting)
Maintenance Yard/Facility and components within (office buildings, parking, storage of equipment and materials).						
Emissions, Discharges and Wastes ¹ : Noise, air emissions / greenhouse gases, water discharge, and hazardous and non-hazardous wastes.	-	✓	-	✓	✓	-
Potential for Accidents and Malfunctions ² : Spills, vehicle collisions, flooding, forest fire and vandalism.	✓	✓	✓	✓	✓	-
Employment and Expenditures ³	-	-	-	-	-	-

Notes:

✓ = Potential interaction

- = No interaction

¹ Emissions, Discharges, and Wastes (e.g., air, noise, light, solid wastes, and liquid effluents) can be generated by many project activities. Rather than acknowledging this by placing a checkmark against each of these activities, "Wastes and Emissions" is an additional component under each project phase.

² Accidents and Malfunctions including spills, vehicle collisions, flooding, forest fire and vandalism may occur at any time during construction and operations of the Project. Rather than acknowledging this by placing a checkmark against each of these activities, "Potential for Accidents and Malfunctions" is an additional component under each project phase. The potential effects of accidental spills are assessed in Section 23 – Accidents and Malfunctions.

³ Project employment and expenditures are related to most project activities and components and are the main drivers of many socio-economic effects. Rather than acknowledging this by placing a checkmark against each of these activities, "Employment and Expenditures" is an additional component under each project phase.

⁴ Any interconnected roads to the WSR in the RSA could experience increased traffic flow during Operations leading to potential down-road fish and fish habitat effects related to any additional maintenance and repair required.



13.2 Existing Conditions

This section summarizes the existing conditions for Species at Risk and their habitats found within the Project Footprint. The baseline assessment focused on the supply road conceptual alternatives within the proposed preliminary corridor, as identified in Section 3 of this EAR/IS.

Briefly, the objectives of the studies are to identify and characterize Species at Risk within the Project Footprint as well as to identify important terrestrial features related to SAR habitat, critical life cycle activities, including:

- Identify SAR;
- Identify the presence, distribution, and abundance of SAR occurring within the Project study areas (i.e., Project Footprint, LSA, RSA);
- Identify and characterize critical habitat for provincial and federal species at risk (SAR); and
- Support the determination of habitat of species of special concern.

The assessment of effects on Wildlife and Wildlife Habitat and the data collected for those species are presented separately in Section 12. Species at Risk are addressed separately from the Wildlife and Wildlife Habitat section, because of the unique biology of each SAR and the unique ways in which each such VC may experience impacts resulting from Project activities. The NEEC Report can be reviewed in its entirety in Appendix F of this EAR/IS.

13.2.1 Methods

Wildlife surveys, including those for Species at Risk, were conducted between 2018 and 2024. Baseline surveys were designed using standard methodologies to identify and assess for the presence of provincial and federal SAR and species of Special Concern and their specialized habitat. Field surveys were designed to provide comprehensive coverage at the appropriate time of year, optimize detectability, and represent temporal sources of variation among seasons. Areas of high sensitivity associated with various life processes were particularly targeted. Detailed field data collection combined with a background information review allowed for ecological components to be described and characterized in terms of habitat suitability for SAR and species of special concern. It also allows for the identification of any federal and provincial critical habitat, residences, and provincial Significant Wildlife Habitat in the study area. A summary of each survey methodology is provided in subsequent sections. Detailed methodology for all SAR surveys, the sources for background information review, description of survey site selection, and habitat typing can be found in Appendix F of this EAR/IS – NEEC Report.



Indigenous community members prefer the EA to rely on knowledge and information provided by hunters and other land users for establishing population trends. It was also suggested that the use of aerial photography together with land cover mapping from the MNR's Far North Land Cover Dataset to identify suitable habitat types in the study area. Section 13.2.1 includes a summary of data collection methods, including: aerial surveys (developed with input from MNR and MECP biologists), WSR collaring data, MNR collaring data, NHIC caribou occurrence data, caribou habitat mapping, Far North Land Cover Data, aerial photography and Indigenous Knowledge. Detailed description of data collection methods is provided in Appendix F of this EAR/IS – Natural Environment Existing Conditions Report (NEEC Report).

13.2.1.1 Mammals

13.2.1.1.1 Winter Aerial Surveys – Caribou

Winter, aerial surveys were conducted in 2018, 2019, and 2021 within the Project study areas (i.e., the Project Footprint, LSA and RSA). These surveys were initially recommended by the Nipigon District Ministry of Natural Resources (MNR) primarily to inventory the presence of Caribou and identify Caribou winter habitat in proximity to the proposed route.

Caribou occurring within the LSA and RSA may belong to each of two populations of interest: the Boreal and Eastern Migratory populations. The Boreal population is sedentary, and may occur in the LSA throughout the year, while the Eastern Migratory population is known to range south from their typical ranges closer to Hudson Bay into the study areas. The aerial surveys were designed to spot signs of Caribou presence within the study areas, and, as such, it was not possible to determine the specific population observed. Therefore, collaring studies were also conducted (see **Section 13.2.1.1.3**) to help confirm which populations were using the LSA and surroundings.

Winter aerial surveys were conducted between February 22 and 28, 2018, February 9 and 13, 2019 and February 24 – March 1, 2021, according to standardized survey methodology for identifying and delineating Caribou winter habitat provided by the MNR (Select Wildlife and Habitat Features: Inventory Manual, Ranta, 1998), to the extent possible. The aerial survey consisted of flying a grid of parallel transects oriented in a north-south direction using a Bell 206 Long Ranger helicopter. The standardized parallel transect spacing of 2 km was used, as suggested in the MNR protocol. Refer to Appendix F of this EAR/IS – NEEC Report for detailed information and figures regarding the transects surveyed in each year of this study.

Surveys were typically conducted by a three-person team experienced in aerial wildlife surveys to maximize detection of wildlife. In 2018 and 2019 the survey team was joined by Eric Jacob, a member of Webequie First Nation and local trapper, throughout the entirety of the surveys.

All wildlife observations made during the survey were recorded immediately on a data sheet along with the date, time, transect number, Universal Transverse Mercator (UTM) coordinates, species name, number of individuals, and habitat type. When possible, Caribou sex (male, female, unknown) and age (adult, yearling, calf) was noted, unless undue stress on the animals would result from the determination of these details. Other signs of Caribou or other wildlife presence were also recorded, including tracks, beds, cratering, slushing, or Gray Wolf kills. Fresh tracks were distinguished from old tracks and digital photographs of wildlife were taken whenever possible.

13.2.1.1.2 Caribou Nursery Habitat Survey

To assess the presence and distribution of Caribou nursery areas, nursery habitat surveys were conducted in 2019 according to methodology detailed in the MNR Select Wildlife and Habitat Features: Inventory Manual (Ranta, 1998). Information provided in the General Habitat Description (GHD) for the Forest-dwelling Caribou (*Rangifer tarandus Caribou*) (MNR 2013a) was also used to narrow down areas to be searched. A desktop analysis to determine which candidate sites would be included in the survey was completed prior to the start of field work. Landforms that were recognized as candidate calving or nursery habitats, such as islands and peninsulas, were prioritized for surveys. Candidate nursery habitats that were within, or closer to, the preliminary preferred corridor were also prioritized for surveys.



Caribou nursery habitat surveys were conducted between June 12 and 17 and July 2 and 9, 2019. Field biologists were joined by two members of the Webequie First Nation, Eric Jacob and Vincent Jacob, both of whom are local hunters and are knowledgeable in ungulate tracking and sign. Data recorded included:

- Date;
- Time;
- Surveyor names;
- UTM coordinates;
- Transect number (if applicable);
- Species name;
- Number of individuals;
- Habitat type; and
- Type of observation (sign or presence).

Adjustments were made to the methods detailed in the MNR survey protocol due to the size of the project study areas (i.e., LSA, RSA) and the inability to access many of the sites using the recommended methodology. An aerial survey approach was undertaken because waterbodies accessible by boat are only available on the western side of the Caribou LSA; however, in many instances, islands could not be accessed because there was a lack of landing sites (i.e., due to tall vegetation, narrow shorelines, and uneven ground). In total, 74 candidate habitats were surveyed within 10 km of project route alternatives; however, only 18 could be accessed on the ground.

For the aerial only survey locations, recognized limitations included:

- A reduced ability to see and differentiate between pellet groups;
- A reduced ability to differentiate between moose and Caribou tracks and age animals; and
- A reduced ability to find signs of use in denser habitats.

Given these limitations, it was recognized that the nursery habitat surveys alone would not identify woodland Caribou calving and nursery sites within the Caribou LSA. As such, the surveys were used to supplement and identify Caribou nursery habitat, rather than confirm the distribution and presence or absence of Caribou nursery areas. As discussed in **Section 13.2.1.1.3** (below), the nursery habitat surveys were later supplemented by a Caribou collaring study.

13.2.1.1.3 Caribou Collaring Study

In a meeting on February 28, 2020, MECP Species at Risk Branch (SARB) staff indicated that the Caribou aerial surveys conducted in 2018 and 2019 were insufficient to inform the characterization of baseline conditions for the EA/IA on their own. As such, MECP recommended the initiation of a Caribou collaring program to provide information for the Project.

The Caribou collaring program informs many aspects of Caribou occurrence, demographics, and behaviour at various scales across the RSA. It will also inform the effectiveness of mitigation actions taken to avoid or minimize adverse effects to Caribou during the construction and operations phases of the Project. Specific objectives fulfilled via Caribou collaring include:

- Optimize detectability and comprehensive coverage at the appropriate time of year (e.g., nursery habitat during calving season, winter habitat usage);



- Collect data to represent the following temporal sources of variation: among years; within and among seasons; and within the 24-hour daily cycle;
- Use existing data and literature as well as at least two years of data collected via field surveys to provide information that reflects the natural interannual and seasonal variability of Caribou;
- Describe the distribution and abundance of Caribou in relation to the Project Footprint, LSA and RSA;
- Provide data and summary lists for each species at risk ranked according to abundance, distribution across survey sites (i.e., percentage of survey stations at which they were recorded), and abundance in each habitat type. Map areas with the highest concentrations (or use by Caribou);
- Identify and map critical habitat and residences within the Project Footprint and LSA;
- Document baseline conditions within the LSA and RSA to support the evaluation of alternatives and effects analysis of the Project in the EAR/IS;
- Describe Boreal Caribou use (e.g., distribution, movement) of the study areas over time;
- Complement existing data, if information within the study areas is insufficient or unavailable, to better understand how Caribou use the habitat;
- Describe the type and spatial extent of biophysical attributes present in the study areas; and
- Conduct surveys to complement existing data if data within the study areas are insufficient or unavailable, to be able to understand where the biophysical attributes occur.

To inform the characterization of baseline conditions for Caribou at the subrange scale and assess potential impacts, it was proposed that a sample size of 30 female Caribou be collared. MECP initially recommended a sample size of 20 female Caribou be maintained for the duration of the study, which would have required additional collars be deployed following collar failures or the death of Caribou. The sample size of 30 was deemed adequate to account for 15-20% mortality annually and still maintain a minimum sample size of 20 animals over the course of a three-year study. Between February 25 and March 6, 2021, 29 female Caribou were successfully collared. The 30th collar did not pass the pre-deployment check, and a decision was made to proceed without it. The collaring program was conducted with all necessary permits and approvals, including: a Section 17(2)(b) Species at Risk permit under the Ontario ESA, approval from MNR's Wildlife Animal Care Committee (WACC), a Wildlife Scientific Collectors Permit under the 1997; and a federal SARA permit for capture of Caribou on federal lands.

The program followed methods detailed in the approved protocol provided by the MNR (WACC, 2020). Prior to capturing individuals, a scouting survey via Bell 206 Long Ranger helicopter was completed by AtkinsRéalis biologists to locate candidate individuals for collaring. The scouting flights were conducted according to winter aerial transect surveys described in Selected Wildlife and Habitat Features: Inventory Manual (Ranta, 1997). A primary search area was defined by the boundary of the Caribou LSA (1 km + 10 km from the centre of the preliminary preferred corridor) and a secondary search area was defined that extended 25 km (11 km to 36 km from the centre of the preliminary preferred corridor) from outer boundary of the Caribou LSA.

A specialized wildlife capture team captured healthy, adult female Caribou using a net gun from a Eurocopter AS350 helicopter. All captures occurred in-situ and no Caribou were transported or relocated from the original site of capture. Collars were deployed in mid-winter (i.e., between mid and late February) to avoid disturbance to Caribou cows during late pregnancy. Caribou were fitted with satellite GPS collars that transmit data wirelessly and contain drop-off mechanisms to permit collar retrieval upon study completion. G5-2D Iridium/GPS Collars (Advanced Telemetry Systems Inc.) with drop-off mechanisms were used and programmed to transmit fixes eight (8) times per day or every three (3) hours. These



collars include a built-in mechanical release system called “SureDrop” to facilitate the collar release on a pre-programmed date. The proposed collar release date for this study was March 1, 2024, based on the MECP recommendation that a minimum study duration of three (3) years would be required to appropriately characterize baseline conditions and inform the EA/IA effects assessment. Collars were removed and collected in the between February 19 and March 1, 2025.

The following data gathered from collared Caribou helps assess potential impacts on this species and its habitat:

- Annual home range size;
- Calving areas;
- Calving events;
- Calf mortality;
- Parturition dates and locations;
- Distance travelled to calving sites;
- Calf recruitment;
- Wintering ranges;
- Travel routes and corridor crossing points;
- Seasonal movement timeframes;
- Fidelity to critical habitat features;
- Lands used and time spent in proximity to the preliminary preferred road corridor; and
- Mortality and mortality assessment to determine cause of mortality.

Biological Sampling

In addition to collar deployment, each captured Caribou had blood, pellet, and hair samples taken to assess pregnancy status using blood progesterone, to determine presence of parasites and/or potential genetic analysis, for potential genetic analysis, and/or assessment of chronic stress using cortisol levels (Macbeth, 2013), respectively. Samples were dispatched for laboratory analyses. Molar wear was also assessed for each animal to estimate age.

Mortality

Mortality events were identified when a collar signals that no movement has been detected after a 24 hours. However, the detection of mortality signal does not necessarily indicate a death; a collar can break or fall off an animal. As a result, continued monitoring of collar signals was required to ensure no further movement occurred. Mortality investigations were conducted after a minimum of three collars signalled the death of a Caribou, or at least once per year, to a maximum of twice per year. They were conducted between collar deployment and March 2025.

Depending on the location, timing, and crew availability, mortality investigations were conducted by the Project team, or when available, the MNR. Upon arrival at the collar location, the site and the Caribou remains (when present) were inspected to collect evidence of the cause of death. Inspection of the site followed guidance provided in Stonehouse *et al.* (2016) and other similar studies. Digital photos were taken of the carcass (when present) and the site. At times, cause of death can be difficult to determine, particularly if the carcass has been scavenged. Mortality investigations did not include a detailed analysis by a veterinarian or pathologist (e.g., organ biopsy, tissue samples, or parasites are not collected).



Survivorship and Recruitment

Survivorship of collared Caribou was determined based on records of mortality events. Recruitment surveys were also conducted as part of the collar study by locating collared females during the winter. The collar of each Caribou was tracked until it was located, and individuals were confirmed through visual identification (i.e., of the collar, any photographs of the Caribou cow or Caribou calves present). Recruitment surveys were conducted in 2022, 2023 and 2024.

Detection of Nursery Locations and Calf Mortality Events

Assessment for the presence and distribution of Caribou nursery areas is required as part of the EA process. A movement-based approach was used to determine parturition and early calf mortality events. Movement data were used to infer parturition and survival of neonatal Caribou calves (DeMars et al., 2013, Bonar et al. 2018), with abrupt drops in movement associated with parturition, and early calf mortality associated with a quick resumption in movement. This kind of data has been used for both sedentary boreal Caribou and migratory Caribou (Bonar et al. 2018). Identified parturition locations were used to guide follow-up nursery habitat surveys.

Seasonal Movement Rates and Migrations

Travel Corridors are generalized habitat features that Caribou may use to move between Nursery Areas and Winter Use Areas (MNR, 2014 (GHD)). For Boreal Caribou, these movements are less distinct than those of Eastern Migratory Caribou. Collar data was used to determine whether distinct travel corridors existed within the Project Footprint. Particular attention was paid to any telemetry that suggested Caribou travel corridors, either Boreal or Eastern Migratory, crossed the preferred road alignment. Movement analysis focused on the periods during April and/or November because MNR has adopted the use of animal movements during these periods to inform their delineation of Travel Corridors (MNR, 2014 (GHD)). Movement direction and step-length derived from GPS collar data were used to delineate migratory movements.

Site Fidelity

Depending on the season, both Eastern Migratory and Boreal Caribou make use of different areas of their range (Pond et al., 2016) and often return to the same areas in consecutive years. Caribou are known to exhibit site fidelity to Nursery Areas, Winter Use Areas and Travel Corridors over multiple years, with fidelity being higher in the spring and summer than the early and late winter (Bergerud 1990, Schaefer et al. 2007). Fidelity to areas can also be maintained even in the event of disturbances like fire, especially for calving areas (Dalerum et al., 2007, Silva et al., 2020). Using Seasonal home ranges for each individual and year, the overlap in utility distributions (UD) were used to explore similarity in space use over time.

General Habitat Description Category 2 and 3 Analysis

As mentioned in **Section 13.1.2.2.1**, (SAR Species included in the assessment – Caribou (Boreal population)), under the General Habitat Description, Category 1 areas include nursery habitat, winter use habitat and travel corridors; Category 2 habitat represents seasonal ranges for Caribou, and Category 3 refers to remaining areas that are used within the Caribou's range (MNR 2013). MECP took a Resource



Selection Probability Functioning (RSPF)² approach to mapping Category 2 habitat by mapping each of the four (4) seasonal ranges. This approach mapped potential habitat value based on modelling associations of observed Caribou use with land cover, linear features, and other environmental variables. This methodology is briefly described in the State of the Woodland Caribou Resource Report: Part 3 (MNRF, 2014). Additional details are available in Hornseth and Rempel (2016) and Rempel and Hornseth (2017).

The Category 2 (RSPF) model was based on seven (7) classes from the Landsat based Provincial Forest Classification (PLC) as well as esker lines, mapped forest fires, and anthropogenic linear features. Calculations were conducted in the specialized GIS program, Landscape Scripting Language (Kushneriuk and Rempel 2011), which allowed for multiple scale modeling using spatial averaging of hexagons. For Caribou Category 2 maps, an intersection of 3 ha hexagons with landscape variables was conducted first, and then spatial averages generated at the 5,000-ha scale were used for the RSPF analysis. This scale was chosen because it resulted in the highest performance relative to all other scales that were assessed (Hornseth and Rempel 2016).

GHD Category 2 and 3 regional range Caribou habitat was based on the selective use of landscape features across all four seasons. The RSPF models probability of use for each season, and a threshold value for the continuous probability of use is determined above which the habitat is categorized as high use, therefore contributing to Category 2 habitat. A location that has predicted high use for any season is labelled Category 2, otherwise in is labelled Category 3. A total of 202,882 ha of Category 2 habitat was delineated within the Caribou LSA and 7,858,915 ha in the Caribou RSA; meanwhile, a total of 48,755 ha of Category 3 habitat was delineated within the LSA and 2,203,180 ha within the RSA. For additional details, refer to Appendix 11E (GHD Category 2 and 3 Mapping Report for Baseline Conditions in Ozhiski and Missisa Caribou Ranges 2024) in Appendix F (Natural Environmental Existing Conditions Report) of this EAR/IS.

Seasonal Patterns of Habitat Use

Seasonal patterns of habitat use are an important piece of background information for the WSR assessments. Although the report on GHD Category 2 critical habitat provides helpful information to assess the prevalence of important Caribou habitat, it was developed based on Resource Selection Function (RSF)³ that used older collaring data, and an inadequate number of locations in the Ozhiski range. Additionally, since neither the Missisa nor Ozhiski range have permanent disturbance, any RSF developed with data only from these locations would not be able to predict changes in patterns of use based on new development proposals. For additional details, refer to Appendix 11F (Report on Caribou

² RSPFs are statistical models that are used to understand how animals, like Caribou, select their habitat based on available resources. They provide the actual probability of a resource being used. They are used to obtain a precise measure of the likelihood of resource use.

³ RSFs also are statistical models that are used to understand how animals select their habitat based on available resources. They estimate relative probability of a resource being used and are often used to identify and quantify the importance of different habitat features or resources based on their use relative to availability.



Seasonal Patterns of Habitat Use in the NRL and WSR Study Areas) in Appendix F (Natural Environmental Existing Conditions Report) of this EAR/IS.

Analytical Approach

Early movement data indicated that 27 of the 29 Caribou collared by AtkinsRéalís as part of the WSR study were members of the Eastern Migratory population; only two individuals were the target boreal Caribou ecotype. As a result, development of the analytical approach for the collar program was paused until other data sources were acquired. The intention of the study was to have an approach to Caribou analysis that was consistent with the Marten Falls First Nation (MFFN) Community Access Road (CAR) and Northern Road Link (NRL) projects.

Missisa and Ozhiski were the primary ranges of interest for the NRL and WSR projects. However, neither of these ranges had any permanent roads, and other anthropogenic disturbances were minimal. To create an RSF that would be responsive to anthropogenic disturbance, it was necessary to include data from other Caribou ranges that have significant areas of disturbance. The Nipigon and Pagwachuan ranges were selected because they were contiguous with the northern ranges, the southern parts of these ranges have significant anthropogenic disturbance, and the ranges also encompass the Marten Falls Community Access Road project.

The paragraphs that follow provide a summary of the data integration, data processing, RSF model building processes, and movement visualization. For detailed information, please refer to Appendix 11F (Report on Caribou Seasonal Patterns of Habitat Use in the NRL and WSR Study Areas) in Appendix F (Natural Environmental Existing Conditions Report) of this EAR/IS.

Additional Information Sources and Data Integration

In addition to the GPS collaring data that was collected by AtkinsRéalís as part of the WSR program, five (5) additional sources information were used to develop an RSF suitable for describing seasonal patterns of habitat use by Caribou:

- Data from AtkinsRéalís on 14 adults collared as part of the NRL project, which is located between the eastern extent of the WSR Project Footprint and MFFN between February and December of 2023.
- Data from the MNR on 58 animals collared within the Ozhiski range between February 2020 and March 2023.
- Data from the MNR on 101 animals collared in the Missisa range between March 2019 and March 2023.
- Data from the Natural Heritage Information Centre (NHIC) on 166 animals collared as part of the Far North Monitoring Program between 2009 and 2012 (Missisa, Ozhiski, Nipigon and Pagwachuan ranges).
- Data from the NHIC on animals that were collared as part of the Collaborative Provincial Caribou Research Program between 2010 and 2015.

The collar data from the different datasets was combined into a common database, with data fields converted into consistent formats.



Data Processing

All data was sorted according to season: winter (December 22 – April 14), spring (April 15 – June 21), summer (June 22 to September 21) and fall (September 22 to December 21). Subsequently, filtering was used to remove duplicate records, and records with assumed errors (Fullman et al. 2021). A software package (animal movement tool or 'amt') was then used to create movement tracks and filter location data. Movement tracks were identified using periods of sequential movement (i.e., track bursts), with sampling being optimized for each source of data (i.e., WSR, NRL, MNR, NHIC). Step lengths between sequential locations were created to help with filtering (a step length of greater than 150 m avoids sleeping animals, dead animals, dropped collars and GPS accuracy errors).

A kernel density approach in 'amt' was used to define a population-level season home range based on individual animal tracks, and a random set of points were generated. Coding was written to ensure that points from the same animal stayed together and that the same proportion of points were selected. To create and save shapefiles (mapping) of home ranges in each season, geographic coordinates were kept. Shapefiles (maps) were connected to environmental data using a specialized GIS software program (Landscape Scripting Language), which overlaid them placed over the provincial landcover raster map, mapped forest fires, human-made features, and eskers. Details of this process can be found in the Biophysical Attributes report that is appended to Appendix F (Natural Environmental Existing Conditions Report). Seasonal data sets were subsequently used for RSF model building.

RSF Modelling

The RSF model is useful for evaluating the net effects of future development proposals. The RSF developed for this Project uses biophysical attributes reported in FERIT, February 7, 2024 (refer to Appendix F, Natural Environmental Existing Conditions Report) although additional scales of analysis were considered in developing the RSF. A gradient-boosted regression tree approach (BRT) was used to model resource selection. BRT involves the creation of a simple model (i.e., one that makes basic predictions), followed by a series of newer models, each of which correct the errors of the previous one (i.e., various iterations). The final model is a combination of all of the previous iterations, with each contributing to the overall prediction. The BRT approach was appropriate for this Project because many variables existed across six (6) spatial scales, and there was limited knowledge of variables or interactions of variables would best predict presence/absence. The R package gbm (Generalized Boosted Regression Model) was used to estimate the BRT. The gbm package is particularly useful for creating predictive models and is widely used in statistics and machine building to handle complex data sets and improve model accuracy (Elith et al., 2008).

In order to develop a strong model, the original data was set into a training set and a testing set. The training data comprised 80% of the full data set. The training data set was applied to the model prior to the test data. The approach involved a 10-fold cross variation. Model performance was evaluated on both the training and testing data set based on 11 performance measures. To understand the model, and how it was making predictions for probability of use, variable influence and response diagrams were created. Plots of the top eight (8) variables indicated by the variable influence analysis were created. The seasonal models were then applied to the four Caribou ranges (Missisa, Ozhiski, Nipigon and Pagwachuan), with the former two occurring in the WSR study areas.



Movement Visualization

Caribou patterns of movement across seasons were visualized by creating temporal variables in QGIS⁴. This permitted the viewing and inspection of patterns of Caribou activity within seasons, as well as migration patterns between seasons.

13.2.1.1.4 Wolverine Occupancy Study

Wolverine is a Threatened species under the Ontario Endangered Species Act and Special Concern under the federal Species at Risk Act. A two (2) year occupancy study will inform many aspects of wolverine occurrence, abundance, demographics, and behaviour at various scales across the LSA and RSA. Specific objectives fulfilled via the wolverine program include:

- Using existing data and literature as well as surveys to collect field data for two years to provide current field data that reflects the natural interannual and seasonal variability;
- Collecting data to represent the following temporal sources of variation: among years; within and among seasons; and within the 24-hour daily cycle;
- Describing the distribution and abundance of wolverine in relation to the ultimate Project Footprint, LSA and RSA;
- Describing abundance; distribution across survey sites (i.e., percentage of survey stations at which they were recorded); abundance in each habitat type; and map areas of highest concentrations or areas of use by species;
- Documenting demographics for individuals in the LSA, including sex, age, genetic identity, and presence of reproductive females;
- Identifying and mapping critical habitat and residences within the study areas; and
- Documenting baseline conditions within the study areas to support the effects analysis in the EAR/IS.

The Wolverine Occupancy Study consisted of integrated camera traps and hair snare sampling; a conventional method used across North America and was proposed to augment baseline data collection for wolverine for the WSR Project. Study planning, including overall study design and run pole construction and implementation, was developed through consultation with wolverine researchers Mirjam Barrueto (University of Calgary), Dr. Matthew Scraftford (Wildlife Conservation Society and Ontario Boreal Wolverine Project), and Dr. Justina Ray (Wildlife Conservation Society and Ontario Boreal Wolverine Project).

Deployment and maintenance of run poles, hair snares, and remote cameras were deemed as unlikely to have any negative or undue impacts to wolverine by the MNR Animal Care Committee. Prior to study commencement, a Wildlife Scientific Collectors Permit under the *Fish and Wildlife Conservation Act, 1997* was acquired and a Section 17(2)(b) Species at Risk permit under the Ontario *Endangered Species Act, 2007* was also acquired from MECP.

Federal guidance provided in the TISG indicates that an appropriate scale for field sampling for wolverine is represented by a Local Study Area that extends 10 km from the outer boundary of the Project Footprint. As such, the WSR Wolverine LSA is 2,513 km². Sampling protocols for hair snare and trail camera sampling described in Koen et al. (2008) suggest establishing a grid of 100 km² tessellating hexagon

⁴ QGIS, or Quantum Geographic Information System, is a software that allows users to create, edit, visualize, analyze and publish geospatial information.



sampling units across the study area and systematically placing a minimum of one sampling stations per 100 km² sampling unit. A sample unit area of 100 km² represents the accepted minimum home range area for female wolverines (Koen et al., 2008). COSEWIC (2014) gives home range sizes of 50 – 400 km² for females and 230 – 1,580 km² for males. A study by Dawson et al. (2010) near Red Lake, Ontario, found an average male wolverine home range size of 2,563 km² between December and October.

A study area of 25 complete sampling units (totalling 2,500 km²) centered over the Wolverine LSA was established. One (1) integrated sampling station was installed per unit. Pseudo-replication was addressed by separating stations by a minimum of 3 linear km, a method that has been used in other studies (Hurlbert, 1984; Fisher 2004).

Protocols suggested by Koen et al. (2008) allow for trap positioning within each sampling unit that maximizes the likelihood that sampling stations will be visited by a wolverine. Koen et al. (2008) noted that the Ontario Boreal Wolverine Project had greater success detecting wolverines in coniferous riparian corridors left behind following logging which appeared to funnel wolverines through the landscape, making detection more probable. Woods *et al.* (1999) note that, at a local scale, riparian sites should be targeted for sampling. Studies using cameras setup in locations that maximized the probability of detection within grid cells, such as along high-travel routes, have been used for Snow Leopard (*Panthera uncia*) and Coyote (*Canis latrans*) (Jackson *et al.* 2006, Larrucea *et al.* 2007).

The Wolverine Occupancy Study was initiated in mid-winter (February 10-20, 2021) to take advantage of frozen conditions, which improves ease of access by helicopter or snow machine to remote sampling sites. A study duration of two (2) years was determined to be appropriate based on consultation with regulatory agencies. It is recommended that, for the purposes of baseline/preconstruction data collection, sampling occurs over a minimum of two (2) winters (2020/2021 and 2021/22) and at least between January and May of each winter. Wolverines do not shed hair easily until late spring; thus, wolverine hair was not expected to be collected until late winter (mid-late February; Magoun *et al.* 2007). Nonetheless, earlier deployment of integrated run pole structures allowed wolverines to find and become comfortable with the structures. Annual monitoring continued until the snow melted from the study area, ending the use of any den sites present.

Hair Snares

The Project Team used an adapted run pole structure based on the design presented in Magoun et al. (2011; refer to Appendix 11-A1 of **Appendix F** of this EAR/IS – NEEC Report) and that are depicted in Barrueto (2019). Photos of run pole station setups used in this study are also presented in the same appendix. This sampling technique provides the greatest amount of data and makes best use of the effort required to access remote locations across the RSA. Run pole stations were typically baited with chunks of frozen moose meat provided by Webequie First Nation community members. In rare instances, frozen moose broth was substituted when meat was not available. Frozen bait was securely hung 1-2 feet above and in front of the run pole from a cable running between two (2) trees. In addition to the moose meat bait, a trapping scent lure (Caven's – Gusto Long Distance Lure) was smeared on the bait and atop the run pole. The scent lure was used to widen the area of attraction for passing wolverines.

Loops of barbed wire were wrapped loosely around the base of the run pole, close to where the run pole is anchored to the tree (as depicted in **Appendix 11-A1**). Two (2) vertical hair snare posts were integrated on to the run pole. Six (6) alligator clips were attached to each post via cable lanyards and were held in an open position to grab hair from wolverines that climbed the run pole structure to inspect the bait (refer to **Appendix 11-A1**).



Hair samples collected from the alligator clips or barbed wire hair snares may contain follicles, which provide DNA. Genetic analysis can identify the species (via mitochondrial DNA; Schwartz and Monfort 2008) and genetic 'fingerprints' can be detected that identify individuals (using microsatellite analysis of nDNA; Mowat *et al.* 2003; Fisher, 2004). Site access aside, hair trapping can yield low-cost and high-return data on distribution, relative abundance, and home range estimates (Fisher, 2004). Detection of known individuals through genetic analysis of hair follicles collected at multiple sample sites can act as a mark-recapture survey. Hair samples were screened for the presence of hair follicles and samples containing follicles were submitted for genetic analysis to the Natural Resources DNA Profiling and Forensic Centre at Trent University.

Each sampling station was visited every four (4) weeks to examine the wrapped barbed wire and run pole hair snares at each site. Collectors wore latex gloves to remove hair samples and deposited samples into paper coin envelopes for each site. Envelopes were labelled with the station ID, date of collection, and name of collector. The bait at each sampling station was replaced during each visit.

Species Identification

Hair samples were analyzed by the Natural Resources DNA Profiling and Forensic Centre at Trent University. Hair samples were analyzed for species identification, sexing, and individual identification (DNA profiling). Methodologies used for these analyses are described in detail.

Remote Cameras

While hair snares may provide DNA samples, camera photos may capture unique pelage markings that are unique to individual wolverines. In particular, the light markings on a wolverine's chest (known as the ventral pattern or chest blaze) can be used for individual identification. As such, remote cameras can also be used as mark-recapture sampling for this species and add redundancy to sampling at each station. Photos may also provide additional details such as age, sex, and body condition. Reproductive characteristics of males and females, notably those of lactating females, may be documented using a run pole structure. The presence of lactating females is indicative of denning activity in the area.

An additional advantage to pairing camera traps with hair snares is to inform non-detection. Non-detection at a given sampling site does not mean that the site was not visited if hair was not sampled. Camera traps were positioned as to capture as many identifying features as possible for any animal accessing a baited hair snare. The study team deployed Reconyx Hyperfire 2 Professional Series remote cameras. Reconyx cameras are known to operate well in very cold environments and have very efficient battery use. Two (2) cameras were deployed at each sampling station. One (1) camera (the White LED Flash model) directly faced the front of the run pole to capture the chest and underside of wolverines inspecting the hanging bait. A second camera (the Infrared Flash model) was installed at an angle to the run pole to capture wildlife movement around the run pole, should wolverines visit the station but do not climb the run pole or are not captured by the other camera. All cameras were set to record date, time, station ID and temperature along the bottom of each frame.

The station ID was labelled on the front of each run pole to ensure proper station categorization. Each sampling station was visited every four weeks to check the remote cameras, replace SD cards and batteries, ensure proper camera functioning, and replace the bait. Upon collection, photos from each station were screened for Wolverine presence. For each Wolverine detected, details were recorded including ID number, chest blaze pattern, sex, height, and age (when possible).



Stations were deployed and maintained between January – May 2021 (refer to Table 11-4) and were deployed again between January and May 2022. This field program concluded in May 2022.

Population Estimate

A simple estimation of population size for this Mark-Recapture study was calculated using the Lincoln Index:

$$P = \mu(N1 \times N2)/R$$

Where:

P = total size of population

N1 = size of first sample (number of individual wolverines identified)

N2 = size of second sample (recapture: number of individual wolverines identified)

R = number of marked (identified) individuals recaptured in second sample

The Lincoln Index makes several assumptions that must be met if the estimate is to be accurate. These assumptions are:

- The population of organisms must be closed, with no immigration or emigration;
- The time between samples must be very small compared to the life span of the organism being sampled; and
- The marked organisms must mix completely with the rest of the population during the time between the two samples.

The current study meets assumption 2 and likely assumption 3. The Lincoln index was calculated for each month-long interval between replacing bait and photo card/hair sample collection. A total of 7 intervals were calculated: three (3) from 2021 (February-March, March-April, April-May) and four (4) from 2022 (January-February, February-March, March-April, April-May).

Home Range Calculations

Home range was calculated, to the extent possible, for individual wolverines that were recorded at more than two (2) locations. Home range was calculated using two (2) methods: minimum convex polygon (MCP) and kernel density.

Calculation of MCP consisted of drawing a 2-dimensional polygon all the known locations from an individual. This method would provide a conservative, likely underestimated, home range area for suitable individuals.

Kernel densities were generated in R using the package AdehabitatHR (Calenge, 2006). The Utilization Distribution (UD) was generated using the ad hoc method as the bandwidth (smoothing) parameter which supposes that the UD is bivariate normal. The smoothing factor is the distance over which a data point influences the utilization distribution and is influenced by the number of relocations. This method also tends to estimate a larger home range than other methods. Following generation of the kernels home ranges were generated for the 95% extrapolated isopleth as the home range contour. Given the small number of relocations (6-42) the resulting distributions for most of the wolverines are very large and



potentially oversmoothed, and they are presented as an exploratory examination of wolverine utilization within the RSA. Additionally, environmental factors such as barriers have not been accounted for in the estimates.

13.2.1.1.5 Bat Hibernacula Screening

The presence and distribution of natural features supporting bat hibernacula was assessed by screening features potentially used as hibernacula by bats including natural caves, abandoned mines, talus slopes, and rock cliffs with crevices (Fenton 1969; COSEWIC 2013). The following sources of information were used to screen for bat hibernacula:

- Natural Heritage Information Centre (NHIC) Ministry of Energy, Northern Development and Mines (ENDM, now Ministry of Energy and Mines) Abandoned Mine Information System (AMIS) (ENDM, 2016);
- ELC vegetation community data for the Project Footprint (Rock Barrens and Cliffs);
- 2020 J.D. Mollard and Associates report; and
- Reconnaissance helicopter flight along the proposed preferred alternative for the Project in May 2019.

13.2.1.1.6 Bat Maternity Roost Habitat Screening

Methodology to screen for candidate bat maternity roosting habitat was taken from *Bats and Bat Habitats: Guidelines For Wind Power Projects* (MNR, 2011) and Significant Wildlife Habitat Criteria Schedules for Ecoregions 3E and 3W (MNR 2015a, 2017a). Bat Maternity Roost Habitat SWH criteria (MNR 2015a, 2017a) include mature (dominant trees greater than 80 years old) hardwood or mixed forest stands greater than 10 trees per hectare with large diameter (>25 cm DBH) trees.

To identify the highest quality forest tracts that may provide the highest likelihood of use, the Project Team screened for older, more mature tracts (>80 years old) of hardwood forest and mixed forest. Vegetation communities within the LSA were screened using Ontario Land Information wetland and Far North Landcover vegetation community data with ArcGIS software. This process identified 19 mixedwood forest stands and 14 deciduous forest stands. Through screening the identified mixedwood and deciduous forest stands for age, it was determined that all appropriate ecosite classes within the RSA were over 80 years old.

A reconnaissance helicopter flight along the proposed preferred alternative for the Project was flown on May 27 and 28, 2019, which provided further visual assessment and confirmation of locations where mature deciduous and mixed forest with trees and snags of with large diameter at breast-height occurred.

In lieu of conducting ground assessment of maternity roost habitat, this screening approach was supported by MECP bat specialist Michelle Karam (personal communication, July 2019). Discussion of field methods for SAR with MECP in July 2019 concluded that no ground searches for bat maternity roosts were required for the Project.

13.2.1.1.7 Bat Acoustic Surveys

The results of the Bat Maternity Roost Habitat screening further informed positioning of acoustic detection surveys in 2019 and 2020. Forest tracts with larger-diameter cavity trees were identified as high quality and used to select acoustic detection locations for acoustic monitoring.

Four (4) stations were established in 2019 with surveys conducted between June 12 and July 5 for a total of 85 recording nights across all 4 stations. In 2020, the survey was expanded to nine (9) sites during the maternity roosting season, including three (3) stations from 2019 and six (6) novel stations, with surveys were conducted between June 7 and October 15 to include both the breeding and migration/swarming



periods. One station (BAT2) failed soon after deployment in 2020, resulting in data being collected at eight (8) stations in total. Overall, in 2020, eight (8) stations were sampled during the maternity roosting period for sampling periods ranging from 16 to 36 nights, totalling 203 nights. Seven (7) stations were sampled during the fall migration/swarming season with periods ranging between 27 and 50 nights.

Acoustic recordings were collected concurrently at the stations in 2019 and 2020 using acoustic full-spectrum, ultrasonic recording units (ARU, Song Meter SM4BAT [Wildlife Acoustics Inc.]). Each ARU was paired with a Wildlife Acoustics SMM-U2 ultrasonic, omnidirectional microphone with a 3 metre (m) microphone cord. Each ARU setup was installed on site using an extension pole to raise the microphone approximately 2.5 m above the ground. ARUs were powered with four D-cell alkaline batteries. Microphones were positioned approximately 10 m from the forest edge so that recordings occurred in a low-clutter environment; maximizing the clarity and quality of echolocation calls for more accurate species identification. ARU schedules were set to record thirty (30) minutes before sunset until thirty (30) minutes after sunrise.

Additional surveys were conducted in 2023 based on feedback from MECP and IAAC that surveys should be conducted in wider range of potential bat maternity habitats including coniferous forests and swamps. A spatially dispersed random stratified survey design using ELC as the stratification variable was employed to select an additional 30 sampling locations. Five stations collected no data after deployment due to equipment failure (4 units) and one unit going missing, resulting in data being collected at 25 stations in total. ARUs monitored bat activity between May and October 2023 with collection periods ranging from 27 to 147 nights, totaling 2521 nights.

Bat recordings were analyzed using the acoustic analysis program Kaleidoscope Pro 5.1.9 (Kaleidoscope, Wildlife Acoustics). Bat recordings were run through the auto-identification function in Kaleidoscope, then examined by a qualified biologist experienced in the analysis of bat acoustics and trained in the use of Kaleidoscope software. Files where the biologist disagreed with the recognizer were vetted through comparison of call parameters to North American acoustic identification keys (i.e., O'Farrell et al., 1999; O'Farrell and Gannon, 1999; Britzke and Murray, 2000). Complete details of the acoustic analysis process are provided in Appendix F – NEEC Report.

13.2.1.1.8 Bat Maternal Activity Modeling

Current Habitat Use

Activity Models were developed for bat activity (habitat use) during the maternity period (June – early July) in the WSR study area. Models were developed to understand the relationship between bat activity (habitat use) and habitat types, and to support net effects analysis to predict the impact of disturbance on bat activity for specific land cover/habitat types. The analysis was focused on counts of activity, not counts of individuals.

Data used for this analysis included the bat acoustic data collected in 2019, 2020 and 2023 along with habitat data from the Far North Land Cover (FNLC) and the modelled ELC layer developed for the study areas (see **Section 11**). Selection of habitat variables was done using a boosted regression tree (BRT) model and those variables that were considered the most important and were selected for further analysis using Poisson Generalized Linear Models (GLM). Predicted activity for the models were summarized by ELC class at the RSA level to reveal relative expected activity levels among ELC classes. Complete details of the modeling process are provided in Appendix F – NEEC Report.



Changes to habitat Use due to Future Disturbance

Future disturbance effects were modelled by overlaying the Project Footprint including access-roads, aggregate sources, and laydown areas on the FNLC map, and then reassigning wetland and upland values in the 3-ha hexagons underlying the anthropogenic layer as disturbance. The original habitat model for each species was then loaded in R and applied to the modified landscape to create new probability of use values expected under future disturbance conditions. Percent change in probability of use was calculated as:

$$\frac{(pUse_{fd} - pUse_{cc})}{pUse_{cc}} * 100$$

where $pUse_{fd}$ is probability of use under future disturbance (*fd*) conditions, and $pUse_{cc}$ is probability of use under current conditions (*cc*). The % change in functional value represents the net effect of all proposed disturbances on the $pUse$ values. Complete details of the modeling process are provided in Appendix F – NEEC Report.

13.2.1.2 Birds

13.2.1.2.1 Breeding Bird Point Count Surveys

Point count surveys followed the principles of the Forest Bird Monitoring Program, as well as the OBBA survey protocols. These protocols are described in the MNR's publication Wildlife Monitoring Programs and Inventory Techniques (Konze and McLaren 1997), the Ontario Breeding Bird Atlas Participants Guide (OBBA, 2001) and generally in Appendix 1 of the TISG.

Surveys were conducted between one half hour before sunrise until five (5) hours after sunrise between June 1 and July 10, and data collected include:

- Species;
- Number of individuals;
- Estimated Distance from viewer (0-50m, 50-100m, 100+ m);
- Minute interval first detected (1, 2, 3...10);
- Breeding evidence (i.e., suitable habitat, singing male, pair, nest with eggs, nest with young, etc.); and
- Survey weather conditions (temperature, wind [Beaufort Scale], precipitation, cloud cover [%]).

Any incidental observations of non-target wildlife species or bird species observed between point counts was also recorded.

Each sample location was surveyed by a qualified biologist skilled in visual and aural identification of Ontario bird species. Surveys were conducted by qualified biologists using a standardized 10-minute point count. Each species encountered were recorded at 1-minute intervals with distance estimates recorded between 0-50m, 50-100m and >100m. Vegetation classification within 100m of each sample was also assessed.

In 2020, during each point count survey, observers deployed high quality portable acoustic recording (ARU) devices (i.e., with 360-degree recording in WAV format, selectable sampling rate, and adjustable microphone gain), mounted on a tripod. This survey type is suitable for sampling a representative species composition for the Project Footprint, LSA, and RSA including forest and bog/fen birds, as well as for locating most diurnal avian SAR that occur in the region.



Data recorded using ARUs during the morning breeding bird point counts was used to aid in normalizing data recorded during these counts and data recorded by ARU only.

Methodologies for sample selection and data analysis and modelling are further described in Appendix F – NEEC Report.

13.2.1.2.2 Bird Acoustic Surveys

ARUs were deployed to survey bird presence in 2020 and 2021. Deployment of ARUs was used to augment data collection conducted during point count surveys and obtain data to support the abundance and distribution modelling process and capture temporal variations in bird species presence, abundance, and distribution across a broad range of dates (including seasons) and times of day. ARUs were placed at least 500 m apart and proportionately sampled all major habitat types present within the LSA and RSA, as done with the point count surveys. The recording schedule programmed into each ARU adhered to protocols prescribed in the TISG for the WSR Project, recording daily, with a morning and an evening schedule.

In 2020, a total of 55 Song Meter SM4 Mini (Wildlife Acoustics Inc.) were deployed across representative habitats for data collection. ARUs recorded until the batteries died or memory cards were filled. Batteries and memory cards of all 55 detectors were replaced in mid-late June of 2020 and 16 detectors were moved to secondary supplemental locations to record for the rest of the avian breeding season (late July), until the batteries or memory card capacity was exhausted. In total, 70 survey locations were sampled through the core avian breeding season through remote ARU use. Following this, ARUs were left at their location to record during the fall migration period (August 1 through September 30, 2020) and during the winter (December 1, 2020, through to March 31, 2021) (i.e., collectively, Fall/Winter Recordings).

In 2021, an additional 21 ARUs were deployed in habitats which were underrepresented in the initial deployment and in areas which had poor spatial coverage. Nine (9) ARUs were also removed from habitats which were over-represented, namely conifer swamp and conifer forests. In total, 82 survey locations were sampled through the core avian breeding season in 2021 through remote ARU use. Batteries and memory cards of all 82 detectors were replaced in mid-late July of 2021. Once the breeding season ended, ARUs were left at their location to record during the fall migration period. In total, 49 ARUs were positioned within the LSA and 33 were located within the RSA. At the end of the fall migration period ARU's were collected from the field, and no winter data collection was conducted.

Acoustic files were analysed according to methodologies described in the TISG. Methodologies for sample selection and data analysis and modelling are further described in Appendix F – NEEC Report.

13.2.1.2.3 Shorebird Migration Studies

Shorebird migration studies were done in conjunction with waterfowl aerial surveys done in 2019 and 2020. The survey consisted of flying the entire length of the proposed route alternatives and circling over each lake or open wetland within 1 km of the alternative routes, with particular attention to those areas identified during the background data review and from the consultation undertaken to date. Additional surveys were undertaken along the Winisk River – extending 50 km north from Winisk Lake. This additional survey route has the potential to provide the best shoreline habitat in proximity to the Project and provided a possible movement route for northbound migrant shorebirds. This route was identified through consultation with Webequie First Nation. The survey consisted of flying 50 km of the Winisk River north of Winisk Lake.



In northern Ontario, spring shorebird migration typically peaks later than waterfowl migration (late May) and occurs during a relatively short time period (mid May to early June). Conversely, fall shorebird migration typically begins and peaks earlier than waterfowl migration, yet spans up to four months (late July – October). Overall, timing of waterbird surveys did not coincide well with peak shorebird migration in Ontario; however, it is expected that shorebird migration across the LSA is minimal. This preliminary assessment is based on the limited extent of suitable shoreline habitat present within the study areas as well as the fact that shorebirds are well known to stage and migrate along the shoreline of James Bay from which they travel to the Atlantic coast or to fall staging locations along the Great Lakes.

Shorebird data collected included:

- Date;
- Time started and time ended;
- Weather conditions;
- Species observed;
- GPS location; and
- Number of individuals.

Methodologies for sample selection and data analysis and modelling are further described in Appendix F – NEEC Report.

13.2.1.2.4 Raptors

Raptor nests were noted when they were observed during winter aerial surveys (see Section 12.2.1.1.1) and during surveys for waterfowl and shorebirds (see Section 12.2.1.2.4). During these flight activities, particular attention was given to stick nest searches in the vicinity of rivers and lake shorelines, and unburned mature Hardwood/conifer stands. The classification of nest type was determined through a combination of staff knowledge, habitat type, stick and nest size, nest placement, and raptor sightings, and photos when possible. If the species associated with the nest could not be determined, the nest was simply recorded as a stick nest. Typically, stick nests are most readily found during leaf-off.

Stick nests were also recorded when they were found during breeding bird point count surveys (see Section 12.2.1.2.1). Data recorded for each raptor nest included GPS location, associated species (if possible), relative size and characteristics (if species cannot be determined), tree species used, and a description of surrounding vegetation community and structure.

13.2.1.3 Lake Sturgeon

13.2.1.3.1 Desktop Review

A desktop review of background information was conducted to obtain information on the existing conditions for Lake Sturgeon. This included a review of the following primary and secondary information sources:

- Noront Resources Ltd. Eagle’s Nest Project Environmental Impact Assessment and relevant Fish and Fish Habitat and Aquatic environment studies;
- MECP Ring of Fire Baseline Data (MECP 2019a);
- Federal (DFO, SARA, COSEWIC) and Provincial Databases and species lists (MECP, MNR);



- Existing satellite imagery and aerial photography for the Project Footprint, LSA, and RSA (Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community), 2020;
- Project LiDAR imagery and elevation data gathered by J.D. Mollard and Associates (JDMA); 20 cm resolution (2016);
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC) reports and databases;
- The Species at Risk in Ontario (SARO) List; and
- Indigenous Knowledge and community consultation.

13.2.1.3.2 Field Surveys

Existing conditions surveys for Lake Sturgeon were completed as part of the fish and fish habitat survey program. The survey methodologies included detailed field assessments of large, medium sized and small waterbodies or lotic habitat and also lakes/ponds or lentic habitat. Aerial assessments of waterbodies were conducted in areas where access was not safe or possible due to the difficult and wet terrain conditions. The fish and fish habitat field program that relates to Lake Sturgeon includes the following surveys:

- Fish habitat and fish community surveys;
- Spawning surveys; and
- Environmental DNA (eDNA) Surveys.

13.2.1.3.3 Fish Habitat and Fish Community Surveys

A waterbody crossing list was developed for the proposed preliminary corridor for the WSR using GIS, Light Detection and Ranging (LiDAR), and digital elevation model. This list was further refined after route alternatives were considered and an initial reconnaissance survey of the waterbody crossings was conducted. Each of the identified waterbody and watercourse crossings were assigned a unique site ID that consisted of a common, two-letter code (specifically “WC” for watercourse crossing, or “WB” for waterbody crossing [i.e., a lake]), and a unique number (e.g., WC-26).

The Project is located entirely within the Southwestern Hudson Bay Primary Watershed. All waterbodies in this watershed generally flow northeast towards Hudson Bay. Major rivers in the watershed in Ontario include the Severn River, Winisk River, Ekwon River, and the Attawapiskat River. The RSA extends into three secondary watersheds including the Ekwon River – Coast, Winisk River – Coast, and Attawapiskat River – Coast. The RSA for the Project extends into four tertiary watersheds (Figure 10.2):

1. Upper Winisk Watershed;
2. Middle Winisk Watershed;
3. Upper Ekwon Watershed; and
4. Lower Attawapiskat Watershed.

In the LSA and RSA, there are many different waterbodies, including streams, rivers, lakes, ponds, and wetlands that provide direct habitat and support many different fish species. Several large rivers are located in the RSA including the Winisk, Ekwon, Attawapiskat, Fishbasket and the Muketei Rivers. A notable large lake includes Winisk Lake that provides year-round fish habitat. There are 31 large watercourses or waterbodies that are projected to be crossed by the roadway. There is also a network of smaller connected headwater streams, ponds, and lakes, many of which are part of open fens. There are 10 of these smaller connected streams that have also been identified along the proposed roadway. These



smaller, shallower lakes and wetlands may dry over the course of the summer but still offer suitable fish habitat for seasonal rearing and feeding, usually in early spring.

Aquatic field surveys were completed at water crossing locations that met one or more of the following criteria:

- Watercourses and/or waterbodies displayed the ability to support fish at the time of the field survey (dry water crossings were not assessed);
- Watercourses and/or waterbodies were likely to contain a criterion species, defined as a species of importance to Indigenous Peoples for recreation, commercial and/or food source purposes and are also identified in the TISG; and/or
- Watercourses and/or waterbodies where no specific aquatic (instream) habitat field data of sufficient detail were available from the review of background information sources.

Watercourses and/or waterbodies that did not meet any of these criteria were not sampled. Waterbody crossing sites that did meet the above criteria, but could not be sampled, were photographed from the air.

Fish community sampling was conducted concurrently with the fish habitat assessment surveys to determine fish presence, relative abundance and assemblages per sampling effort at 15 of the 31 waterbody crossings. Field survey methods followed standard practices for fish and fish habitat surveys, including those methods contained in the Ontario Stream Assessment Protocol (Stanfield, 2017). Additional methods based on the TISG (IAAC, 2020) were incorporated. Not all sites were sampled due to high-water levels, which prevented safe access to additional sites.

Fish communities were assessed using minnow traps, dip nets, and gill nets. Observations of uncaptured fish were also recorded. Minnow traps were of uniform size, but gill nets had panels with mesh measuring 25 mm to 127 mm so that fish of all body sizes could be captured where deployed. Seine netting and electrofishing using a backpack electrofisher were planned but could not be completed safely due to site conditions. Fish community sampling was completed as close to the planned road crossing locations as possible.

13.2.1.3.4 Spawning Surveys

Spring spawning surveys were conducted to determine the presence of Walleye and Lake Sturgeon and the extent of spawning habitat within the LSA of the proposed corridor for the WSR. Spawning surveys using egg mats were conducted at three (3) locations; two (2) within the LSA at Sites WB-1 and WC-26, and one (1) outside of the RSA approximately 15 km north of WB-1 near the mouth of the Winisk River where Lake Sturgeon had been historically found (Site WC-1). The spawning surveys consisted of the deployment of artificial substrate egg mats in suitable habitat. Artificial substrate egg mats were used as a proxy to confirm spawning by Walleye and Lake Sturgeon since it was not feasible to conduct typical visual spawning surveys due to health and safety reasons as well as accessibility (no helicopter flights permitted after sunset).

13.2.1.3.5 Environmental DNA (eDNA) Sampling

Environmental DNA (eDNA) refers to DNA present in aquatic or terrestrial environments, which organisms shed into their surroundings. By sampling eDNA, it is possible to identify what animals are using a habitat based on the DNA signatures found in the sample. To support the fisheries program, eDNA samples were collected between August 17-20, 2023, from watercourses that had not been previously assessed, as well as from major watercourses that had been examined in earlier conventional sampling efforts.



The Project team collected eDNA samples from nine sites, including four previously sampled locations: Winisk Lake, Winiskisis Channel, Ekwan River, and Muketei River. The eDNA kits and sampling protocols were provided by NatureMetrics.

eDNA samples were collected using a NatureMetrics vampire pump, which drew water directly from the waterbody crossing site and passed it through an eDNA collection filter. The vampire pump consists of a peristaltic pump that creates a vacuum which draws water up a silicone hose and passes it through the collection filter. In order to obtain enough eDNA for a sample, each filter required a minimum of 1.5 L of water to be passed through it. At each site, three samples were taken.

13.2.2 Results

A background review of SAR that are protected provincially and federally (i.e., those that are Endangered or Threatened on the Species at Risk lists in Ontario or Canada) was conducted, and taxa with potential to inhabit the LSA and RSA were identified. Background reviews and data gathered from field studies were used to determine whether potential habitat for species at risk exists within the LSA and RSA.

Table 13-12 summarizes all provincially listed terrestrial SAR and taxa assessed by COSEWIC that have the status of extirpated, endangered, threatened, or of special concern and that may be directly or indirectly affected by the Project. Two (2) species listed in **Table 13-12** (Canada Warbler and Yellow Rail) are not discussed in this section due to an absence of local information in the background review and also not being detected during field programs.

A summary of survey results is provided in subsequent sections. Detailed results for all wildlife surveys can be found in Appendix F of this EAR/IS – NEEC Report. Detailed descriptions of the populations and habitats of each species considered in the EAR/IS are provided in **Section 13.1.2.2**.

Table 13-12: Terrestrial Vertebrate SAR Potentially Present in the Vicinity of the Project

English Name	Scientific Name	Provincial Status	COSEWIC Status	SARA Schedule 1 Status
Mammals				
Little Brown Myotis	<i>Myotis lucifugus</i>	Endangered	Endangered	Endangered
Northern Myotis	<i>Myotis septentrionalis</i>	Endangered	Endangered	Endangered
Wolverine	<i>Gulo gulo</i>	Threatened	Special Concern	Special Concern
Caribou (Boreal population)	<i>Rangifer tarandus caribou</i>	Threatened	Threatened	Threatened
Caribou (Eastern migratory population)	<i>Rangifer tarandus caribou</i>	Special Concern	Endangered	Not Listed
Birds				
Common Nighthawk	<i>Chordeiles minor</i>	Special Concern	Special Concern	Special Concern
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Special Concern	Special Concern	Special Concern
Lesser Yellowlegs	<i>Tringa flavipes</i>	Threatened	Threatened	Not Listed
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Special Concern	Special Concern	Special Concern



English Name	Scientific Name	Provincial Status	COSEWIC Status	SARA Schedule 1 Status
Rusty Blackbird	<i>Euphagus carolinus</i>	Special Concern	Special Concern	Special Concern
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Not Listed	Not at Risk	Not Listed
Short-eared Owl	<i>Asio flammeus</i>	Threatened	Threatened	Special Concern

13.2.2.1 Mammals

13.2.2.1.1 Winter Aerial Survey Results – Caribou

Winter aerial Caribou surveys were conducted in 2018, 2019, and 2021. These surveys were specifically conducted to detect evidence (or confirm sightings) of Caribou, though observations of all wildlife were recorded to support other species datasets.

In 2018, a total of 45 Caribou were recorded across seven (7) locations. Seven groups, each having between one (1) and 13 individuals, were observed. Sixteen (16) Caribou cows and 15 Caribou bulls were identified, with the sex of the remaining 16 being unconfirmed. No calves were noted in the aerial survey.

Eighty-seven (87) Caribou tracks were observed throughout the survey area east of Webequie, illustrating the geographic distribution of Caribou within their range and indicating that more were present within the surveyed area. In general, Caribou were only observed east and southeast of Webequie where there were mature upland black spruce forests interspersed with lakes. Caribou groups and tracks were generally observed on lakes or in open forested areas leading into denser stands of forest.

No evidence of Caribou was observed west of Webequie, which was burned by a forest fire approximately 40 years ago. The forest cover has regenerated, but the habitat is currently unlikely to support the species. According to the GHD habitat mapping provided by MECP, this area is largely considered Category 2 and Category 3 habitat.

In 2019, a total of 13 Caribou were recorded across four (4) locations, with groups that ranged in size from three (3) to six (6) individuals. Six Caribou bulls, five Caribou cows, and two calves were identified. Although only four groups of Caribou were observed, Caribou tracks were identified at 70 locations throughout the survey area. As was the case in 2018, Caribou were observed primarily east and southeast of Webequie. They were found mainly in habitat consisting of mature upland jack pine and black spruce forests interspersed with small to mid-sized lakes.

Caribou activity, as determined by track and animal observations, was concentrated in a band that extended between five km and 30 km east of Webequie (i.e., 93% of the observations were made in this band). Few tracks and no Caribou observations were recorded west of Webequie.

The area where Caribou were recorded in 2018 and 2019, and where track densities have been moderate to high, is considered Category 2 habitat according to GHD habitat mapping provided by MECP. Based on the data collected in 2018 and 2019, upland conifer habitat within this area may merit a reassignment to Category 1 (Wintering Area) in future impact analyses to Caribou with regards to this Project. It is anticipated that the habitat mapping will be updated following a review from MECP SARB of relevant information. AtkinsRéalis is committed to include and consider this updated information for the EAR/IS.



In 2021, a marked increase in Caribou presence was observed compared to 2018 and 2019. A total of 552 animals were recorded within the Caribou LSA, in addition to 573 track observations. Caribou tracks were observed along 40 transects while Caribou were directly observed along 22 transects. Cratering observations (i.e., areas where Caribou use their hooves to dig through the snow) were also much higher with 191 instances of cratering recorded. A total of 171 locations were recorded as high density.

The reasons for an increase in 2021 is unclear at this juncture. Inter-year movement and range utilization may have affected numbers; however, this kind of analysis is beyond the scope of this study which was localized in scale. In terms of the influence of study methodology introducing bias into observed numbers of Caribou, methodology of the aerial surveys remained the same across survey years. Surveys were conducted systematically from west to east, with the same number of observers and flight patterns.

Winter aerial data was analyzed to produce winter probability of occurrence mapping for this species. Lands across the standard WSR RSA were categorized into High, Medium, and Low likelihood of occurrence.

13.2.2.1.2 Caribou Nursery Surveys

Caribou nursery habitat surveys were conducted between June 12 and 17, and July 2 and 9, 2019. In total, 74 candidate nursery and calving habitats were surveyed within 10 km of the alternative routes: 18 sites were surveyed on foot, while 56 were surveyed by helicopter only. No Caribou were observed during the formal calving surveys; however, Caribou sign was identified in nine (9) habitat features. Evidence of Caribou calf occurrence was present at five (5) sites; however, these sites could not be definitively identified as calving or nursery habitat. Further details and a summary of observations across all sites surveyed are available in Appendix F of this EAR/IS – NEEC Report.

13.2.2.1.3 Caribou Collaring Study



Indigenous community members recommend the completion of analysis of caribou crossing data to determine appropriate mitigation measures and design criteria for the road. As with other caribou-related data, the caribou collaring study results are included in Section 13.2.2 for review by Indigenous communities as part of the draft and final EAR/IS. Input from those reviews will help inform Detail Design of the WSR, as appropriate.

Collar Deployment

Between February 25, 2021, and March 6, 2021, 29 collars were deployed on female Caribou. All collars were deployed within the primary search area within the Caribou LSA. One collar did not pass the pre-deployment check and was not deployed. Collars were retrieved between February 19 and March 1, 2025.

Females collared ranged in age from two and a half (2.5) to ten (10) years and were captured from groups that ranged in size from 1 to 33. Photographs and capture information are provided in Appendix F of this EAR/IS – NEEC Report. Collar data was downloaded monthly.

Biological Sampling

Analysis of blood serum samples taken during capture confirmed that all 29 collared individuals were pregnant at the time of capture.



Hair samples were analyzed by the laboratory at the Toronto Zoo. Three (3) animals had cortisol levels below the detection limit and were removed from analysis. Cortisol levels in hair samples from the remaining 26 captured Caribou averaged 2.04 pg/mg and ranged from 1.04 to 4.41. Bondo *et al.* (2019) reported average hair cortisol levels of 1.52 pg/mg (range 0.95 to 2.63) for 162 adult female Boreal Caribou in northeastern BC. Macbeth (2013) reported a mean of 2.21 pg/mg, range 0.60-6.90 pg/mg, for 94 free-ranging Barren-ground Caribou in West Greenland. An analysis has not been conducted on potential factors influencing cortisol levels of Caribou in the RSA; however, disturbance by anthropogenic activities has been found to explain variation in Caribou cortisol concentrations (Ewacha et al. 2017). The values collected assist with establishing a baseline for comparison during any sampling that may take place during construction and post-construction.

Fecal and hair samples were submitted to the MNRF Science and Research Branch in Thunder Bay for future analyses, if deemed necessary. No results of any nature have been reported to AtkinsRéalisis, regarding these samples.

Mortality

Across four (4) total years of movement tracking, ending March 1, 2025, ten (10) mortalities of collared Caribou were confirmed, and four (4) collars released prematurely. One (1) mortality resulted from capture, while nine (9) others resulted from natural causes – most likely predation by wolves. It is not thought that incidental mortality occurred because of any other anthropogenic impacts. Mortality rates in years one to three (1-3) of the collaring study were 7.4%, 17.4%, and 21.3%, respectively. No mortalities were confirmed in year four (4). Average mortality rate over the four (4) years of study was 12.5%.

Survivorship and Recruitment

Recruitment surveys were conducted for individuals that were determined or expected to be members of the Boreal population. Individuals determined to be from the Eastern Migratory population were omitted from recruitment surveys since that population is not designated as Threatened or Endangered (and thus not protected under the ESA). Furthermore, wintering grounds for members of this population were shown to vary greatly year to year and study animals were prone to overwinter great distances from the defined Caribou search areas.

Overall, two study members were determined to part of the Boreal population, 049128 and 049132. Caribou 049128 was a five (5) year old female and may have had a calf in 2022, but did not have a calf in 2023 and 2024. This individual was too far outside of the study area in 2022 to pursue. Caribou 049132 was a seven (7) year old female did not have a calf-at-heel in 2022 and perished prior to the 2023 recruitment survey. Predation was the most likely cause for the lack of calves during recruitment surveys.

Calf Mortality Events

No Caribou were observed during the formal calving surveys, and no carcasses were found. Evidence of Caribou calf occurrence was present at five (5) sites; however, these sites could not be definitively identified as calving or nursery habitat.

Spatial Movements and Ecotype Evaluations

Analysis of Caribou movements by Pond et al. (2016) indicated that percent calving locations within the Hudson's Bay lowland and mean distance to treeline calving season were variables which showed the best discriminatory power between members of the Boreal and Eastern Migratory populations. Early

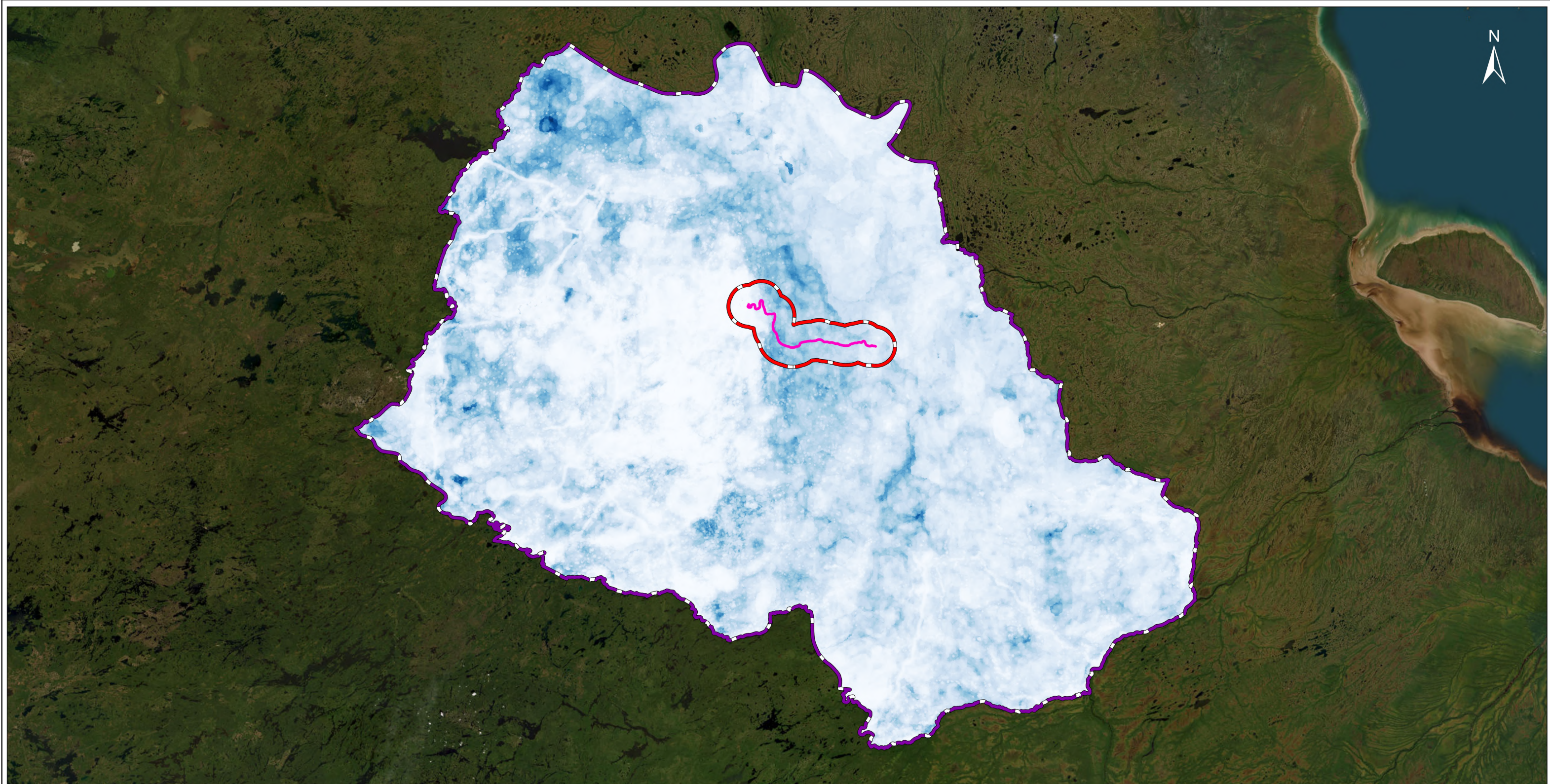


movement data clearly indicated that 26 of the 29 Caribou collared were members of the Eastern Migratory population, based on the long-distance movements that these individuals made to the Hudson's Bay coastline in the spring of 2021. Two (2) individuals did not make the aforementioned spring movement and remained within the forested Missisa Range throughout the majority of 2021. These two (2) individuals were considered members of the Boreal population. One (1) collared Caribou was not assigned to a population as it did not survive the winter.

General Habitat Description Category 2 and 3 Analysis

GHD Category 2 and 3 regional range Caribou habitat was based on the selective use of landscape features across all four (4) seasons. The RSPF modelled probability of use for each season, and a threshold value for the continuous probability of use was determined above which the habitat is categorized as high use and therefore contributes to Category 2 habitat (**Figure 13.3**). A location that has predicted high use for any season is labelled Category 2, otherwise it is labelled Category 3. A total of 202,882 ha of Category 2 habitat was delineated within the Caribou LSA and 7,858,915 ha in the Caribou RSA; meanwhile, a total of 48,755 ha of Category 3 habitat was delineated within the LSA and 2,203,180 ha within the RSA. For additional details, please refer to Appendix 11E (GHD Category 2 and 3 Mapping Report for Baseline Conditions in Ozhiski and Missisa Caribou Ranges 2024) in Appendix F (Natural Environmental Existing Conditions Report) of this EAR/IS.





Legend:

- Preferred Route
- Caribou Local Study Area (LSA 11km from Preferred Route)
- Caribou Regional Study Area (RSA Includes the Missisa and Ozhiski Ranges)

Probability of Use

0.42%
88.0%

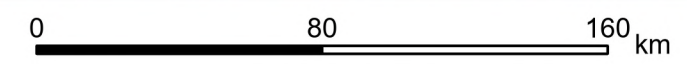


NOTES

1. Coordinate System: NAD 1983 UTM Zone 18N.
2. Cadastral boundaries are for informational purposes only and should not be considered suitable for legal, engineering, or surveying purposes.
3. Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information, and Land Information Ontario (LIO) Warehouse Open Data (<https://geohub.lio.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNRF)
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Webequie Supply Road

Probability of use by Caribou for the Winter Season
in the ranges overlaying the RSA

Figure Number: 13-3		REV: PA		
Client: Webequie First Nation	Project Number: 661910	Date: 5/13/2025		
DSC		DRN	CHK	APP
		TE	GS	GS

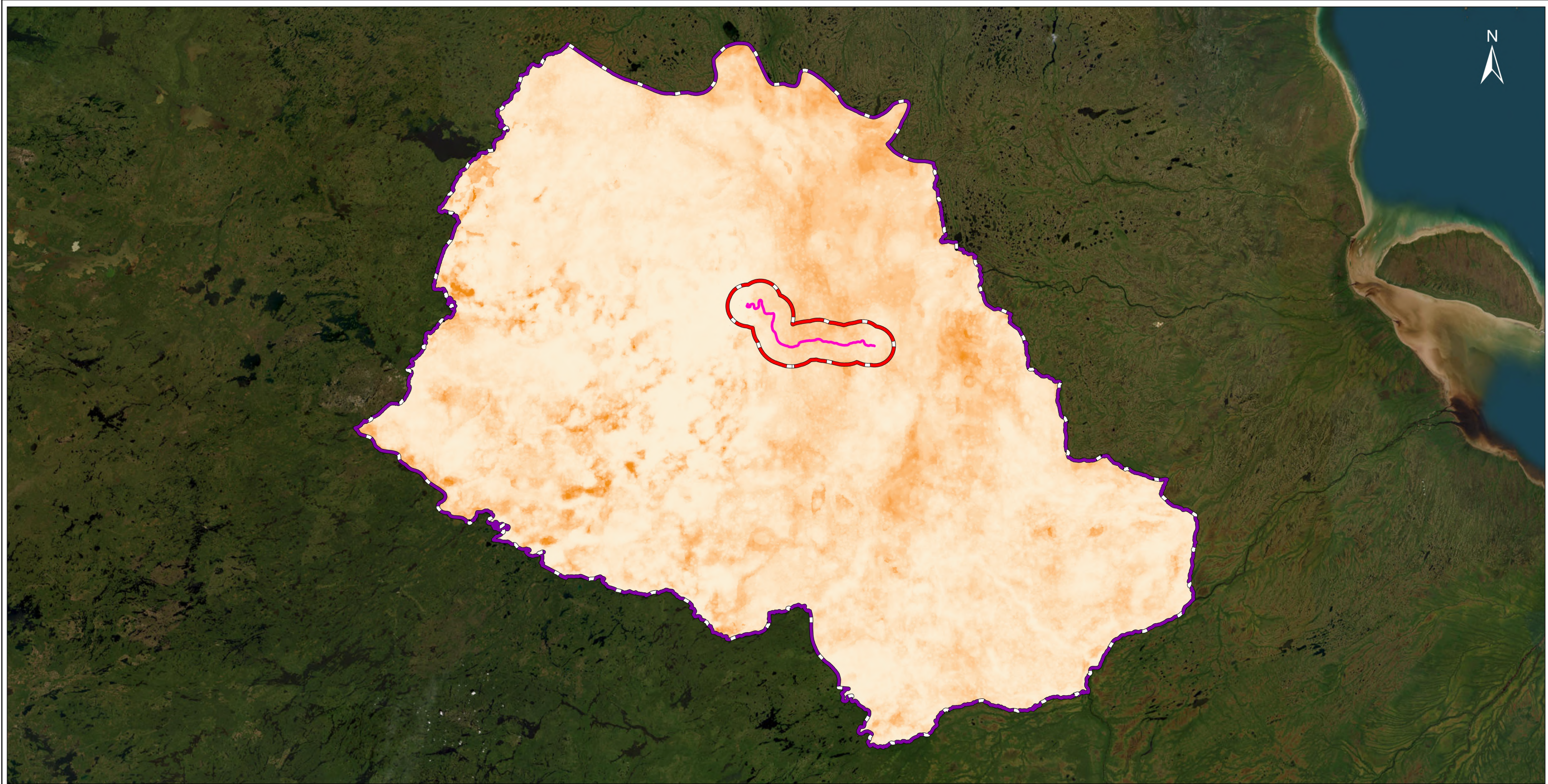
Seasonal Patterns of Habitat Use

The following paragraphs present a summary of the results of seasonal modelling, for additional details, please refer to Appendix 11-F (Report on Caribou Seasonal Patterns of Habitat Use in the NRL and WSR Study Areas) in Appendix F – NEEC Report.

The seasonal models performed well, with area under the curve model performance (overall model accuracy) on the training data ranging from 0.810 to 0.874, and 0.709 to 0.745 on the model testing data. As expected, model performance was higher for the training data, but overall, the performance was good, and the model was useful for projecting spatial patterns of use. In general, model sensitivity was higher than model specificity. As a result, the model is more successful at predicting where Caribou are likely to be found than predicting where they are likely to be absent. Among the seasons, the model performed better for the Spring, Summer, and Fall than for Winter.

The importance of variables differed among seasons, with importance identified in the variable influence diagrams and table of all variables with influence > 1 (refer to Appendix 11-F in Appendix F – NEEC Report). In the summer, water, conifer, open peatland, mixed wood, natural disturbance, and eskers are some of the most important variables, and all of these were at the 10,000-ha scale. The total density of linear features was also included in the top variable list. The response of Caribou to these variables was estimated by plotting the response of a single variable while holding all other variables constant, and these plots revealed that caribou respond positively to conifer, water, and open peatland, but negatively to natural disturbance.

The seasonal models were applied to the full landscape to visualize the relative probability of use across the landscape. This can also be interpreted as spatial patterns in relative carrying capacity or habitat quality among seasons. Patterns for probability of use differ among seasons, but in general, the Missisa range is used more heavily than the Ozhiski range. Probability of use for all seasons are given in **Figure 13.4, Figure 13.5, Figure 13.6 and Figure 13.7.**



Legend:

- Preferred Route
- Caribou Local Study Area (LSA 11km from Preferred Route)
- Caribou Regional Study Area (RSA Includes the Missisa and Ozhiski Ranges)

Probability of Use

0.29%
64.0%

WSR
WEBEQUIE
SUPPLY ROAD

NOTES

1. Coordinate System: NAD 1983 UTM Zone 18N.
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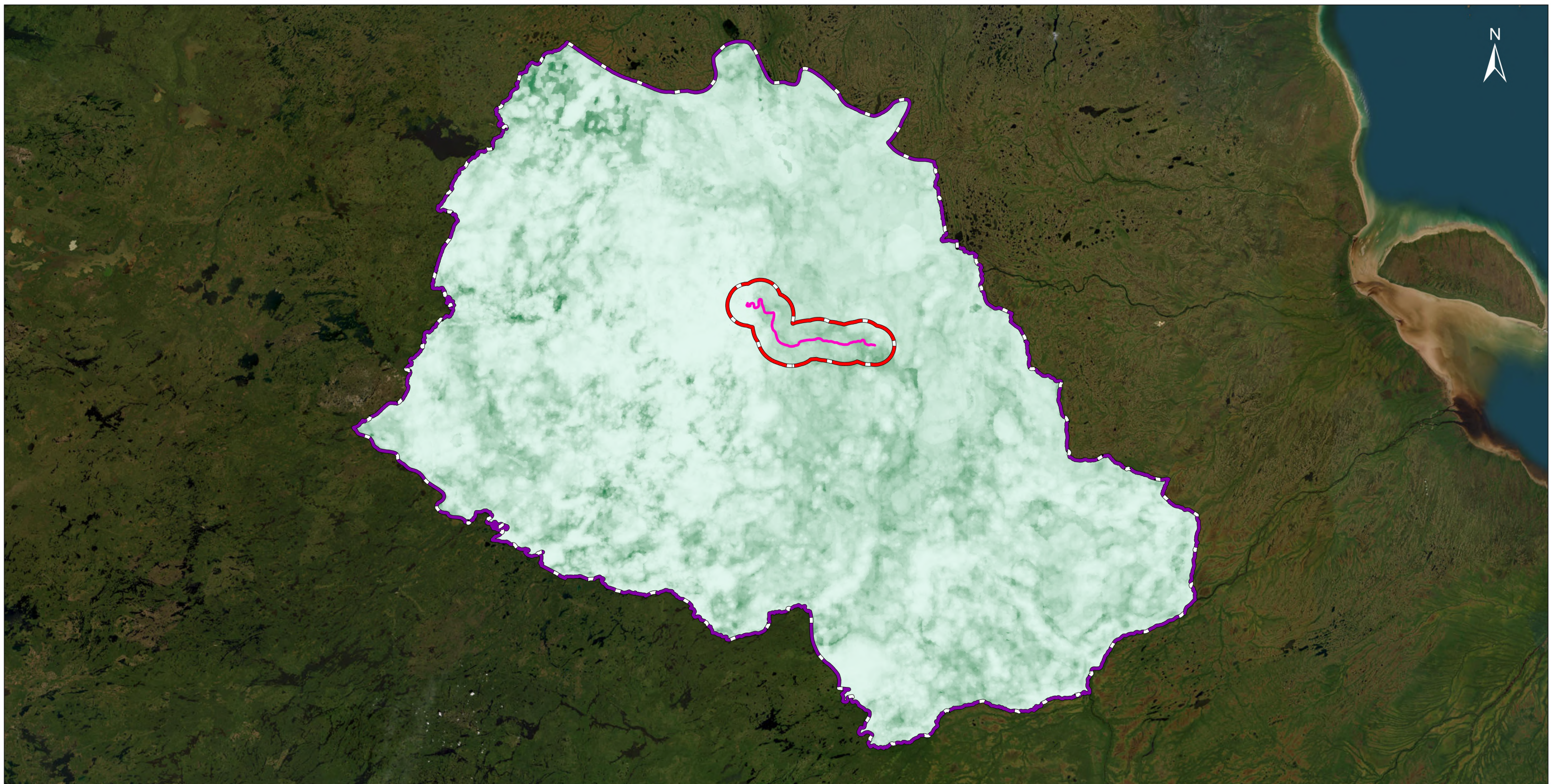
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0 80 160 km

Webequie Supply Road

Probability of use by Caribou for the Fall Season
in the ranges overlaying the RSA

Figure Number: 13-4		REV: PA	
Client: Webequie First Nation	Project Number: 661910	Date: 5/13/2025	
DSC		DRN	CHK
		TE	GS
			APP
			GS



Legend:

- Preferred Route
- Caribou Local Study Area (LSA 11km from Preferred Route)
- Caribou Regional Study Area (RSA Includes the Missisa and Ozhiski Ranges)

Probability of Use

0.64%

91.0%

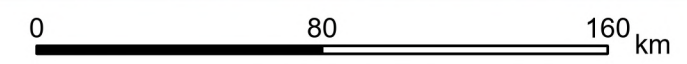


NOTES

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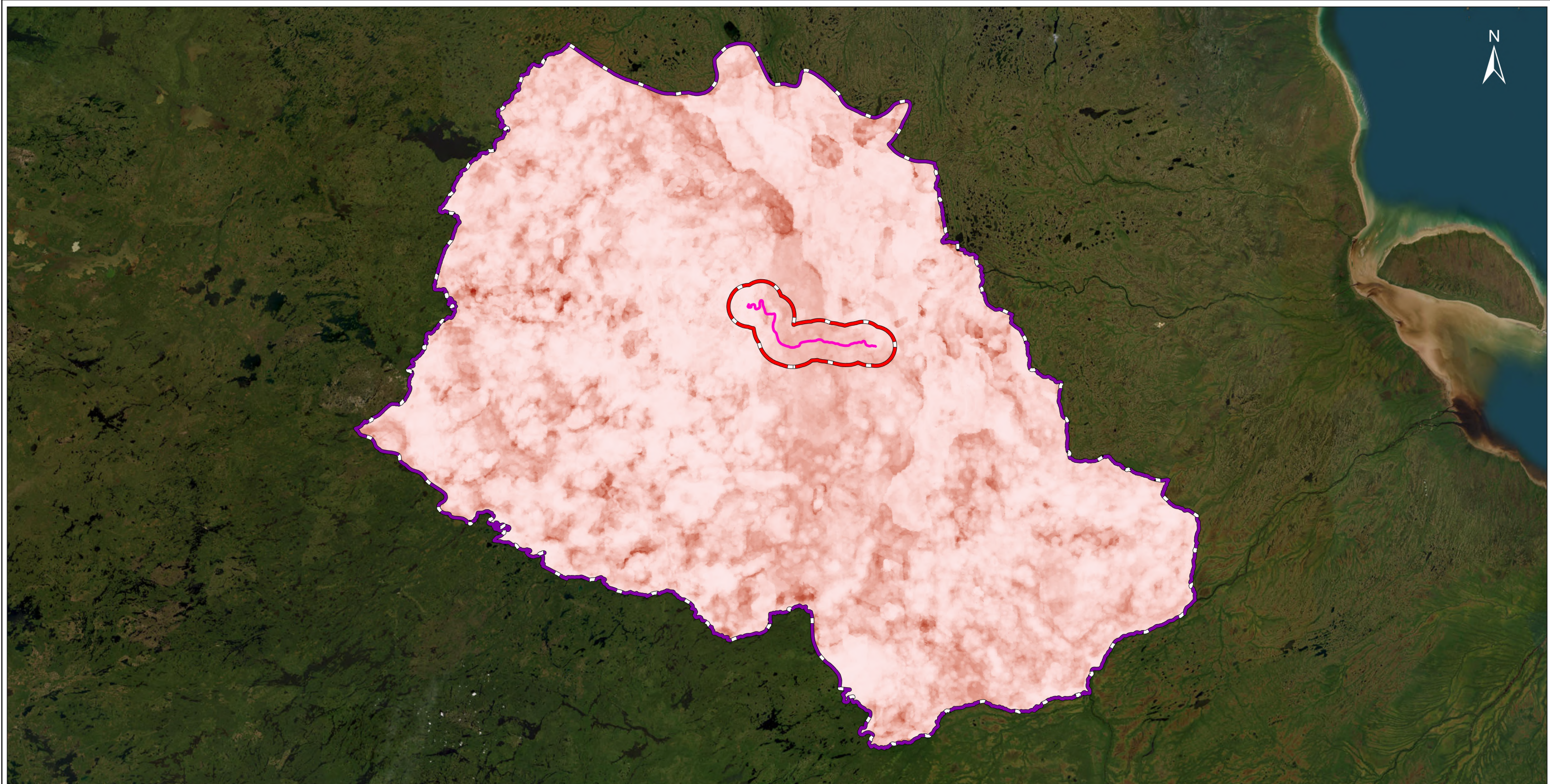
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Webequie Supply Road

Probability of use by Caribou for the Spring Season
in the ranges overlaying the RSA

Figure Number: 13-5		REV: PA		
Client: Webequie First Nation	Project Number: 661910	Date: 5/13/2025		
DSC		DRN TE	CHK GS	APP GS



Legend:

- Preferred Route
- Caribou Local Study Area (LSA 11km from Preferred Route)
- Caribou Regional Study Area (RSA Includes the Missisa and Ozhiski Ranges)

Probability of Use

0.37%

87.0%

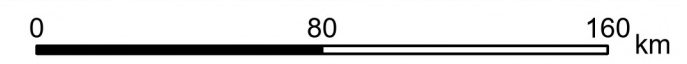


NOTES

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3. Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information, and Land Information Ontario (LIO) Warehouse Open Data (<https://geohub.lio.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNRF)
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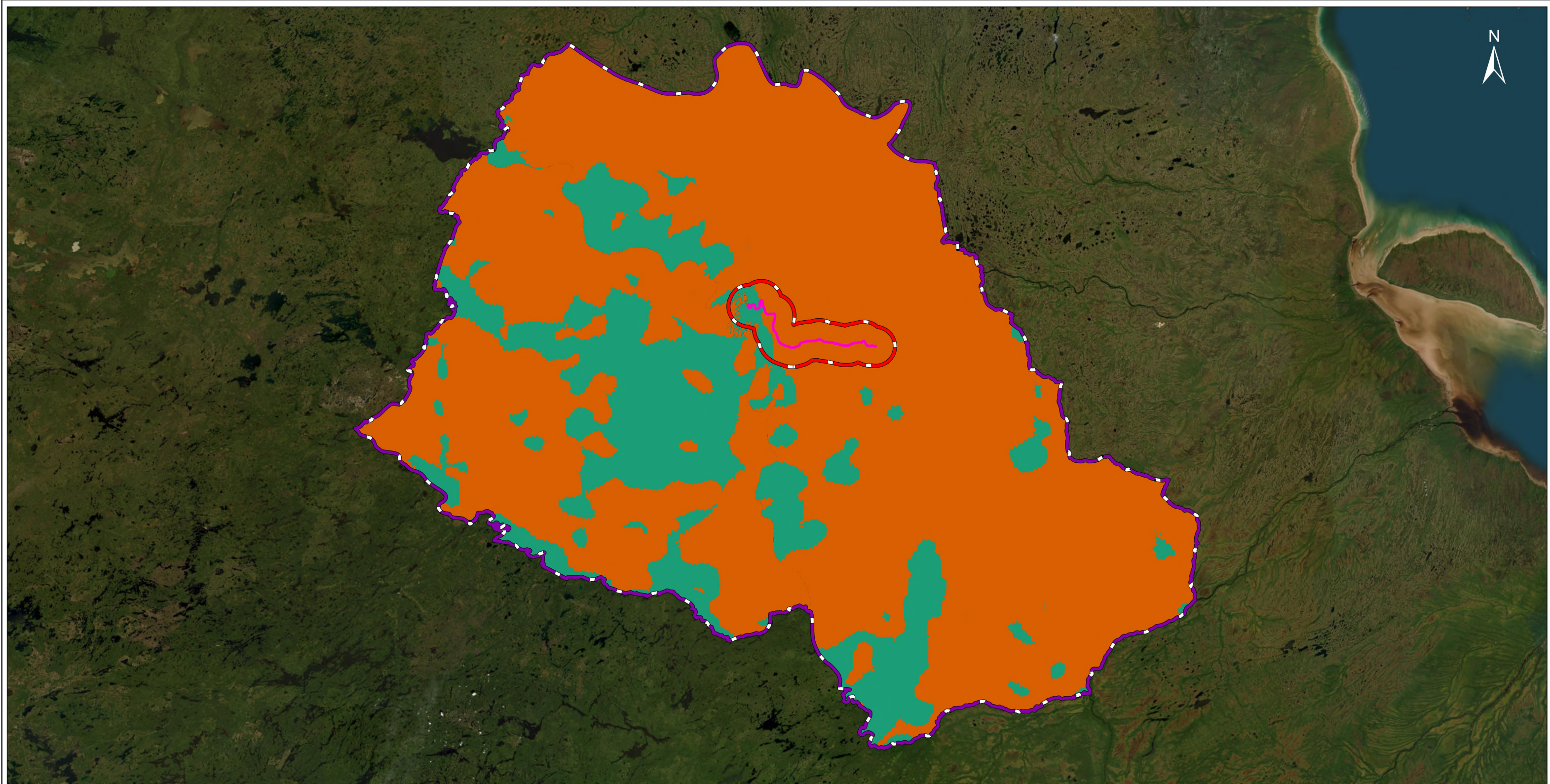
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Webequie Supply Road

Probability of use by Caribou for the Summer Season
in the ranges overlaying the RSA

Figure Number: 13-6		REV: PA	
Client: Webequie First Nation	Project Number: 661910	Date: 5/13/2025	
DSC		DRN	CHK
		TE	GS
			APP
			GS



- Legend:**
- Preferred Route
 - Caribou Local Study Area (LSA 11km from Preferred Route)
 - Caribou Regional Study Area (RSA Includes the Missisa and Ozhiski Ranges)
 - Category Two Habitat
 - Category Three Habitat

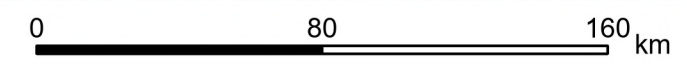


NOTES

1. Coordinate System: NAD 1983 UTM Zone 18N.
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3. Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information, and Land Information Ontario (LIO) Warehouse Open Data (<https://geohub.lio.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNR/F).
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Webequie Supply Road

Map of GHD Caribou Category Two and Category Three for Existing Conditions

Figure Number: 13-7		REV: PA		
Client: Webequie First Nation	Project Number: 661910	Date: 5/13/2025		
DSC		DRN	CHK	APP
		TE	GS	GS

13.2.2.1.4 Wolverine

Survey Results

Winter Aerial Results

Winter aerial surveys for wolverine were conducted concurrently with Caribou surveys in 2018, 2019 and 2021 (Appendix F). When fresh tracks were observed, they were followed until an animal was observed or until tracks were lost. Typically, trails were lost in areas of dense cover.

In 2018, wolverine tracks were recorded at 20 locations across the winter aerial survey area, but no animals were observed. Tracks were observed to the southwest, south, and southeast of Webequie. These tracks were commonly situated along rivers or lakes.

The 2019 survey resulted in the observation of one (1) live wolverine, in addition to 38 track occurrences. The single individual was observed briefly within 5 km of the preliminary proposed corridor. Wolverine tracks were observed extensively east of Webequie, predominantly within the north-eastern quadrant of the survey area (67% of track observations, 44% of transects). Twenty-seven per cent (27%; 10) of the track observations were recorded south of the alignment. Wolverine track occurrences were typically associated with riverine habitats within large tracts of peatland and were spread across the western half of the survey area. In one instance, wolverine tracks were observed moving back and forth to a moose carcass, likely the result of a Wolf-kill.

In 2021, only three (3) Wolverine track observations were made during the winter aerial surveys, and no individuals were observed within the LSA. Transects surveyed in 2021 were greatly reduced in overall area, compared to those flown in 2018 (reduced by 52%) and 2019 (reduced by 29%) and included only the Wolverine LSA. This reduction in survey area likely contributed to the overall reduction of wolverine track encounters, compared to 2018 and 2019.

Wolverine Occupancy Study

Trail Cameras

In 2021, trail cameras deployed to each of the 25 run pole stations resulted in the capture of 31,037 wildlife photos (Appendix F). A total of 4,151 photos of wolverine were taken, across 13 stations. Wolverines made 29 distinct appearances at run pole stations and were documented on 25 camera days. When photos were analyzed for the presence of distinct individuals, at least seven (7) unique individuals were identified in 2021. Not all wolverine visits to run pole stations resulted in the wolverine climbing the run pole or sampling the bait. Wolverines climbed the run pole on 56% of visits.

In 2022, a total of 26,758 photos of wolverine were taken, across 20 stations (Appendix F). Wolverines made 145 distinct appearances at run pole stations and were documented on 120 camera days. Wolverines climbed the run pole on 73% of visits. When photos were analyzed for the presence of distinct individuals, at least 11 unique individuals were identified in 2022. All individuals identified in 2021 were recaptured in photographs in 2022, with the exception of W06. In total, a minimum of 12 individual wolverines have been identified during this two-year investigation.

A wolverine den was serendipitously found on March 3, 2021, by the Project Team's biologists while maintaining bird ARUs. Following discussion with wolverine experts and an MECP biologist, two (2) additional trail cameras were deployed approximately 2 km from the den site to document wolverine



movements. A total of five (5) wolverine passes were documented between the two (2) cameras. Only one (1) pass showed identifying features of the individual with chest markings confirming it as W04, which had been viewed at run pole stations but did not present enough data to have its sex confirmed.

Confirmed Individuals

At least 12 unique individuals were identified from photos that provided views of distinct markings. All individuals that were identified as unique eventually climbed at least one run pole; however, some individuals were identified prior to climbing a run pole. Of the 12 unique individuals recorded, five (6) were confirmed as females and four (4) were confirmed as male. Two (2) were unable to have their sex determined.

The six (5) female wolverines included W02, W06, W07, W08, W09, and W11. Due to the visibility of teats on individuals W02, W07, and W09 between late March and early May, it is assumed that these were adult, lactating females which had established dens within or in proximity to the wolverine LSA. W07 was recorded in both 2021 and 2022. W06 was recorded four times at the same camera in 2021 and was determined to be a female through genetic analysis, yet did not show any visible sexual characteristics, despite being well photographed. W06 was not recorded in 2022 and is presumed to have dispersed or perished. W08 was recorded on 42 distinct occasions in 2022 only and was photographed sufficiently to be identified as a female through photo analysis, even though evidence of lactation was not observed. This classification was confirmed via genetic analysis. W11 was recorded twice and was determined to be a female via -photo documentation, only because she bathed in a puddle in front of run pole, showing the presence of a vulva and lack of prepuce or testicles. She showed no evidence of lactation. She is presumed to have a territory adjacent to the LSA and may occasionally cross into the LSA where their ranges overlap with the core population of the LSA.

A total of four (4) males were confirmed via photo and genetic evidence. Of the four (4), sex for W05 was determined through genetic testing only in 2021. W01, W03, and W10 were identified as males via photo documentation, as testicles could be observed.

W04 had an extensive ventral pattern that that was readily identified. This individual was recorded a total of 9 times, yet only climbed a run pole once and did not leave hair on the snares for DNA analysis. No sex has been confirmed for W04.

No sex was determined for W12. W12 twice (2). Both of these individuals are expected to have home ranges within the RSA that are adjacent to, and slightly overlap with, the LSA.

Hair Snares

2021 Hair Snare Results

In 2021, a total of 51 hair samples were collected from nine (9) stations. Hair collection yielded between 1 and 7 samples at each sampling station. When hair snare samples were compared to photo documented wolverine visits, hair verifiably sampled during 52.9% of occasions when a wolverine climbed a run pole. If repeated visits (i.e., visits where a single wolverine returns to run pole multiple times) are excluded, then 69.2% of run pole visits resulted in the collection of hair samples.

Overall, 49 samples could be processed by the laboratory, 36 of which were sufficient to confirm wolverine presence. Of these, 14 samples from eight (8) separate wolverine occurrences were robust enough to undergo genotyping.



Genetic analysis resulted in the determination or confirmation of sex for each of the five (5) wolverines known to have climbed the run poles. Sex was correctly determined via photo analysis for individuals W02, W03, W06 and W07 and genetic analysis identified W05 as a male and W06 as a female.

The 2021 report of genetic analysis conducted by the Natural Resources DNA Profiling and Forensic Center team at Trent University can be found in Appendix F – NEEC Report.

The results of the 2021 aerial survey indicate that track levels observed from the air do not necessarily provide a true indication of the level of wolverine activity in the area, as wolverines regularly visited wolverine run pole stations.

2022 Hair Snare Results

In 2022, a total of 146 hair samples were collected from 20 stations. Hair collection yielded between 1 and 12 samples at sampling stations. Overall, 132 samples could be processed by the laboratory and 120 samples could be sufficiently confirmed as wolverine. Of these, 79 samples from eight (8) separate wolverine occurrences were robust enough to undertake genotyping.

Genetic analysis resulted in the determination or confirmation of sex for six (6) wolverines known to have climbed the run poles.

A full report produced by the Natural Resources DNA Profiling and Forensic Center team at Trent University for the 2022 results is included in Appendix F – NEEC Report.

Abundance and Distribution

A total of twelve (12) individual wolverines were distinguished by way of the occupancy study conducted between 2021 and 2022. Of the individuals recorded, six (6), (three (3) males [W03, W05, W10], two (2) females [W02, W08] and one (1) undetermined [W04]) were recorded repeatedly; therefore, it can be reasonably concluded that much of their winter home range falls within the LSA. Of these individuals, five (5) were recorded in both 2021 and 2022. One additional female (W07) was recorded on one occasion, during both years. This individual was determined to be lactating in 2021. Based on this evidence, it is assumed that the home range of this female covers enough area within the LSA that she regularly occurs therein. While male wolverines are known to have large ranges that overlap with the ranges of multiple females, there is evidence that denning females establish ranges away from other wolverines (COSEWIC, 2014). This may be the case with W07. Conversely, female W02 occupies a range that overlaps greatly with two (2) males (W03, W05).

An additional five (5) individuals were recorded between 1 and 4 times. W06 was recorded four (4) times at the same camera in 2021 and was determined to be a female through genetic analysis. W06 was not recorded in 2022 and is presumed to have dispersed or perished. W09, W11, and W12 are presumed to have territories adjacent to the LSA and may occasionally cross into the LSA where their ranges overlap with the core population of the LSA. A proportion of the population, typically yearlings, is transient at any given time. Yearling females tend to establish home ranges nearer their natal ranges than do yearling males, although both sexes are capable of long-distance movements (COSEWIC, 2014).

A simple estimation of population size for this Mark-Recapture study was calculated using the Lincoln Index (see Appendix F– NEEC Report for details). Through qualitative analysis and use of the Lincoln Index, the population of wolverines using the LSA can be interpreted to range between seven (7) and twelve (12) wolverines. An average of these estimations is 9.4 wolverines. This translates to a range of wolverine densities between 2.7 to 4.7 per 1,000 km², with an average density of 3.6 per 1,000 km².



Wolverine density across the LSA is high, compared to other study areas in Ontario and within the southern Boreal ecological area. This result is in agreement with probability of occurrence modelling produced by Ray et al. (2018), where a band of higher probability of occurrence (0.51-1.00) was present in the region of the Wolverine LSA. While abundance and probability of occurrence are not synonymous, Ray et al. (2018) surmise that their distribution model of wolverines in northern Ontario likely reflects the relative abundance patterns of wolverines in the same study area.

The WSR is located across a transition zone at the boundary of Ecoregions 2W and 2E: upland, mixed and coniferous forested lands in the west give way to expansive wetlands in the eastern portion of the LSA. Wolverine activity at run pole stations was notably concentrated across the western portion of the wolverine LSA, where six (6) Wolverines had overlapping territories in addition to three (3) individuals. Additionally, two (2) wolverines were recorded that had ranges in more easterly portions of the LSA, east of Bender Lake, based on the data collected during the occupancy study. This pattern of occurrence also agrees with the pattern of occurrence shown by modelling done by Ray et al. (2018), where wolverine occurrence was shown to be high in the centre of northern Ontario and then decreased as it approached the boundary between the Northern Shield Ecozone and the Hudson Bay Lowlands Ecozone.

Home Range

Home range was calculated to the extent possible for six (6) individuals, where enough occurrences were recorded, using Minimum Convex Polygons (MCP) as well as 95% kernel density. Average winter home range for males in the LSA and RSA was estimated at 397.1 km² using MCP and 1,445.0 km² using kernel density. This average home range size falls well below the average of 2,563 km² calculated by Dawson et al (2010). Average winter home range for females was estimated at 125.1 km² using MCP and 586.8 km² using kernel density, which is similar to the home range area of 428 km² for females that was calculated by Dawson et al. (2010). Scrafford et al. (2022) calculated 95% MCP using GPS data from 39 collared wolverines in the Red Lake area of Ontario and found the average home range size for males was 1,409 km² (n = 25) and for females was 713 km² (n=14). The average home range for males estimated by Scrafford et al. by way of MCP is similar to our estimated average male home range calculated via kernel density.

Wolverine Habitat

A single wolverine den, identified as a reproductive den, was discovered in March 2021, under the root ball of a fallen spruce. By nature, denning sites are secretive locations. For a species so wide-ranging in nature, identification of microhabitat features such as candidate denning sites is challenging. Scrafford et al. (2022) used GPS telemetry to find reproductive den sites of five (5) females and indicated that in certain years microhabitats may not be suitable as den sites because of lower snowfall. Research into female denning behaviour in the Red Lake area indicates that females will continue to den year-after-year within the same small area in the center of their ranges and that den sites used may all occur as close as within 1-2 km of each other (Scrafford et al. 2022). MECP considered the den and area within a 4 km radius as the “denning area”.

Data from wolverine run pole station occurrences and winter aerial survey data are indicative of preferred habitat in the more upland, densely wooded, and varied habitats present in the west of the Wolverine LSA.



Survival and Reproduction

In 2021, three (3) females were recorded in the study area, while in 2022 five were recorded, Camera evidence indicates that up to six (6) total females have had winter-spring territories that occurred within or extended into the LSA. Of these, one (W06) was recorded in 2021 but not in 2022 and two (2) individuals (W09 and W11) may be transient their territories borders the LSA, such that they infrequently occur within it. Evidence of lactation was noted for two (2) of the three remaining (3) females whose territories are expected to overlap more widely across the LSA, indicating that at least two (2) reproductive females are present. Both confirmed adult females were recorded in 2021 and 2022.

It is difficult to determine if female wolverines are adult or subadult. Wolverine research near Red Lake, Ontario indicates that half of females trapped were adult and half were subadult (Scrafford and Ray, 2022). At maximum, five (5) female wolverines were recorded within the study area in a given year (2022), compared to a minimum of three (3) in 2021. Female wolverines may only give birth every other year.

If reproductive rates reported by Magoun (0.6-0.7, 1985) Persson et al. (0.74, 2006) and Rauset (0.84, 2013) are averaged, then the reproductive rate of females (min=3 and max=5) within the LSA would be 2.18 - 3.64 kits per year. Two distinct wolverines of unknown sex were recorded during the study. Based on the female:male ratio recorded during the study area for known individuals (6:4), an additional female may occur in the study area, raising the reproductive rate to 2.91 - 4.37.

Threats and Survival

In the Project Footprint, natural predators of wolverine are likely limited to gray wolves.

Traditional Knowledge gathered from members of Webequie First Nation indicate that wolverines are rarely encountered and seldom trapped. Only one (1) modern-day record of a trapped wolverine was communicated to the WSR project team. Overall interest and participation in trapping activities by Webequie First Nation members is low as is the current risk to the local wolverine population from trapping or hunting pressure.

13.2.2.1.5 Little Brown Myotis and Northern Myotis

Bat Hibernacula Screening

Background Information Review

A review of the ENDM AMIS (ENDM, 2016) did not identify any mining infrastructure within 100 km of proposed project alternatives.

A review of the ELC vegetation community data indicates that there are 14 sites (covering a total of 9.1 ha) of candidate bat hibernacula habitat that occur within the LSA. When expanded to the RSA, 18 candidate sites are present. These areas total 13.4 ha in size.

J.D. Mollard (2020) detailed one (1) location where there were areas of bedrock at the surface, based on the topography described in the report there were no vertical rock faces, and no large cracks were described. Given the reports description these areas were not visited on foot for the purpose locating bat hibernacula but were flown over during the reconnaissance helicopter flights.



Field Survey Results

Reconnaissance helicopter flights along the proposed preferred route and alternative routes did not yield any observation of landforms that indicated the presence of bat hibernacula. No such features were observed during subsequent extensive field studies by the Project Team during other field survey types between 2019-2021. Additionally, a report detailing the underlying geology only identified one (1) location in the RSA where underlying bedrock met the surface, and there were no vertical rock faces or large cracks indicating the feature contained a potential bat hibernaculum.

Bat Maternity Roost Habitat Screening

Mature hardwood and mixed treed ecosites representing suitable bat maternity roost habitat account for a total of 180.44 ha within the LSA. When expanded to the RSA, bat maternity roost habitat with these characteristics totals an area of 355.92 ha. Given the preferred characteristics of the mixedwood and hardwood areas, these were classified as suggested bat maternity roost habitat. Upland areas of coniferous trees were also classified as candidate habitat; however, lowland areas of coniferous trees were not given their small stature.

Data from the 2020 vegetation field program indicate a total of 1,932.36 ha of candidate habitat occurs within the LSA and an area of 7,013.61 ha occurs within the RSA (LSA – 6.99%, RSA – 6.59% of respective study areas). Based on these results, it was determined that mature hardwood and mixed forest were not present in sufficient amounts (LSA – 0.66%, RSA – 0.33% of respective study areas) to merit habitat assessment surveys. This view was expressed to bat specialists with MECP, who agreed that such surveys were not necessary.

2019 Bat Acoustic Surveys – Maternity Roosting Period

In 2019, a total of 693 bat passes were recorded at the four (4) acoustic detection stations. Bats were recorded at each detection station. Of the 693 total recordings obtained using passive monitoring equipment, 507 were identified as bat recordings by Kaleidoscope software. Manual vetting identified 76 additional non-bat recordings. As such, a total of 431 bat passes were recorded. Auto-identification and manual vetting concluded that a total of four (4) bat species were recorded during the 2019 acoustic survey.

Overall, bat activity at all four (4) detection stations was relatively low. The four (4) stations averaged 5.1 bat passes per night, which is well below averages of 44.4 and 37.9 bat passes per night for stationary recorders deployed by MECP along the Pickle Lake and Ear Falls routes in 2016 and 2017 (M. Karam, *pers. comm.*, 2020). Low-frequency bat species accounted for the majority (n=338) of bat recordings identified to species during the survey period. Big Brown Bat (n=90), Silver-haired Bat (n=90), Hoary Bat (n=37), and other low frequency bat recordings (n=121) comprised 67% of the total classified passes. Big-brown and Silver-haired Bats were detected at all stations, while Hoary Bat was detected at stations BAT1, BAT3 and BAT4. Little brown myotis was identified at two stations (BAT 1 and BAT 2); however, only a single recording was confirmed to species-level identification at station BAT 2. Myotis sp. and High Frequency bat calls were recorded that could not be attributed to any species with certainty. It is expected that these recordings are indeed little brown myotis. Confirmed little brown myotis recordings accounted for 18% (85 passes) of all bat passes.



2020 Bat Acoustic Surveys – Maternity Roosting Period

In 2020, a total of 1,599 bat passes were recorded at the eight (8) acoustic detection stations. Bats were recorded at each detection station. Of the total recordings obtained using passive monitoring equipment, 528 were confirmed as bat recordings through manual vetting. Auto-identification and manual vetting concluded that a total of five (5) bat species were recorded during the 2020 acoustic survey.

Overall, bat activity at all eight (8) detection stations was relatively low. Only two (2) stations (BAT7 and BAT8) recorded more than ten bat passes. Low-frequency bat species accounted for the majority (n=371) of bat recordings identified to species during the survey period. big brown bat (n=2), silver-haired bat (n=16), hoary bat (n=272), and other low frequency bat recordings (n=77) comprised 70% of the total classified passes. Big-brown bat, silver-haired bat, and hoary bat were all detected at three (3) of the stations. Low-frequency species were detected at stations BAT3, BAT4, BAT5, BAT6, BAT7, and BAT8. Little brown myotis was identified at a single station, BAT 7. Myotis sp. and High Frequency bat calls were recorded that could not be attributed to any species with certainty were recorded at stations BAT7 and BAT8. It is expected that these recordings include, in part, Little Brown Myotis calls. Eastern Red Bat (*Lasiurus borealis*), another high-frequency species was recorded at BAT7. Confirmed little brown myotis recordings accounted for 3.7% (20 passes) of all bat passes.

Few files contained detections of little brown myotis in 2020, possibly reflecting one or a combination of factors such as:

- The LSA's position near the northern limits of the species' range in Ontario;
- Lack of high-suitability roosting habitat in the LSA; and
- Low numbers of the species due to WNS-induced mortality.

2020 Bat Acoustic Surveys – Migration Period

Bat acoustic surveys conducted during the swarming and migration period recorded bats at three (3) of seven (7) survey stations. A total of 1,559 bat passes were recorded. Four (4) species (Hoary Bat, Big Brown Bat, Eastern Red Bat, and Little Brown Myotis) were recorded during this survey.

2023 Bat Acoustic Surveys

In 2023, a total of 22,237 bat passes were recorded at the twenty-five (25) acoustic detection stations. Bats were recorded at each detection station. Auto-identification indicated 18,179 of these recordings as noise leaving 4,058 recordings possible bat recordings. Manual review took place for 3,120 recordings. Of the total recordings obtained using passive monitoring equipment, 3285 were determined as bat recordings through manual vetting and Auto-identification. Auto-identification and manual vetting concluded that a total of five (5) bat species were recorded during the 2023 acoustic survey.

Overall, bat activity was highly variable. Two stations (WSR06 and WSR33) had no recorded bat passes while 13 stations had less than 10. Conversely, nine stations had more than 100 bat passes, with the highest number being 474 recorded at WSR27. Low-frequency bat species accounted for the majority (n=2,579) of bat recordings identified to species or species groups during the survey period. Big Brown Bat (n=71), Silver-Haired Bat (n=1,720), Hoary Bat (n=457), Big Brown/Silver-haired Bat (n=126) and other low frequency bat recordings (n=225) comprised 78.5% of the total classified passes. High-frequency bat species accounted for 706 of bat recordings identified to species or species groups during the survey period. Little Brown Myotis (n=459), Eastern Red Bat (n=74), Eastern Red Bat/Little Brown Myotis (n=8), Myotid Bat (n=86) and other high frequency bat recordings (n=79) comprised 21.5% of the



total classified passes. *Myotis* sp. and High Frequency bat calls were recorded that could not be attributed to any species with certainty were recorded at eight (8) stations. It is expected that these recordings include, in part, Little Brown *Myotis* calls. Silver-Haired Bat, and Hoary Bat were all detected at the most stations (19) with Eastern Red Bat only recorded at four (4) stations.

Bat Maternal Activity Modeling

Current Habitat Use

The data from all identified bat species or species groups was first used to develop a general bat habitat use BRT model. The application of cross-validation to the BRT model resulted in an optimal number of iterations of 125, where models more complex than this did not improve model performance. The five (5) most important habitat variables were conifer forest, the edge between water and land, hard edges, shoreline treed fen, and treed fen and bog. These variables were then selected as candidate variables in a Poisson GLM model. Model coefficients were almost all highly significant, suggesting meaningful selection of variables through the BRT modelling process, however due to issues with overfitting the GLM models were limited to the top four variables.

Species specific models were then explored for Little Brown *Myotis*, Silver-haired Bat, and Hoary Bat. The Little Brown *Myotis* model was unstable, so it was dropped from the process. Predicted activity for the all-bats model, Silver-haired Bat, and Hoary Bat were summarized by ELC class at the RSA level to reveal relative expected activity levels among ELC classes. The highest levels of predicted activity occurred for ELC classes Mixed Wood Swamps, Open Shore Fen/Thicket Swamp (OSF/TS), Open Shore Shrub Fen, and River Open Water (Riv/OW). The all-bats model was then used to predict changes in habitat use due to future disturbance.

Changes To Habitat Use Due to Future Disturbance

As expected, the largest change in functional values occurred within the Project Footprint scale, as the entire 35 m wide footprint is changed to an “anthropogenic disturbance” landcover type (**Table 13-13**). The reason the use of the Project Footprint does not drop to zero is because the RSF models include variables estimated across broader spatial extents. The Project Footprint is 35 m across, while the 3-ha hexagons used in modeling are approximately 200 m across. In contrast, the LSA is approximately 2-3 km wide, and is a very relevant scale for assessing local net effects. For the general bat model the decrease in use in the LSA is 11.84%. The RSA is approximately 13 km wide and as expected had the weakest response to future disturbance.

Table 13-13: Bat Species Group Probability of Habitat Use Percent Change by Study Area

Species	% Change by Study Area		
	Project Footprint	LSA	RSA
Bat Species Group	-30.4%	-11.8%	-0.5%

13.2.2.2 Birds

13.2.2.2.1 Evening Grosbeak

Survey Results

One (1) Evening Grosbeak was heard flying over a count site, during point count surveys conducted for the Project in 2019. One (1) additional Evening Grosbeak detection was recorded during 2021 ARU surveys.

Overall, Evening Grosbeak was rarely encountered within the LSA and insufficient data on this species was collected to produce BRT density or Resource Selection Function (RSF) occurrence modelling for this species.

13.2.2.2.2 Olive-sided Flycatcher

Survey Results

Twenty-six (26) Olive-sided Flycatcher detections were recorded during 2019 point-count surveys. Most of those detections (21) were recorded in either coniferous forest or woody wetland habitats.

Sufficient detections of Olive-sided Flycatcher were collected across baseline breeding bird point counts and ARU recordings, such that Boosted Regression Tree (BRT) density modelling could be produced for this species. The values were then summarized to the ELC polygon level, and a five-class quantile classification was applied to derive an aggregated functional habitat use value. The top quantile is rated as high (top 20% of values), next two quantiles as moderate and bottom two quantiles as low. Based on the model the LSA contains 6,285.66 ha (22.7%) of high suitability habitat while the RSA contains 26,285.6 ha (19.6%) of high suitability habitat (**Table 13-14**).

Table 13-14: Olive-sided Flycatcher Habitat availability in the LSA and RSA

Habitat Use	Density Range	LSA Area (ha)	LSA %	RSA Area (ha)	RSA %
High	0.319 – 0.584	6285.66	22.7	26285.6	19.6
Moderate	0.152 – 0.319	10484.89	37.9	50702.64	37.8
Low	0.0 – 0.152	10882.75	39.4	57020.74	42.5

Density mapping for this species across the RSA can be found in Appendix F of this EAR/IS – NEEC Report and **Section 13.3.9.1**.

13.2.2.2.3 Rusty Blackbird

Survey Results

Six detections of Rusty Blackbird were recorded on four plots during 2019 breeding bird surveys. All four (4) of the plots where the detections were made were classified as woody or non-woody wetlands. One Rusty Blackbird was also recorded on May 28 during a 2019 waterfowl stopover survey. Seven detections of Rusty Blackbird were recorded on six plots during 2020 breeding bird point counts. All detections were recorded within fen, swamp, or riparian habitats.

Overall, Rusty Blackbird was uncommonly encountered across the LSA and insufficient data on this species was collected to produce BRT density or RSF occurrence modelling for this species.

13.2.2.2.4 Lesser Yellowlegs

Survey Results

One Lesser Yellowlegs was detected in the aerial waterbird survey on September 1, 2020. During the breeding bird point acoustic surveys, Lesser Yellowlegs were detected at one station in 2020 and twelve stations in 2021. Based on survey results, Lesser Yellowlegs are likely only present at low density numbers within the LSA and RSA. This is in agreement with modeling done by the Boreal Avian Modeling Project (BAM) which estimates Lesser Yellowlegs density within the RSA at 0.00016 adult males per hectare (BAM, 2020).

Insufficient data on Lesser Yellowlegs were collected to produce BRT density or RSF occurrence modelling. Suitable Habitat was determined based on ELC vegetation classification. Based yellowlegs nesting habitat requirements open and sparsely treed bogs and fens, shoreline wetlands, burnt wetlands and disturbed habitats were classified as suitable habitat. Based on these categories 15.5% of the PF, 18% of the LSA and 22% of the RSA was considered suitable habitat (**Table 13-15**).

Table 13-15: Lesser Yellowlegs Habitat availability in the PF, LSA and RSA

Habitat Use	PF Area (ha)	PF%	LSA Area (ha)	LSA %	RSA Area (ha)	RSA %
Suitable	85.49	15.51	4984.85	18.0	29732.17	22.2
Not Suitable	465.80	84.49	22668.45	82.0	104276.82	77.8

13.2.2.2.5 Common Nighthawk

Survey Results

Common Nighthawk was not searched for formally during 2019 field surveys due to constraints with accessing remote habitat during dusk and dawn hours. None were recorded incidentally during breeding bird surveys or flushed accidentally. This species is assumed to be present in suitable habitat across the Project Footprint.

Analysis of dawn ARU data indicated that Common Nighthawk was notably more likely to be detected through ARU sampling than point count survey (20.6% vs 0%). Analysis of dusk ARU data yielded Common Nighthawk occurrence at 18 stations.



Common Nighthawk is a common breeder across open habitats across the LSA. Sufficient detections of Common Nighthawk were collected across baseline breeding bird point counts and ARU recordings, such that Boosted Regression Tree (BRT) density modelling could be produced for this species. The values were then summarized to the ELC polygon level, and a five-class quantile classification was applied to derive an aggregated functional habitat use value. The top quantile is rated as high (top 20% of values), next two quantiles as moderate and bottom two quantiles as low. Based on the model the LSA contains 4333.32 ha (15.7%) of high suitability habitat while the RSA contains 32781.12 ha (24.5%) of high suitability habitat (**Table 13-16**).

Table 13-16: Common Nighthawk Habitat availability in the LSA and RSA

Habitat Use	Density Range	LSA Area (ha)	LSA %	RSA Area (ha)	RSA %
High	0.083 – 0.089	4,333.32	15.7	32,781.12	24.5
Moderate	0.08 – 0.083	1,0324.13	37.3	49,892.95	37.2
Low	0.075 – 0.08	12,995.85	47.0	51,334.92	38.3

13.2.2.2.6 Bald Eagle

Background Information Review

Survey Results

A total of 23 Bald Eagle nests have been recorded during field studies for the Project. Bald Eagle nests were located primarily along the expansive shoreline of Winisk Lake and among the many lakes west of Webequie. No Bald Eagle nests have been located within 1 km of the route alternatives for the WSR.

Overall, Bald Eagle is a regular breeding species along shoreline habitat across the LSA; however, insufficient data on this species was collected to produce BRT density or RSF occurrence modelling for this species.

13.2.2.2.7 Short-eared Owl

Survey Results

Short-eared Owls were not detected during field studies for the Project, incidentally or otherwise. No Short-eared Owls were detected at any point count locations and given that Short-eared Owls are a relatively non-vocal species, no detections were made on ARUs during the breeding season and fall. Non-detection of Short-eared Owls during field is not necessarily unexpected as Short-eared Owls are an irruptive and nomadic species (Wiggins et al., 2020). Both the breeding bird surveys (42 in the LSA and 40 in the RSA) and the ARU acoustic surveys (42 in the LSA and 13 in the RSA) had large numbers of stations in suitable habitat for Short-eared Owls. Additionally, ARUs have successfully been used to detect Short-eared Owls in the Hudson Bay Lowlands (Wyshynski, 2024) suggesting the lack of detections may indicate lack of presence. One caveat is due to battery and SD card failure, no recordings were available for processing from late winter (February-April) which does add some uncertainty to their presence

Insufficient data on Short-eared Owls were collected to produce BRT density or RSF occurrence modelling. Suitable Habitat was determined based on ELC vegetation classification. Based on Short-eared Owl nesting habitat requirements for open habitats, the ELC classes defined as suitable habitat were open and sparsely treed bogs and fens, shoreline wetlands, and disturbed habitats. Short-eared Owl nest predominantly in large open areas, with a minimum area of 50 to 100 ha thought to be required for breeding (Austen et al. 1994). However, total area of habitat within a landscape is thought to be more important than patch size (Herkert et al. 1999) so no patch size minimum was applied. **Table 13-17** details available habitat for Short-eared Owl in the project areas.

Table 13-17: Short-eared Owl Habitat availability in the PF, LSA and RSA

Habitat Use	PF Area (ha)	PF%	LSA Area (ha)	LSA %	RSA Area (ha)	RSA %
Suitable	80.22	14.55	4892.79	17.69	29523.31	22.03
Not Suitable	471.07	85.45	22760.51	82.31	104485.68	77.97

13.2.2.3 Lake Sturgeon

13.2.2.3.1 Field Surveys

In general, waterbodies in the LSA and RSA were considered to support a variety of cool and cold-water fish. The large rivers support populations of Walleye, Lake Sturgeon, Brook Trout, Lake Whitefish, and other fish species. Many lower energy watercourses connected to these rivers provide habitat for Walleye and Northern Pike. Typically, Yellow Perch, White Sucker, and other small forage fish species are present with these larger bodied fish. Smaller streams and lakes in the area also support a variety of smaller-bodied fish, including cyprinid species, Brook Stickleback, and Mottled Sculpin. Fish habitat sensitivity ratings were determined for all waterbodies. Of the 31 waterbodies, three (3) were determined to be “rare”, 23 were determined to be “moderate”, and one (1) was “low”.

No Lake Sturgeon were captured during fish community sampling program for the Project and no eggs were identified during the spring spawning surveys. However, Webequie First Nation community members caught Lake Sturgeon from the Winiskisis Channel confirming their presence in that waterbody in 2020 as part of traditional food collection.

Results of the eDNA surveys did not identify any Lake Sturgeon at time of sampling in any watercourses assessed as well. Due to the current limited information, a precautionary approach will be used, and it will be assumed that Lake Sturgeon is present in Winisk Lake, Winisk River, the Muketei River, the Winiskisis Channel and major tributaries to these systems within the LSA and RSA for fish and fish habitat.

13.3 Identification of Potential Effects, Pathways and Indicators

In accordance with TISG **Section 13** (Effects Assessment), the effects assessment must describe in detail the project's potential adverse and positive effects in relation to each phase of the Project. For the WSR, this includes the construction and operation of the road. For the Species at Risk VC, potential environmental effects and measurable parameters were selected based on review of similar environmental assessments for linear projects (such as roadways, transmission lines, and pipelines) in Ontario and within Canada, comments provided during the engagement process, and professional judgement. While Potential Effects may be similar across the different wildlife criteria, each of the key species and species groups are evaluated individually.

The primary potential effects of the Project on the SAR and SAR Habitat VC are:

- Species at Risk Habitat Loss;
- Species at Risk Habitat Alteration or Degradation;
- Alteration in the Movement of Species at Risk; and
- Injury or Death of Species at Risk.

Potential effects, indicators, nature of the interactions, and linked VC's for the SAR and SAR Habitat VC are described in the following subsections and are summarized in **Table 13-36**.

13.3.1 Threat Assessment Approach

As required in the TISG (**Section 13**) the methodology for the effects assessment for species at risk is a staged approach involving an initial assessment of the effects of the Project or "Threat Assessment" (without consideration of mitigation), followed by an assessment of the predicted net effects with application of mitigative measures as presented in **Section 13.4**. These two assessments differ in that the Threat Assessment is limited to the physical direct removals or alteration of species at risk habitat, while the predicted net effects assessment incorporates a qualitative and quantitative description of the effects using criteria to assess adverse effects, taking into account any important contextual factors and mitigation. For species at risk the VC, the potential effects for the threats assessment used the following criteria:

- **Scope** – defined spatially as the proportion of the valued component's occurrence or population within the study areas (Project Footprint, LSA, and RSA) that can reasonably be expected to be affected by the predicted effect within 10 years:
 - pervasive: the effect is likely to be pervasive in its scope, affecting the valued component across all or most (71-100%) of its occurrence or population within the study areas (i.e., Project Footprint, LSA, RSA);
 - large: the effect is likely to be widespread in its scope, affecting the valued component across much (31-70%) of its occurrence or population within the study areas;
 - restricted: the effect is likely to be restricted in its scope, affecting the valued component across some (11-30%) of its occurrence or population within the study areas; and
 - small: the effect is likely to be very narrow in its scope, affecting the valued component across a small proportion (1-10%) of its occurrence or population within the study areas.



- **Severity** – defined as, within the scope, the level of damage to the valued component from the effect that can reasonably be expected; typically measured as the degree of destruction or degradation within the scope or the degree of reduction of the population within the scope:
 - extreme: within the scope, the effect is likely to destroy or eliminate the valued component or reduce its population by 71-100% within ten years or three generations;
 - serious: within the scope, the effect is likely to seriously degrade/reduce the valued component or reduce its population by 31-70% within ten years or three generations;
 - moderate: within the scope, the effect is likely to moderately degrade/reduce the valued component or reduce its population by 11-30% within ten years or three generations; and
 - slight: within the scope, the effect is likely to only slightly degrade/reduce the valued component or reduce its population by 1-10% within ten years or three generations.

- **Irreversibility (or permanence)** – defined as the degree to which the effect can be reversed and the valued component restored, if the effect no longer existed:
 - very high: the effects cannot be reversed, and it is very unlikely the valued component can be restored, and/or it would take more than 100 years to achieve this (e.g., wetlands converted to a shopping center);
 - high: the effects can technically be reversed and the valued component restored, but it is not practically affordable and/or it would take 21-100 years to achieve this (e.g., wetland converted to agriculture);
 - medium: the effects can be reversed and the valued component restored with a reasonable commitment of resources and/or within 6-20 years (e.g., ditching and draining of wetland); and
 - low: the effects are easily reversible, and the valued component can be easily restored at a relatively low cost and/or within 0-5 years (e.g., off-road vehicles trespassing in wetland).

- **Magnitude** – magnitude = scope x severity, as follows:

SEVERITY	SCOPE				
		Pervasive	Large	Restricted	Small
Extreme		Very High	High	Medium	Low
Serious		High	High	Medium	Low
Moderate		Medium	Medium	Medium	Low
Slight		Low	Low	Low	Low

- **Degree of effect** – degree of effect = magnitude x irreversibility, as follows:

MAGNITUDE	IRREVERSIBILITY				
		Very High	High	Medium	Low
Very High		Very High	Very High	Very High	High
High		Very High	High	High	Medium
Medium		High	Medium	Medium	Low
Low		Medium	Low	Low	Low



A Summary of the Threats Assessment is included at the end of the potential effects assessment for each of the SAR species. The evaluation criteria within the net effects section (**Section 13.5**) uses additional evaluation criteria, but the criteria used in the threats assessment are accounted for through the use of magnitude and irreversibility within the net effects evaluation. Similarly, the degree of effect found in the threat assessment is a component of the evaluation of significance completed in **Section 13.6**.

Given that the application of the threat assessment process to a project level spatial scale is new and requires adapting a process designed for Global and National assessments of populations there are some limitations that should be considered.

- The assessment results are highly susceptible to study area size, as scope will be proportional to the study area, and evaluations of severity are based within the scope;
- Evaluation at very small scales (project footprint) are questionable as species rarely have closed populations at this scale;
- The choice of study area size will affect the scoring results so may be susceptible manipulation (only evaluate impacts at larger scales); and
- Importance is not factored into the assessment, removal of a few sensitive features, or spatially important features may be more important than loss of a larger number of less sensitive features.

Given that the process was designed for global and national population assessments, issues at smaller scales can be problematic. The NatureServe document on which the threat assessment is based on (NatureServe, 2012) quotes the International Union for the Conservation of Nature (IUCN) in its discussion of scale "The choice of scale ... may thus, itself, influence the outcome of ... assessments and could be a source of inconsistency and bias." While this is in a discussion of mapping scale, it is also an important consideration when determining the appropriate scale of the evaluation.

All potential effects, indicators, nature of the interactions, and threat assessments for the SAR and SAR Habitat VC are described in **Section 13.3.2** through **13.3.12**.

13.3.2 SAR and SAR Habitat

The following potential effects are common to all SAR and SAR Habitat criteria. Additionally, with the implementation of mitigation measures, described in **Section 13.4** the effects are adequately mitigated and are not expected to cause net effects and were therefore not carried forward for further assessment.

13.3.2.1 Habitat Alteration or Degradation

Accidental Spills

Chemical or hazardous materials stored on or spills of such materials in the Project Footprint could affect wildlife survival and reproduction. Spills, should they occur, are predicted to be generally localized in nature. Given the types of activities that will be associated with the Project, the most likely types of spills would be fuel and/or oil-based products from machinery and equipment.

Deposition of Dust and Other Airborne Particles

Construction and operation of the Project is predicted to generate air and dust emissions such as carbon monoxide (CO), oxides of sulphur (SO_x), including sulphur dioxide (SO₂), oxides of nitrogen (NO_x), particulate matter (e.g., PM_{2.5}) and total suspended particulate matter. Air emissions such as SO_x and



NO_x will result from the use of fossil fuels in generators, vehicles, and equipment during the Project. Air emission, and subsequent deposition, can affect upland, riparian and wetland ecosystems through changes to soil quality by altering soil pH, nutrient content and soil composition.

Accumulation of dust produced from the Project may result in localized changes to vegetation in the LSA. Changes in plant community structure may affect habitat use by many species of wildlife. Dust resulting from the disturbance, transport and stockpiling of earth materials and vehicle and equipment movement on the road during construction and operations have the potential to affect vegetation through direct interaction (e.g., smothering over time), and/or transport of harmful chemicals or nutrients which alter soil and water conditions (Forman and Alexander, 1998). While road dust can fertilize nutrient-limited peatlands and affect their plant assemblages and ecosystem functions, these alterations are general found only along roadways with high traffic and dust deposition levels (Li et al., 2023).

The modelling results for the Assessment of Effects on the Atmospheric Environment are found in Section 9. During construction, the results of the modelling indicate a maximum dust deposition value of 10 g/m², 143% greater than the provincial ambient air quality criteria (AAQC) even with dust controls. However, due to the intermittent and localized nature of these potential effects during the construction phase their impact is anticipated to be low. These values drop during operations to 4.3 g/m² (61% of the AAQC) over 30 days at 50 m of the road centerline. Additionally, dust depositions during the operations phase will only be present for the first three years as the road is forecasted to be paved at that point.

Vibration

Vibration is discussed in Appendix J - Webequie Supply Road Noise and Vibration Technical Report: Existing Conditions and Impact Assessment. Vibration during road and bridge construction was assessed using 3 mm/s as the target level criteria. Based on equipment type 24 m was the largest setback required to reach this level. At greater distances vibration minimal, for the largest source of vibration, an impact pile driver during bridge construction, vibration levels were 0.271 mm/s at 165 m and 0.094 mm/s at 350 m. While minimum vibration perception by individual wildlife species is generally unknown, perception by humans starts between 0.14 and 0.25 mm/s.

Based on the relatively low volumes of rock needed for the Project, blasting of rock requiring the use of explosives during construction and operation activities is expected to occur on an infrequent basis when aggregate and/or rock materials are required for construction and maintenance activities. Vibration generated by blasting is expected to be temporary and the potential effects will be centered around blasting locations.

In terms of Operations ground vibration impacts from the operations phase of the Project were deemed highly unlikely, and therefore an assessment of vibrations from operations was not required under the Provincial Terms of Reference.

Invasive Plant Species

The introduction and spread of invasive plant species can affect vegetation community structure and composition, which can affect the habitat availability and distribution. Invasive plants could structurally affect habitats that function as shelter, while composition changes could alter the availability of forage. Invasive plant species could be brought into the Project Footprint during construction along with equipment and supplies. Road construction and associated infrastructure may also create abiotic conditions in which invasive species thrive, allowing them to spread from temporary areas of disturbance (e.g., construction camps, staging areas).



13.3.2.2 Injury or Death

Wildlife Attractants

Human-wildlife interactions will increase during the construction phase if SAR, or their predators are attracted to the Project Footprint by such things as food waste, sewage, or petroleum-based products. These materials can also change predator-prey relationships, which can affect SAR survival and abundance.

During Operations, attractants could also increase human-wildlife interactions and change predator-prey relationships, thereby affecting the survival and reproduction of Species at Risk. One example of an operational attractant would be roadkill, which, if not removed, could attract scavengers to the ROW and lead to collisions, incidental take, or changes to predator-prey relationships.

13.3.3 Caribou (Boreal population)



Indigenous community members expressed concerns about the impacts of the Project on caribou migration routes. To assess the movement of caribou (Boreal and Eastern Migratory populations), the Project Team has reviewed background studies and Indigenous Knowledge shared by communities and conducted field investigations that include aerial surveys and caribou collaring. The results of the assessment of the Project's potential impacts to caribou are described in Section 13.3.3. Proposed mitigation measures and monitoring approach to address potential effects of the Project to Caribou are outlined in Section 13.4 and Section 13.10.

13.3.3.1 Habitat Loss

Caribou habitat loss may result from vegetation clearing activities and disturbance during construction and throughout operations. As a conservative estimate for caribou and all other species the entire project footprint will be considered as cleared by project activities. The pathways or activities which may result in loss of Caribou habitat are described below:

Site preparation, vegetation clearing activities, quarry creation and roadbed construction → Permanent removal of vegetation → Loss of Caribou habitat.

Construction

Habitat Loss Due to Clearing Activities

The Missisa Caribou Range is approximately 70,000 km² in size while the Ozhiski Caribou Range covers 38,700 km² (MNR, 2014a; 2014b; 2014c). In northeastern Ontario, female Caribou were found to have mean annual home range sizes of 4,026 km² (Brown et al., 2003); however, these ranges are used variably throughout the year, and from year to year. Caribou (Boreal population) use habitat at different spatial scales, as described and categorized in the General Habitat Description (MECP, 2020). A total of 486,857 ha or 4.6% of the combined Missisa and Ozhiski Caribou Ranges are classified as Category 1. Category 2 encompass the majority of current Caribou distribution during all seasons within the range, with 71.79% or approximately 7.6 million ha classified as Category 2 within the Missisa and Ozhiski Caribou Ranges. Category 3 areas within the Missisa and Ozhiski Caribou Ranges total 23.6% of the range or 2.5 million ha.



Habitat loss is recognized as one of the contributing factors to Caribou range recession in Ontario (Ontario Woodland Caribou Recovery Team, 2008). Provincial mapping indicates that two (2) Category 1 features, both Nursery Areas, are present in the Caribou LSA, totaling 759 ha, or 0.3%. Approximately 80.4%, or 202,882 ha, of the Caribou LSA is classified as Category 2. The remaining 19.3% of the Caribou LSA is classified as Category 3. Details of the categorized caribou habitat areas potentially impacted, and hectares removed by the Project in the Caribou LSA and RSA are presented in **Table 13-18**. Overall, the results of habitat modeling estimate the removal of 232.4 ha of Category 1 Nursery Areas and 98,483.57 ha of Category 2 Seasonal Ranges. Category 3 Remaining Areas in the Range will increase by 98,797.34 ha from construction activities due to the conversion of Category 1 and Category 2 habitats, representing an increase of 202.6% of Category 3 in the Caribou LSA.

The 232.40 ha of Category 1 Nursery Areas estimated to be removed during construction activities represents 0.1% of the known Nursery Areas in the Missisa and Ozhiski Caribou Ranges (RSA). The 98,483.57 ha of Category 2 Seasonal Ranges to be removed during construction activities represents approximately 1.30% of the known Category 2 habitat in the Missisa and Ozhiski Caribou Ranges (RSA). Category 3 Remaining Areas in the Ranges will increase in the RSA by 102,096.69 ha or 4.6%.

Table 13-18: Details of Categorized Caribou Habitat Loss in the LSA and RSA

	Caribou LSA				Caribou RSA			
	Existing Conditions (ha)	Road Construction (ha)	Change in Area (ha)	Change in Area (%)	Existing Conditions (ha)	Road Construction (ha)	Change in Area (ha)	Change in Area (%)
Category 1								
Nursery Area	759.2	526.8	-232.4	-30.6	313,618.8	313,386.4	-232.4	-0.1
Winter Area	0	0	0		486,857.0	486,857.0	0	0
Category 2								
Seasonal Ranges	203,253.8	104,390.8	-98,863	-48.6	7,858,914.7	7,757,050.4	-101,864.3	-1.3
Category 3								
Remaining Areas in the Range	48,478.7	147,574.2	99,095.4	204.4	2,203,180.6	2,305,277.3	102,096.7	4.6

Operations

Habitat Loss Due to Clearing Activities

Road operations are unlikely to result in additional loss of Caribou habitat, including Category 1 High Use Areas, Category 2 Seasonal Ranges, and Category 3 Remaining Areas in the Range habitat areas, as regular maintenance will involve managing re-growth of vegetation along the ROW within the Project Footprint. There is a very low probability that reclaimed temporary laydown areas and clearings may need to be reused during operations. While the quarries are expected to remain operational following construction, the footprints will not be expanded and as such no additional habitat loss or destruction is anticipated to occur during operations.



13.3.3.2 Habitat Alteration or Degradation

There may be alterations to caribou habitat resulting from vegetation clearing, hydrological changes and disturbance during construction and throughout operations. The pathways or activities which may result in alteration or degradation of caribou habitat include the following:

Construction and operations require vegetation removal, clearing activities, and maintenance → Changes in vegetation height, density, and community composition → Habitat structural changes alter or degrade Caribou habitat.

Construction activities and road operations generate noise, light, and other sensory disturbances → Habitat becomes less suitable, and Caribou use less frequently → Sensory disturbances alter or degrade Caribou habitat.

Construction of road and vegetation removals change drainage and alter soil moisture regimes → Hydrological changes to ground or surface water change wetland complexes within Nursery Areas and Seasonal Ranges → Alteration and degradation of Caribou habitat.

The federal recovery strategy (ECCC, 2020) describes Caribou (Boreal population) habitat alteration as changes to the landscape that “adversely impact the ecosystem, either temporarily or permanently, reducing the overall function of habitat within the range”. Project-related Caribou habitat alteration or degradation may result from vegetation clearing and disturbance during construction and throughout operations.

Alteration or degradation of Caribou habitat, including Category 1 High Use Areas, Category 2 Seasonal Ranges, and Category 3 Remaining Areas in the Range, may result from vegetation clearing and disturbances during construction and throughout operations. The area of disturbance is delineated as the Project Footprint surrounded by a 500 m buffer. Areas of sub-range classified habitat within 500 m that will potentially be impacted by the Project can be found in **Table 13-20**.

Seasonal use of habitats within the 500 m buffered Project Footprint (i.e., area of disturbance), as determined under existing conditions, is presented in **Table 13-21**. Caribou seasonal use was modelled with a presence/absence RSF based collaring data using NRL, WSR and MNRF data.

GHD Category 2 and 3 regional range Caribou habitat described in **Section 13.2.2.1.3** was updated with the WSR as a linear feature. Future condition includes disturbance resulting from the project footprint of the proposed road, along with laydown areas and aggregate extraction sites. Average probability of use of GHD Category 2 for the Ozhiski and Missisa Caribou Range under current condition and future condition resulting from disturbance can be seen in **Table 13-19**. The availability of Category 2 habitat remained unchanged for the Ozhiski Range and drops from 86.2% under existing conditions to 84.7% under future conditions or a drop of 1.7%. For additional details, please refer to **Appendix U** (GHD Category 2 and 3 Mapping Report for Net Effects Assessment in Ozhiski and Missisa Caribou Ranges - 2024).

Table 13-19: Average Probability of Use and GHD Category 2 for the Ozhiski and Missisa Caribou Ranges Under Future Conditions

Range	Spring	Summer	Fall	Winter	Overall
Ozhiski	0.271	0.403	0.483	0.330	0.688
Missisa	0.696	0.488	0.574	0.276	0.847



In general, the Missisa Range is used more heavily than the Ozhiski Range, with heightened use in areas throughout the Caribou LSA. Details of the modelling methods are provided in the Baseline report. Overall, the buffered area of disturbance contains moderate-use Caribou habitat in the spring (approximately 56.7% of the area) and in the winter (47.8% of the area) as identified in the existing conditions; only 0.1% of the buffered area of disturbance is considered high-use spring habitat, and 10.7% is high-use winter habitat in the existing conditions.

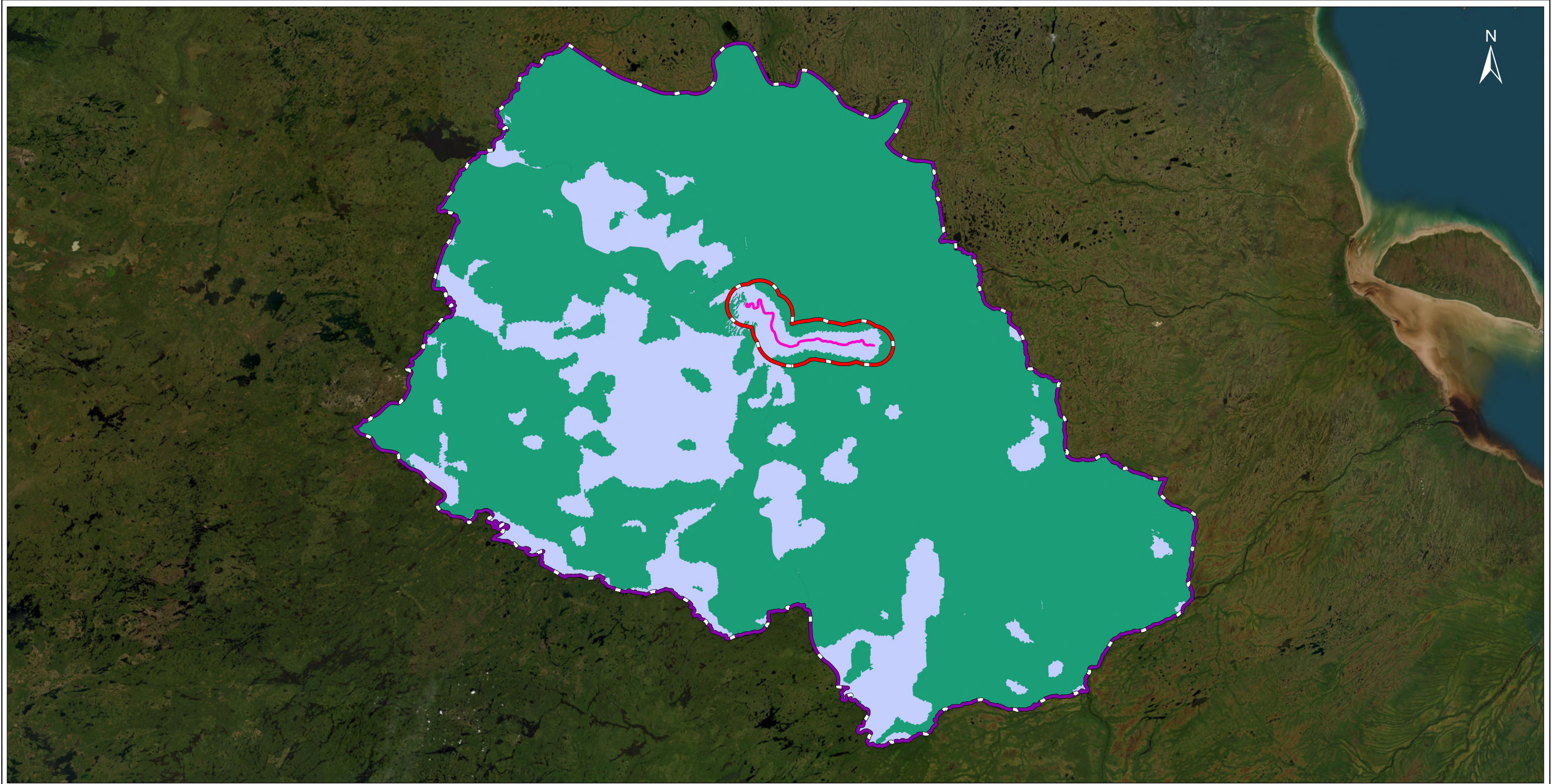
The pathways or activities which may result in alteration or degradation of Caribou habitat are described below.

Table 13-20: Details of Categorized Caribou Habitat Alteration or Degradation

Habitat Description	Area (ha) Within 500 m Buffer Potentially Impacted	% of Buffered Area	% of Caribou LSA Existing Conditions	% of Caribou RSA Existing Conditions
Category 1				
Nursery Area	0	0	0	0
Category 2				
Seasonal Ranges	9,488.4	78.3	4.68	0.12
Category 3 – Remaining Areas in the Range				
Remaining Areas in the Range	2,635.8	21.7	5.41	0.12

Table 13-21: Seasonal Use of Habitats within 500 m Buffered Area of Disturbance

Rating	Spring Use (ha)	% of Buffered Area	Winter Use (ha)	% of Buffered Area
Low	3,104.3	25.6	2,922.6	24.1
	2,136.6	17.6	2,107.0	17.4
Moderate	3,294.7	27.2	3,505.2	28.9
	3,583.3	39.5	2,296.1	18.9
High	9.3	0.1	1,293.2	10.7



- Legend:**
- Preferred Route
 - Caribou Local Study Area (LSA 11km from Preferred Route)
 - Caribou Regional Study Area (RSA Includes the Missisa and Ozhiski Ranges)
 - Category Two Habitat
 - Category Three Habitat

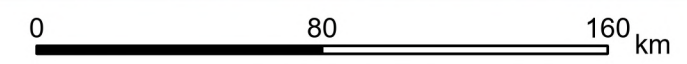


NOTES

1. Coordinate System: NAD 1983 UTM Zone 18N.
2. Cadastral boundaries are for informational purposes only and should not be considered suitable for legal, engineering, or surveying purposes.
3. Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information, and Land Information Ontario (LIO) Warehouse Open Data (<https://geohub.lio.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNR/F).
4. Service Layer Credits: Earthstar Geographics

DISCLAIMER

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Webequie Supply Road

Map of GHD Caribou Category Two and Category Three for Future Conditions

Figure Number: 13-8		REV: PA		
Client: Webequie First Nation	Project Number: 661910	Date: 5/13/2025		
DSC		DRN	CHK	APP
		TE	GS	GS

Construction

Habitat Alteration or Degradation due to Habitat Structural Change

The Woodland Caribou Recovery Strategy (Woodland Caribou Recovery Team, 2008) identifies alteration of vegetative cover as an activity that may result in adult female Caribou selecting higher risk environments for calving, i.e., Nursery Areas. Category 1 habitats, including Nursery Areas, have the lowest tolerance to alteration before their function in supporting Caribou is compromised (MECP, 2020). Range condition informs the relative tolerance of the range to alteration: where range condition is sufficient, there is an increased tolerance to alteration in all three (3) habitat categories (MNRF, 2014c). Based on the Integrated Range Assessment for Woodland Caribou and their Habitat: Far North Ranges (MNRF, 2014d), it is uncertain if the Missisa Range condition is sufficient to sustain Caribou, while the Ozhiski Range is sufficient to sustain Caribou; however, additional population trend data was identified as a requirement for the Ozhiski Range. The federal Recovery Strategy (ECCC, 2020) recognizes that highly disturbed Caribou ranges will take decades to recover from habitat alteration as Caribou (Boreal population) rely on mature boreal forest ecosystems that have evolved over centuries.

Vegetation removals, creation of the ROW and construction of the paved and gravel road surfaces may alter or degrade Caribou habitat near the Project Footprint, extending into the LSA by changing habitat structure, including vegetation height, density, and community composition. The ROW will be 35 m wide with a road surface spanning 12 m composed of gravel (eastern half) and asphalt or chip seal treatment (western half) (refer to Section 4.3.1). Edge effects from construction of the road include abiotic, direct biotic, and indirect biotic effects on the habitat that may influence changes to habitat structure. In Boreal upland mixed forests, road edge effects on forest plant communities and environmental variables can be measured at the immediate edge, and changes to species composition are also evident (Buss et al., 2024). Additionally, temporary construction facilities such as laydown areas and access roads that are reclaimed and revegetated will undergo succession as the habitats mature. Beauchesne et al. (2013) found female Caribou were less likely to be found within clearcuts as stands aged, gaining only a temporary benefit from young, regenerating habitats until other species such as moose and wolf increase in those areas (Courtois et al., 1998; Nielsen et al., 2005).

Habitat Alteration or Degradation due to Sensory Disturbance

In Ontario, the impacts of sensory disturbances and their effects on Caribou are not well studied and are therefore a source of uncertainty (ECCC, 2024a). Anthropogenic disturbance in the Missisa Range is prevalent compared to the other Far North ranges and is primarily associated with high levels of mineral exploration activity (MNRF, 2014d). At a minimum, the application of a 500 m buffer on anthropogenic disturbance in Caribou habitat is recommended by ECCC, as 500 m represents an estimated zone of influence imparted by human-caused disturbance (ECCC, 2024a; ECCC, 2020; EC, 2011). Within this buffer, approximately 4.68% of existing Category 2 Seasonal Ranges would be altered in the Caribou LSA, and 5.41% of Category 3 habitat; in the Caribou RSA, this reflects an addition of 12,124 ha or 0.12% new anthropogenic disturbance to the area.

During construction, activities such as blasting at quarries/pits, earth hauling and vegetation clearing, and the use of construction lighting, may reduce the ability of Caribou to use habitat in the LSA along the ROW and supportive infrastructure due to sensory disturbances. Noise modeling discussed in Section 9 (Atmospheric Environment) and Appendix J - Webequie Supply Road Noise and Vibration Technical Report: Existing Conditions and Impact Assessment modeled three main sources of noise: general road construction, bridge construction and aggregate extraction. Caribou hearing is similar to humans but better at higher frequencies (Flydal et al., 2001). Given the lack of federal or provincial legislation that



specifically stipulates noise levels for wildlife, modeling was done using Health Canada's Mitigation Noise Level (MNL) for rural environments of 47dBA. For general construction noise the 47 dBA sound level distance would be 160 m, for bridge construction the distance would be 280 m and for aggregate extraction the 47 dBA noise level would be up to 650 m from the pit.

Aircraft have the potential be one of the loudest sources of noise, with caribou able to hear an aircraft taking off up to 6.5 km away (NWT CIMP, 2022). However, noise levels of flying helicopters are lower in sound pressure and 400 m flight height is often recommended to minimize wildlife disturbance.

Based on the relatively low volumes of rock needed for the Project, blasting of rock requiring the use of explosives during construction and operation activities is expected to occur on an infrequent basis when aggregate and/or rock materials are required for construction and maintenance activities. Noise generated by blasting is expected to be temporary and the potential effects will be centered around blasting locations.

Habitat Alteration or Degradation due to Hydrological Changes

While Caribou (Boreal population) rely on mature conifer forest cover, other biophysical features are important in composing the different types of habitats used throughout their lifecycle (MECP, 2020). Nursery Areas, considered as Category 1 High Use Areas, include wetland complexes dominated by fens and bogs interspersed with peninsulas and upland islands (Carr et al., 2011), while Seasonal Ranges (Category 2 habitat) are typically large tracts of undisturbed, mature forest interspersed with wetlands and lakes (MECP, 2020). Hydrological changes during road construction from activities such as grading, installation of drainage features, and construction of the roadbed could alter soil moisture regime, and shift or alter Nursery Areas and Seasonal Ranges. Changes may occur to both surface and groundwater, causing flooding or drying of vegetation communities. As described in Section 11.3.2.3, 91.82% of the project RSA is wetlands, primarily peatlands susceptible to changes in the flow of surface and subsurface water resulting from the bisection of these features by roads. The effects of roads on hydrology and Caribou habitat can occur up to 250 m from the ROW; the habitat alteration assessment uses the same values as those shown in Section 11.3.2.3, with significant effects expected within 20m, moderate effects within 60m and minimal effects experienced at 250 m. **Table 13-17** shows the known and potential caribou habitats within the hydrologically affected zones. Known areas are based on General Habitat Description mapping provided by the MNR, predicted areas are based on modeling conducted for the WSR project according to methods detailed in Appendix 11F (Predictive Mapping and Development of an RSF for GHD Category 1 (Nursery and High Use Winter) Habitat for the WSR and NRL Environmental Assessment Projects.) in Appendix F (Natural Environmental Existing Conditions Report) of this EAR/IS.



Table 13-22: Existing and Potential New Caribou Habitat Within Hydrological Affected Buffer Areas

Distance from Project Footprint	Known Areas (ha)		Potential Areas (ha)				
	Category 2 - Seasonal Range	Category 3 - Remaining Areas within the Range	Category 1 - Nursery Areas	Category 1 - Winter Use	Category 1 - Total ^(a)	Category 2 - Seasonal Range	Category 3 - Remaining Areas within the Range
0-20m	372.07	98.92	47.27	228.54	240.39	156.14	68.63
20-60m	739.73	197.70	95.65	425.72	439.29	310.55	139.21
60-250m	3470.78	939.16	437.07	1864.44	1891.69	1471.12	705.71

a) As Category 1 caribou habitats can overlap and are not mutually exclusive the total for Category 1 habitat is not simply additive.



Operations

Habitat Alteration or Degradation due to Habitat Structural Change

The habitat structural changes that result in Caribou habitat alteration and degradation initiated during the construction phase from vegetation clearing and changes to vegetation community structure is expected to continue during the operations phase. These vegetation changes will be maintained during road operations, but no new structural changes to habitat are expected to be generated as a result. Operation of the roadway is unlikely to result in additional physical habitat alteration or degradation. Roadway repairs will be generally made to the roadway surface which may require short-term clearing of vegetation, but not beyond the original footprint of the road. Some additional clearing of gravel or borrow pits may occur which may result in small amounts of habitat alteration or degradation

Habitat Alteration or Degradation due to Sensory Disturbance

Sustained or repeated disturbance, such as regular road use by vehicles, can result in the reduction in use of suitable habitat (Sapolsky, 1992; Creel et al., 2002). Several studies have demonstrated that Caribou do not use suitable habitat in the vicinity of industrial activities and other human developments (Dyer et al., 2001; Mahoney and Schaefer, 2001; Dyer et al., 2002) indicating sensory disturbances such as noise, light, and scent may contribute to alteration or degradation of habitat. Overall, sensory disturbance effects to Caribou habitat in Ontario are poorly understood (ECCC, 2024a) and the Caribou disturbance analysis used in the integrated risk assessment for the Missisa and Ohziski Ranges (MNR, 2014d) may underestimate the effects of sensory disturbances on habitat (MNR, 2014a). It is possible that noise, light, scent, and visual disturbances from vehicles travelling on the road during operations may impact Caribou habitat along the ROW and supportive infrastructure.

Habitat Alteration or Degradation due to Hydrological Changes

Operation of the road is not anticipated to result in further changes to hydrology than those initiated during the construction phase. It is possible that temporary changes to hydrology may occur during the operations, such as accumulation of debris affecting culverts and drainage that results in localized flooding and drying of areas.

13.3.3.3 Alteration in Movement

Caribou (Boreal population) move between high use areas and seasonal ranges depending on their needs throughout the year, with individual mean annual home ranges of 4,000 km² (Brown et al., 2003). The ability of Caribou to move long distances through the landscape to evade predators and access nursery areas and foraging opportunities, is likely critical to their fitness. Alteration in Caribou movement may result from vegetation clearing and disturbance during construction and throughout operations. The pathways or activities which may result in alteration in Caribou movement include the following:

Vegetation removal and clearing during construction fragments vegetated habitats and vehicle use during road operations creates a barrier → Caribou avoid crossing the road corridor during construction and operations → Loss of habitat connectivity alters Caribou movement.

Construction activities and road operations generate noise, light, scent, and other sensory disturbances → Sensory disturbances result in avoidance of area → Sensory disturbances alter Caribou movement.



Construction

Alteration in Movement due to Loss of Connectivity

Caribou movement is also likely to be altered by construction of the road due to the fragmentation of forest habitat, resulting in a loss of connectivity. The ROW will be 35 m wide with a road surface spanning 12 m composed of gravel (eastern half) and asphalt or chip seal treatment (western half) (refer to Section 4.3.1). The road corridor itself will extend approximately 70 km east-west across the Missisa Range, this creates a disturbance that stretches across 45% of the east-west distance near the middle of the range. Given their reluctance to crossroads, including moving parallel to the road prior to crossing (Leblond et al., 2013), this potentially may cause Caribou to move large distances east (into the Ozhiski Range) or west to avoid or prior to crossing the road, which may be through sub-optimal habitat.

A study tracking 53 GPS-collared Caribou (Boreal population) in the Laurentides Wildlife Reserve (7250 km²), Quebec, before, during and after a highway expansion project found that 77% of the caribou did not cross the highway during the 6-year study period, and the presence of active construction sites (up to 7 km in length) elicited strong behavioural reactions by caribou (Leblond et al., 2013). The width of corridors can influence the barrier effect as well. When the highway in the Laurentides Wildlife Reserve was expanded from 25 m to 90 m, Caribou that had once used the highway prior to the expansion modified their home range as the modifications progressed and exhibited stronger avoidance behaviour (Leblond et al., 2013). Barrier effects on Caribou (Boreal population) may be more pronounced due to their sedentary or non-migratory nature making them less inclined to cross disturbance corridors (Klein, 1980; Dyer et al., 2002).

Alteration in Movement due to Sensory Disturbance

Caribou movement is likely to be altered by sensory disturbances generated during the construction phase. Noise, lighting, scent, and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of Caribou as they avoid the ROW and supportive infrastructure areas. In Ontario, the impacts of sensory disturbances and their effects on Caribou behaviour are not well studied and are therefore a source of uncertainty (ECCC, 2024a). It is generally understood that adult female Caribou avoid suitable locations when selecting Nursery Areas due to sensory disturbances from development or recreational activities (Carr et al., 2007; Schaefer and Mahoney, 2007; Vors et al., 2007; Vistnes and Nellmann, 2008), with a potential critical threshold for pregnant cows identified as 10 to 15 km from the disturbance (Carr et al., 2011; MECP, 2020). In disturbed landscapes, Caribou (Boreal population) have been found to increase the size of their home ranges and reduce fidelity to seasonal and annual home ranges, likely to avoid disturbed habitat (Courtois et al., 2007). While Caribou (Boreal population) in Ontario have been found to demonstrate plasticity in migration, with facultative migration observed in forest-dwelling ecotypes, this plasticity was positively correlated with snow depth and had no relationship with human disturbance (Pereira et al., 2024).

Operations

Alteration in Movement due to Loss of Connectivity

Alteration in Caribou movement will occur in the Project Footprint due to vegetation clearing initiated during road construction that results in habitat fragmentation and loss of habitat connectivity. These vegetation changes will be maintained during road operations, but no new habitat fragmentation is



expected to be generated as a result. Vehicles using the road during operations are expected to produce additional barrier effects resulting in a loss of connectivity across Caribou habitat. Temporally, roads may pose as a greatest barrier to Caribou during late winter or periods of the year when traffic levels are higher during operations. Dyer et al. (2002) found Caribou (Boreal population) in Alberta crossed actual roads six (6) times less frequently in late winter than control roads in their study, and also less frequently compared to other seasons (calving, summer, rut), although road use was higher in the winter than the other seasons. As such, it may actually be the level of traffic that creates the barrier effect, which was the result of a similar study conducted by Smith and Johnson (2023).

Alteration in Movement due to Sensory Disturbance

Caribou movement will be affected by road operations due to sensory disturbances noise, light, scent, and visual disturbances from vehicles travelling on the road. While the impacts of sensory disturbances and their effects on Caribou behaviour are not well studied in Ontario (ECCC, 2024a), Caribou are described as disturbance sensitive (Leblond et al., 2013) and their behaviour is known to be altered by sensory disturbances from human developments and recreational activities, such as avoiding suitable Nursery Areas affected by sensory disturbances or increasing home range size to avoid disturbed habitats (Carr et al., 2007; Schaefer and Mahoney, 2007; Vors et al., 2007; Vistnes and Nellmann, 2008; MECP, 2020; Courtois et al., 2007). A potential critical threshold for pregnant cows was identified by Carr et al. (2011) as 10 to 15 km from the disturbance. Sensory disturbances generated by road operations may also elicit anti-predator behaviour in Caribou. The risk-disturbance hypothesis suggests displacement of wildlife by roads is because wildlife perceives roads, and associated human activity, as a predation risk (Frid and Dill 2002). Caribou (Boreal population) also move more quickly when near roads with increased traffic density (Leblond et al., 2013).

13.3.3.4 Injury or Death

The mean annual survival of adult female Caribou in the Missisa Range based on collaring data from 2008-2011 was 80% (MNRF, 2014d), which was below the assumed average adult female survival of 85% (EC, 2008). There was insufficient data collected for collared individuals in the Ozhiski Range to determine mean annual survival (MNRF, 2014d); however, based on recruitment data the population is either stable or declining (MNRF, 2014d). Survival of Caribou in a logged landscape was found by Fryxell et al. (2020) to be significantly lower than Caribou in an unlogged landscape (mean annual survival rate of 0.76 vs 0.90). The creation of the road may lead to both direct and indirect Caribou mortality. There could be increases in Caribou injury or death stemming from increased vehicle traffic during both construction and operation of the road, with indirect mortalities arising from increased energy expenditures, habitat changes, and increased presence of other ungulates carrying disease. The pathways or activities which may result in Caribou injury or death are described below.

Equipment and vehicles move within Project Footprint → Collisions with Caribou within Project Footprint → Injury or Death of Caribou.

Construction and operations activities clear vegetation → Increased access for Caribou predators → Injury or Death of Caribou.

Construction and operations of road changes habitat structure and availability and alters movement of Caribou → Caribou increase energy expenditures to move to and from breeding and foraging habitats → Injury or Death of Caribou.



Construction of Road → Increased access to Caribou habitat by humans → Injury or Death of Caribou.

Construction and operation activities create linear corridor and change habitat structure and availability → Increased access for ungulates (e.g., white-tailed deer) carrying disease (e.g., brainworm [*Parelaphostongylus tenuis*], chronic wasting disease) → Injury or Death of Caribou.

Construction

Injury or Death due to Collisions with Vehicles

Caribou injury and death may occur during construction due to collisions with construction vehicles and equipment. Generally, Caribou are known to avoid human disturbance, including roads. Wildlife species capable of sensing and avoiding risk from afar are typically at low risk of mortality from roads because they are rarely near roads (Rytwinski and Fahrig 2012; Jacobson et al. 2016).

Injury or Death Due to Increased Access

The development of the Webequie Supply Road could result in a negative effect on the abundance of Caribou through increased human access to Caribou habitat. Across most of the Caribou (Boreal population) distribution, including ranges in Ontario's Far North Region, the extent of hunting and its effect on local Caribou populations is largely unknown (ECCC, 2020), including from poaching (COSEWIC, 2014). Caribou (Boreal population) have not been legally harvested in Ontario, except by First Nation Peoples, since 1929 (MECP, 2020). Creation of roads in previously inaccessible areas can often lead to increased use by hunters (Crichton et al., 2004; Boston 2016), which may also include increased harvesting by First Nation Peoples. Construction and other temporary workers may contribute to Caribou mortality via poaching during construction and exploit the local area to hunt during their time-off or post-shift. The COSEWIC (2014) status assessment for Boreal Caribou across Canada indicates that adult female annual survival is approximately 75% (thus 25% mortality). Schmelzer (2013) determined that mean survival of females increased by 6% when hunting-related mortality was excluded from survival calculations. For certain Boreal populations in Quebec, a 3% decrease in female survival was observed in areas where hunting effects were present (Rudolph et al. 2012). As the mean annual adult female survival in the Missisa Range has been recognized as being below the 85% average annual survival rate (MNRF, 2014d; EC, 2008), additional pressure from hunting may jeopardize the recovery of the species in this range, and potentially the Ozhiski Range as well.

Injury or Death due to Changes to Predator-Prey Dynamics

The primary cause of Caribou (Boreal population) decline in Ontario is widely recognized as habitat disturbance that indirectly results in changes to predator-prey dynamics and increased predation rates (COSEWIC, 2014). Effects on Caribou survival from improved predator access and movement rates created during construction is likely. Grey Wolf is recognized as the primary predator of Caribou (Boreal population) (Ontario Woodland Caribou Recovery Team, 2008). In the context of the collaring study conducted to describe the baseline conditions, nine (9) of twenty-nine (29) collared caribou tracked over four (4) years died, presumed to have been due to wolf predation, with an annual mortality rate of 12.5%. Fryxell et al. (2020) found that Caribou mortality from predation was 7% in an unlogged landscape (Pickle Lake) and 14% in a logged landscape (Nakina) in Ontario, with the majority of predation events attributed to Grey Wolf. Grey Wolves and other predators use linear corridors to facilitate movement, which also increases hunting efficiency by these species as a result (Dickie et al., 2020, 2022; McKay et al., 2021; Pigeon et al., 2016). In the Nipigon Caribou Range, where there was 41 km of road per 100 km²



(Thompson et al., 2014) and the minimum caribou abundance was 0.50/100 km² (MNR, 2014d), Found et al. (2017) found that caribou made up only 3.1% of Grey Wolf diet. Mortality sites of radio-collared caribou killed by wolves were found to be closer to linear corridors than the locations of live animals (James and Stuart-Smith, 2000). Habitat disturbance may also create movement corridors and suitable habitat for alternate ungulate prey species (Cumming, 1992), which in turn results in increased wolf numbers (Ballard et al., 2000).

Injury or Death due to Increased Energy Expenditures

The cumulative effects of habitat loss, alteration and degradation, and alteration of movements on Caribou during construction will likely lead to increased efforts to travel throughout their home ranges, forage for food, and evade predators in the RSA. Female Caribou that avoid crossing roads have the potential to become trapped in sub-optimal habitats which can disrupt crucial biological activities and deplete energy as more time is spent foraging (Beauchesne et al., 2013; Frid and Dill, 2002; Zollner and Lima, 2005). Greater postpartum movement rates and increased use of lowland habitats have been associated with a higher risk of neonatal mortality (Walker et al., 2020), both of which may result from a combination of effects generated by the construction phase. Caribou in Ontario have seasonal differences in activity levels and relating to vegetation abundance (Mosser et al., 2014). They are typically more active in the winter in areas with intermediate vegetation, with the opposite relationship observed in the summer, and activity levels are also higher in deeper snow, presumably due to cratering behaviour (Mosser et al., 2014). Caribou in Ontario were also observed by Mosser et al. (2014) to have significantly higher levels of activity at the lowest temperatures, suggesting the use of behavioural thermoregulation. In Alberta, Bradshaw et al. (1998) calculated the energy cost of a single disturbance event to Caribou (Boreal population) as 3.46-5.81 megajoules. To lose >20% of autumn mass over the winter, which can reduce calf production (Cameron and Ver Hoef, 1994; Bradshaw et al., 1998), Caribou would have to encounter 41 to 137 disturbance events (mean = 89), highlighting the importance of modelling cumulative influences of disturbance during the winter on Caribou energy loss (Bradshaw et al., 1998). Modelling by Plante et al. (2020) on Caribou (Boreal population) in Quebec and Labrador suggest that cumulative effects of non-industrial (roads, villages) and industrial (mines, mining exploration) human disturbances impact early life (1 to 7 years) mortality risk during the winter for Caribou using warmer areas, with the mortality risk increasing by a factor of 6.5 for each 1°C increase. This suggests that Caribou displaced by roads into sub-optimal winter habitats may experience higher mortality rates, which may also be exacerbated by warmer temperatures.

Injury or Death Due to Disease

Construction of the road corridor may create suitable conditions for Moose and White-tailed Deer populations to increase, which may result in the proliferation of ungulate pathogens and disease in the Missisa and Ozhiski Caribou ranges. White-tailed Deer are the natural host of the parasitic meningeal worm or brainworm (*Parelaphostrongylus tenuis*), which is shed in the deer's feces and taken up by gastropods (i.e., snails, slugs) and then incidentally consumed by ungulates browsing on vegetation (Cornell Wildlife Health Lab, 2025). While not fatal to White-tailed Deer, brainworm in Moose and Caribou migrates through the brain and spinal cord, causing severe neurological disease and death (Cornell Wildlife Health Lab, 2025; Anderson and Strelive, 1968). Another fatal disease carried by wild cervids is chronic wasting disease (CWD), which has been detected in jurisdictions bordering Ontario (Manitoba; Quebec; New York, U.S.A.) (MNR, 2024). CWD has been actively monitored in the province since 2002 and has not been detected to date (MNR, 2024). At this time, climate, snow depth, and winter severity are recognized as the greatest limiting factors to the expansion of White-tailed Deer into new northern environments in Ontario (Kennedy-Slaney et al., 2018; Dickie et al., 2024) with habitat alteration



contributing to a lesser degree (Dickie et al., 2024), likely limiting the ability of this species to spread disease to naïve Caribou populations in Ontario's Far North in the medium-term.

Operations

Injury or Death due to Collisions with Vehicles

During operations, the predicted maximum vehicles travelling on the road is 500 per day, with the majority of travel anticipated to take place during daylight hours while Caribou are active. Generally, Caribou are known to avoid human disturbance, including roads, making them lower risk for road mortality; however, Caribou mortality due to collision with vehicles or trains, often involving groups of live animals, has been documented in several Canadian provinces, including Ontario (Cumming, 1992; Johnson, 1985; Brown and Ross, 1994).

Injury or Death Due to Increased Access

Effects on Caribou from increased access during operations are a continuation of the same impacts as described for the construction phase. The potential for harvest is also likely greater during the operations phase as it will operate over a long period of time with complete public access and provide new areas for hunters and harvesters to access habitat.

Injury or Death due to Changes to Predator-Prey Dynamics

Effects on Caribou from predators during operations are a continuation of the same impacts as described for the construction phase. Maintenance clearing during operations will maintain openness along the ROW which will maintain predator access to areas on and near the road and facilitate movement. During the winter months, wolves have difficulty moving in snow deeper than 40 to 50 cm (Formozov, 1946) which typically prevents them from accessing low-density Caribou populations (Jung et al., 2019) such as those in the Missisa and Ozhiski ranges. In unaltered environments, wolves will travel in areas of low snow, including existing wildlife trails, creeks, lakes, coniferous forests, and windswept ridges (Mech, 1970; Paquet et al., 1996; Kuzyk and Kuzyk, 2002). During operations, the road will be kept clear of snow during the winter (refer to Section 4.3.1.5) which may allow for wolves to travel along the road or shoulder and access previously inaccessible Caribou habitat; for example, wolves in Denali National Park, Alaska, used plowed roads to hunt Dall sheep (*Ovis dalli*) in areas that were difficult to access (Murie, 1944). Paquet et al. (2010) also found that wolves used compacted trails, such as plowed roads and snowmobile trails, to travel areas where deep snow would otherwise impede movements. As such, wolves may use the plowed ROW to access both anthropogenic and natural movement corridors that may have otherwise been inaccessible and infiltrate further into the caribou RSA. Additionally, Caribou predators may be attracted to the active road due to roadside foraging opportunities, including hunting (e.g., hare, rodents, berries) and scavenging (e.g., roadkill) (Grilo et al., 2015).

Injury or Death due to Increased Energy Expenditures

Effects on Caribou from increased energy expenditures during road operations are largely a continuation of the same impacts as described for the construction phase. While some sensory disturbances may be minimized, the presence of the road corridor and daily use by vehicles will generate continuous effects. Murphy and Curatolo (1987) found that, near roads, Caribou reduce their food acquisition and increase their energy expenditure, and they tend to have higher movement rates and increased vigilance. Leblond et al. (2013) also found Caribou exhibited higher movement rates within 5 km of roads, especially when



traffic density was high. The sensory disturbances generated by road traffic may lead to increased vigilance behaviour and movement, which can compromise fitness (Frid and Dill, 2002; Cameron et al., 2005).

Injury or Death Due to Disease

Effects on Caribou from disease during operations are a continuation of the same impacts as described for the construction phase. The use of the road by vehicles is unlikely to generate additional opportunities for transmission of disease vectors to Caribou.

13.3.3.5 Threat Assessment

Each of the four potential effects categories were evaluated based on the threats assessment criteria outlined in the TISG and is based on IUCN-CMP unified threat classification system, referenced from NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk (NatureServe, 2012). Threats are assessed prior to any mitigative measures being applied. The threat assessment process is generally done at the population level but can be done at a more regional level. Caribou (Boreal population) were assessed at the range level (i.e., Missisa and Ozhiski) in the RSA.

Scope for all threats to Caribou ranges from small to large as certain effects will be experienced more widely in the RSA. Threat severity ratings for these species range from slight to moderate. Loss of connectivity, sensory disturbances altering movement, and changes to predator-prey dynamics are serious as Caribou avoid crossing roads and avoid areas of human activity, and Caribou predators such as wolves and bears are likely to use the corridor to facilitate movement through Caribou habitat, especially during winter when the cleared road would be free of deep snow. Caribou are known to be impacted by roads and human disturbances, which will likely result in Caribou being unable to use habitat in the LSA, including nursery areas, and avoiding areas entirely. Loss of connectivity will mainly occur across the Missisa range as the road will partially bisect the range east-west and may result in Caribou moving through sub-optimal habitat. Magnitude is rated as low to medium, with loss of connectivity, sensory disturbances that alter movement, and changes to predator-prey dynamics rated as medium. Irreversibility is very high for clearance activities and disease; high for habitat structural change, hydrological changes, loss of connectivity, and changes to predator-prey dynamics; medium for increased access and increased energy expenditure; and low for sensory disturbances and collisions with vehicles. Many of the effects relate to the fact that returning the corridor to baseline conditions would take decades or longer. Relating to injury and death of Caribou, changes to predator-prey dynamics and disease are highly irreversible due to several factors, including reducing predator use of the ROW; eradication of disease; and the apparent lower annual survival and recruitment rate of the Missisa and Ozhiski ranges, which could take decades to recover from the loss of reproductively mature adults. The degree of effect is medium for clearance activities, loss of connectivity, changes to predator-prey dynamics, and disease, and low for all others.

A summary of the threat assessment for Caribou habitat loss, alteration or degradation of habitat, alteration in movement, and injury or death prior to the consideration of mitigation measures, is presented in **Table 13-23**.



Table 13-23: Summary of Threat Assessment for Potential Effects on Caribou (Boreal population)

Threat	Scope	Severity	Magnitude	Irreversibility	Degree of Effect
Habitat Loss – Clearance Activities	Small	Slight	Low	Very High	Medium
Habitat Alteration or Degradation – Habitat Structural Change	Small	Slight	Low	High	Low
Habitat Alteration or Degradation – Sensory Disturbances	Restricted	Slight	Low	Low	Low
Habitat Alteration or Degradation – Hydrological Changes	Small	Slight	Low	High	Low
Alteration in Movement – Loss of Connectivity	Large	Moderate	Medium	High	Medium
Alteration in Movement – Sensory Disturbances	Large	Moderate	Medium	Low	Low
Injury or Death – Collisions with Vehicles	Small	Slight	Low	Low	Low
Injury or Death – Increased Access	Small	Slight	Low	Medium	Low
Injury or Death – Changes to Predator-Prey Dynamics	Large	Moderate	Medium	High	Medium
Injury or Death – Increased Energy Expenditure	Restricted	Slight	Low	Medium	Low
Injury or Death – Disease	Restricted	Slight	Low	Very High	Medium

13.3.4 Wolverine

13.3.4.1 Habitat Loss

Wolverine habitat loss is described as a reduction in total available habitat for the species during one or more stages of their life cycle. Wolverines are a far-ranging species that has been detected at survey sites across the Wolverine LSA. As such, the entire Wolverine LSA and project footprint is considered wolverine habitat, with the possible exception of deep lakes (although these are also utilized as travel paths during the winter). Given that much of the landscape is mature boreal forest, there are likely multiple areas of downed trees that may be suitable for wolverine denning. Wolverine habitat loss, including suitable denning habitat, movement, and foraging habitat, may result from vegetation clearing activities and disturbance during construction and throughout operations. The pathways or activities which may result in loss of wolverine habitat are described below:

Site preparation, vegetation clearing activities, quarry creation and roadbed construction → Permanent removal of vegetation → Loss of Wolverine habitat.



Construction

Habitat Loss due to Clearing Activities

Wolverines select habitat at multiple spatial scales to meet their life history requirements, ranging from thousands of square-kilometres to the den site (Wolverine Recovery Team, 2013; ECCC, 2024b). Male wolverines establish their own territories and will travel long distances, crossing large areas of low-quality habitat (Packila et al., 2017; Carroll et al., 2020). Adult females exhibit a high fidelity to their territories and re-use their dens, which are typically taken over by a daughter when their mother dies (Aronsson and Persson, 2018; Vangen et al., 2001; Glass et al., 2022). Females have smaller home ranges than males and do not typically travel far from their natal home ranges, and they also prefer to den as far away from roads as possible (May et al., 2012; Sawaya et al., 2019; ECCC, 2024b). In a study conducted in Idaho and Alaska, almost all reproductive dens were located many kilometres from the closest road (Magoun and Copeland, 1998) which may indicate that the construction of roads, even several kilometers from a den site, may result in functional habitat loss through indirect effects.

As a result of their wide-ranging and diverse habitat preferences, wolverine habitat loss, including suitable denning, movement, and foraging habitat, will result from any permanent vegetation clearing, quarry creation, and related disturbance during construction and for the duration of operations. Habitat loss is recognized as the primary driver of wolverine range contraction from the historic southern extent of their range, which has been permanently converted and fragmented by human infrastructure (urban centres, settlement and associated linear corridors) (Wolverine Recovery Team, 2013; van Zyll de Jong, 1975; and Dawson, 2000; ECCC, 2024b). The placement of a road and its associated infrastructure would make the areas of removed habitat unusable to wolverines and have indirect effects to dens within several kilometres of the road. One den site discovered during baseline studies is known to occur within 400 m of the preferred alternative and will likely lose habitat function due to the construction of the road.

The results of habitat modelling via Ecological Land Classification (refer to Section 11), and an understanding of the Project Footprint, estimate construction activities will result in the removal of 546.57 ha of wolverine habitat in the LSA (**Table 13-24**), comprised of all ecotypes as Wolverine are wide-ranging and may use even low-quality habitat for movement purposes.

Table 13-24: Wolverine High-Use Habitat by Study Area

Species	LSA		RSA	
	Pre-construction (ha)	% Removed	Pre-construction (ha)	% Removed
Wolverine	19,711.37 ha	3%	110,520.24 ha	0.49%

Operations

Habitat Loss due to Clearing Activities

Road operations are unlikely to result in additional loss of wolverine habitat, including denning, movement, and foraging habitats, as regular maintenance will involve managing re-growth of vegetation along the ROW within the Project Footprint. There is a very low probability that reclaimed temporary laydown areas and clearings may need to be reused during operations. While the quarries are expected to remain operational following construction, the footprints will not be expanded and as such no additional habitat loss or destruction is anticipated to occur during operations.



13.3.4.2 Habitat Alteration or Degradation

Alteration or degradation of wolverine habitat, including suitable denning habitat, may result from vegetation clearing and disturbances during construction and throughout operations. The pathways or activities which may result in alteration or degradation of wolverine habitat are described below.

Construction and operations require vegetation removal, clearing activities, and maintenance → Changes in vegetation height, density, and community composition → Habitat structural changes alter or degrade wolverine habitat.

Construction activities and road operations generate noise, light, and other sensory disturbances → Habitat becomes less suitable, and wolverine use less frequently → Sensory disturbances alter or degrade wolverine habitat.

Construction of road and vegetation removals change drainage and alter soil moisture regimes → Hydrological changes to ground or surface water reduce beaver habitat and riparian corridors → Alteration and degradation of wolverine foraging habitat and movement habitat.

Construction

Habitat Alteration or Degradation due to Habitat Structural Change

Vegetation removals, creation of the ROW and construction of the paved and gravel road surfaces may alter or degrade wolverine habitat near the Project Footprint, extending into the LSA by changing habitat structure, including vegetation height, density, and community composition. The ROW will be 35 m wide with a road surface spanning 12 m composed of gravel (eastern half) and asphalt or chip seal treatment (western half) (refer to Section 4.3.1). Edge effects from construction of the road include abiotic, direct biotic, and indirect biotic effects on the habitat that may influence changes to habitat structure. In boreal upland mixed forests, road edge effects on forest plant communities and environmental variables can be measured at the immediate edge, and changes to species composition are also evident (Buss et al., 2024).

Scrafford et al. (2017) found that wolverines were strongly attracted to logging areas during the active logging period as well as the following summer: slash piles and log decks in logging areas can provide suitable denning structures. Disturbed forest sites also create early seral vegetation and edge habitats, which may provide foraging opportunities, and borrow pits may provide additional wolverine foraging habitat as suitable beaver habitat (Scrafford et al., 2017). However, temporal characteristics of such disturbances should be put into context, as attraction can result in negative consequences (e.g., road mortalities) and differ between age classes and sexes (Scrafford et al. 2017).

Wolverine activity was modelled with a presence/absence RSF. Details of the modelling methods are provided in the Baseline report. RSF modeling based on anticipated habitat loss predicts wolverine utilization of the Project Footprint to increase by 5.10%, use of the LSA to decrease 1.96% and use of the RSA to decrease 0.32% (**Table 13-25**).

Figure 13.9 shows the predicted use of the RSA under current conditions for wolverine. **Figure 13.10** shows the predicted use under future conditions. The predictions of higher use in the Project Footprint are counterintuitive and may be a result of the model using the disturbances category to model projected use of the ROW. Given the use of the disturbance category as the representative for the ROW in the RSF modeling, the results can be interpreted as wolverine would use the new vegetated areas within the ROW



at a higher rate than the vegetation communities that were removed; however, this only considers habitat structure, and not other effects that influence wolverine habitat selection, such as sensory disturbance.

Table 13-25: Wolverine Probability of Habitat Use Percent Change by Study Area

Species	% Change by Study Area		
	Project Footprint	LSA	RSA
Wolverine	5.10%	-1.96%	-0.31%

Habitat Alteration or Degradation due to Sensory Disturbance

During construction, activities such as blasting at quarries or pits, earth hauling and vegetation clearing, and the use of construction lighting, may reduce the ability of wolverine to use habitat along the ROW and supportive infrastructure due to sensory disturbances. Wolverine is identified as an excellent indicator of ecosystem integrity as it is one of the first species to disappear with the onset of human disturbance (Wolverine Recovery Team, 2013). Spatial studies of wolverine by Krebs et al. (2007) suggests that they negatively respond to human disturbance (such as helicopter activity and backcountry skiing) within occupied habitat.

Along the Trans-Canada Highway in Yoho National Park and Banff National Park, wolverines preferred areas more than 1.1 km from the highway (Austin, 1998). Studies have also indicated that wolverines are sensitive to forestry activities (e.g., Krebs et al., 2007, Bowman et al., 2010, Fisher et al., 2013) which include road building and would be similar to the activities undertaken by heavy machinery to clear vegetation and move earthen materials during the construction phase. Noise and light generated by construction may degrade wolverine habitat by reducing utilization of the area: this may be especially true during activities such as blasting, quarrying, hauling and clearing.



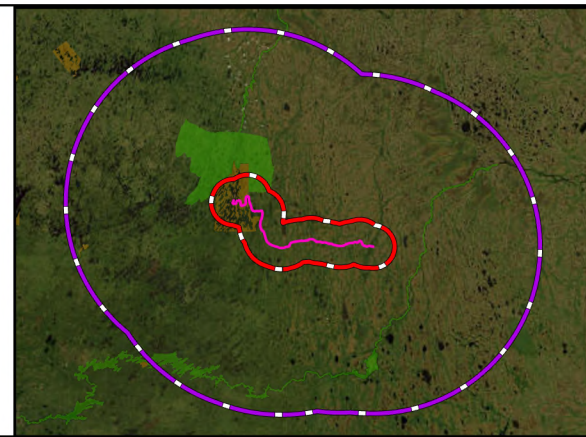


Legend:

- Preferred Route
- Wolverine Local Study Area (LSA 11km from Preferred Route)
- Wolverine Regional Study Area (RSA 75km from either side of LSA boundary)
- First Nation Reserve
- Provincial Park

Probability of Use

- 0.13% - 8.38%
- 8.38% - 43.25%
- 43.25% - 91.13%



WSR
WEBEQUE
SUPPLY ROAD

NOTES

1. Coordinate System: NAD 1983 UTM Zone 18H.
2. Cadastral boundaries are for informational purposes only and should not be considered suitable for legal, engineering, or surveying purposes.
3. Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information, and Land Information Ontario (LIO) Warehouse Open Data (<https://geohub.lio.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNRF).
4. Service Layer Credits: Earthstar Geographics

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0 5 10 km	
Webeque Supply Road	
Probability of Use of the RSA Under Existing Conditions for Wolverine	
Figure Number: 13-9	REV: PA
Client: Webeque First Nation	Project Number: 661910
Date: 5/13/2025	
DSC	DRN CHK APP
	TE GS GS

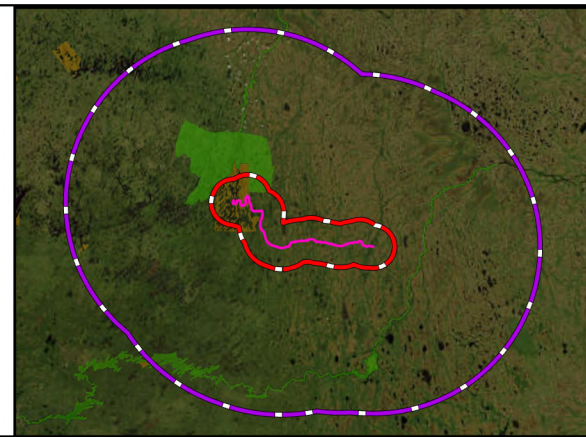


Legend:

- Preferred Route
- Wolverine Local Study Area (LSA 11km from Preferred Route)
- Wolverine Regional Study Area (RSA 75km from either side of LSA boundary)
- First Nation Reserve
- Provincial Park

Probability of Use

- 0.13% - 8.38%
- 8.38% - 43.25%
- 43.25% - 91.13%



WSR
WEBEQUIE
SUPPLY ROAD

NOTES

1. Coordinate System: NAD 1983 UTM Zone 18N.
2. Cadastral boundaries are for informational purposes only and should not be considered suitable for legal, engineering, or surveying purposes.
3. Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information, and Land Information Ontario (LIO) Warehouse Open Data (<https://geohub.lio.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNR/F).
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0 5 10 km	
Webeque Supply Road	
Probability of Use of the RSA Under Future Conditions for Wolverine	
Figure Number: 13-10	REV: PA
Client: Webeque First Nation	Project Number: 661910
Date: 5/13/2025	
DSC	DRN CHK APP
	TE GS GS

Habitat Alteration or Degradation due to Hydrological Changes

Hydrological changes during road construction from activities such as grading, installation of drainage features, and construction of the roadbed could alter soil moisture regime, and shift or alter wolverine wetland and riparian foraging and movement habitat. Changes may occur to both surface and groundwater, causing flooding or drying of vegetation communities. Beavers comprise an important part of wolverine diet in Ontario (Wolverine Recovery Team, 2013; COSSARO, 2014) and may be negatively affected by drying of wetland areas. As described in Section 11.3.2.3, 91.82% of the project RSA is wetlands, primarily peatlands susceptible to changes in the flow of surface and subsurface water resulting from the bisection of these features by roads. The effects of roads on hydrology and wolverine habitat can occur up to 250 m from the ROW; the habitat alteration assessment uses the same values as those shown in Section 11.3.2.3, with significant effects expected within 20 m, moderate effects within 60 m and minimal effects experienced at 250 m.

Operations

Habitat Alteration or Degradation due to Habitat Structural Change

The habitat structural changes that result in wolverine habitat alteration and degradation initiated during the construction phase from vegetation clearing and changes to vegetation community structure is expected to continue during the operations phase. These vegetation changes will be maintained during road operations, but no structural changes to habitat are expected to be generated as a result. Operation of the roadway is unlikely to result in additional physical habitat alteration or degradation. Roadway repairs will be generally made to the roadway surface which may require short-term clearing of vegetation, but not beyond the original footprint of the road. Some additional clearing of gravel or borrow pits may occur which may result in small amounts of habitat alteration or degradation

Habitat Alteration or Degradation due to Sensory Disturbance

Noise, light, and visual disturbances from vehicles travelling on the road during operations may impact habitat along the ROW and supportive infrastructure. Previous studies indicate that roads generally reduce habitat suitability for wolverines (Scrafford et al. 2018) and both males and females have negative associations with active roads (Hornocker and Hash, 1981; Krebs et al., 2007). During the denning period, wolverines are particularly sensitive and select remote, undeveloped areas to establish their dens (Copeland, 1996; Krebs and Lewis, 2000; Copeland et al., 2007; Krebs et al., 2007; May, 2007). In Norway, the mean distance of 50 wolverine dens from public roads was 7.46 km and 3.06 km from private, less used roads (May, 2007), indicating road traffic may broadly alter adjacent habitats.

Habitat Alteration or Degradation due to Hydrological Change

Operation of the road is not anticipated to result in further changes to hydrology than those initiated during the construction phase. It is possible that temporary changes to hydrology may occur during the operations, such as accumulation of debris affecting culverts and drainage that results in localized flooding and drying of areas.

13.3.4.3 Alteration in Movement

The ability of wolverines to move long distances across the landscape to detect scavenging and foraging opportunities, as well as to patrol territories, is likely critical to their fitness. These biological traits make wolverines especially sensitive to the effects of roads (Rytwinski and Fahrig 2012). Alteration in wolverine movement may result from vegetation clearing and disturbance during construction and throughout



operations. The pathways or activities which may result in alteration in wolverine movement include the following:

Vegetation removal and clearing during construction fragments vegetated habitats → wolverines avoid crossing large gaps during construction and operations → Loss of habitat connectivity alters wolverine movement.

Construction activities and road operations generate noise, light, and other sensory disturbances → Sensory disturbances result in avoidance of area → Sensory disturbances alter wolverine movement.

Construction

Alteration in Movement Due to Loss of Connectivity

Wolverine movement is likely to be altered by construction of the road because of the fragmentation of forest habitat, which results in a loss of connectivity. The ROW will be 35 m wide and have a road surface that spans 12 m and is composed of gravel (on the eastern half) and asphalt or chip seal treatment (on the western half) (refer to Section 4.3.1: Project Description, Project Components: Roadway). Wolverines are known to avoid crossing roads, which therefore act as a barrier and result in a loss of habitat connectivity that will extend into the operations phase. In a study that identified wolverine winter travel routes and responses to the Trans-Canada Highway in British Columbia, wolverines rarely approached the highway. Over a two-year period, they only crossed three (3) times, while also approaching the highway and not crossing an additional three (3) times (Austin, 1998). Where the three crossings occurred, the mean right-of-way width was significantly shorter (68 m) than where no crossings occurred (165 m) (Austin, 1998). Squires et al. (2006) also found that in Montana, Wolverine crossings of major roads occurred in areas with the narrowest distance between forest cover on each side of the road.

Alteration in Movement Due to Sensory Disturbance

Wolverine movement is also likely to be altered by sensory disturbances generated during the construction phase. Noise, lighting and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of wolverines as they avoid the ROW and supportive infrastructure areas. In Norway, wolverines were found to avoid areas with human structures such as houses, cabins, and settlements at the home range level, and this was attributed to human activities resulting in disturbance (May et al., 2006). Human disturbance has been found to be a major driver of wolverine distribution in British Columbia, with wolverines particularly avoiding areas with mechanized human disturbance (Kortello et al., 2019). Wolverines have also been found to abandon their dens when disturbed by human activities (Myrberet, 1968; Copeland, 1996).

Operation

Alteration in Movement Due to Loss of Connectivity

Alteration in wolverine movement will occur in the Project Footprint because of vegetation clearing, initiated during road construction, that results in habitat fragmentation and loss of habitat connectivity. These vegetation changes will be maintained during road operations, but the generation of new habitat fragmentation is not anticipated.



Alteration in Movement Due to Sensory Disturbance

Wolverine movement will be affected by road operations due to sensory disturbances generated from road use. Regular road use by vehicles and human use may create sensory disturbances that alter wolverine movement (Barrueto, 2025). Scrafford et al. (2018) found that wolverines in Alberta avoid roads and move quickly when in proximity to roads. Wolverines are thought to perceive roads and surrounding areas as high-risk and are likely to spend less time in proximity to them (Scrafford et al., 2018). Wolverine displacement increases as traffic volume increases, and high-traffic roads are more likely to displace wolverines than low-traffic roads (Scrafford, 2017). The risk-disturbance hypothesis suggests displacement of wildlife by roads is because wildlife perceives roads, and associated human activity, as a predation risk (Frid and Dill 2002). This behaviour may be linked to a fear of being exposed to predators while crossing resource roads — particularly wolves, which may use the roads to hunt (Scrafford et al. 2018).

13.3.4.4 Injury or Death

The creation of the road may lead to both direct and indirect wolverine mortality. There could be increases in wolverine injury or death stemming from increased vehicle traffic during both construction and operation of the road, with indirect mortalities arising from increased energy expenditures and habitat change. The pathways or activities which may result in wolverine injury or death are described below.

Equipment and vehicles move within Project Footprint → Collisions with wolverine within Project Footprint → Injury or Death of wolverine.

Construction and operations activities clear vegetation → Increased access for wolverine predators → Injury or Death of wolverine.

Construction and operations activities clear vegetation around den site during denning period (January 15 – May 31) → Abandonment of kits by their mother → Resulting death of one or more kits.

Construction and operations of road changes habitat structure and availability and alters movement of wolverine → wolverines increase energy expenditures to move to and from denning and foraging habitats → Injury or Death of wolverine.

Construction of Road → Increased access to wolverine habitat by humans → Injury or Death of wolverine.

Construction

Injury or Death Due to Collisions with Vehicles

Wolverine injury and death may occur during construction due to collisions with construction vehicles and equipment. Wolverines are largely nocturnal but can be active at any time of day. Generally, wolverine are known to avoid human disturbance, including roads. Wildlife species capable of sensing and avoiding risk from afar are typically at low risk of mortality from roads because they are rarely near roads (Rytwinski and Fahrig 2012; Jacobson et al. 2016). Wolverines use both speed and avoidance to reduce their residency time in roadside habitats, which should ultimately reduce their mortality from roads (Scrafford et al. 2018).



Injury or Death Due to Changes to Predator-Prey Dynamics

Effects on wolverine survival from improved predator access and movement rates created during construction is possible. Predators of wolverine include Black Bear (*Ursus americanus*) and Grey Wolf (COSSARO, 2014). These species can use linear corridors to facilitate movement, which also increases hunting efficiency as a result (Dickie et al., 2019, 2022; McKay et al., 2021; Pigeon et al., 2016). In a study that tracked 56 wolverines near Red Lake, ON, between 2018 and 2022, one (1) of two (2) predator deaths was by wolf and located near a road/trail (Scrafford et al., 2024). It is suggested that increased predator populations following habitat changes, such as the construction of a road, may negatively impact wolverine through competition or predation if wolf population density increases (Wolverine Recovery Team, 2013). Competition for prey may also increase if the range of Eastern coyote (*Canis latrans*) expands as a result of the constructed road (Chow-Fraser et al., 2022; ECCC, 2024b). Wolverine prey, including moose and caribou, area also affected by roads and avoid areas with dense corridors and heavy traffic (Beazley et al., 2004; Boulanger et al., 2020; ECCC, 2024b).

Injury or Death Due to Increased Energy Expenditures

The cumulative effects of habitat loss, alteration and degradation, and alteration of movements on wolverine during construction will likely lead to increased efforts to travel throughout their home ranges, forage for food, and access denning habitat in the RSA. Females are known to have high energetic demands while rearing young, and female body condition is thought to be a critical factor in successful reproduction (Banci, 1987; Persson, 2003; Rauset, 2013). Efforts to avoid construction-related disturbance, including increasing speed when near the corridor (Scrafford et al. 2018), may result in increased energy expenditures that can affect wolverine survival and reproduction.

Injury or Death Due to Increased Access

The development of the Webequie Supply Road could result in a negative effect on the abundance of wolverine through increased human access to wolverine habitat. Creation of roads in previously inaccessible areas can often lead to increased use by hunters (Crichton et al., 2004; Boston 2016), which may also include increased harvesting by First Nation Peoples. Of 239 wolverines tracked by radio telemetry between 1972 and 2001, 22 of the 62 mortalities recorded were the result of trapping or hunting (Krebs et al., 2004). During the same period, in populations where trapping occurred, human-influenced mortality accounted for 46% of wolverine mortalities, while none occurred in un-trapped populations (Krebs et al., 2004). In a study conducted in northwestern Ontario beginning in 2003, two (2) of seven (7) radio-collared wolverines were killed by incidental trapping 13 months after being collared (Dawson et al., 2010). Furthermore, a study near Red Lake, ON found that incidental trapping killed 6 of 56 individual wolverines between 2018 and 2022 (Scrafford et al. 2024). In 2009, the season for wolverine was closed to non-Indigenous trappers in Ontario (Wolverine Recovery Team, 2013); however, licenced trappers may apply to the MNR to possess incidentally trapped and killed wolverine as per Section 23.19 of Ontario Regulation (O. Reg.) 242/08 under the ESA and Part II of O. Reg. 666/98 under the FWCA.

Operations

Injury or Death Due to Collisions with Vehicles

During operations, the predicted maximum vehicles travelling on the road is 500 per day, with most of the travel anticipated to take place during daylight hours. Generally, wolverine are known to avoid areas of human disturbance, including roads, making them lower risk for road mortality. Less than 5% of radio-collared wolverines were killed by vehicles in North American between 1972 and 2001 (Krebs et al.,



2004). In a study conducted in Red Lake, ON, that tracked 56 wolverines by radio-collar from 2018 through 2022, two (2) mortalities were by caused by vehicles (Scrafford et al., 2024).

Injury or Death Due to Changes to Predator-Prey Dynamics

Effects on wolverines from predators during operations are a continuation of the same impacts as described for the construction phase. Maintaining roadside vegetation during operations will sustain open conditions along the ROW, maintaining predator access to areas near the road and facilitating their movement. Predators such as wolves and bears may be attracted to the active road due to roadside foraging opportunities, including hunting (e.g., rodents, berries) and scavenging (e.g., roadkill) (Grilo et al., 2015).

Injury or Death Due to Increased Energy Expenditures

Effects on wolverine from increased energy expenditures during road operations are a continuation of the same impacts as described for the construction phase. While some sensory disturbances may be minimized, the presence of the road corridor and daily use by vehicles will generate effects that cause wolverines to avoid the ROW or increase their movement rate (speed). For example, one study found that the wider the road and the more traffic there is, the less likely Wolverines will cross it (Austin, 1998). When wolverine movement across the land is restricted, that makes it difficult to find food, suitable shelter, and find mates, leading to lowered health and genetic drift (ECCC, 2024b).

Injury or Death Due to Increased Access

Effects on wolverine from increased access during operations are a continuation of the same impacts as described for the construction phase. The potential for harvest is also likely greater during the operations phase as it will operate over a long period of time with complete public access and provide new areas for trappers to deploy traplines, which may result in intentional or incidental harvest of wolverine.

13.3.4.5 Threat Assessment

Each of the four potential effects categories were evaluated based on the threats assessment criteria outlined in the TISG and is based on IUCN-CMP unified threat classification system, referenced from NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk (NatureServe, 2012). Threats are assessed prior to any mitigative measures being applied. The threat assessment process is generally done at the population level but can be done at a more regional level. Wolverine, which have home ranges averaging 428 km² (females) and 2,563 km² (males), were evaluated at the LSA level.

Scope for all threats to wolverine ranges from small to large as certain effects will be experienced in the LSA and affect the population widely. Threat severity ratings for these species range from slight to serious. Clearance activities, sensory disturbances leading to habitat alteration or degradation, and sensory disturbances altering movement, are serious as wolverines are known to be impacted by roads and human activities, including mechanical disturbances, and will likely result in wolverines being unable to use habitat in the LSA, including denning habitat, and avoiding areas entirely. Injury or death associated with collisions with vehicles is also serious, as the risk will be present nearly constantly with vehicles travelling the road daily and the population of wolverines in the study areas is only thought to be six (6), so any mortality will have long-lasting impacts. Hydrological changes, loss of connectivity, increased access, and changes to predator-prey dynamics are moderate in severity, and clearance activities, habitat structural change, and increased energy expenditure are slight.



Magnitude is rated as low to high, with clearance activities, sensory disturbances that cause habitat alteration or degradation and sensory disturbances that alter movement rated as high. Irreversibility is very high for clearance activities and high for the remaining effects, apart from habitat structural change, which is medium, and sensory disturbances resulting in alteration of movement, which is low. Many of the effects relate to the fact that returning the corridor to baseline conditions would take decades or longer. Relating to injury and death of wolverine, collisions, increase access, changes to predator-prey dynamics, and increased energy expenditure are highly irreversible due to the low population number and low reproduction rate of this species, which could take decades to recover from the loss of reproductively mature adults. The degree of effect is very high for clearance activities, and medium for all others except for the two effects related to sensory disturbances, which is high, and loss of connectivity, which is very high.

A summary of the threat assessment for wolverine habitat loss, alteration or degradation of habitat, alteration in movement, and injury or death prior to the consideration of mitigation measures, is presented in **Table 13-26**.

Table 13-26: Summary of Threat Assessment for Potential Effects on Wolverine

Threat	Scope	Severity	Magnitude	Irreversibility	Degree of Effect
Habitat Loss – Clearance Activities	Large	Serious	High	Very High	Very High
Habitat Alteration or Degradation – Habitat Structural Change	Small	Slight	Low	Medium	Low
Habitat Alteration or Degradation – Sensory Disturbances	Large	Serious	High	High	High
Habitat Alteration or Degradation – Hydrological Changes	Small	Moderate	Low	High	Medium
Alteration in Movement – Loss of Connectivity	Large	Moderate	Medium	High	High
Alteration in Movement – Sensory Disturbances	Large	Serious	High	Low	Medium
Injury or Death – Collisions with Vehicles	Small	Serious	Low	High	Medium
Injury or Death – Increased Access	Restricted	Moderate	Medium	High	Medium
Injury or Death – Changes to Predator-Prey Dynamics	Small	Moderate	Low	High	Medium
Injury or Death – Increased Energy Expenditure	Small	Slight	Low	High	Medium

13.3.5 Little Brown Myotis and Northern Myotis

13.3.5.1 Habitat Loss

Little Brown Myotis and Northern Myotis habitat loss, including maternity roosting habitat and foraging habitat, may result from vegetation clearing and disturbance during construction and throughout operations. The pathways or activities which may result in loss or destruction of Myotis bats habitat are described below.



Site preparation, vegetation clearing activities, quarry creation and roadbed construction → Permanent removal of vegetation → Loss of Little Brown Myotis and Northern Myotis maternity roosting habitat and foraging habitat.

Construction

Habitat Loss due to Clearing Activities

Site preparation and construction activities would reduce the availability of suitable Little Brown Myotis and Northern Myotis maternity roosting and foraging habitat in the LSA and Project Footprint, and most areas in the Project Footprint will be permanently removed for the duration of road operations. Quarry creation may result in destruction of Myotis bats habitat when roosting and foraging habitat is removed. The results of habitat modelling via Ecological Land Classification (refer to Section 11), and an understanding of the Project Footprint, estimate construction activities will result in the removal of 9.22 ha of high use bat habitat in the LSA, comprised of Mixedwood Swamps (2.45 ha), Open Shore Fen/Thicket Swamp (0.02 ha), Open Shore Shrub Fen (0.83 ha) and River/Open Water (0.92 ha). Mixedwood Swamp is rare in the study areas, typically occurring in very small pockets within a Conifer Swamp mosaic.

RSF modelling was done for bats as a species group. **Figure 13.11** shows the predicted use of the RSA under current conditions for bats. The Project Footprint was overlaid, and the underlying habitat removed. For Myotis bats, this represents a loss of approximately 1.91% of high-use habitat in the LSA and a loss of 0.71% of high-use habitat in the RSA due to road construction and operations (**Table 13-27**).

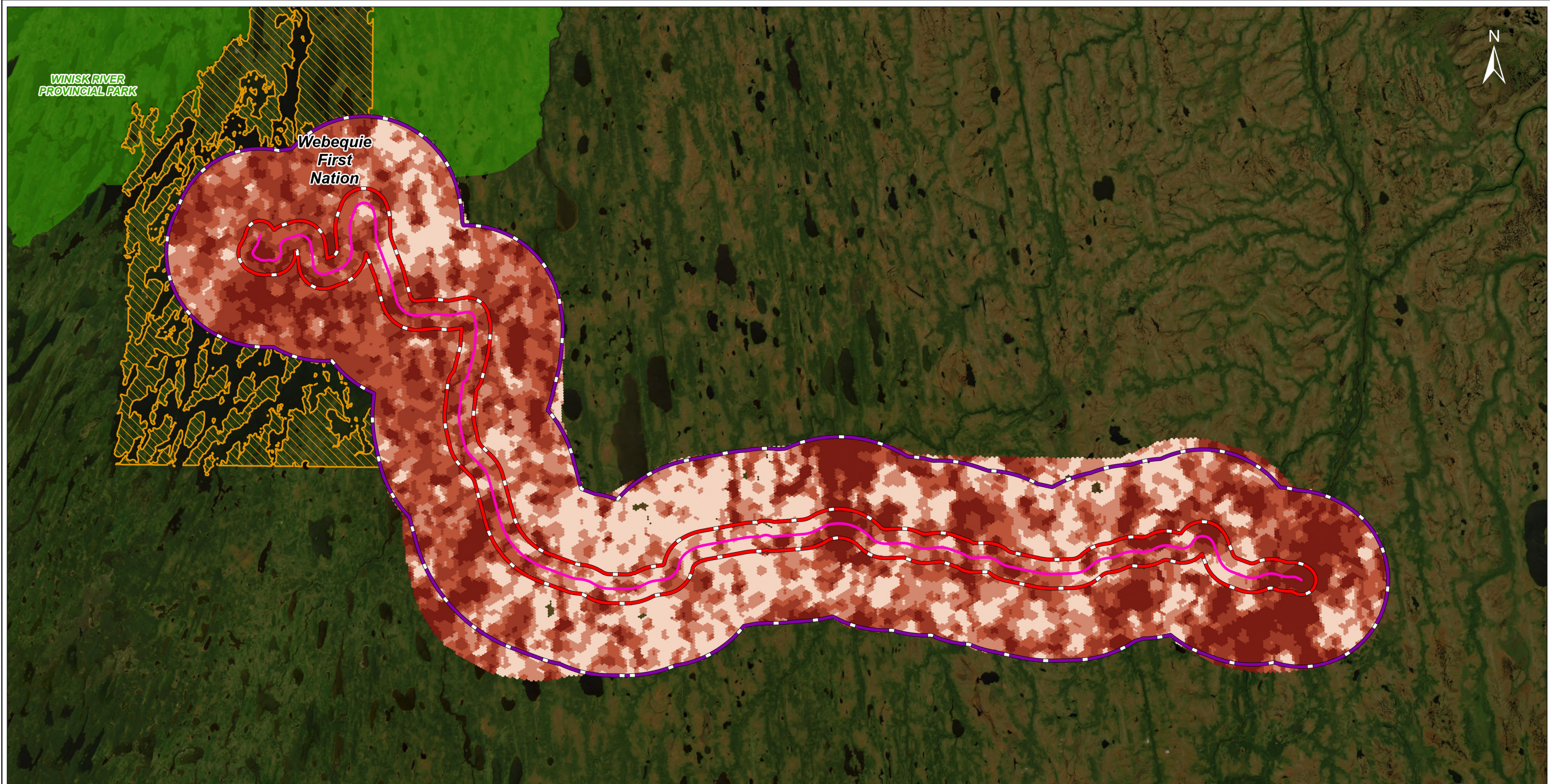
Table 13-27: Little Brown Myotis and Northern Myotis High-Use Habitat by Study Area

Species	LSA			RSA		
	Pre-construction (ha)	Hectares Removed	% Removed	Pre-construction (ha)	Hectares Removed	% Removed
Myotis Bats	2757.19 ha	52.66	1.91%	13263.48 ha	94.17	0.71%






Potentially suitable bat maternity roosting habitat, identified as upland forest (conifer, hardwood, and mixedwood), as well as conifer swamp (includes mixedwood swamp), totals approximately 6,848.0 ha in the LSA and 31,556.7 ha in the RSA. Approximately 312.2 ha will be removed, including 150.8 ha of conifer forest, 155.6 ha of conifer swamp, 1.6 ha of hardwood forest and 4.2 ha of mixedwood forest, or 4.6% of potential maternity roosting habitat in the LSA and 1.0% of potential maternity roosting habitat in the RSA.

Potentially suitable foraging habitat, comprised of open wetlands, open water, and riparian areas, totals approximately 2,622.6 ha in the LSA and 13,605.1 ha in the RSA. Foraging can also occur within forests and along forest edges; however, these numbers are already accounted for as part of potential maternity roosting habitat. Approximately 27.3 ha will be removed, including 9.0 ha of open wetland, 2.0 ha of open water, and 16.3 ha of riparian corridors, or 1.0% of potential foraging habitat in the LSA and 0.2% of potential foraging habitat in the RSA.










Legend:

-  Preferred Route
-  Bat Local Study Area (LSA 1km from Preferred Route)
-  Bat Regional Study Area (RSA 5km from either side of LSA boundary)
-  First Nation Reserve
-  Provincial Park

Bat Detection Counts

-  7.983889 - 34.877137
-  34.877138 - 70.419640
-  70.419641 - 126.376754
-  126.376755 - 326.402650
-  326.402651 - 355131.080388

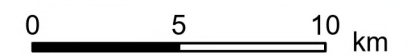


NOTES

1. Coordinate System: NAD 1983 UTM Zone 18N.
2. Cadastral boundaries are for informational purposes only and should not be considered suitable for legal, engineering, or surveying purposes.
3. Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information, and Land Information Ontario (LIO) Warehouse Open Data (<https://geohub.lio.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNR/F).
4. Service Layer Credits: Earthstar Geographics

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Webequie Supply Road

Predicted SAR Bat Utilization of RSA Under Existing Conditions

Figure Number: 13-11		REV: PA		
Client: Webequie First Nation	Project Number: 661910	Date: 5/13/2025		
DSC		DRN	CHK	APP
		TE	GS	GS

Operations

Habitat Loss due to Vegetation Clearing Activities

Road operations are unlikely to result in additional loss of Little Brown Myotis and Northern Myotis maternity roosting habitat and foraging habitat, as regular maintenance will involve managing re-growth of vegetation along the ROW within the Project Footprint. There is a very low probability that reclaimed temporary laydown areas and clearings may need to be reused during operations. While the quarries are expected to remain operational following construction, the footprints will not be expanded and as such no additional habitat loss or destruction is anticipated to occur during operations.

13.3.5.2 Habitat Alteration or Degradation

Alteration or degradation of Little Brown Myotis and Northern Myotis maternity roosting habitat and foraging habitat may result from vegetation clearing and disturbances during construction and throughout operations. The pathways or activities which may result in alteration or degradation of bat habitat are described below.

Construction and operations require vegetation removal, clearing activities, and maintenance → Changes in moisture levels, sunlight exposure, temperature, and other abiotic and biotic habitat elements in adjacent habitats affecting vegetation height, density, and community composition → Habitat structural changes alter or degrade Little Brown Myotis and Northern Myotis habitat.

Construction activities and road operations generate noise, light, and other sensory disturbances → Noise and light impair echolocation and changes prey availability → Sensory disturbances alter or degrade Little Brown Myotis and northern myotis habitat.

Construction of road and vegetation removals change drainage and alter soil moisture regimes → Hydrological changes to ground or surface water → Alteration and degradation of Little Brown Myotis and Northern Myotis wetland and riparian foraging habitat.

Construction

Habitat Alteration or Degradation Due to Habitat Structural Change

Vegetation removals, creation of the ROW and construction of the paved and gravel road surfaces may alter or degrade Little Brown Myotis and Northern Myotis habitat near the Project Footprint, extending into the LSA by generating edge effects that change habitat structure, including vegetation height, density, and community composition. The ROW will be 35 m wide with a road surface spanning 12 m composed of gravel (eastern half) and asphalt or chip seal treatment (western half) (refer to Section 4.3.1). Edge effects from construction of the road include abiotic, direct biotic, and indirect biotic effects on the habitat. In Boreal upland mixed forests, road edge effects on forest plant communities and environmental variables can be measured at the immediate edge, and changes to species composition are also evident (Buss et al., 2024).

Bat activity (SAR and non-SAR) was modelled with a Poisson regression, rather than a presence/absence RSF, using the daily average of number of detections (i.e., bat activity). Details of the modelling methods are provided in Appendix F – NEEC Report). Poisson regression based on anticipated future disturbance effects predicts bat utilization to decrease 30.4% in the Project Footprint, decrease 11.8% in the LSA, and decrease 0.5% in the RSA (**Table 13-28**). **Figure 13.11** shows the predicted use of the RSA under current conditions for all bats. **Figure 13.12** shows the predicted use under future



conditions. Overall, the change in habitat utilization can be attributed to habitat alteration from clearing the ROW and changing existing habitat features into early seral communities.

Table 13-28: Bat Species Group Probability of Habitat Use Percent Change by Study Area

Species	% Change by Study Area		
	Project Footprint	LSA	RSA
Bat Species Group	-30.4%	-11.8%	-0.5%

Habitat Alteration or Degradation Due to Sensory Disturbance

During construction, activities such as blasting at quarries/pits, earth hauling and vegetation clearing, and the use of construction lighting, may reduce the ability of Little Brown Myotis and Northern Myotis to use habitat along the ROW and supportive infrastructure due to sensory disturbances. Noise generated by construction equipment (e.g., generators, pumps, and other motors), if occurring between dusk and dawn during the active season, may mask the lower frequency components of echolocation calls (Altringham and Kerth, 2016). Construction lighting may draw insects out of woodland habitats resulting in less prey availability for woodland-adapted bats near habitat edges (Altringham and Kerth, 2016).

Habitat Alteration or Degradation Due to Hydrological Changes

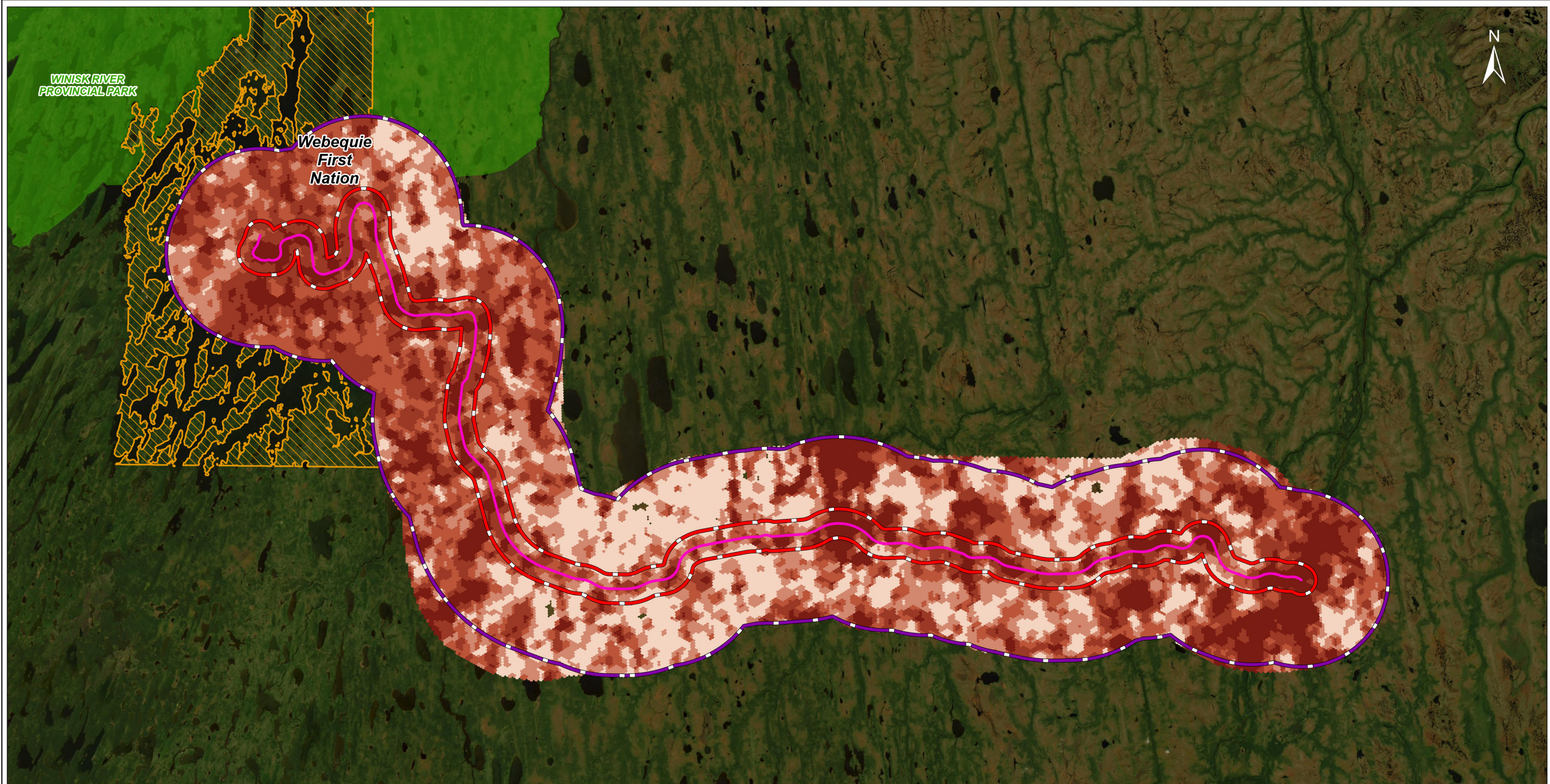
Hydrological changes during road construction from activities such as grading, installation of drainage features, and construction of the roadbed could alter soil moisture regime, and shift or alter bat wetland and riparian foraging habitat. Changes may occur to both surface and groundwater, causing flooding or drying of vegetation communities. Little Brown Myotis foraging habitat is strongly associated with surface water features (Thorne, 2017). Additionally, many of the insect prey species of Little Brown Myotis and other bats originate from rivers, streams, ponds, and lakes (Clare et al., 2011). As described in Section 11.3.2.3, 91.82% of the project RSA is wetlands, primarily peatlands susceptible to changes in the flow of surface and subsurface water resulting from the bisection of these features by roads.

The effects of roads on hydrology and bat habitat can occur up to 250 m from the ROW; the habitat alteration assessment uses the same values as those shown in Section 11.3.2.3, with significant effects expected within 20 m, moderate effects within 60 m and minimal effects experienced at 250 m. The amount of suitable foraging habitat within these distances from the Project Footprint including the ROW, access roads, construction camps, and aggregate and quarry sites can be found in **Table 13-29**. The amount of suitable foraging habitat within 20 m where significant habitat alteration or degradation may occur is 21.24 ha.

Table 13-29: Amount of Suitable Bat Foraging Habitat Within Range of Project Components

Distance from Project Components		
20 m	60 m	250 m
21.24 ha	47.53 ha	227.07 ha





- Legend:**
- Preferred Route
 - Bat Local Study Area (LSA 1km from Preferred Route)
 - Bat Regional Study Area (RSA 5km from either side of LSA boundary)
 - First Nation Reserve
 - Provincial Park

Bat Detection Counts

	7.983889 - 36.815815
	36.815816 - 75.281131
	75.281132 - 139.438619
	139.438620 - 353.200127
	353.200128 - 355131.080388

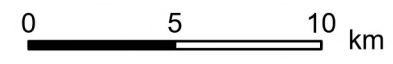


NOTES

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Webequie Supply Road

Predicted SAR Bat Utilization of RSA Under Future Conditions

Figure Number: 13-12		REV: PA		
Client: Webequie First Nation	Project Number: 661910	Date: 5/13/2025		
DSC		DRN	CHK	APP
		TE	GS	GS

Operations

Habitat Alteration or Degradation Due to Habitat Structural Change

The habitat structural changes that result in Little Brown Myotis and Northern Myotis habitat alteration and degradation initiated during the construction phase from vegetation clearing and changes to vegetation community structure is expected to continue during the operations phase. These vegetation changes will be maintained during road operations, but no new edge effects are expected to be generated as a result.

Habitat Alteration or Degradation Due to Sensory Disturbance

Noise and light from vehicles travelling on the road during operations may impact habitat along the ROW and supportive infrastructure. Siemers and Schaub (2011) found that traffic noise can decrease the foraging efficiency of bats by approximately 50%, decreasing proportionally with increasing proximity to highway noise.

Habitat Alteration or Degradation Due to Hydrological Changes

Operation of the road is not anticipated to result in further changes to hydrology than those initiated during the construction phase. It is possible that temporary changes to hydrology may occur during the operations, such as accumulation of debris affecting culverts and drainage that results in localized flooding and drying of areas.

13.3.5.3 Alteration in Movement

Alteration in Little Brown Myotis and Northern Myotis movement may result from vegetation clearing and disturbance during construction and throughout operations. The pathways or activities which may result in alteration in little brown myotis and northern myotis movement include those described below.

Vegetation removal and clearing during construction fragments vegetated habitats → Little Brown Myotis and Northern Myotis avoid crossing large gaps during construction and operations → Loss of habitat connectivity alters little brown myotis and northern myotis movement.

Construction activities and road operations generate noise, light, and other sensory disturbances → Sensory disturbances result in avoidance of area → Sensory disturbances alter Little Brown Myotis and Northern Myotis movement.

Construction

Alteration in Movement Due to Loss of Connectivity

Myotis bats movement is likely to be altered by construction of the road due to the fragmentation of forest habitat. The ROW will be 35 m wide with a road surface spanning 12 m composed of gravel (eastern half) and asphalt or chip seal treatment (western half) (refer to Section 4.3.1). It is acknowledged that forest fragmentation has been found to positively affect the abundance Little Brown Myotis potentially due to increased access to both foraging and roosting sites (Ethier and Fahrig, 2011); however, this has not been studied in the context of boreal forest or roads, nor for all species such as those present in the RSA. Additionally, the Ethier & Fahrig (2011) study was conducted in 2009 prior to the discovery of White-nose Syndrome in Ontario in 2010 (MNR, 2015b) and may not be reflective of present populations and their behaviours.



Alteration in Movement Due to Sensory Disturbance

Little Brown Myotis and Northern Myotis movement is also likely to be altered by sensory disturbances. Noise, lighting and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of bats as they avoid the ROW and supportive infrastructure areas. Construction lighting used during the bat active season may result in woodland-adapted bats avoiding these areas, as they have been found to avoid both high-pressure sodium and white LED lights (Stone et al. 2009, 2012; Altringham and Kerth, 2016).

Operations

Alteration in Movement Due to Loss of Connectivity

Changes in Little Brown Myotis and Northern Myotis movement will occur in the Project Footprint due to vegetation clearing initiated during road construction that results in habitat fragmentation and reduced connectivity. These vegetation changes will be maintained during road operations, but no new habitat fragmentation is expected to be generated as a result.

Alteration in Movement Due to Sensory Disturbance

Little Brown Myotis and Northern Myotis movement will be affected by road operations due to sensory disturbances generated from road use. Bats, including Myotis bats, are less likely to fly across a road as traffic noise increases and display anti-predator behaviour in response to vehicles (Bennett and Zurcher, 2013; Zurcher et al., 2010).

13.3.5.4 Injury or Death

The creation of the road may lead to both direct and indirect Little Brown Myotis and Northern Myotis mortality. There could be increases in Myotis bats injury or death stemming from increased vehicle traffic during both construction and operation of the road, with indirect mortalities arising from increased energy expenditures and habitat change. The pathways or activities which may result in Little Brown Myotis and Northern Myotis injury or death are described below.

Equipment and vehicles move within Project Footprint → Collisions with Myotis bats within Project Footprint → Injury or Death of Little Brown Myotis and Northern Myotis.

Construction and operations activities clear vegetation → Incidental encounters with roosting little brown myotis and northern myotis → Injury or Death of little brown myotis and northern myotis.

Construction and operations activities clear vegetation → Increased access for little brown myotis and northern myotis predators → Injury or Death of little brown myotis and northern myotis.

Construction and operations of road changes habitat structure and availability and alters movement of little brown myotis and northern myotis → little brown myotis and northern myotis increase energy expenditures to move to and from roosting and foraging habitats → Injury or Death of little brown myotis and northern myotis.



Construction

Injury or Death Due to Collisions with Vehicles

Little Brown Myotis and Northern Myotis injury and death may occur during construction due to collisions with construction vehicles and equipment that operate between dusk and dawn during the active season.

Injury or Death Due to Incidental Take

Vegetation clearing in Little Brown Myotis and Northern Myotis habitat and nearby quarry activities during road construction may result in injury or death to bats if conducted during the active season. Little Brown Myotis and Northern Myotis have very small body sizes, ranging from just a few centimetres to 10 cm in length, and can roost individually in leaf clusters, knot holes, loose bark, and cracks and crevices of trees, making them difficult to detect in their habitats. They roost during daylight hours, when work activities such as vegetation clearing and blasting are typically conducted. Additionally, as pups are non-volant during the maternity roosting period (typically June and July), there is elevated potential during that time for injury or death to pups and their roosting mothers from vegetation clearing. Vegetation clearing of roosting habitat has the potential to directly harm roosting Little Brown Myotis and Northern Myotis. Explosives will be used at aggregate source areas (i.e., ARA-2 and ARA-4) as part of the extraction/mining of bedrock rock material needed for the construction and operation phases of the Project (refer to Section 4). Based on the relatively low volumes of rock needed for the Project (5,500 m³) the blasting of rock using explosives during construction and operation activities is expected to occur on an infrequent basis. Blasting has the potential to cause injury or death to Little Brown Myotis and Northern Myotis from impact of uncontrolled projectiles if conducted in or adjacent to roosting habitat.

Injury or Death Due to Changes to Predator-Prey Dynamics

Effects on Little Brown Myotis and Northern Myotis survival from improved predator access and movement rates created during construction is possible. Owls are recognized as predators of Myotis bats, including Great Horned Owl (*Bubo virginianus*) and Barred Owl (*Strix varia*); however, geographic variation of prey species in diet exists, therefore it is unknown to what extent owls may prey on bats in the RSA. According to a meta-analysis conducted by Bishop & Brogan (2013), owls comprise the second-largest number of road-killed birds after passerines in North America, which may serve as an indication that the bats are not deterred from roads and may be attracted to them.

Injury or Death Due to Increased Energy Expenditures

The cumulative effects of habitat loss, alteration and degradation, and alteration of movements on Little Brown Myotis and Northern Myotis during construction will likely lead to increased efforts to travel between roosting and foraging habitats and also to successfully forage for food in habitats near the Project Footprint. Bats are known to experience oxidative damage while migrating (Constantini et al., 2019), which may be experienced to a lesser degree during the active season if nightly travel distances between habitats increases. Foraging flight has been calculated as accounting for the largest proportion of the daily metabolized energy for female Little Brown Myotis during pregnancy (61%) and lactation (66%) (Kurta et al., 1989). Little Brown Myotis at higher latitudes may have lower daily energy expenditures than conspecifics at lower latitudes, however this may be explained by shorter summer periods coupled with behavioural strategies such as targeting different prey groups/species that provide different energetic benefits (Boyles et al., 2016).



Operations

Injury or Death Due to Collisions with Vehicles

During operations, the predicted maximum vehicles travelling on the road is 500 per day, with the majority of travel anticipated to take place during daylight hours. Mortality during the operational phase is expected to occur throughout the Little Brown Myotis and Northern Myotis active season where flyways cross the road, such as near watercourses and upland forest habitat, in the event that vehicles travel between dusk and dawn. In one study along a 4 km stretch of highway that bisected Myotis bat travel routes between roosts and foraging areas, it was estimated that annual highway mortality could approach 5% of the roost colony (Russel et al. 2009). Additionally, Little Brown Myotis have been observed flying less than 2 m above the ground above open field (Russel et al. 2009), which would be low enough to encounter vehicles along a road, and these bats are documented suffering from vehicle-caused mortality (Russel et al. 2009).

Injury or Death Due to Incidental Take

Vegetation trimming in Little Brown Myotis and Northern Myotis habitat during road operation may result in injury or death to bats if conducted during the active season. Little Brown Myotis and Northern Myotis have very small body sizes, ranging from just a few centimetres to 10 cm in length, and can roost individually in leaf clusters, knot holes, loose bark, and cracks and crevices of trees, making them difficult to detect during vegetation management.

Injury or Death Due to Changes to Predator-Prey Dynamics

Operation of the road may provide resources that attract predators (Hill et al., 2020), such as increased rodent populations attracting raptors. Use of the ROW during road operations by raptors can alter encounter rates with Little Brown Myotis and Northern Myotis and lead to increased predation, directly affecting Little Brown Myotis and Northern Myotis injury and mortality.

Injury or Death Due to Increased Energy Expenditures

Little Brown Myotis and Northern Myotis may experience increased energy expenditures during road operations as a result of other effects such as alteration in movement due to road avoidance, improved predator access, and sensory disturbances generated by road operations.

13.3.5.5 Threat Assessment

Each of the four potential effects categories were evaluated based on the threats assessment criteria outlined in the TISG and is based on IUCN-CMP unified threat classification system, referenced from NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk (NatureServe, 2012). Threats are assessed prior to any mitigative measures being applied. The threat assessment process is generally done at the population level but can be done at a more regional level. Little Brown Myotis and Northern Myotis, which have home ranges encompassing roosting and foraging habitats that are at minimum 90 ha and 17.7 ha, respectively in size (Owen et al., 2003; Yates et al., 2011), were evaluated at the LSA level. These species were evaluated together as they share many similarities in life processes and habitat requirements.

Scope is small for all threats to both Little Brown Myotis and Northern Myotis as the percent of the population affected is less than 10% of the available habitat and population within the LSA. Threat severity ratings for these species range from slight to serious. One (1) threat related to hydrological change resulting in habitat alteration or degradation is serious because these bats rely on aquatic



habitats to produce much of their aerial insect prey, and Little Brown Myotis foraging habitat is strongly associated with surface water features. Clearance activities, habitat structural change, sensory disturbances, and changes to predator-prey dynamics are rated as moderate, while loss of connectivity, incidental take and increased energy expenditure are assessed as having slight severity. Magnitude is rated as low for all threats. Irreversibility is very high for clearance activities and high for hydrological changes as the roadbed will likely never be removed and such changes are challenging to reverse in short time, if ever. Irreversibility is also high for edge effects and habitat fragmentation, as the effects can technically be reversed but would take time and considerable effort. Relating to injury and death of Little Brown Myotis and Northern Myotis, collisions, incidental take and changes to predator-prey dynamics are highly irreversible due to the low population numbers and low reproduction rate of these species, which could take decades to recover from the loss of reproductively mature adults. The rest of the threats are deemed medium or low and can be more easily reversed. The degree of effect is low for all except habitat loss and destruction due to vegetation removal, which is moderate.

A summary of the threat assessment for Little Brown Myotis and Northern Myotis habitat loss, alteration or degradation of habitat, alteration in movement, and injury or death prior to the consideration of mitigation measures, is presented in **Table 13-30**.

Table 13-30: Summary of Threat Assessment for Potential Effects on Little Brown Myotis and Northern Myotis

Threat	Scope	Severity	Magnitude	Irreversibility	Degree of Effect
Habitat Loss – Clearance Activities	Small	Moderate	Low	Very High	Medium
Habitat Alteration or Degradation – Habitat Structural Change	Small	Moderate	Low	High	Low
Habitat Alteration or Degradation – Sensory Disturbances	Small	Moderate	Low	Low	Low
Habitat Alteration or Degradation – Hydrological Changes	Small	Serious	Low	High	Low
Alteration in Movement – Loss of Connectivity	Small	Slight	Low	High	Low
Alteration in Movement – Sensory Disturbances	Small	Moderate	Low	Low	Low
Injury or Death – Collisions with Vehicles	Small	Moderate	Low	High	Low
Injury or Death – Incidental Take	Small	Slight	Low	High	Low
Injury or Death – Changes to Predator-Prey Dynamics	Small	Moderate	Low	High	Low
Injury or Death – Increased Energy Expenditure	Small	Slight	Low	Medium	Low

13.3.6 Evening Grosbeak

In general, reviews of available scientific literature indicate that the construction and presence of roads are detrimental to birds through a series of interconnected effects (Kociolek et al., 2011). The ECCC (2022) Management Plan for the Evening Grosbeak, lists roads and railroads as one of three primary threats to the species in Canada, yet considers the impact as ‘low’ overall. However, the ECCC threat assessment does not discuss many of the indirect or habitat loss effects of roads on the species. The following sections discuss both the direct and indirect impacts of road construction and operation on the Evening Grosbeak, under four broad effect categories.



13.3.6.1 Habitat Loss

Project activities will include vegetation removal and soil disturbance, which will cause the physical removal of potential habitat across the Project Footprint – this directly results in upland forest habitat removal. There may be additional upland forest habitat loss resulting from hydrological changes and disturbance during construction and throughout operations. Removal of forest habitat within the Project Footprint will be a permanent impact, as long as the road is used and maintained.

The pathways or activities which may result in loss or destruction of wildlife habitat include the following:

Site preparation vegetation clearing and ground disturbance within upland forest areas → loss of Evening Grosbeak breeding and foraging habitat.

Construction

Habitat Loss due to Clearance Activities

The construction of the road has the potential for direct and indirect effects that could cause the loss of Evening Grosbeak habitat through physical alteration and removal of suitable habitat.

Evening Grosbeak distribution is closely associated with old, mixed wood forests with high percentages of Fir (*Abies* sp.), White Spruce (*Picea glauca*), or Trembling aspen (*Populus tremuloides*) as well as conifer forests. Based on an understanding of Evening Grosbeak habitat preferences, the results of habitat modelling for Ecological Land Classification (refer to Section 11), were used to estimate removals of preferred habitat during construction. Predicted construction activities will result in the removal of 4.21 ha (3.32%) of mixedwood forest and 81.15 ha (4.29%) of Conifer Forest in the LSA, representing approximately 4.23% of the most suitable Evening Grosbeak habitat in the LSA. Overall, suitable Evening Grosbeak habitat is somewhat uncommon throughout the study area with 7.29% of the LSA and 7.5% of the total study areas (Project Footprint, LSA and RSA combined) consisting of these vegetation communities.

However, according to the Boreal Avian Modeling Project (2020) and Birds Canada (2018), the RSA is located at the very northern extent of the boreal distribution range for Evening Grosbeak (COSEWIC, 2016). Therefore, given the limited removal percentages of upland conifer forest in the RSA, and the limited distribution of the species in the region, the effect of habitat loss is likely minimal.

Operations

Habitat Loss due to Clearance Activities

Ongoing vegetation clearing during roadway operations are likely to be limited to overgrowth at road edges. The Project footprint is not expected to expand during operations. Since Evening Grosbeak require mature, diverse, forested habitats it is unlikely that operation of the roadway will result in additional habitat losses from vegetation removal.

13.3.6.2 Habitat Alteration or Degradation

There may be alterations to Evening Grosbeak habitat resulting from vegetation clearing, introduction or pollution of invasive species and disturbances during construction and throughout operations. The pathways or activities which may result in alteration or degradation of upland forest bird habitat include the following:



Accidental spill during construction or operations activities → Transportation of material into wetland → Alteration or degradation of Evening Grosbeak habitat.

Construction and operations activities cause sensory disturbances (light, noises, dust) → Sensory disturbances impact on adjacent areas → Alteration or degradation of Evening Grosbeak habitat.

Construction and operations activities clear vegetation → Structural differences between cleared and remaining vegetation create edge effect → Alteration or degradation of Evening Grosbeak habitat.

Construction and maintenance activities → Introduction of invasive species → Alteration or degradation of Evening Grosbeak habitat.

Construction

Habitat Alteration or Degradation due to Accidental Spills

Accidental spills and releases that occur during construction phase may result in Evening Grosbeak habitat degradation. Depending on concentrations and material spilled, an accidental spill could cause death of vegetation, lower productivity and alter the vegetation community (Hutchinson and Freedman, 2011; Lednev et al., 2023). While spills in uplands may cause local soil contamination and vegetation degradation these upland areas and associated wildlife species are likely less affected than lowland areas that are often hydrologically connected through subsurface flows (Smerdon et al., 2005).

Habitat Alteration or Degradation due to Sensory disturbances

Sensory disturbances resulting from road construction, including movement of equipment and vehicles, noise, lighting, and other human activities may degrade habitat for Evening Grosbeak adjacent to the Project Footprint, reducing utilization of the area or masking vocalizations related to courtship or alarm calling (Zhou et al. 2024). Noise generated by construction equipment and vehicles during the construction phase may degrade habitat, resulting in reduced body condition (Ware et al. 2015). Sensory disturbance may be especially high during construction when activities such as blasting, quarrying, hauling and clearing may occur during all hours causing wetland birds to avoid the ROW and supportive infrastructure. Construction noise is less continuous and more impulsive than traffic noise so habituation to the noise would not be likely in most cases. Light pollution can alter songbird singing occurrence (Da Silva et al., 2015) and egg laying (Senzaki et al., 2020) which may alter reproductive success. Species with good lowlight eyesight could be using artificial light to hunt more effectively (Senzaki et al., 2020).

Habitat Alteration or Degradation due to Habitat Structural Change

Changes to vegetation structure during road construction activities may alter or degrade upland songbird habitat near the Project Footprint due to vegetation clearing activities and removals. These vegetation removals may lead to edge effects, including abiotic, direct biotic, and indirect biotic effects on the habitat after the implementation of mitigation measures. It is anticipated that restoration of laydown areas and access roads will reverse some of the habitat alteration or degradation caused by road construction, but most areas will remain free of tall vegetation. Edge effects from road construction and operation have not been specifically studied for Evening Grosbeak populations; however, unpaved road corridors 8 to 10 m in width have been found to affect the distribution of forest songbirds, resulting in reduced relative abundance (Ortega and Capen, 2002). Evening Grosbeak typically breeds in second growth and mature



coniferous woodland and mixed forest and has not been reported in peer reviewed literature as benefitting from or commonly interacting with early successional habitat. However, successional habitats resulting from regenerating clearcuts in conjunction with larger, natural landscapes have been recognized as important for post-fledgling bird species that nest in mature forest (Chandler et al., 2012).

Habitat Alteration or Degradation from introduction of invasive plant species

Construction activities have the potential to introduce invasive plant species to the forested habitats used by Evening Grosbeak. One of the pathways of spread for invasive plants is through construction equipment. Improperly cleaned construction equipment has the potential to transport and spread invasive plants, with cleared areas, including roads sides being susceptible to invasion (Hanen and Clevenger, 2005). Once established in a new habitat, most invasive species are nearly impossible to eradicate (Pimentel et al. 2005). Invasive plant species can impact on multiple ecosystem aspects including structure, diversity and function (CFIA, 2008). However, while invasive plants are known to spread along transportation corridors, few invasive species have been found in naturally occurring boreal forest habitats used by Evening Grosbeak and when established often only spread a few meters into the adjacent forest (Langor et al. 2014). For Evening Grosbeak density is closely tied to Spruce Budworm (*C. occidentalis*) and is unlikely to be affected by any change in understory plant composition.

Operations

Habitat Alteration or Degradation due to Accidental Spills

Similar to the effects during the construction phase, there could be effects to Evening Grosbeak habitat quality during the operations phase of the Project from accidental spills, which may result in Evening Grosbeak habitat degradation. Spills during operations would most likely originate from accidental releases from vehicles traveling to and from the community. The road is forecasted to have low traffic volumes, and traffic along the roadway will be primarily personal and commercial vehicles and transport trucks associated with the community. While estimate frequency of spills is low (0.00000019 spills per mile, or 0.00000012 spills per kilometer [Harwood and Russell, 1990]), its predicted that minor spills and release are possible. However, given the upland environment for Evening Grosbeak any spills are likely to be small and contained to the local environment.

Habitat Alteration or Degradation due to Sensory disturbances

Road operations may impact Evening Grosbeak habitat. During operations, most sensory impacts will be related to traffic noise, which has been found to degrade bird habitat either through complete avoidance of areas near roads or decreased habitat value (Ware et al. 2015; Summers et al. 2011). Declines in densities of some songbird species have been shown to occur at a threshold around 45-48 dB (Sadlowski, 2011). Acoustic modeling places the 50 db zone of influence at approximately 125 m beyond the Project footprint (See Appendix J – Noise and Vibration Impact Assessment Report), and 50 dB is the noise level Environment and Climate Change Canada uses in their guidelines to avoid harm to migratory birds (EEEC, 2023). Noise from vehicles has been found to reduce bird vocalization, which could affect behaviour related to foraging, mating and predator avoidance (Cretois et al., 2023). While road sensory disturbance has not been specifically studied for Evening Grosbeak populations, road corridors 8 to 10 m in width have been found to affect the distribution of forest songbirds, resulting in reduced relative abundance (Ortega and Capen, 2002), which may be attributed to alteration or degradation of habitat. However, at the regional scale, Evening Grosbeak abundance was not found to correlate with local background noise levels at banding stations across the U.S. (Ng et al., 2020). While lighting along roads is a major sensory disturbance for birds, the WSR road will not have lighting except near the community limiting its impact.



Habitat Alteration or Degradation due to Habitat Structural Change

Changes to vegetation structure during operations will have similar impacts on Evening Grosbeak and their habitat as during the construction phase. While it is anticipated that restoration of laydown areas and access roads will reverse some of the habitat alteration or degradation caused by road construction, maintenance activities, including removal of roadside vegetation during road operations, will create periodic disturbances and sustain edge effects along the ROW. The sustained early seral vegetation along the ROW will continue to not be viable as Evening Grosbeak habitat. Regenerating areas may become viable in the long-term if they remain undisturbed.

Habitat Alteration or Degradation due to Introduction of Invasive Plant Species

The introduction and spread of noxious and invasive plant species could also occur during operations and will have similar potential impacts on Evening Grosbeak habitat as during construction or lack thereof. Transportation corridors are avenues of dispersal for invasive plants (Langor et al. 2014), and given the longer timeframe, operation of the road has a greater chance for introduction of invasive plant species. However, while the timeframe is longer, introductions of plants into Evening Grosbeak habitat are likely limited in the ability to spread beyond disturbed areas of the road ROW (Kent et al., 2018).

13.3.6.3 Alterations in Movement

There may be alterations in Evening Grosbeak movement stemming from construction activities and operation of the road and associated activities. The pathways or activities which may result in changes in upland forest SAR bird movement include the following:

Construction and operations activities clear vegetation → Structural differences between cleared and natural vegetation act as a barrier → Alteration in movement of Evening Grosbeak.

Construction and operations activities cause sensory disturbances (light, noises, dust) → Disturbances cause avoidance response → Alteration in movement of Evening Grosbeak.

Construction

Alteration in Movement due to Loss of Connectivity

Gaps in cover created by anthropogenic activities are known to impede movement of birds but is species- and habitat-dependent (Desrochers and Hannon, 1997; Grubb and Doherty, 1999). Forest specialist species that have shown reluctance to cross gaps like those created by roads where the road creates a distinctive edge between the road and preferred habitats, with larger gaps acting as a greater barrier (Grubb and Doherty, 1999). The project ROW, at 35 m, is smaller than the gap size (50 m) found to limit crossings for some boreal birds (St Clair et al., 1998), although some laydown and temporary clearings will exceed this limit. While Evening Grosbeak has been shown to be area sensitive, this was at the landscape level and not at the local level where gaps along forest edges may affect movement (Desrochers et al., 2010). No studies have shown that Evening Grosbeaks are limited in their movement by narrow gaps between forest patches. Evening grosbeaks are highly mobile and migratory based on food availability.

Alteration in Movement due to Sensory Disturbance

Upland forest bird movement is also likely to be altered by sensory disturbances. Noise, lighting and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of upland forest birds as they avoid the project ROW and



supportive infrastructure. While no studies specifically examining noise effects on Evening Grosbeak were found, multiple bird species have been found to respond behaviourally to sudden, loud noises by abandoning the area near the disturbance and varied in their rate of return (Wright et al. 2010; Delaney et al. 2011). This behavior of abandonment of locations due to loud noise has been used in some locations like airports to prevent birds from occupying the area. Light pollution is a top sensory disturbance for birds during migration often disorienting them during migration. Light pollution can also attract insectivorous birds due to increased foraging opportunities (Lebbin et al., 2007).

Operations

Alteration in Movement due to Loss of Connectivity

Similar to the construction phase, during operations alteration in movement due to loss of connectivity may occur. Maintenance activities will maintain vegetation in an early seral state, however like during the construction phase, avoidance of these areas may be minimal. While some forest species have shown to avoid gaps, including road gaps this has generally been found along much wider gaps than the 35 m project ROW.

Alteration in Movement due to Sensory Disturbance

Noise will be the primary sensory impact on Evening Grosbeak during operations as the road will not have lighting. Traffic noise has been found to lower abundance and promote avoidance in many bird species (McClure et al. 2013). High-traffic roads have been shown to affect bird distribution when noise exceeded 56 dB (Hirvonen, 2001). Sensory disturbance by roads has not been directly measured for Evening Grosbeak.

13.3.6.4 Injury or Death

The creation of the road may lead to both direct and indirect Evening Grosbeak mortality. There may be increases in upland forest SAR bird injury or death stemming from increased vehicle traffic during both construction and operation of the road, with indirect mortalities arising from increased energy expenditures and habitat change. The pathways or activities that may result in upland forest SAR bird injury or death include the following:

Equipment and vehicles moving within Project footprint → Collisions with Evening Grosbeak within Project Footprint → Injury or Death of Evening Grosbeak.

Construction and operations activities clear vegetation → Incidental encounters with Individuals or nests → Injury or Death of Evening Grosbeak.

Construction and operations activities clear vegetation → Increased access for Evening Grosbeak Predators → Injury or Death of Evening Grosbeak.

Construction

Injury or Death due to Collisions with Vehicles

Movement of construction equipment and vehicles within Project Footprint could result in increased death and injury of Evening Grosbeak. Collisions with vehicles is among the top three causes of bird mortalities in Canada (Calvert et al., 2013). Vehicles will be travelling between camps and construction locations;



these trips could occur at all hours and encounters with birds would not be unexpected. Bird mortality from vehicle collisions is often related to travel speed of the vehicle as birds use distance as a threat estimate and can miss-judge the closing distance between themselves and the vehicle, resulting in collision (DeVault et al. 2016). Evening Grosbeaks are attracted to roads, particularly outside of the breeding season, for the ingestion of grit and road salt and suffer mortality as a result of collisions with vehicles (ECCC, 2022). For example, more than 2,000 Evening Grosbeaks were found dead along a 16-km stretch of highway in British Columbia in a single count conducted in 1981 (Smith, 1981).

Injury or Death due to Incidental Take

As Special Concern species under the SARA and the ESA, Evening Grosbeak habitats are not protected. However, under the *Migratory Birds Convention Act* (GOC, 1994), it is prohibited to disturb their nests during the breeding season. Vegetation clearing in Evening Grosbeak habitat during road construction, and/or movement of equipment/vehicles through vegetated areas, may result in injury or death to birds, hatchlings, and/or eggs if management of vegetation is carried out during the breeding season, even after mitigation measures have been applied. The characteristics of songbird nests can make them difficult to detect. Evening Grosbeaks typically build medium (13 cm diameter) nests in tall trees at least 5 m above the ground typically close to the trunk (Gillihan and Byers, 2020). The nests are usually in dense foliage and are rarely located (OBBA, 2005) making incidental take is possible.

Injury or Death due to Changes to Predator-Prey Dynamics

Effects on Evening Grosbeak survival from improved predator access and movement rates is possible during the construction phase. Creation of new roads connected to human activity is known to spread predators into previously unoccupied areas (Lantham et al. 2011). Possible nest predators of Evening Grosbeak include Common Raven (*Corvus corax*), and Sharp-shinned Hawk (*Astur striatus*), Cooper's Hawk (*Astur cooperii*), and Northern Goshawk (*Astur gentilis*) are known to prey on young birds and adults (Gillihan and Byers, 2020). Sharp-shinned Hawks will hunt from forest edges (Bildstein et al., 2020). Nest parasitism by Brown-headed Cowbirds (*Molothrus ater*) has also been reported (Gillihan and Byers, 2020), however no Brown-headed Cowbirds were recorded during the baseline studies and Brown-headed Cowbird range is outside the RSA (OBBA, 2005).

Operations

Injury or Death due to Collisions with Vehicles

As in the construction phase, Evening Grosbeak are likely to suffer from vehicle collisions because of their roadside foraging behaviours. Collisions with vehicles is among the top three causes of bird mortalities in Canada (Calvert et al., 2013). Along low-volume forest roads in Canada, it has been estimated that more than 14,000 birds are killed annually due to collisions with vehicles, or approximately one (1) bird every 3 km per year (Bishop and Brogan, 2013), this number is likely vastly underreported for small birds due to their size and scavenging. The number of collisions will vary over the lifetime of the road as collisions are related to periods of Spruce Budworm outbreaks.

Injury or Death due to Incidental Take

Vegetation clearing in Evening Grosbeak habitat is also scheduled to occur during operations. Though smaller in scale, periodic clearing of the ROW may occur during operations as part of line-of-sight maintenance or infrastructure repairs. Most clearing during operations will consist of removal of small



vegetation and is unlikely to affect preferred Evening Grosbeak habitat but a small chance exists that large trees adjacent to the roadway may be removed due to safety concerns.

Injury or Death due to Changes to Predator-Prey Dynamics

Effects on Evening Grosbeak from changes to predator-prey dynamics during operations are a continuation of the same impacts as described for the construction phase. Maintenance clearing during operations will maintain openness along the ROW which will maintain predator access to areas near the road and facilitate movement.

13.3.6.5 Threats Assessment

Each of the four potential effects categories were evaluated based on the threats assessment criteria outlined in the TISG and is based on IUCN-CMP (International Union for the Conservation of Nature-Conservation Measures Partnership) unified threat classification system, referenced from NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk (NatureServe, 2012). Threats are assessed prior to any mitigative measures being applied. The threat assessment process is generally done at the population level but can be done at a more regional level. Evening Grosbeaks, which is highly nomadic, with little site fidelity, dispersing up to 950 km between breeding seasons was evaluated at the RSA level.

Scope is small for all threats to both Evening Grosbeaks as the percent of the population affected is less than 10% of the available habitat and population within the RSA. Severity of the threats ranges from slight to serious: threats related to vegetation removals are serious within the scope based on the high degree of habitat loss and alteration; changes to habitat structure, collisions with vehicles and changes in predator-prey dynamics were all rated as moderate due to measurable population changes within the scope; and all other threats are slight. Magnitude is rated as low for all threats.

Irreversibility is very high for vegetation remove as the roadbed will likely never be removed but hydrological mitigations could be done. Irreversibility is high for spills, habitat structural change, invasive species, and predation because while the effects can technically be reversed it would take time and considerable effort. Hunting and loss of connectivity could be restored with a reasonable commitment of resources. The rest of the threats were deemed low and can be easily reversed. The degree of effect was low for all except vegetation loss which was moderate.

A summary of the threat assessment for Evening Grosbeak habitat loss, alteration or degradation of habitat, alteration in movement, and injury or death prior to the consideration of mitigation measures, is presented in **Table 13-31**.

Table 13-31: Summary of Threat Assessment for Potential Effects on Evening Grosbeak

Threat	Scope	Severity	Magnitude	Irreversibility	Degree of Effect
Habitat Loss – Clearance Activities	Small	Serious	Low	Very High	Moderate
Habitat Alteration or Degradation – Accidental Spills	Small	Slight	Low	High	Low
Habitat Alteration or Degradation – Sensory Disturbance	Small	Slight	Low	Low	Low
Habitat Alteration or Degradation – Habitat Structural Change	Small	Moderate	Low	High	Low



Threat	Scope	Severity	Magnitude	Irreversibility	Degree of Effect
Habitat Alteration or Degradation – Invasive Species	Small	Slight	Low	High	Low
Alteration in Movement – Loss of Connectivity	Small	Slight	Low	Low	Low
Alteration in Movement – Sensory Disturbance	Small	Slight	Low	Low	Low
Injury or Death – Incidental Take	Small	Slight	Low	Low	Low
Injury or Death – Changes to Predator-Prey Dynamics	Small	Moderate	Low	High	Low
Injury or Death – Collisions with Vehicles	Small	Moderate	Low	Low	Low

13.3.7 Wetland Songbirds (Olive-sided Flycatcher, Rusty Blackbird)

While each species occupies its own ecological niche within the LSA and RSA, potential effect pathways will be similar in the context of proposed project activities for Olive-sided Flycatcher and Rusty Blackbird, which are both part of the Bog, Fen and Other Wetland Birds guild (i.e., “Wetland Songbirds”).

13.3.7.1 Habitat Loss

Wetland songbird habitat loss may result from vegetation clearing, hydrological changes and disturbance during construction and throughout operations. These losses could be to both foraging and breeding habitats. The pathways or activities which may result in loss or destruction of wetland songbird habitat include the following:

Site preparation and vegetation clearing and ground disturbance → loss of Olive-sided Flycatcher and/or Rusty Blackbird habitat.

Construction of roadbed and crossing structures → Hydrological changes to ground or surface water → loss of Olive-sided Flycatcher and/or Rusty Blackbird habitat.

Construction

Habitat Loss due to Clearance Activities

The construction of the road has the potential for direct and indirect effects that could cause the loss of wetland songbird habitat through physical alteration and removal of suitable habitat.

In the eastern and northern boreal, Olive-sided Flycatcher is heavily associated with open wetland habitats, including bogs and swamps with a high ratio of forest edges and wetlands (COSEWIC 2020). Based on an understanding of Olive-sided Flycatcher habitat preferences, the results of habitat modelling for Ecological Land Classification (refer to Section 11), were used to estimate removals of preferred habitat during construction. Predicted construction activities will result in the removal of 201.02 ha (2.02%) of Conifer Swamp communities, 44.85 ha (1.33%) of Fen Communities, 90.36 ha (1.07%) of Bog Communities, 6.88 ha (0.84%) of Riparian/Shore Communities, and 81.15 ha (4.29%) of Conifer Forest in the LSA, representing approximately 1.73% of the most suitable Olive-sided Flycatcher habitat in the LSA. Overall, suitable Olive-Sided Flycatcher habitat is common throughout the study area with 64.58% of the LSA and 60.77% of the Full Study Area consisting of these vegetation communities.



Gradient BRT modelling was also done to estimate density for the Olive-Sided Flycatcher using ARU data. **Figure 13.13** shows the estimated density of Olive-Sided Flycatcher within the RSA under current conditions for the Olive-Sided Flycatcher. When the Project Footprint is overlaid it shows a loss of approximately 1.11% of highest-use habitat in the LSA and a loss of 0.27% of high-use habitat in the RSA due to road construction (**Table 13-32**). Modeled densities ranged from 0.0 to 0.584 birds/ha with the highest quantile (highest 20%) starting at 0.319.






Table 13-32: Olive-sided Flycatcher High-Density Habitat by Study Area


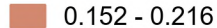

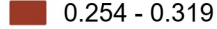
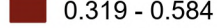
Species	LSA		RSA	
	Pre-construction (ha)	% Removed	Pre-construction (ha)	% Removed
Common Nighthawk	6285.66 ha	1.11%	26406.83 ha	0.27%





Legend:

-  Preferred Route
-  Bird Local Study Area (LSA 1km from Preferred Route)
-  Bird Regional Study Area (RSA 5km from either side of LSA boundary)
-  First Nation Reserve
-  Provincial Park

Predicted Density	
	-0.019 - 0.152
	0.152 - 0.216
	0.216 - 0.254
	0.254 - 0.319
	0.319 - 0.584

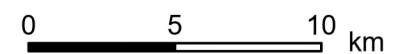


NOTES

1. Coordinate System: NAD 1983 UTM Zone 18N.
2. Cadastral boundaries are for informational purposes only and should not be considered suitable for legal, engineering, or surveying purposes.
3. Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information, and Land Information Ontario (LIO) Warehouse Open Data (<https://geohub.lio.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNRF).
4. Service Layer Credits: Earthstar Geographics

DISCLAIMER

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Webeque Supply Road

BRT Density Modeling for Olive-sided Flycatcher under Existing Conditions

Figure Number: 13-13		REV: PA		
Client: Webeque First Nation	Project Number: 661910	Date: 5/13/2025		
DSC		DRN	CHK	APP
		TE	GS	GS

On its breeding grounds, Rusty Blackbird prefers wet ecosites including fens, bogs, and ponds. In the Hudson Bay Lowlands, it occurs along creeks with dense riparian vegetation (OBBA, 2005). Nesting occurs in trees or shrubs near water, relatively low down with dense vegetation preferred (COSEWIC, 2017). Based on an understanding of Rusty Blackbird habitat preferences the results of habitat modelling for Ecological Land Classification (refer to Section 11), were used to estimate removals of preferred habitat during construction. Predicted construction activities will result in the removal of 201.02 ha (2.02%) of Conifer Swamp communities, 44.85 ha (1.33%) of Fen Communities, 90.31 ha (1.09%) of Treed Bog Communities, 6.55 ha (0.91%) of Shrubby Riparian/Shore Communities, representing approximately 1.53% of the most suitable Rusty Blackbird habitat in the LSA. Overall, suitable Rusty Blackbird habitat is common throughout the study area with 64.58% of the LSA and 60.77% of the Full Study Area consisting of these vegetation communities.

Given the wide availability of suitable habitat for both Olive-sided Flycatcher and Rusty Blackbird, the effect of habitat loss is likely minimal.

Habitat Loss due to Hydrological Changes

Construction activities have the potential to cause the destruction of wetland songbird habitat through changes to groundwater and surface flows. In terms of groundwater, project construction may lead to changes in the local hydrogeological environment by increasing, decreasing or redirecting groundwater flows. Road construction in particular can alter subsurface flows in peatlands changing the hydrology long-term (Waddington et al. 2014). Changes in surface water conditions can also occur with the installation of crossing structures. Such changes are generally concentrated downstream of the effect but can also take place on the upstream side if channel restriction causes water impoundment which can cause death of vegetation (Bocking et al., 2017). Both Olive-sided Flycatcher and Rusty Blackbird could be affected by hydrological changes. For Rusty Blackbird, shallow water (≤ 6 cm deep) is an important driver of habitat selection (COSEWIC, 2017), therefore small changes in water levels could destroy feeding habitats. For Olive-sided Flycatcher, given its preference for nesting in forest edge trees near water, death of vegetation could lead to loss of nesting habitat, but the creation of snags could add perching habitat.

Operations

Habitat Loss due to Clearance Activities

Operation of the roadway is unlikely to result in additional loss of Olive-sided Flycatcher or Rusty Blackbird habitat through vegetation removal. There is a very low probability that reclaimed temporary laydown areas and clearings may need to be reused during operations, but it is predicted that these impacts would be short-term and of limited size. Most maintenance activities will be involve managing re-growth of vegetation along the ROW within the Project Footprint and are accounted for in the construction phase. Quarries will remain operational following construction as additional material may be needed for maintenance activities. However, no additional habitat loss or destruction is anticipated to occur as the footprints will not be expanded during operations.

Habitat Loss due to Hydrological Changes

Olive-sided Flycatcher or Rusty Blackbird habitat loss through changes to hydrology could also potentially occur during the operations phase due to culvert and crossing structure maintenance. Culverts and other crossings could become partially or fully blocked from sediment or beaver activity. If culvert maintenance is ignored, given sufficient time, death of vegetation and loss of habitat could occur (Bocking et al., 2017).



13.3.7.2 Habitat Alteration or Degradation

Wetland songbird habitat alteration or degradation may result from vegetation clearing and disturbance during construction and throughout operations. The pathways or activities which may result in alteration or degradation of wetland songbird habitat include the following:

Accidental spill during construction or operations activities → transportation of material into wetland → Alteration and degradation of Olive-sided Flycatcher and/or Rusty Blackbird habitat.

Construction of roadbed and crossing structures → Hydrological changes to ground or surface water → Alteration and degradation of Olive-sided Flycatcher and/or Rusty Blackbird habitat.

Construction and operations activities cause sensory disturbances (light, noises, dust) → Sensory disturbances impact on adjacent areas → Alteration and degradation of Olive-sided Flycatcher and/or Rusty Blackbird habitat.

Construction and operations activities clear vegetation → Structural differences between cleared and remaining vegetation create edge effect → Alteration and degradation of Olive-sided Flycatcher and/or Rusty Blackbird habitat.

Construction and maintenance activities → Introduction of invasive species → Alteration and degradation of Olive-sided Flycatcher and/or Rusty Blackbird habitat.

Construction

Habitat Alteration or Degradation due to Accidental Spills

Accidental spills and releases that occur during construction phase may result in Olive-sided Flycatcher or Rusty Blackbird habitat degradation. Boreal wetlands are often hydrologically connected through subsurface flows (Smerdon et al., 2005), resulting in large watersheds throughout which pollutants can spread. Depending on concentrations and material spilled, an accidental spill could cause death of vegetation, lower productivity and alter the vegetation community (Hutchinson and Freedman, 2011; Lednev et al., 2023).

Habitat Alteration or Degradation due to Hydrological Changes

It is widely accepted that roads can alter the hydrologic function and characteristics of peatland communities (Saraswati et al., 2020). Potential changes in surface water drainage patterns and increases or decreases in flows and surface water levels in waterbodies, as well as changes to groundwater, are described in detail in Sections 7 and 8. While destruction of habitat can result in extreme cases, alteration and degradation of Olive-sided Flycatcher or Rusty Blackbird habitat could occur in many others (Bocking et al., 2017). Hydrological changes associated with construction may affect wetland drainage patterns, resulting in lower or higher water levels and altering the plant community (Miller et al. 2015). For Rusty Blackbird, shallow water (≤ 6 cm deep) is an important driver of habitat selection (COSEWIC, 2017), therefore small changes in water levels could easily alter feeding habitats as depth to water table is a primary driver of habitat suitability (Bale et al., 2019). These changes can be extensive; a study within boreal fens in Alberta found pronounced differences in canopy cover up to 250 m from road edges in both rich and poor treed fens (Willier et al., 2022).



Habitat Alteration or Degradation due to Sensory Disturbances

Sensory disturbances resulting from road construction, including movement of equipment and vehicles, noise, lighting, and other human activities may degrade habitat for Olive-sided Flycatcher or Rusty Blackbird adjacent to the Project Footprint, reducing utilization of the area or masking vocalizations related to courtship or alarm calling (Zhou et al. 2024). There is evidence that Rusty Blackbirds respond negatively to disturbance and avoid changes in their environment (IRBTG, 2009) including lower abundance near roads (Wildlife Resources Consulting Services, 2020). While human disturbance effects on Olive-sided Flycatcher have not specifically been measured, noise disturbance has been shown to reduce abundance in some species of flycatcher (Francis et al., 2021), and reproductive success in others (Mulholland et al., 2018). Light pollution can alter songbird singing occurrence (Da Silva et al., 2015) and egg laying (Senzaki et al., 2020) which may alter reproductive success; this is species and habitat dependant with species in open habitats more effected than those in forested habitats. Insectivorous species with good lowlight eyesight could be using artificial light to hunt more effectively (Senzaki et al., 2020) and while Olive-sided Flycatcher has not been specifically studied, other flycatcher species have been found to use artificial light for foraging (Frey, 1993).

Habitat Alteration or Degradation due to Habitat Structural Change

Changes to vegetation structure during road construction activities may alter or degrade wetland songbird habitat near the Project Footprint due to vegetation clearing activities and removals. These vegetation removals may lead to edge effects, including abiotic, direct biotic, and indirect biotic effects on the habitat after the implementation of mitigation measures. It is anticipated that restoration of laydown areas and access roads will reverse some of the habitat alteration or degradation caused by road construction, but most areas will remain free of tall vegetation.

The edge effect on Olive-sided Flycatcher and Rusty Blackbird is likely relatively low due vegetation structure of their preferred wetland communities. Olive-sided Flycatcher prefers habitats with high heterogeneity and high contrast edges like where forest meets bogs, fens and other open habitats (Altman and Sallabanks, 2012). Small openings like roads may be a positive effect for Olive-sided Flycatcher as they often have higher densities (Norris et al., 2021) Rusty Blackbirds also use high contrast habitats, especially the edge between forest and riparian areas (Larue et al., 1995), although given their avoidance of human disturbance, an edge effect for roads may be expected.

Habitat Alteration or Degradation from Introduction of InvasiveSpecies

Construction activities have the potential to introduce invasive plant species to the wetland habitats used by Olive-sided Flycatcher and Rusty Blackbird. One of the pathways of spread for invasive plants is through construction equipment. Improperly cleaned construction equipment has the potential to transport and spread invasive plants, with cleared areas, including roads sides being susceptible to invasion (Hanan and Clevenger, 2005). The use of contaminated seed mixes in restoration efforts is also a pathway for invasive plants to establish in an area (Houghen et al. 2012). Once established in a new habitat, most invasive species are nearly impossible to eradicate (Pimentel et al. 2005).

Once established, invasive plant species can impact on multiple ecosystem aspects including structure, diversity and function (CFIA, 2008). However, while invasive plants are known to spread along transportation corridors, few invasive species have been found in naturally occurring boreal wetland habitats used by Olive-sided Flycatcher and Rusty Blackbird (Langor et al. 2014) with most invasive wetland species found well to the south of the RSA (EDDMAs, 2024)



Operations

Habitat Alteration or Degradation due to Accidental Spills

Similar to the effects during the construction phase, there could be effects to wetland songbird habitat quality during the operations phase of the Project from accidental spills, which may result in Olive-sided Flycatcher and Rusty Blackbird habitat degradation. Spills during operations would most likely originate from accidental releases from vehicles traveling to and from the community. The road is forecasted to have low traffic volumes, and traffic along the roadway will be primarily personal and commercial vehicles and transport trucks associated with the community. While estimate frequency of spills is low (0.00000019 spills per mile, or 0.00000012 spills per kilometer [Harwood and Russell, 1990]), its predicted that minor spills and release are possible.

Habitat Alteration or Degradation due to Hydrological Changes

Olive-sided Flycatcher and Rusty Blackbird habitat could also be impacted by changes to hydrology may occur during the operations phase. Localized changes to hydrology could occur if culvert maintenance along the road is ignored, either in terms of repairs to the structure or removal of accumulated debris. The area affected would be dependent on the amount of time the culvert remains blocked as well as the size of the impounded area.

Habitat Alteration or Degradation due to Sensory Disturbances

Road operations may impact Olive-sided Flycatcher and Rusty Blackbird habitat. During operations, most sensory impacts will be related to traffic noise, which has been found to degrade bird habitat either through complete avoidance of areas near roads or decreased habitat value (Ware et al. 2015; Summers et al. 2011). Declines in densities of some songbird species have been shown to occur at a threshold around 45-48 dB (Sadlowski, 2011). Noise from vehicles has been found to reduce bird vocalization, which could affect behaviour related to foraging, mating and predator avoidance (Cretois et al., 2023). Acoustic modeling places the 50db zone of influence at approximately 125 m beyond the Project footprint (See Appendix J – Noise and Vibration Impact Assessment Report), and 50 dB is the noise level Environment and Climate Change Canada uses in their guidelines to avoid harm to migratory birds (EIEEC, 2023). Rusty Blackbird has been shown to have lower abundance near roads in some boreal studies (Wildlife Resources Consulting Services, 2020) but has not been shown to have an impact in other areas (Powell et al. 2014). While lighting along roads is a major sensory disturbance for birds, the WSR road will not have lighting except near the community limiting its impact.

Habitat Alteration or Degradation due to Habitat Structural Change

Edge effects during operations will have similar impacts to Olive-sided Flycatcher and Rusty Blackbird and their habitats. While it is anticipated that restoration of laydown areas and access roads will reverse some of the habitat alteration or degradation caused by road construction, maintenance activities, including removal of roadside vegetation during road operations, will create periodic disturbances and sustain edge effects along the ROW.

Habitat Alteration or Degradation from Introduction of Invasive Species

The introduction and spread of noxious and invasive plant species could also occur during operations and will have similar potential impacts on Olive-sided Flycatcher and Rusty Blackbird habitat. Transportation corridors are avenues of dispersal for invasive plants (Langor et al. 2014), and given the longer timeframe, operation of the road has the potential to spread aquatic as well as terrestrial invasive plants into the RSA. Aquatic plants can be introduced to waterbodies when recreational boats are moved, and



improper cleaning and decontaminating procedures are used on the boat or equipment (Cole et al. 2019). The introduction of riparian species such as *Phragmites australis australis* (European Common Reed) could potentially alter both Olive-sided Flycatcher and Rusty Blackbird habitat but given the current northern range limits of most invasive plants in Ontario, the potential for establishment could be limited.

13.3.7.3 Alteration in Movement

There may be alterations in wetland songbird movement stemming from construction activities and operation of the road. The pathways or activities which may result in changes in wildlife movement include the following:

Construction and operations activities clear vegetation → structural differences between cleared and natural vegetation act as a barrier → Alteration in movement of wetland Olive-sided Flycatcher and/or Rusty Blackbird.

Construction and operations activities cause sensory disturbances (light, noises, dust) → Disturbances cause avoidance response → Alteration in movement of Olive-sided Flycatcher and/or Rusty Blackbird.

Construction

Alteration in Movement due to Loss of Connectivity

Gaps in cover created by anthropogenic activities are known to impede movement of birds but is species- and habitat-dependant (Desrochers and Hannon, 1997; Grubb and Doherty, 1999). Bird species that have shown reluctance to cross gaps like those created by roads are generally forest species where the road creates a distinctive edge between the road and preferred habitats, with larger gaps acting as a greater barrier (Grubb and Doherty, 1999). While wetland songbirds have not been studied to the same degree, birds in treed swamps and bogs are likely to respond similarly. Lack of gap crossing is especially true for small birds which are more likely to be impeded by the changes in vegetation structure (Johnson et al. 2017). Fragmentation likely has a low impact on Olive-sided Flycatcher as it commonly uses fragmented areas and gaps, including abrupt edges (COSEWIC, 2018). While Rusty Blackbird uses forest openings, there is the potential for areas fragmented by roads to act as a barrier to movement as some avoidance of roads has been detected.

Alteration in Movement due to Sensory Disturbance

Noise, lighting and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of wetland songbirds as they avoid the project ROW and supportive infrastructure. Unlike sensory disturbances in the operations phase, many of these disturbances will be abrupt, and occur randomly and at different locations. While no studies specifically examining wetland songbirds were found, multiple bird species have been found to respond behaviourally to sudden, loud noises by abandoning the area near the disturbance and varied in their rate of return (Wright et al. 2010; Delaney et al. 2011). The abandonment of locations due to loud noise has been used in some locations like airports to prevent birds from occupying the area. Rusty Blackbird in particular are known to be neophobic and may alter movement to avoid construction noise and other activities (IRBTG, 2005). Anthropogenic light may also affect bird movement as evidence shows it can be both a deterrent (Read, 1999) and an attractant (Gauthreux et al., 2006), this may be particularly true for Olive-sided Flycatcher which may forage for insects around the artificial lights (Lebbin et al., 2007).



Operations

Alteration in Movement due to Loss of Connectivity

Similar to the construction phase, during operations alteration in Olive-sided Flycatcher and/or Rusty Blackbird movement due to loss of connectivity may occur. Maintenance activities will maintain vegetation in an early seral state; however, as was the case during the construction phase, avoidance of these areas may be minimal as both Olive-sided Flycatcher and Rusty Blackbird use edge habitats. Intraspecific competition might cause crossing avoidance: roads are often used as territory boundaries, and territorially aggressive species such as the Olive-sided Flycatcher could prevent conspecifics, or in some cases other species, from crossing (Johnson et al., 2017).

Alteration in movement due to Sensory Disturbance

Vehicle noise is anticipated be the primary sensory impact on Olive-sided Flycatcher and/or Rusty Blackbird during operations. Traffic noise has been found to lower abundance and promote avoidance in many in many bird species (McClure et al. 2013). High-traffic roads have been shown to affect bird distribution when noise exceeded 56 dB (Hirvonen, 2001). One study that directly examined sensory disturbance of roads by the Keeyask Generation Project (WRCS, 2020) found Olive-sided flycatcher activity appeared to be similar at disturbed and reference sites while there was less activity by Rusty Blackbird at disturbed sites; however, the results are preliminary.

13.3.7.4 Injury or Death

The creation of the road may lead to both direct and indirect Olive-sided Flycatcher and/or Rusty Blackbird mortality. There could be increases in wetland bird injury or death stemming from increased vehicle traffic or clearing activities during both construction and operation of the road, with indirect mortalities arising from increased predator encounters. The pathways or activities which may result in wetland songbird injury or death include the following:

Equipment and vehicles moving within Project footprint → Collisions with Olive-sided Flycatcher and/or Rusty Blackbird within Project Footprint → Injury or Death of Olive-sided Flycatcher and/or Rusty Blackbird.

Construction and operations activities clear vegetation → Incidental encounters with Individuals or nests → Injury or Death of Olive-sided Flycatcher and/or Rusty Blackbird.

Construction and operations activities clear vegetation → Increased access for Olive-sided Flycatcher and/or Rusty Blackbird Predators → Injury or Death of Olive-sided Flycatcher and/or Rusty Blackbird.

Construction

Injury or Death due to Collisions with Vehicles

Movement of construction equipment and vehicles within the Project Footprint could result in increased death and injury of Olive-sided Flycatcher and Rusty Blackbird. Collisions with vehicles is among the top three causes of bird mortalities in Canada (Calvert et al., 2013). Vehicles will be travelling between camps and construction locations; these trips could occur at all hours and encounters with birds would not be unexpected. Bird mortality from vehicle collisions is often related to travel speed of the vehicle as birds use distance as a threat estimate and can miss-judge the closing distance between themselves and the vehicle, resulting in collision (DeVault et al. 2016). Wetland songbirds that forage and fly low from shrub to



shrub have been found to be highly vulnerable to road mortality (Santos et al., 2016). Rusty Blackbirds, which forage in shallow water and perch in low vegetation, would likely be more vulnerable than Olive-sided Flycatchers, which forage from perches at the top of trees.

Injury or Death due to Incidental Take

As Special Concern species under the SARA and the ESA, Rusty Blackbird and Olive-sided Flycatcher habitats are not protected. However, under the *Migratory Birds Convention Act* (GOC, 1994), it is prohibited to disturb their nests during the breeding season. Vegetation clearing in Olive-sided Flycatcher and Rusty Blackbird habitat during road construction, and/or movement of equipment/vehicles through vegetated areas, may result in injury or death to birds, hatchlings, and/or eggs if management of vegetation is carried out during the breeding season, even after mitigation measures have been applied. The characteristics of songbird nests can make them difficult to detect. Rusty Blackbird place well concealed nests in small trees or dense shrubs often close to water (OBBA, 2005). Olive-sided Flycatcher are often high in coniferous trees in dense clusters of needles and twigs. Given the cryptic nature of their nests, incidental take is possible.

Injury or Death due to Changes to Predator-Prey Dynamics

Effects on Rusty blackbird and Olive-sided Flycatcher survival from improved predator access and movement rates is possible during the construction phase. Linear features are known to facilitate predator movement in the boreal (Dickie et al., 2017; Benoit-Pepin et al., 2024) and creation of new roads connected to human activity is known to spread predators into previously unoccupied areas (Lantham et al. 2011). Rusty Blackbird and Olive-sided Flycatcher have a number of common predators including Canada Jay, Sharp-shinned Hawk (*Accipiter striatus*), Common Raven and Red Squirrel (COSEWIC 2017 and 2018). These species have been documented to use forest edges like a road ROW to increase their predation success (Ibarzabal and Desrochers, 2004; Robertson and Hutto, 2007; Bildstein et al., 2020). While nest parasitism is often discussed as an outcome of edge creation, no Brown-headed Cowbirds (*Molothrus ater*) were recorded during the baseline studies. As such, nest parasitism related to the project is unlikely as reported Brown-headed Cowbird range is outside the RSA (OBBA, 2005).

Operations

Injury or Death due to Collisions with Vehicles

Vehicle travel during operations will likely cause injury or death to Olive-sided Flycatcher and Rusty Blackbird as collisions with vehicles is among the top three causes of bird mortalities in Canada (Calvert et al., 2013). Along low-volume forest roads in Canada, it has been estimated that more than 14,000 birds are killed annually due to collisions with vehicles, or approximately one (1) bird every 3 km per year (Bishop and Brogan, 2013), this number is likely vastly underreported for small birds due to their size and scavenging. As in the construction phase, if present near the road, Rusty Blackbirds are more likely to suffer a collision than Olive-sided Flycatcher because of their foraging behaviours. However, they have shown some road avoidance which would make their presence less likely near the road.

Injury or Death due to Incidental Take

Vegetation clearing in Olive-sided Flycatcher and Rusty Blackbird habitat is also scheduled to occur during operations as both species use habitat openings and edges. Though smaller in scale, periodic clearing of the ROW may occur during operations as part of line-of-sight maintenance or infrastructure repairs. If maintenance occurs during the breeding season, nests, eggs and individuals could be injured or killed; Rusty Blackbird nests are usually well concealed in small trees which would make them vulnerable



to maintenance activities. Olive-sided Flycatcher placement of nests high in mature trees would make them less vulnerable in the operations phase.

Injury or Death due to Changes to Predator-Prey Dynamics

Effects on Olive-sided Flycatcher and Rusty Blackbird from predators during operations are a continuation of the same impacts as described for the construction phase. Maintenance clearing during operations will maintain openness along the ROW, which will allow predators increased access to wetland areas near the road, exposing Olive-sided Flycatcher and Rusty Blackbird to increased predation. Nest predation is the most common source of nest failure for both birds (COSEWIC, 2017; COSEWIC 2018). The predator impact in some cases could be species specific as with American Marten (*Martes americana*) for Rusty Blackbirds and Peregrine Falcon (*Falco peregrinus*) for Olive-sided Flycatcher (COSEWIC 2017 and 2018). While some studies have found a positive effect on bird survival due to roads and resulting predator avoidance of roads, it is often attributed to higher levels of human presence (Singer et al. 2020), which given the low traffic levels are unlikely for this project.

13.3.7.5 Threats Assessment

Each of the four potential effects categories were evaluated based on the threats assessment criteria outlined in the TISG and is based on IUCN-CMP (International Union for the Conservation of Nature–Conservation Measures Partnership) unified threat classification system, referenced from NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk (Natureserve, 2012). Threats are assessed prior to any mitigative measures being applied. The threat assessment process is generally done at the population level but can be done at a more regional level. Olive-sided Flycatchers and Rusty Blackbirds, which have breeding territories that are approximately 10 to 20 ha in size, were evaluated at the LSA level.

Scope is small for all threats to both Olive-sided Flycatcher and Rusty Blackbird as the percent of the population affected is less than 10% of the available habitat and population within the LSA. Both species have threat severity ratings ranging from slight to serious. The two (2) threats related to vegetation removals are serious for both species as well, as within the scope based on the high degree of habitat loss and alteration, hydrologic loss is rated as severe for Rusty Blackbird because of its requirement for specific water depths while Olive-sided Flycatcher rates as moderate. Hydrologic alteration, predation and spills are rated as moderate for both Olive-sided Flycatcher and Rusty Blackbird. Rusty Blackbird has a severity rating of moderate for sensory disturbances and connectivity while Olive-sided Flycatcher has a rating of slight. The difference is based on the evidence of road avoidance for Rusty Blackbird. All other severity ratings are slight. Magnitude is rated as low for all threats.

For both Olive-sided Flycatcher and Rusty Blackbird the ratings are the same. Irreversibility is high for hydrological changes and very high for vegetation removal as the roadbed will likely never be removed and such changes are challenging to reverse in short time, if ever. Irreversibility is also high for spills, edge effects, invasive species, and predation because while the effects can technically be reversed it would take time and considerable effort. The rest of the threats were deemed low and can be easily reversed. The degree of effect was low for all except habitat loss and destruction due to vegetation removal, which was moderate.

A summary of the threat assessment for Olive-sided Flycatcher habitat loss, alteration or degradation of habitat, alteration in movement, and injury or death prior to the consideration of mitigation measures, is presented in **Table 13-33**, and the summary for Rusty Bird is presented in **Table 13-34**.



Table 13-33: Summary of Threat Assessment for Potential Effects on Olive-sided Flycatcher

Threat	Scope	Severity	Magnitude	Irreversibility	Degree of Effect
Habitat Loss – Clearance Activities	Small	Serious	Low	Very High	Moderate
Habitat Loss – Hydrological Changes	Small	Moderate	Low	High	Low
Habitat Alteration or Degradation – Accidental Spills	Small	Moderate	Low	High	Low
Habitat Alteration or Degradation – Hydrological Changes	Small	Moderate	Low	High	Low
Habitat Alteration or Degradation – Sensory Disturbance	Small	Slight	Low	Low	Low
Habitat Alteration or Degradation – Habitat Structural Change	Small	Slight	Low	High	Low
Habitat Alteration or Degradation – Invasive Species	Small	Slight	Low	High	Low
Alteration in Movement – Loss of Connectivity	Small	Slight	Low	Low	Low
Alteration in Movement – Sensory Disturbance	Small	Slight	Low	Low	Low
Injury or Death – Incidental Take	Small	Slight	Low	Low	Low
Injury or Death – Changes to Predator-Prey Dynamics	Small	Moderate	Low	High	Low
Injury or Death – Collisions with Vehicles	Small	Slight	Low	Low	Low

Table 13-34: Summary of Threat Assessment for Potential Effects on Rusty Blackbird

Threat	Scope	Severity	Magnitude	Irreversibility	Degree of Effect
Habitat Loss – Clearance Activities	Small	Serious	Low	Very High	Moderate
Habitat Loss – Hydrological Changes	Small	Serious	Low	High	Low
Habitat Alteration or Degradation – Accidental Spills	Small	Moderate	Low	High	Low
Habitat Alteration or Degradation – Hydrological Changes	Small	Moderate	Low	High	Low
Habitat Alteration or Degradation – Sensory Disturbance	Small	Moderate	Low	Low	Low
Habitat Alteration or Degradation – Habitat Structural Change	Small	Slight	Low	High	Low
Habitat Alteration or Degradation – Invasive Species	Small	Slight	Low	High	Low
Alteration in Movement – Loss of Connectivity	Small	Moderate	Low	Low	Low
Alteration in Movement – Sensory Disturbance	Small	Moderate	Low	Low	Low
Injury or Death – Incidental Take	Small	Slight	Low	Low	Low
Injury or Death – Changes to Predator-Prey Dynamics	Small	Moderate	Low	High	Low
Injury or Death – Collisions with Vehicles	Small	Slight	Low	Low	Low



13.3.8 Lesser Yellowlegs

13.3.8.1 Habitat Loss

There may be Lesser Yellowlegs habitat loss resulting from vegetation clearing, hydrological changes and disturbance during construction and throughout operations. These losses could be to both foraging and breeding habitats. The pathways or activities which may result in loss or destruction of wildlife habitat include the following:

Site preparation and vegetation clearing and ground disturbance → loss/destruction of Lesser Yellowlegs habitat.

Construction of roadbed and crossing structures → Hydrological changes to ground or surface water → loss/destruction of Lesser Yellowlegs habitat.

Construction

Habitat Loss due to Clearing Activities

The construction of the road has the potential for direct and indirect effects that could cause the loss of Lesser Yellowlegs habitat through physical alteration and removal of suitable habitat. Lesser Yellowlegs in the eastern Canadian boreal nest primarily in drier areas surrounded by open wetlands, specifically large open fens with open waterbodies (COSEWIC, 2020). They also nest in raised open areas like regenerating burns that retain their wetland features (Cadman et al. 2007).

Using the results of habitat modelling via Ecological Land Classification (refer to Section 11), and based on an understanding Lesser Yellowlegs habitat preferences and the Project Footprint, estimate construction activities will result in the removal of 29.62 ha (1.04%) of Sparse Treed Bog, 43.47 ha (1.55%) of Sparse Treed Fen, 0.33 ha (0.32%) of Open Shore Fen, 5.92 ha (1.11%) of River/Fen, 1.37 ha (0.25%) of Poor Fen, and 0.05 ha (0.03%) of Open Bog in the LSA, representing approximately 1.15% of the most suitable Lesser Yellowlegs habitat in the LSA. Overall, suitable Lesser Yellowlegs habitat is common throughout the study area with 28.33% of the LSA and 30.20% of the combined Project Footprint and RSA (i.e., full study area) consisting of these vegetation communities.

Habitat Loss due to Hydrological Changes

Potential changes in surface water drainage patterns and increases or decreases in flows and surface water levels in waterbodies, as well changes to groundwater, are described in detail in Sections 7 and 8. Construction activities have the potential to locally influence the contribution of groundwater discharge to the baseflow of waterbodies. Specifically, Project construction may lead to changes in the local hydrogeological environment by increasing, decreasing or redirecting groundwater flows. Changes in surface water conditions can also occur with the installation of crossing structures. While changes are generally concentrated downstream of the effect, they can also take place on the upstream side if channel restriction causes changes to water impoundment. Extreme changes, such as those due to poor road design or large fluctuations in water levels, can lead to death of vegetation and loss of Lesser Yellowlegs habitats as they are converted to open water habitats (Bocking et al., 2017).



Operations

Habitat Loss due to Clearing Activities

Operation of the roadway is unlikely to result in additional loss of Lesser Yellowlegs habitat as maintenance activities will involve managing re-growth of vegetation along the ROW within the Project Footprint. There is a very low probability that reclaimed temporary laydown areas and clearings may need to be reused during operations, but it is predicted that these impacts would be short-term and of limited size. While the quarries are expected to remain operational following construction, the footprints will not be expanded and as such no additional habitat loss or destruction is anticipated to occur during operations.

Habitat Loss due to Hydrological Changes

Lesser Yellowlegs habitat loss through changes to hydrology could also occur during the operations phase due to culvert and crossing structure maintenance. Habitat loss could occur if culvert maintenance is ignored, either in terms of repairs to the structure or removal of accumulated debris. Given sufficient time, death of vegetation and loss of habitat could occur (Bocking et al., 2017).

13.3.8.2 Habitat Alteration or Degradation

There may be alterations or degradation to Lesser Yellowlegs habitat resulting from vegetation clearing, hydrological changes and disturbance during construction and throughout operations. Alteration of habitat is defined as a modification in the habitat type or quality of the habitat, this change could be either positive or negative (Fuller, 2017). Habitat degradation is defined similarly as decline in the quality of the habitat resulting in reduced capacity to support the target species.

The pathways or activities which may result in alteration or degradation of shorebird habitat include the following:

Accidental spill during construction or operations activities → transportation of material into wetland → Alteration and degradation of Lesser Yellowlegs habitat.

Construction of roadbed and crossing structures → Hydrological changes to ground or surface water → Alteration and degradation of Lesser Yellowlegs habitat.

Construction and operations activities cause sensory disturbances (light, noises, dust) → Sensory disturbances impact on adjacent areas → Alteration and degradation of Lesser Yellowlegs habitat.

Construction and operations activities clear vegetation → Structural differences between cleared and remaining vegetation create edge effect → Alteration and degradation of Lesser Yellowlegs habitat.

Construction and maintenance activities → Introduction of invasive species → Alteration and degradation of Lesser Yellowlegs habitat.



Construction

Habitat Alteration or Degradation due to Accidental Spills

Accidental spills and releases that occur during construction phase may result in Lesser Yellowlegs habitat degradation. Boreal wetlands are often hydrologically connected through subsurface flows (Smerdon et al., 2005), resulting in large watersheds throughout which pollutants can spread.

Habitat Alteration or Degradation due to Hydrological Changes

It is widely accepted that roads can alter the hydrologic function and characteristics of the landscapes they traverse. While destruction of habitat can result in extreme cases, alteration and degradation of shorebird habitat can occur in many others (Bocking et al., 2017). Flooding events during construction may result in erosion of the ROW and deposition of granular materials into adjacent wetlands and waterways. Conversely, hydrological changes associated with construction may affect wetland drainage patterns, resulting in lower or higher water levels and altering the plant community (Miller et al. 2015). These changes can be extensive, a study within boreal fens in Alberta found pronounced differences in canopy cover up to 250 m from road edges in both rich and poor treed fens (Willier et al., 2022). Potential changes in surface water drainage patterns and increases or decreases in flows and surface water levels in waterbodies, as well changes to groundwater, are described in detail in Sections 7 and 8 respectively.

Habitat Alteration or Degradation due to Sensory Disturbances

Sensory disturbances resulting from road construction, including movement of equipment and vehicles, noise, lighting, and other human activities may degrade habitat for Lesser Yellowlegs adjacent to the Project Footprint, reducing utilization of the area or masking vocalizations related to courtship or alarm calling (Zhou et al. 2024). While sensory disturbance effects on Lesser Yellowlegs have not specifically been measured, human disturbance has been shown to reduce shorebird abundance and site fidelity (Gibson et al., 2017; Placidis et al., 2021).

Sensory disturbance may be especially high during construction when activities such as blasting, quarrying, hauling and clearing may occur during all hours causing wetland birds to avoid the ROW and supportive infrastructure. Construction noise is less continuous and more impulsive than traffic noise so habituation to the noise would not be likely in most cases. Research on shorebird response to impulsive noise, such as occurs during construction, showed area abandonment by birds at high decibel levels (Wright et al. 2010). Light pollution is a major impact on shorebirds. Shorebirds may avoid roosting at artificially lit roosts and a lack of unlit roost areas may cause shorebirds to avoid using otherwise suitable feeding grounds (Gaston et al., 2013).

Habitat Alteration or Degradation due to Habitat Structural Change

Changes to vegetation structure during road construction activities may alter or degrade shorebird habitat near the Project Footprint due to vegetation clearing activities and removals. These vegetation removals may lead to edge effects, including abiotic, direct biotic, and indirect biotic effects on the habitat after the implementation of mitigation measures. It is anticipated that restoration of laydown areas and access roads will reverse some of the habitat alteration or degradation caused by road construction, but most areas will remain free of tall vegetation. Shorebird species from multiple families have been found to rely on bare, wet ground for thermoregulation when experiencing high ambient temperatures (Ryeland et al. 2020), and such microhabitat features may experience edge effects if they occur adjacent to the ROW. However, the edge effect on Lesser Yellowlegs is likely relatively low due to the more open and lower vegetation structure of its preferred wetland communities compared to forested habitats which undergo



large changes in structure and composition due to edge effects (Frankin et al. 2020) in addition to its ability to use disturbed habitats like cleared areas (MECP, 2024).

Habitat Alteration or Degradation due to Introduction of Invasive Species

The introduction and spread of noxious and invasive plant species have the potential to affect aquatic and terrestrial habitats used by Lesser Yellowlegs. Invasive plant species can impact multiple ecosystem aspects including structure, diversity and function (CFIA, 2008). One of the pathways of spread for invasive plants is through construction activities and associated equipment use. Construction equipment has the potential to transport and spread invasive plants, with cleared areas including roadsides being susceptible to invasion (Hanan and Clevenger, 2005). The use of contaminated seed mixes in restoration efforts is also a pathway for invasive plants to establish in an area (Houghen et al. 2012). Once established in a new habitat, most invasive species are nearly impossible to eradicate (Pimentel et al. 2005). While invasive plants are known to spread along transportation corridors, few invasive species have been found in naturally occurring open habitats such as the wetland habitats used by Lesser Yellowlegs (Langor et al. 2014).

Operations

Habitat Alteration or Degradation due to Accidental Spills

Similar to the effects of construction, there could be impacts to water quality during the operations phase of the Project from accidental spills which may result in Lesser Yellowlegs habitat degradation. Boreal wetlands are often hydrologically connected through subsurface flows (Smerdon et al., 2005), resulting in large watersheds throughout which pollutants can spread. Spills during operations would most likely originate from accidental releases from vehicles. The road is forecasted to have low traffic volumes, and traffic along the roadway will be primarily personal and commercial vehicles and transport trucks associated with the community. While estimated frequency of spills is low (0.00000019 spills per mile, or 0.00000012 spills per kilometer, (Harwood and Russell, 1990), its predicted that minor spills and release are possible.

Habitat Alteration or Degradation due to Hydrological Changes

Changes to hydrology could also occur during the operations phase due to culvert and crossing structure maintenance. Localized changes to hydrology could occur if culvert maintenance along the road is ignored, either in terms of repairs to the structure or removal of accumulated debris. The area affected would be dependent on the amount of time the culvert remains blocked as well as the size of the impounded area.

Habitat Alteration or Degradation due to Sensory Disturbances

Sensory disturbances resulting from road operations may degrade habitat for Lesser Yellowlegs adjacent to the Project Footprint, reducing utilization of the area or masking vocalizations of individuals that remain. Most sensory impacts during operations will be related to traffic noise which has been found to degrade bird habitat either through complete avoidance of areas near roads or decreased habitat value (Ware et al. 2015; Summers et al. 2011). Sensory disturbance has been found to lower abundance of birds near roads, especially at high traffic densities (Husby, 2017). Acoustic modeling places the 50 db zone of influence at approximately 125 m beyond the Project footprint (See Appendix J – Noise and Vibration Impact Assessment Report), and 50 dB is the noise level Environment and Climate Change Canada uses in their guidelines to avoid harm to migratory birds (EEEEC, 2023). While lighting along roads is a major sensory disturbance for shorebirds, the WSR will not have lighting except near the community limiting its impact.



Habitat Alteration or Degradation due to Habitat Structural Change

Edge effects associated with structural changes to habitat during operations will have similar impacts of Lesser Yellowlegs and their habitat. While it is anticipated that restoration of laydown areas and access roads will reverse some of the habitat alteration or degradation caused by road construction, maintenance activities, including removal of roadside vegetation during road operations, will create periodic disturbances and sustain edge effects along the ROW.

Habitat Alteration or Degradation due to Introduction of Invasive Species

The introduction and spread of noxious and invasive plant species could also occur during operations and will have similar potential impacts on Lesser Yellowlegs habitat. Road operations could have larger impacts than construction in terms of introduction, particularly of invasive aquatic plants. Aquatic plants can be introduced to waterbodies when recreational boats are moved, and improper cleaning and decontaminating procedures are used on the boat or equipment (Cole et al. 2019). While recreational boating has been found to be responsible for movement of invasive species throughout the Great Lakes region (Cole et al. 2019), currently the spread of invasive aquatic plants into the boreal has only occurred in a few isolated pockets (iNaturalist, 2024). Given that transportation corridors are avenues of dispersal for invasive plants (Langor et al. 2014), operation of the road has the potential to spread aquatic as well as terrestrial invasive plants into the RSA.

13.3.8.3 Alterations in Movement

There may be alterations in Lesser Yellowlegs movement stemming from construction activities and operation of the road. The pathways or activities which may result in changes in wildlife movement include the following:

Construction and operations activities clear vegetation → Structural differences between cleared and natural vegetation act as a barrier → Alteration in movement of Lesser Yellowlegs.

Construction and operations activities cause sensory disturbances (light, noises, dust) → Disturbances cause avoidance response → Alteration in movement of Lesser Yellowlegs.

Construction

Alteration in Movement due to Loss of Connectivity

Gaps in cover created by anthropogenic activities are known to impede movement of birds but is species and habitat dependent (Desrochers and Hannon, 1997; Grubb and Doherty, 1999). Bird species that have shown reluctance to cross gaps like those created by roads are generally forest species where the road creates a distinctive edge between the road and preferred habitats, with larger gaps acting as a greater barrier (Grubb and Doherty, 1999). The project ROW, at 35 m, is smaller than the gap size (50 m) found to limit crossings for some boreal birds (St Clair et al., 1998), although some laydown and temporary clearings will exceed this limit. Lesser Yellowlegs prefer more open habitats where the road ROW would present as less of a barrier as it is more structurally similar its wetland habitats, and Lesser Yellowlegs are known to use disturbed anthropogenic areas (COSEWIC, 2020). Additionally, no studies were found that indicated shorebirds respond to road gaps as a barrier.



Alteration in Movement due to Sensory Disturbance

Lesser Yellowlegs movement is likely to be altered by sensory disturbances associated with Project construction and operations. Noise, lighting and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of Lesser Yellowlegs as they avoid the project ROW and supportive infrastructure. Some shorebird species, when roosting, have been found to respond behaviourally to sudden, loud noises by flying away and abandoning their roost site (Wright et al. 2010). Human activity can increase the amount of time that shorebirds spend moving, increasing energy expenditure and decreasing the amount of time available for foraging (Murchison et al., 2016).

Operations

Alteration in Movement due to Loss of Connectivity

As was the case during the construction phase, alteration in movement due to loss of connectivity may occur during road operation. Maintenance activities will maintain vegetation in an early seral state; however, like during the construction phase, avoidance of these areas may be minimal as Lesser Yellowlegs prefer more open habitats including anthropogenically disturbed sites.

Alteration in Movement due to Sensory Disturbance

Noise will be the primary sensory impact on Lesser Yellowlegs during operations. Traffic noise has been found to lower abundance and promote avoidance in many bird species (McClure et al. 2013). High traffic roads have been shown to affect shorebird distribution when noise exceeded 56 dB (Hirvonen, 2001). Lesser Yellowlegs may also be affected by the visual presence and movement of vehicles. Shorebirds have been found to increase their time away from the nest, change their use patterns and spend increased time in flight when exposed to nearby off-highway vehicles (Defeo et al. 2009; Schlacher et al., 2013). However, Cole et al. (2019) found that in a highly regulated off-highway vehicles trail system, which is more similar to a road network, these responses did not occur, and overall, some habituation may be possible (Schlacher et al., 2013).

13.3.8.4 Injury or Death

The creation of the road may lead to both direct and indirect Lesser Yellowlegs mortality. There may be increases in wildlife injury or death stemming from increased vehicle traffic or clearing activities during both construction and operation of the road, with indirect mortalities arising from increased predator encounters and human access. The pathways or activities that may result in Lesser Yellowlegs injury or death include the following:

Equipment and vehicles moving within Project Footprint → Collisions with Lesser Yellowlegs within Project Footprint → Injury or Death of Lesser Yellowlegs.

Construction and operations activities clear vegetation → Incidental encounters with Individuals or nests → Injury or Death of Lesser Yellowlegs.

Construction and operations activities clear vegetation → Increased access for Lesser Yellowlegs Predators → Injury or Death of Lesser Yellowlegs.

Construction of Road → Increased access to Lesser Yellowlegs habitat by poachers → Injury or Death of Lesser Yellowlegs



Construction

Injury or Death due to Collisions with Vehicles

Movement of construction equipment and vehicles within the Project Footprint could result in increased death and injury of Lesser Yellowlegs. Vehicles will be travelling between camps and construction locations; these trips could occur at all hours and encounters with birds would not be unexpected. Bird mortality related to vehicle collisions is often related to travel speed of the vehicle as birds use distance as a threat estimate and can misjudge the closing distance between themselves and the vehicle resulting in collision (DeVault et al. 2016).

Injury or Death due to Incidental Take

Vegetation clearing in Lesser Yellowlegs habitat during road construction, and/or movement of equipment/vehicles through vegetated areas, may result in injury or death to birds, hatchlings, and/or eggs if management of vegetation is carried out during the breeding season. Lesser Yellowlegs nest on the ground in sheltered sites under shrubs, trees or next to logs, these sites are also typically close to water (BSI, 2024). The characteristics of shorebird nests can make them difficult to detect. Additionally, like many shorebirds, nesting adult Lesser Yellowlegs stay on their nest when approached by humans and their young either remain still or run into thick vegetation (Tibbitts and Moskoff, 2020).

Injury or Death due to Changes to Predator-Prey Dynamics

Effects on Lesser Yellowlegs survival from improved predator access and movement rates is possible during the construction phase. Linear features are known to facilitate predator movement in the boreal (Dickie et al., 2017; Benoit-Pepin et al., 2024) and creation of new roads connected to human activity is known to spread predators into previously unoccupied areas (Lantham et al. 2011). Nest predators are not well documented for Lesser Yellowlegs, but ground-nesting shorebirds are particularly vulnerable to mammal predators like Red Fox (*Vulpes vulpes*) and coyote which are known to spread via human infrastructure like roads (MECP, 2024). Other known predators of Lesser Yellowlegs include a variety of avian species, including Bald Eagle, Northern Harrier (*Circus hudsonius*), Merlin (*Falco columbarius*), American Crow (*Corvus brachyrhynchos*) and Peregrine Falcon, that prey on nests and young (SIMoN, 2024). These avian predators may have increased success along the road edge as avian predators can take advantage of increased prey viability along the road edge (Degregorio et al., 2014).

Injury or Death due to Increased Access

The development of the Webequie Supply Road could result in a negative effect on the abundance of shorebird species through increased human access to habitats where populations are present. Access to previously undisturbed areas introduces opportunity for increased harvesting by First Nation Peoples and recreational hunting. Construction and other temporary workers may contribute to increased harvest during construction of the Project. These workers may exploit the local area to hunt during their time-off or post-shift. While hunting of shorebirds was extensive in the 19th and early 20th century, Lesser Yellowlegs has not been legally harvested in Canada, except by First Nation Peoples, since the introduction of the Migratory Bird act in 1918. Currently hunting by Indigenous communities is thought to be negligible (COSEWIC, 2020).



Operations

Injury or Death due to Collisions with Vehicles

Vehicles traveling along the road during operations could collide with Lesser Yellowlegs causing injury or death. Collisions with vehicles is among the top three causes of bird mortalities in Canada (Calvert et al., 2013). In coniferous-dominated Canadian landscapes with low-volume roads, it has been estimated that more than 14,000 birds are killed annually due to collisions with vehicles, or approximately one bird every 3 km per year (Bishop and Brogan, 2013). Shorebirds comprise a relatively small number of avian casualties attributed to collisions with vehicles in Canada, at 0.9% of mortalities (Bishop and Brogan, 2013) but are likely under-reported due to their small size. For Lesser Yellowlegs in particular the impact of collisions on populations is unknown (MECP, 2024).

Injury or Death due to Incidental Take

Lesser Yellowlegs and their nests are protected under the SARA which prohibits the damage or destruction of nests for bird species listed as threatened (GOC, 2025). Lesser Yellowlegs and its habitat are also protected under Ontario's ESA (GOO, 2007). Vegetation clearing in Lesser Yellowlegs habitat is also scheduled to occur during operations. Though smaller in scale, periodic clearing of the ROW may occur during operations as part of line-of-sight maintenance or infrastructure repairs. If maintenance occurs during the breeding season, nests, eggs, and individuals could be injured or killed, as the cryptic behavior of Lesser Yellowlegs during breeding will be unchanged, presenting the same potential for incidental take.

Injury or Death due to Changes to Predator-Prey Dynamics

Effects on Lesser Yellowlegs from predator encounters are predicted to be long-term in duration as predators are known to use linear features well beyond their operational lifetime. Maintenance clearing during operations will maintain openness along the ROW which will allow predators increased access to wetland areas near the road exposing ground nesters, like Lesser Yellowlegs, to increased predation. While some studies have found a positive effect on bird survival due to roads and resulting predator avoidance of roads, it is often attributed to higher levels of human presence (Singer et al. 2020), which given the low traffic levels are unlikely for this project.

Injury or Death due to Increased Access

Access to Lesser Yellowlegs Habitat will continue during operations, potentially leading to harvest of Lesser Yellowlegs. Creation of roads in previously inaccessible areas can often lead to increased use by hunters (Crichton et al., 2004; Boston 2016). The potential for harvest is also likely greater during the operations phase as it will operate over a long period of time and access will not be controlled unlike the construction phase.

13.3.8.5 Threat Assessment

Each of the four potential effects categories were evaluated based on the threats assessment criteria outlined in the TISG and is based on IUCN-CMP unified threat classification system, referenced from NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk (NatureServe, 2012). Threats are assessed prior to any mitigative measures being applied. Assessments are generally done at the population level, and for Lesser Yellowlegs, which can range up to 100 km²



during the incubation and brood-rearing periods (COSEWIC, 2020), the evaluation was made at the RSA level.

Scope is small for all threats as the percent of the population affected is less than 10% of the available habitat and population within the RSA. Severity of the threats ranges from slight to serious: threats related to vegetation removals and hydrological changes are serious as within the scope based on the high degree of habitat loss and alteration; sensory disturbances are rated as moderate; and all other threats are slight. Magnitude is rated as low for all threats.

Irreversibility is high for hydrological changes and very high for vegetation remove as the roadbed will likely never be removed but hydrological mitigations could be done. Irreversibility is also high for spills, edge effects, invasive species, and predation because while the effects can technically be reversed it would take time and considerable effort. Hunting and loss of connectivity could be restored with a reasonable commitment of resources. The rest of the threats were deemed low and can be easily reversed. The degree of effect was low for all except vegetation loss which was moderate.

A summary of the threat assessment for Lesser Yellowlegs habitat loss, alteration or degradation of habitat, alteration in movement, and injury or death prior to the consideration of mitigation measures, is presented in **Table 13-35**.

Table 13-35: Summary of Threat Assessment for Potential Effects on Lesser Yellowlegs

Threat	Scope	Severity	Magnitude	Irreversibility	Degree of Effect
Habitat Loss – Clearing Activities	Small	Serious	Low	Very High	Moderate
Habitat Loss – Hydrological Changes	Small	Serious	Low	High	Low
Habitat Alteration or Degradation – Spills	Small	Serious	Low	High	Low
Habitat Alteration or Degradation – Hydrological Changes	Small	Serious	Low	High	Low
Habitat Alteration or Degradation – Sensory Disturbance	Small	Moderate	Low	Low	Low
Habitat Alteration or Degradation – Habitat Structural Change	Small	Slight	Low	High	Low
Habitat Alteration or Degradation – Invasive Species	Small	Slight	Low	High	Low
Alteration in Movement – Loss of Connectivity	Small	Slight	Low	Medium	Low
Alteration in Movement – Sensory Disturbance	Small	Moderate	Low	Low	Low
Injury or Death – Incidental Take	Small	Slight	Low	Low	Low
Injury or Death – Changes to Predator-Prey Dynamics	Small	Slight	Low	High	Low
Injury or Death – Collisions with Vehicles	Small	Slight	Low	Low	Low
Injury or Death – Increased Access	Small	Slight	Low	Medium	Low



13.3.9 Common Nighthawk

13.3.9.1 Habitat Loss

There may be Common Nighthawk habitat loss resulting from vegetation clearing, hydrological changes and disturbance during construction and throughout operations. The pathways or activities which may result in loss or destruction of wildlife habitat include the following:

Site preparation and vegetation clearing and ground disturbance → Loss of Common Nighthawk habitat.

Construction of roadbed and crossing structures → Hydrological changes to ground or surface water → loss of Common Nighthawk habitat.

Construction

Habitat Loss due to Clearing Activities

The construction of the road has the potential for direct and indirect effects that could cause the loss of Common Nighthawk habitat through physical alteration and removal of suitable habitat.

In terms of habitat loss, breeding and foraging habitat can be described separately for Common Nighthawk. In the boreal, Common Nighthawks are often disturbance specialists using post-burn habitats as well as rocky outcrops, dry bogs and pine forests for breeding (COSEWIC, 2018). In terms of foraging habitat, Common Nighthawks are more generalists, congregating in areas where large numbers of aerial insects are available such as riparian areas and large wetlands (Brigham et al. 2011).

Based on an understanding of Common Nighthawks habitat preferences, the results of habitat modelling for Ecological Land Classification (refer to Section 11) were used to estimate removals of preferred breeding habitat during construction. Predicted construction activities will result in the removal of 0.77 ha (2.36%) of Burn-Cut habitat, 0.21 ha (0.68%) of Burn-Cut Mixedwood habitat, 5.26 ha (6.2%) of disturbed habitat, and 3.38 ha (37.22%) of Rock Barren Communities in the LSA, representing approximately 6.1% of the most suitable Common Nighthawk breeding habitat in the LSA. Preferred Common Nighthawk habitat is relatively rare in the study area only making up only 157 ha or 0.12% of the total study area (Project Footprint and RSA combined).

Gradient BRT modelling was also done to estimate density for the Common Nighthawk using ARU data. **Figure 13.14** show the estimated density of Common Nighthawk within the RSA under current conditions for the Common Nighthawk. When the Project Footprint is overlayed it shows a loss of approximately 1.02% of highest-use habitat in the LSA and a loss of 0.13% of high-use habitat in the RSA due to road construction (**Table 13-36**). However, modeled densities ranged from 0.07536 to 0.08987 birds/ha with the highest quantile (highest 20%) starting at 0.08316. The limited predicted density range likely reflects the generalist nature of Common Nighthawk during foraging and not the more limited breeding habitat. This makes BRT modeling limited in its use for the impacts of breeding habitat loss but emphasizes the availability of foraging habitats.



Table 13-36: Common Nighthawk High-Density Habitat by Study Area






Species	LSA		RSA	
	Pre-construction (ha)	% Removed	Pre-construction (ha)	% Removed
Common Nighthawk	4333.32 ha	1.02%	32781.11 ha	0.13%

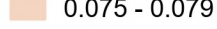
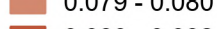
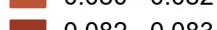
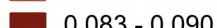

Not all construction activities are expected to be habitat losses: Common Nighthawk use disturbed areas like gravel roads, gravel pits, laydowns and pipelines (Brigham et al. 2011). Temporary clearings will provide additional Common Nighthawk habitat, at least in the short-term, and creation of the quarries will likely add habitat in the long-term.





Legend:

-  Preferred Route
-  Bird Local Study Area (LSA 1km from Preferred Route)
-  Bird Regional Study Area (RSA 5km from either side of LSA boundary)
-  First Nation Reserve
-  Provincial Park

- Predicted Density**
-  0.075 - 0.079
 -  0.079 - 0.080
 -  0.080 - 0.082
 -  0.082 - 0.083
 -  0.083 - 0.090

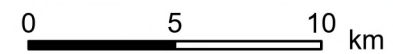


NOTES

1. Coordinate System: NAD 1983 UTM Zone 18N.
2. Cadastral boundaries are for informational purposes only and should not be considered suitable for legal, engineering, or surveying purposes.
3. Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information, and Land Information Ontario (LIO) Warehouse Open Data (<https://geohub.lio.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNRF).
4. Service Layer Credits: Earthstar Geographics

DISCLAIMER

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Webequie Supply Road

BRT Density Modeling for Common Nighthawk under Existing Conditions

Figure Number: 13-14		REV: PA		
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Habitat Loss due to Hydrological Changes

Construction activities have the potential to cause the destruction of Common Nighthawk habitat through changes to groundwater and surface flows. Common Nighthawk could be affected by hydrological changes causing habitat loss. For Common Nighthawk, while upland nesting sites are preferred, in wetland-dominated areas like the Study Area, other open areas like fens and bogs are likely being used as nesting sites. In these areas, changes in hydrology could lead to losses of nesting habitat. In terms of groundwater, project construction may lead to changes in the local hydrogeological environment by increasing, decreasing or redirecting groundwater flows. Road construction in particular can alter subsurface flows in peatlands changing the hydrology long-term (Waddington et al. 2014). Changes in surface water conditions can also occur with the installation of crossing structures, changes are generally concentrated downstream of the effect but can also take place on the upstream side if channel restriction causes water impoundment which can cause death of vegetation (Bocking et al., 2017).

Operations

Habitat Loss due to Clearance Activities

Operation of the roadway is unlikely to result in additional loss of Common Nighthawk habitat through vegetation removal. There is a very low probability that reclaimed temporary laydown areas and clearings may need to be reused during operations, but it is predicted that these impacts would be short-term and of limited size. Most maintenance activities will involve managing re-growth of vegetation along the ROW within the Project Footprint and are accounted for in the construction phase. Quarries will remain operational following construction as additional material may be needed for maintenance activities. Given the use of rocky areas by Common Nighthawk, these areas will likely be used by Common Nighthawk when the quarry is not actively being mined.

Habitat Loss due to Hydrological Changes

Operation of the roadway is unlikely to result in additional loss of Common Nighthawk habitat through hydrologic changes. Changes to hydrology could potentially occur during the operations phase due to culvert and crossing structure maintenance. Culverts and other crossings could become partially or fully blocked from sediment or Beaver activity. If culvert maintenance is ignored and given sufficient time, death of vegetation and loss of habitat could occur (Bocking et al., 2017).

13.3.9.2 Habitat Alteration or Degradation

There may be alterations to Common Nighthawk habitat resulting from vegetation clearing, hydrological changes and disturbance during construction and throughout operations. The pathways or activities which may result in alteration or degradation of Common Nighthawk habitat include the following:

Accidental spills during construction or operations activities → Transportation of material into wetland → Alteration and degradation of Common Nighthawk habitat.

Construction of roadbed and crossing structures → Hydrological changes to ground or surface water → Alteration and degradation of Common Nighthawk habitat.

Construction and operations activities cause sensory disturbances (light, noises, dust) → Sensory disturbances impact on adjacent areas → Alteration and degradation of Common Nighthawk habitat.



Construction and operations activities clear vegetation → Structural differences between cleared and remaining vegetation create edge effect → Alteration and degradation of Common Nighthawk habitat.

Construction and maintenance activities → Introduction of invasive species → Alteration and degradation of Common Nighthawk habitat.

Construction

Habitat Alteration or Degradation due to Accidental Spills

Accidental spills and releases that occur during the construction phase may result in Common Nighthawk habitat degradation. Boreal wetlands are often hydrologically connected through subsurface flows (Smerdon et al., 2005), resulting in large watersheds throughout which pollutants can spread. Depending on concentrations and material spilled, an accidental spill could cause death of vegetation, lower productivity and alter the vegetation community (Hutchinson and Freedman, 2011; Lednev et al., 2023). Accidental spills could also impact Common Nighthawk foraging areas, as spills have the potential impact on the insect communities which Common Nighthawk rely on as insectivorous birds (Pennings, 2014; Reiber 2021).

Habitat Alteration or Degradation due to Hydrological Changes

Hydrological changes may result in degradation of Common Nighthawk habitat. Construction activities such as grading for road installation resulting in changes to both surface and groundwater water causing flooding or drying of vegetation communities. Peatlands, which make up the majority of vegetative communities in the RSA are susceptible to changes in the flow of surface and subsurface water resulting from the bisection of these features by roads. These changes can be extensive: a study within boreal fens in Alberta found pronounced differences in canopy cover up to 250 m from road edges in both rich and poor treed fens (Willier et al., 2022). Changes in wetland drainage patterns, resulting in lower or higher water levels, can alter the plant community (Miller et al. 2015). Nesting sites may also be lost due to flooding (Brigham et al., 2011).

Habitat Alteration or Degradation due to Sensory Disturbances

Sensory disturbances resulting from road construction and operations, including movement of equipment and vehicles, noise, vibration, and other human activities may degrade habitat for Common Nighthawk adjacent to the Project Footprint, reducing utilization of the area or masking vocalizations. Acoustic modeling places the 50 db zone of influence at approximately 125 m beyond the Project footprint (See Appendix J – Noise and Vibration Impact Assessment Report), and 50 dB is the noise level Environment and Climate Change Canada uses in their guidelines to avoid harm to migratory birds (EEEC, 2023). Disturbance will be especially true during construction when activities such as blasting, quarrying, hauling and clearing may occur during all hours causing Common Nighthawk to avoid the ROW and supportive infrastructure. Light during construction may act as an enhancement to Common Nighthawk habitat as insects could be attracted to lighting. Foraging nightjars have been shown to fly long distances to forage under lights suggesting these areas provide high quality foraging habitats especially in areas with minimal anthropogenic light (Adams et al. 2024). Human presence during construction may disturb Common Nighthawk. While Common Nighthawk use anthropogenic areas frequently it has been found that areas with a high human presence can have lower densities for European nightjars (Lowe et al., 2014).



Habitat Alteration or Degradation due to Habitat Structural Change

Changes to vegetation structure during road construction activities may alter or degrade Common Nighthawk habitat near the Project Footprint due to vegetation clearing activities and removals. These vegetation removals may lead to edge effects, including abiotic, direct biotic, and indirect biotic effects on the habitat after the implementation of mitigation measures.

The edge effect on Common Nighthawk is likely relatively low due vegetation structure of their preferred open communities. Common Nighthawk use disturbed habitats; gravel roads, oil and gas clearances, pipeline ROWs are all known to be used by Common Nighthawk (COSEWIC, 2020). Areas currently used for breeding adjacent to the road ROW will be structurally similar to the cleared areas unlike forested habitats which undergo large changes in structure and composition due to edge effects (Franklin et al. 2020).

Habitat Alteration or Degradation due to Introduction of Invasive Species

Invasive plant species can impact on multiple ecosystem aspects including structure, diversity and function (CFIA, 2008). Once established in a new habitat, most invasive species are nearly impossible to eradicate (Pimentel et al. 2005). Construction activities have the potential to introduce invasive plant species to the habitats used Common Nighthawk. One of the pathways of spread for invasive plants is through construction equipment. Improperly cleaned construction equipment has the potential to transport and spread invasive plants, with cleared areas, including roads sides being susceptible to invasion (Hanen and Clevenger, 2005). For roads, construction of the road embankments, especially if open habitats are adjacent, has been shown to facilitate spread and establishment of invasive plants (Meunier and Lavoie, 2017). The use of contaminated seed mixes in restoration efforts is also a pathway for invasive plants to establish in an area (Houghen et al. 2012). While no direct studies have looked at the impact of invasive plants on Common Nighthawk, conversion of open habitats to shrublands by invasive shrub species, such as buckthorn (*Rhamnus* sp.), could degrade Common Nighthawk habitat.

However, while invasive plants are known to spread along transportation corridors, few invasive species have been found in naturally occurring boreal habitats used by Common Nighthawk (Langor et al. 2014) with most invasive plant species found well to the south of the RSA (EDDMAs, 2024).

Operations

Habitat Alteration or Degradation due to Accidental Spills

Similar to the effects of construction, accidental spills could occur during the operations phase which may result in Common Nighthawk habitat degradation. Spills during operations would most likely originate from accidental releases from vehicles. Accidental spills and releases during road operations may occur due to mechanical failure, human error, poor visibility or slippery road conditions. The road is forecasted to have low traffic volumes, and traffic along the roadway will be primarily personal and commercial vehicles and transport trucks associated with the community. While estimate frequency of spills is low (0.00000019 spills per mile, or 0.00000012 spills per kilometer; Harwood and Russell, 1990), its predicted that minor spills and release are possible.



Habitat Alteration or Degradation due to Hydrological Changes

Changes to hydrology could also occur during the operations phase due to culvert and crossing structure maintenance. Localized changes to hydrology could occur if culvert maintenance along the road is ignored, either in terms of repairs to the structure or removal of accumulated debris. The area affected would be dependent on the amount of time the culvert remains blocked as well as the size of the impounded area.

Habitat Alteration or Degradation due to Sensory Disturbances

During the operations phase, most sensory impacts will be related to traffic noise as lighting will be limited along the road and human activity outside of driving will be limited and primarily related to maintenance activities. Traffic noise has been found to degrade bird habitat either through causing avoidance of areas near roads; decreasing habitat value by altering bird behaviour by masking vocalizations; or increasing vigilance (Ware et al. 2015; Summers et al. 2011; Zhou et al., 2018). Sensory disturbance has been found to lower the abundance of birds near roads, especially at high traffic densities (Husby, 2017).

Habitat Alteration or Degradation due to Habitat Structural Change

Edge effects during operations will have similar impacts on Common Nighthawk and their habitat as during construction. Maintenance activities, including removal of roadside vegetation during road operations, will create periodic disturbances and sustain edge effects along the ROW. In the preferred habitats of Common Nighthawk, such as open areas with short vegetation, maintenance activities will result in a minimal edge effect as the early seral vegetation maintained along the ROW will be structurally similar to adjacent vegetation.

Habitat Alteration or Degradation due to Introduction of Invasive Species

The introduction and spread of noxious and invasive plant species could also occur during operations and will have similar potential impacts on Common Nighthawk habitat as during construction. Transportation corridors are avenues of dispersal for invasive plants (Langor et al. 2014), and given the longer timeframe, operation of the road has the potential to have larger impacts than construction in terms of habitat Alteration or Degradation from introduction of invasive species. While the timeframe is longer, introductions of plants into Common Nighthawk habitat are likely still limited by the climate of the RSA and limited in the ability to spread beyond disturbed areas of the road ROW (Kent et al., 2018).

13.3.9.3 Alteration in Movement

There may be alterations in Common Nighthawk movement stemming from construction activities and operation of the road. The pathways or activities which may result in changes in wildlife movement include the following:

Construction and operations activities clear vegetation → Structural differences between cleared and natural vegetation act as a barrier → Alteration in movement of Common Nighthawk.

Construction and operations activities cause sensory disturbances (light, noises, dust) → Disturbances cause avoidance response → Alteration in movement of Common Nighthawk.



Construction

Alteration in Movement due to Loss of Connectivity

Common Nighthawk could alter their movement in response to road construction reducing connectivity. Gaps in cover created by anthropogenic activities are known to impede movement of birds but is species and habitat dependant (Desrochers and Hannon, 1997; Grubb and Doherty, 1999). Bird species that have shown reluctance to cross gaps like those created by roads are generally forest species where the road creates a distinctive edge between the road and preferred habitats, with larger gaps acting as a greater barrier (Grubb and Doherty, 1999). Lack of gap crossing is especially true for small birds which are more likely to be impeded by the changes in vegetation structure (Johnson et al. 2017). Larger birds will also increase flight height to cross active roads (Husby, 2017). The connectivity of Common Nighthawk habit is not expected to be affected as they prefer open habitats and are known to use anthropogenic habitats like road ROWs.

Alteration in Movement due to Sensory Disturbance

Common Nighthawk movement is likely to be altered by sensory disturbances associated with Project construction. Noise, vibration and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of Common Nighthawks, including shifts in territories, as they avoid the project ROW and supportive infrastructure. Noise disturbance may extend up to 125 m into the LSA. Lighting effects may have the opposite effect, attracting Common Nighthawks, as they have been recorded flying up to 6.4 km to forage under lighted areas (Adams et al. 2024). While some Common Nighthawks may shift their breeding territories during construction in response to noise others may use the area for foraging if night activities take place.

Operations

Alteration in Movement due to Loss of Connectivity

During operations Common Nighthawk is expected to have the same response to changes in habitat connectivity as seen during the construction phase. Maintenance activities will maintain vegetation in an early seral state. Similar to the construction phase, avoidance of these areas may be minimal as Common Nighthawk prefer more open habitats, including anthropogenically disturbed sites, and are unlikely to treat changes as a barrier to movement.

Alteration in Movement due to Sensory Disturbance

Vehicle noise is anticipated be the primary sensory impact on Common Nighthawk during operations. Traffic noise has been found to lower abundance and promote avoidance in many in many bird species (McClure et al. 2013). High traffic roads have been shown to affect distribution when noise exceeded 56 dB (Hirvonen, 2001). Birds have also been shown to shift in their use seasonally around roads (Wiacek and Polak, 2015). Studies have not shown a response to vehicle traffic by Common Nighthawk which is known to tolerate human disturbances and use roadways as foraging areas.

13.3.9.4 Injury or Death

The creation of the road may lead to both direct and indirect Common Nighthawk mortality. There could be increases in wildlife injury or death stemming from increased vehicle traffic during both construction and operation of the road, with indirect mortalities arising from increased energy expenditures and habitat



change. The pathways or activities that may result in Common Nighthawk injury or death include the following:

Equipment and vehicles moving within Project footprint → Collisions with Common Nighthawk within Project Footprint → Injury or Death of Common Nighthawk.

Construction and operations activities clear vegetation → Incidental encounters with Individuals or nests → Injury or Death of Common Nighthawk.

Construction and operations activities clear vegetation → Increased access for Common Nighthawk Predators → Injury or Death of Common Nighthawk.

Construction

Injury or Death due to Collisions with Vehicles

Movement of construction equipment and vehicles within Project Footprint could result in increased death and injury of Common Nighthawk. Collisions with vehicles is among the top three causes of bird mortalities in Canada (Calvert et al., 2013). Vehicles will be travelling between camps and construction locations; these trips could occur at all hours and encounters with birds would not be unexpected. For Common Nighthawks, particularly males, collisions can be of particular importance as they often rest on gravel roads at night (Brigham et al. 2011). Collisions can also be frequent in areas where Common Nighthawks congregate in insect eating aggregations (Stevenson and Anderson 1994). Offroad vehicle use can also lead to Common Nighthawk loss of nests and young (Bender and Brigham, 1995).

Injury or Death due to Incidental Take

As Special Concern species under the SARA and the ESA, Common Nighthawk habitats are not protected; however, under the *Migratory Birds Convention Act* (GOC, 1994) it is prohibited to disturb their nests during the breeding season. Vegetation clearing in Common Nighthawk habitat during road construction may result in injury or death to birds, hatchlings, and/or eggs if management of vegetation clearing is carried out during the breeding season. Common Nighthawks nest on the ground in open sites using a slight depression, and these sites are also typically close to a source of shade like logs, shrubs or trees (COSEWIC, 2018). The cryptic characteristics of Common Nighthawks physical appearance can make them difficult to detect while on nests. Additionally, as their camouflage is their primary defense, Common Nighthawks stay on their nest when approached by humans and their young either remain still (Sandilands, 2008). While less likely to be impacted outside of nesting season, Common Nighthawks can roost on the ground and remain still as camouflage is their primary defense.

Injury or Death due to Changes to Predator-Prey Dynamics

Effects on Common Nighthawk survival from improved predator access and movement rates is possible during the construction phase. Linear features are known to facilitate predator movement in the boreal (Dickie et al., 2017; Benoit-Pepin et al., 2024) and creation of new roads connected to human activity is known to spread predators into previously unoccupied areas (Lantham et al. 2011). As ground nesting birds, Common Nighthawks are particularly susceptible to predators. Their eggs and young are susceptible to several boreal species including foxes, coyotes, crows, ravens, gulls, owls and raptors (Brigham et al. 2011). Nesting success rates have been reported from 43% to 93% with most losses attributed to predation (COSEWIC, 2018) Predators of adult Nighthawks are less well known, but records



exist for predation by American Kestrels (*Falco sparverius*) and Peregrine Falcons. While nest parasitism is often discussed as an outcome of edge creation, nest parasitism is not known in Common Nighthawks.

Operations

Injury or Death due to Collisions with Vehicles

Mortality from collisions during the operational phase is expected to occur throughout Common Nighthawk active season where the road intersects breeding, roosting and foraging habitats. Birds are more likely to collide with vehicles if they forage, roost or nest near the road (Kociolek et al. 2011). It has been estimated that more than 14,000 birds are killed annually due to collisions with vehicles, or approximately one bird every 3 km per year (Bishop and Brogan, 2013). Deaths rates for Common Nighthawk could change during the operations phase as the gravel surface is expected to become paved during the 3rd season of operations eliminating the possibility of males roosting on the road.

Injury or Death due to Incidental Take

Vegetation clearing in Common Nighthawk habitat is also scheduled to occur during operations and may cause injury or death as Common Nighthawk use habitat openings and edges. Though smaller in scale, periodic clearing of the ROW may occur during operations as part of line-of-sight maintenance or infrastructure repairs. If maintenance occurs during the breeding season nest and individuals could be injured or killed, Common Nighthawk nest sites are usually well camouflaged on the ground which would make them vulnerable to maintenance activities. If Quarrying is restarted during the breeding season individuals could be injured or killed as Common Nighthawk use old quarries as nesting sites (Brigham et al. 2011).

Injury or Death due to Changes to Predator-Prey Dynamics

Effects on Common Nighthawk from predators during operations are a continuation of the same impacts as described for the construction phase. Maintenance clearing during operations will maintain openness along the ROW which will allow predators increased access to wetland areas near the road exposing Common Nighthawk to increased predation. While some studies have found a positive effect on bird survival due to roads and resulting predator avoidance of roads, it is often attributed to higher levels of human presence (Singer et al. 2020), which given the low traffic levels are unlikely for this project.

13.3.9.5 Threats Assessment

Each of the four potential effects categories were evaluated based on the threats assessment criteria outlined in the TISG and is based on IUCN-CMP unified threat classification system, referenced from NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk (NatureServe, 2012). Threats are assessed prior to any mitigative measures being applied. The threat assessment process is generally done at the population level but can be done at a more regional level. Common Nighthawks, which have breeding territories that are up to 10 ha in size and with breeding and foraging areas separated up to 6 km (COSEWIC, 2020), were evaluated at the RSA level.

Scope is small for all threats as the percent of the population affected is less than 10% of the available habitat and population within the RSA. Severity of threats range from slight to serious: threats related to vegetation removals are serious as within the scope based on the high degree of habitat loss; alteration, hydrologic changes and spills are rated as moderate; and all other threats as slight. Magnitude is rated as low for all threats.



Irreversibility is high for hydrological changes and very high for vegetation remove as the roadbed will likely never be removed but hydrological mitigations could be done. Irreversibility is also high for spills, edge effects, invasive species, and predation because while the effects can technically be reversed it would take time and considerable effort. The rest of the threats were deemed low and can be easily reversed. The degree of effect was low for all except vegetation loss which was moderate.

A summary of the threat assessment for Common Nighthawk habitat loss, alteration or degradation of habitat, alteration in movement, and injury or death prior to the consideration of mitigation measures, is presented in **Table 13-37**.

Table 13-37: Summary of Threat Assessment For Potential Effects on Common Nighthawk

Threat	Scope	Severity	Magnitude	Irreversibility	Degree of Effect
Habitat Loss – Clearing Activities	Small	Serious	Low	Very High	Moderate
Habitat Loss – Hydrological Changes	Small	Moderate	Low	High	Low
Habitat Alteration or Degradation – Accidental Spills	Small	Moderate	Low	High	Low
Habitat Alteration or Degradation – Hydrological Changes	Small	Moderate	Low	High	Low
Habitat Alteration/or degradation – Sensory Disturbance	Small	Slight	Low	Low	Low
Habitat Alteration or Degradation – Habitat Structural Change	Small	Slight	Low	High	Low
Habitat Alteration or Degradation – Invasive Species	Small	Slight	Low	High	Low
Alteration in Movement – Loss of Connectivity	Small	Slight	Low	Low	Low
Alteration in Movement – Sensory Disturbance	Small	Slight	Low	Low	Low
Injury or Death – Incidental Take	Small	Slight	Low	Low	Low
Injury or Death – Changes to Predator-Prey Dynamics	Small	Slight	Low	High	Low
Injury or Death – Collisions with Vehicles	Small	Slight	Low	Low	Low

13.3.10 Bald Eagle

Bald Eagle is an apex predator, specializing in fishing, that utilizes riparian forest habitat for nesting and large waterways for foraging/hunting. Nests are built in the canopy of mature, high diameter at breast-height trees, which differentiate them from the majority of SAR birds considered in this EAR/IS.

13.3.10.1 Habitat Loss

Bald Eagle habitat loss may result from vegetation clearing and disturbance during construction and throughout operations. The pathways or activities which may result in loss or destruction of Bald Eagle habitat include the following:

Site preparation and vegetation clearing and ground disturbance → Loss of Bald Eagle habitat.

Construction of roadbed and crossing structures → Hydrological changes to ground or surface water → Loss of Bald Eagle habitat.



Construction

Habitat Loss due to Clearance Activities

The construction of the road has the potential for direct and indirect effects that could cause the loss of Bald Eagle habitat through physical alteration and removal of suitable habitat. Bald Eagles breed in forested areas adjacent to large bodies of water or large rivers; the nest tree is typically one of the largest in the habitat that has limbs capable of supporting a nest. In Northwestern Ontario, nests are typically between 6 and 200 m from the water's edge, averaging 23 to 65 m from the shoreline (Hackl, 1994; Jones, 1995).

Based on an understanding of Bald Eagle habitat preferences, the results of habitat modelling for Ecological Land Classification (refer to Section 11) were used to estimate removals of preferred breeding habitat during construction. Predicted construction activities will result in the removal of 81.15 ha (4.3%) of Conifer Forest, 1.60 ha (3.13%) of Hardwood Forest, and 4.21 ha (3.32%) of Mixed Forest, representing approximately 7.58% of available potential high quality Bald Eagle nesting habitat in the LSA. Some swamps with large trees may be used but are not considered as the highest quality sites. Overall, suitable Bald Eagle habitat is somewhat uncommon throughout the study area with 8.34% of the LSA and 7.66% of the total study areas (Project Footprint and RSA combined) consisting of these vegetation communities.

Raptor Nests (i.e., stick nests) were recorded during aerial surveys near but not within the project footprint. A total of 23 Bald Eagle nests were recorded; however, none were within 1 km of the WSR route alternatives. Nests are often reused year after year, therefore there is a low likelihood that any nests will be removed as a result of construction.

Habitat Loss due to Hydrological Changes

Bald Eagle could be affected by hydrological changes causing habitat loss. Construction activities have the potential to cause the destruction of Bald Eagle habitat through changes to groundwater and surface flows. Road construction in particular can alter subsurface flows in peatlands changing the hydrology long-term (Waddington et al. 2014). Changes in surface water conditions can also occur with the installation of crossing structures. Such changes are generally concentrated downstream of the effect but can also take place on the upstream side if channel restriction causes water impoundment which can cause death of vegetation (Bocking et al., 2017). While Bald Eagles nest in upland super-canopy trees, these are often located near water. Extreme hydrological changes due to poor road design or water level fluctuations may lead to death of vegetation and loss of Bald Eagle nesting habitats as they are converted to open water habitats (Bocking et al., 2017).

Operations

Habitat Loss due to Clearance Activities

Operation of the roadway is unlikely to result in additional loss of Bald Eagle habitat as maintenance activities will involve managing re-growth of vegetation along the ROW within the Project Footprint. There is a very low probability that reclaimed temporary laydown areas and clearings may need to be reused during operations, therefore in the short- to medium-term, no trees used by Bald Eagles for nesting are likely to be impacted unless nests are established in the future. While the quarries are expected to remain operational following construction, the footprints will not be expanded and as such no additional habitat



loss or destruction is anticipated to occur during operations. A small chance exists that large trees adjacent to the roadway may be removed if they pose safety concerns.

Habitat Loss due to Hydrological Changes

Habitat loss for Bald Eagle through changes to hydrology is unlikely to occur during the operations phase. Changes to hydrology could potentially occur during the operations phase due to culvert and crossing structure maintenance. Culverts and other crossings could become partially or fully blocked from sediment or beaver activity. Hydrological changes during operations are likely to affect a much smaller area, and unlikely to affect super-canopy trees in upland areas.

13.3.10.2 Habitat Alteration or Degradation

Bald Eagle habitat alteration or degradation may result from vegetation clearing and disturbance during construction and throughout operations. The pathways or activities which may result in alteration or degradation of Bald Eagle habitat include the following:

Accidental spill during construction or operations activities → Transportation of material into wetland → Alteration or degradation of Bald Eagle habitat.

Construction of roadbed and crossing structures → Hydrological changes to ground or surface water → Alteration or degradation of Bald Eagle habitat.

Construction and operations activities cause sensory disturbances (light, noises, dust) → Sensory disturbances impact on adjacent areas → Alteration or degradation of Bald Eagle habitat.

Construction and operations activities clear vegetation → Structural differences between cleared and remaining vegetation create edge effect → Alteration or degradation of Bald Eagle habitat.

Construction and maintenance activities → Introduction of invasive species → Alteration or degradation of Bald Eagle habitat.

Construction

Habitat Alteration or Degradation due to Accidental Spills

Accidental spills and releases that occur during the construction phase may result in Bald Eagle habitat degradation. Boreal wetlands are often hydrologically connected through subsurface flows (Smerdon et al., 2005), resulting in large watersheds throughout which pollutants can spread. Accidental spills of chemical or hazardous materials (e.g., petroleum products, ammonium nitrate) during construction has the potential to enter nearby waterbodies along the WSR. Changes to fish habitat and water quality from spills of fuel or other materials can negatively affect fish populations directly, or cause changes to their habitat. Bald Eagle in most regions prefer fish as their major food source, making up to 90% of their diet (Armstrong, 2014).

Habitat Alteration or Degradation due to Hydrological Changes

Hydrological changes may result in degradation of Bald Eagle habitat. Bald Eagle aquatic habitat used for foraging may be altered hydrologically, with construction activities such as grading for road installation resulting in changes to both surface and groundwater water causing flooding or drying of aquatic communities. As described in Section 11.3.2.3, 91.82% of the project RSA is wetlands, primarily peatlands susceptible to changes in the flow of surface and subsurface water resulting from the bisection



of these features by roads. The effects of roads on hydrology and wetland habitat can occur up to 250 m from the ROW. Bald Eagle nesting habitat may also be affected through the death of trees: while nesting tree loss can occur, and in some areas can be as high as 10% per year, Bald Eagles may not breed for a year following loss of a nest tree (Armstrong, 2014). Availability of suitable shoreline trees can be a key factor in the distribution of Bald Eagles along the shore of lakes (Chandler et al. 1995).

Habitat Alteration or Degradation due to Sensory Disturbances

Sensory disturbances resulting from road construction and operations, including movement of equipment and vehicles, noise, vibration, and other human activities may degrade habitat for Bald Eagles adjacent to the Project Footprint, reducing utilization of the area. Bald Eagles may be sensitive to human activity during the breeding season. Even low-impact activity, such as camping, at a distance of 100 m from nests has been found to result in adult Bald Eagles decreasing the amount of time they preen, sleep, maintain their nests, and feed themselves and their nestlings, compared to humans camping 500 m from nests which did not result in a change of behaviours (Steidl and Anthony, 2000). Studies have also demonstrated that eagles in areas of high human activity levels can habituate to human presence (Russel, 1980; Knight and Knight, 1984; Steidl and Anthony, 1996). Once a nesting pair of Bald Eagles has successfully bred, they show increased nest site fidelity and may be more tolerant of human disturbance (Bricker and Hoar 2010). It has been hypothesized that, as Bald Eagles have recovered from their population decline, they have experienced generational habituation and are increasingly more likely to nest in areas with human activities that do not harm the eagles or their nests (Guinn, 2013).

Habitat Alteration or Degradation due to Habitat Structural Change

Changes to vegetation structure during road construction activities, such as vegetation clearing and removal, may alter or degrade Bald Eagle habitat near the Project Footprint. These vegetation removals may also lead to edge effects, including abiotic, direct biotic, and indirect biotic effects on the habitat. Bald Eagles do not use early seral areas but may perch or nest on large canopy trees near edges which can be more productive (Goulet et al., 2021) so the effect of edge creation and structural changes may be dependent on local conditions after clearing has taken place. Fragmentation can cause increased windthrow, which may cause the loss of super canopy trees near the ROW. However, increased windthrow has generally been reported in forestry where openings between forested areas are much larger than the 35 m width of the WSR ROW (Scott and Mitchell, 2005).

Operations

Habitat Alteration or Degradation due to Accidental Spills

Bald Eagle habitat degradation from accidental spills could also occur during the operations phase. Spills during operations would most likely originate from accidental releases from vehicles. Accidental spills and releases during road operations may occur due to mechanical failure, human error, poor visibility or slippery road conditions. Like during construction, the primary concern for Bald Eagle would be spills in or adjacent to aquatic habitats where Bald Eagle food sources are impacted.

Habitat Alteration or Degradation due to Hydrological Changes

Alterations to hydrology during the operations could also impact on Bald Eagle habitat. The primary pathway would be alterations due to culvert and crossing structure maintenance. Localized changes to hydrology could occur if culvert maintenance along the road is ignored, either in terms of repairs to the



structure or removal of accumulated debris. The area affected would be dependent on the amount of time the culvert remains blocked as well as the size of the impounded area.

Habitat Alteration or Degradation due to Sensory Disturbances

During operations, Bald Eagle habitat may be degraded through sensory disturbances. During the operations phase, most sensory impacts will be related to traffic noise as lighting will be limited along the road and human activity outside of driving will be limited and primarily related to maintenance activities. Traffic noise has been found to degrade bird habitat, either through causing avoidance of areas near roads, or decreasing habitat value by masking vocalizations or increasing vigilance, which alters behaviour (Ware et al. 2015; Summers et al. 2011; Zhou et al., 2018). Sensory disturbance has been found to lower abundance of Bald Eagles near roads, especially at high traffic densities (Stalmaster and Newman, 1978). Human presence along watercourses or waterways may also reduce Bald Eagle use of feeding areas (Stalmaster and Newman, 1978).

Habitat Alteration or Degradation due to Habitat Structural Change

Changes to vegetation structure during operations will have similar impacts on Bald Eagles and their habitat as during the construction phase. While it is anticipated that restoration of laydown areas and access roads will reverse some of the habitat alteration or degradation caused by road construction, maintenance activities, including removal of roadside vegetation during road operations, will create periodic disturbances and sustain edge effects along the ROW. Eagles would be expected to continue using trees along any created edge if suitable perching trees are available.

13.3.10.3 Alteration in Movement

Alteration in Bald Eagle movement may result from vegetation clearing and disturbance during construction and throughout operations. The pathways or activities which may result in alteration in Bald Eagle movement include the following:

Construction and operations activities clear vegetation → Structural differences between cleared and natural vegetation act as a barrier → Alteration in movement of Bald Eagle.

Construction and operations activities cause sensory disturbances (light, noises, dust) → Disturbances cause avoidance response → Alteration in movement of Bald Eagle.

Construction

Alteration in Movement due to Loss of Connectivity

Alteration of Bald Eagle movement may occur due to changes in habitat connectivity due to construction activities. The construction of the road will fragment terrestrial and wetland habitats, including temporary access roads, laydown areas, and quarries. However, Bald Eagle movement is unlikely to be altered by the road due to the fragmentation of habitat. While it has been demonstrated that small birds are affected by gaps and cross less frequently, larger birds such as raptors continue to fly over roads only at higher elevations (Johnson et al. 2017; Husby, 2017). Additionally, many raptors have been found to show little response to roads especially with low to moderate traffic (Planillo et al. 2015). Avoidance due to predation concerns are unlikely as healthy adult and immature Bald Eagles are practically invulnerable to predation (Buehler, 2022).



Alteration in Movement due to Sensory Disturbance

Bald Eagle movement may be altered by sensory disturbances. Noise, lighting and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of Bald Eagles as they avoid the project ROW and supportive infrastructure. Bald Eagle movement responses to stimuli vary greatly depending on a variety of factors including time of day, weather, season, noise level, whether the disturbance is moving (fast or slow) or stationary, and whether the disturbance is close to a nest or foraging area (Anthony et al., 1995). Prolonged disturbances may result in displacement from preferred habitats (Anthony et al., 1995). Flushing of Bald Eagles can occur in response to sudden loud noises like blasting, clearing or drilling (Stalmaster and Newman, 1978).

Operations

Alteration in Movement due to Loss of Connectivity

Similar to the construction phase, during operations alteration in movement due to changes in habitat connectivity is unlikely for Bald Eagles. Maintenance activities will maintain vegetation in an early seral state along the road, however like during the construction phase, avoidance of these areas may be minimal as Bald Eagles show little movement response to roads except for flight height.

Alteration in Movement due to Sensory Disturbance

Vehicle noise is anticipated be the primary sensory impact on Bald Eagles during operations. Traffic noise has been found to lower abundance and promote avoidance in many in many bird species (McClure et al. 2013). High traffic roads have been shown to affect bird distribution when noise exceeded 56 dB (Hirvonen, 2001). Birds have also been shown to shift in their use seasonally around roads (Wiacek and Polak, 2015). Bald Eagles have shown to avoid busy roads when alternative habitat is available (Stalmaster and Newman, 1978). Bald Eagles that nest in proximity to human disturbance have shown the ability to habituate, but this varies between individuals (Armstrong, 2014). Use of waterways by people fishing or hunting may also disturb Bald Eagles as visible humans elicit a high level of response; eagles may flush or temporarily leave areas while humans are present (Grub and King, 1991).

13.3.10.4 Injury or Death

The creation of the road may lead to both direct and indirect Bald Eagle mortality. There could be increases in Bald Eagle injury or death stemming from increased vehicle traffic or clearing activities during both construction and operation of the road, with indirect mortalities arising from increased predator encounters. The pathways or activities which may result in Bald Eagle injury or death include the following:

Equipment and vehicles moving within Project footprint → Collisions with Bald Eagles within Project Footprint → Injury or Death of Bald Eagle.

Construction and operations activities clear vegetation → Incidental encounters with Individuals or nests → Injury or Death of Bald Eagle.

Construction and operations activities clear vegetation → Increased access for Bald Eagle Predators → Injury or Death of Bald Eagle.



Construction of Road → Increased hunter access to Bald Eagle habitat → Injury or Death of Bald Eagle.

Construction

Injury or Death due to Collisions with Vehicles

Movement of construction equipment and vehicles within Project Footprint could result in increased death and injury of Bald Eagles. Collisions with vehicles is among the top three causes of bird mortalities in Canada (Calvert et al., 2013). Vehicles will be travelling between camps and construction locations; these trips could occur at all hours and encounters with birds would not be unexpected. In Canada, Accipitriforme birds (hawks, vultures and eagles) are very rarely counted as casualties of vehicle collisions (Bishop and Brogan, 2013); Bald Eagles are particularly susceptible to injury or death from impact with motor vehicles because they often scavenge carcasses along highways (Buehler, 2022). During the construction phase, collisions with helicopters are also possible when they are being used to ferry people and equipment (Washburn et al., 2015).

Injury or Death due to Incidental Take

Vegetation clearing in Bald Eagle habitat during road construction and operations may result in injury or death to birds, hatchlings, and/or eggs if management of vegetation is carried out during the breeding season, even after mitigation measures have been applied. Bald Eagles use large stick nests that are relatively conspicuous on the landscape, in the tallest trees (Buehler, 2022) making accidental removal unlikely. Indirect Bald Eagle mortality could occur if construction activities take place close to the nest as the probability of nest abandonment increases with intensity and proximity to human activities (USFWS, 2007).

Injury or Death due to Changes to Predator-Prey Dynamics

Effects on Bald Eagles injury or death from improved predator access and movement rates is possible during the construction phase. Linear features are known to facilitate predator movement in the boreal (Dickie et al., 2017; Benoit-Pepin et al., 2024) and creation of new roads connected to human activity is known to spread predators into previously unoccupied areas (Lantham et al. 2011). Healthy adult and immature Bald Eagles are practically invulnerable to predation (Buehler, 2022). While there is little documentation on Bald Eagle nest predators, boreal species reportedly taking eggs or nestlings include ravens, hawks, owls, crows, ravens, black bear, and wolverine (Buehler, 2022). Fledglings on the ground are also vulnerable to mammalian predators.

Injury or Death due to Increased Access

The development of the Webequie Supply Road could result in a negative effect on the abundance of Bald Eagles, through increased human access to habitats where populations are present. While illegal under the Ontario *Fish and Wildlife Conservation Act, 1997* (Government of Ontario, 1997), shooting or trapping of Bald Eagles may occur. Access to previously undisturbed areas introduces opportunity for shooting and trapping. In Ontario no summary for shooting or trapping of Bald Eagle exists. In the United States, 38% of individual Bald Eagles recovered between 1982 and 2013 had been shot trapped or poisoned (Russel and Franson, 2014); in the Maritime Provinces between 1991 and 2016, 13% of Bald Eagle deaths were attributed to trapping and gunshots. In the western USA, illegal shooting was found be the leading cause of death of raptors near powerlines (Thomason et al., 2023).



Operations

Injury or Death due to Collisions with Vehicles

Vehicles traveling along the road during operations could collide with Bald Eagles causing injury or death where the road intersects breeding, roosting and foraging habitats. Raptors can be susceptible to collisions due to their feeding behaviors, either through hunting near roads or feeding on roadkill (Croston, 2021). A study of mortality of Bald Eagles in the Maritime Provinces between 1991 and 2016 found 14% of Bald Eagle deaths attributable to vehicle collisions (Mathieu et al., 2020). Bird mortality related to vehicle collisions is often related to travel speed of the vehicle as birds use distance as a threat estimate and can misjudge the closing distance between themselves and the vehicle resulting in collision (DeVault et al. 2016).

Injury or Death due to Incidental Take

Vegetation clearing in Bald Eagle habitat is also scheduled to occur during operations. Though smaller in scale, periodic clearing of the ROW may occur during operations as part of line-of-sight maintenance or infrastructure repairs. Most clearing during operations will consist of removal of small vegetation and is unlikely to affect preferred Bald Eagle habitat but a small chance exists that large trees adjacent to the roadway may be removed due to safety concerns. While no existing nests occur near the road, during the lifetime of the road new nests could be built that may be impacted by maintenance activities. Indirect death of eggs and nestlings may occur if nest abandonment occurs due to maintenance activities occur near occupied nests.

Injury or Death due to Changes to Predator-Prey Dynamics

Effects on Bald Eagle from predators during operations are a continuation of the same impacts as described for the construction phase. Maintenance clearing during operations will maintain openness along the ROW which will maintain predator access to areas near the road and facilitate movement.

Injury or Death due to Increased Access

Effects on Bald Eagle from poachers during operations are a continuation of the same impacts as described for the construction phase. Increased access to previously undisturbed areas introduces opportunity for shooting and trapping. While killing of Bald Eagles was more common in the past, illegal shooting or trappings still occur in the province.

13.3.10.5 Threats Assessment

Each of the four potential effects categories were evaluated based on the threats assessment criteria outlined in the TISG and is based on IUCN-CMP unified threat classification system, referenced from NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk (NatureServe, 2012). Threats are assessed prior to any mitigative measures being applied. The threat assessment process is generally done at the population level but can be done at a more regional level. As Bald Eagles have breeding territories that are between 1 and 2 km² (COSEWIC, 2020), the evaluation was made at the RSA level.

Scope is small for all threats as the percent of the population affected is less than 10% of the available habitat and population within the RSA.



Severity of threats ranges from slight to serious. Threats related to vegetation removals are serious within the scope based on the high degree of habitat loss and alteration, and spills are rated as moderate as they are less likely to occur but would be damaging if they happened. Sensory disturbance is rated as moderate as Bald Eagles show some aversion to disturbance. Collisions are also rated as moderate due to the number of reported injuries in Ontario from vehicle collisions, and all other threats as slight. Magnitude is rated as low for all threats.

Irreversibility is high for hydrological changes and very high for vegetation removal as the roadbed will likely never be removed but hydrological mitigations could be done. Irreversibility is also high for spills, edge effects, invasive species, and predation because while the effects can technically be reversed it would take time and considerable effort. The rest of the threats were deemed low and can be easily reversed. The degree of effect was low for all except vegetation loss which was moderate.

A summary of the threat assessment for Bald Eagle habitat loss, alteration or degradation of habitat, alteration in movement, and injury or death prior to the consideration of mitigation measures, is presented in **Table 13-38**.

Table 13-38: Summary of Threat Assessment for Potential Effects on Bald Eagle

Threat	Scope	Severity	Magnitude	Irreversibility	Degree of Effect
Habitat Loss – Clearing Activities	Small	Serious	Low	Very High	Moderate
Habitat Loss – Hydrological Changes	Small	Slight	Low	High	Low
Habitat Alteration or Degradation – Accidental Spills	Small	Moderate	Low	High	Low
Habitat Alteration or Degradation – Hydrological Changes	Small	Slight	Low	High	Low
Habitat Alteration or Degradation – Sensory Disturbance	Small	Moderate	Low	Low	Low
Habitat Alteration or Degradation – Habitat Structural Change	Small	Slight	Low	High	Low
Habitat Alteration or Degradation – Invasive Species	Small	Slight	Low	High	Low
Alteration in Movement – Loss of Connectivity	Small	Slight	Low	Low	Low
Alteration in Movement – Sensory Disturbance	Small	Moderate	Low	Low	Low
Injury or Death – Incidental Take	Small	Slight	Low	Low	Low
Injury or Death – Changes in Predator-Prey Dynamics	Small	Slight	Low	High	Low
Injury or Death – Collisions with Vehicles	Small	Moderate	Low	Low	Low
Injury or Death – Increased Access	Small	Slight	Low	Medium	Low



13.3.11 Short-eared Owl

13.3.11.1 Habitat Loss

Short-eared Owl habitat loss may result from vegetation clearing and disturbance during construction and throughout operations. The pathways or activities which may result in loss or destruction of Short-eared Owl habitat include the following:

Site preparation and vegetation clearing and ground disturbance → Loss of Short-eared Owl habitat.

Construction of roadbed and crossing structures → Hydrological changes to ground or surface water → Loss of Short-eared Owl habitat.

Construction

Habitat Loss due to Clearance Activities

The construction of the road has the potential for direct and indirect effects that could cause the loss of Short-eared Owl habitat through physical alteration and removal of suitable habitat.

Short-eared Owls favour open habitats for nesting and hunting including fens, bogs and burns, and as such the limiting habitat feature would be nesting locations on dry ground near taller vegetation.

Additionally, conifers adjacent to open areas are used during the winter for roosting adjacent to open areas (COSEWIC, 2021).

Using the results of habitat modelling via Ecological Land Classification (refer to Section 11), and based on an understanding Short-eared Owl habitat preferences and the Project Footprint, estimate construction activities will result in the removal of 80.22 ha of suitable habitat consisting of open and sparsely treed bogs and fens, shoreline wetlands, and disturbed habitats in the LSA, representing approximately 1.64% of the most suitable Short-eared Owl habitat in the LSA. Overall, suitable Short-eared Owl habitat is somewhat uncommon throughout the study area with only 17.69% of the LSA and 22.03% of the Full Study Area consisting of these vegetation communities. Not all construction activities are expected to be habitat losses, Short-eared Owl may use disturbed areas like clearings, laydowns and pipelines. Temporary clearings will provide additional Short-eared Owl habitat, at least in the short-term.

Habitat Loss due to Hydrological Changes

Construction activities have the potential to cause the destruction of Short-eared Owl habitat through changes to groundwater and surface flows. Short-eared Owl Open Shore Fen and Open Bog habitat may be altered hydrologically, with construction activities such as grading for road installation resulting in changes to both surface and groundwater water causing flooding or drying of vegetation communities.

Open wetland areas of the boreal are used by Short-eared Owls both for hunting and breeding, with nest sites located on dry spots within large wetland areas (COSEWIC, 2021). As described in Section 11.2.2.2, 91.03% of the terrestrial ecosites within the standard RSA are wetlands, primarily peatlands susceptible to changes in the flow of surface and subsurface water resulting from the bisection of these features by roads. Project construction may lead to changes in the local hydrogeological environment by increasing, decreasing or redirecting groundwater flows. Changes in surface water conditions can also occur with the installation of crossing structures, changes are generally concentrated downstream of the effect but can also take place on the upstream side if channel restriction causes changes to water



impoundment. If these changes are extreme due to poor road design or water level fluctuations, they can lead to death of vegetation and loss of Short-eared Owl habitats, including nest sites.

Operations

Habitat Loss due to Clearance Activities

Operation of the roadway is unlikely to result in additional loss of Short-eared Owl habitat as maintenance activities will involve managing re-growth of vegetation along the ROW within the Project Footprint and accounted for in the construction phase, with areas maintained as early seral habitats a net benefit for Short-eared Owls. There is a very low probability that reclaimed temporary laydown areas and clearings may need to be reused during operations, however creation of these areas would potentially create habitat for Short-eared Owls. While the quarries are expected to remain operational following construction, the footprints will not be expanded and as such no additional habitat loss or destruction is anticipated to occur during operations.

Habitat Loss due to Hydrological Changes

Short-eared Owl habitat loss through changes to hydrology could also occur during the operations phase due to culvert and crossing structure maintenance. This could be especially true if nest sites are located near the ROW. Habitat loss could occur if culvert maintenance is ignored, either in terms of repairs to the structure or removal of accumulated debris. Given sufficient time, death of vegetation and loss of habitat could occur (Bocking et al., 2017).

13.3.11.2 Habitat Alteration or Degradation

Short-eared Owl habitat alteration or degradation may result from vegetation clearing, hydrological changes and anthropogenic disturbance during construction and throughout operations. The pathways or activities which may result in alteration or degradation of Short-eared Owl habitat include the following:

Accidental spill during construction or operations activities → Transportation of material into wetland → Alteration or degradation of Short-eared Owl habitat.

Construction of roadbed and crossing structures → Hydrological changes to ground or surface water → Alteration or degradation of Short-eared Owl habitat.

Construction and operations activities cause sensory disturbances (light, noises, dust) → Sensory disturbances impact on adjacent areas → Alteration and degradation of Short-eared Owl habitat.

Construction and operations activities clear vegetation → Structural differences between cleared and remaining vegetation create edge effect → Alteration and degradation of Short-eared Owl habitat.

Construction and maintenance activities → Introduction of invasive species → Alteration and degradation of Short-eared Owl habitat.



Construction

Habitat Alteration or Degradation due to Accidental Spills

Accidental spills and releases that occur during construction phase may result in Short-eared Owl habitat degradation. Depending on concentrations and material spilled, an accidental spill could cause death of vegetation, lower productivity and alter the vegetation community (Hutchinson and Freedman, 2011; Lednev et al., 2023). Accidental spills could impact on the small mammal population that Short-eared Owl prey on. Small mammals on reclaimed oils sands sites were found to have higher contaminant levels and reduced body condition (Roderiguez-Estival and Smits, 2016) and bioaccumulation has been known to impact Short-eared Owls (COSEWIC, 2021).

Habitat Alteration or Degradation from Hydrological Changes

While destruction of habitat can result in extreme cases, it is more probable that alteration and degradation of Short-eared Owl habitat may occur from hydrological changes (Bocking et al., 2017). Hydrological changes associated with construction may affect wetland drainage patterns, resulting in lower or higher water levels and altering the plant community (Miller et al. 2015). As described in Section 11.3.2.3, 91.82% of the project RSA is wetlands, primarily peatlands susceptible to changes in the flow of surface and subsurface water resulting from the bisection of these features by roads with the effects extending up to 250 m from the ROW. Based on the Groundwater assessment (Section 8.5) these changes are certain in the RSA, expected to be low in magnitude and moderate in context, but also permanent, occurring infrequently. Effects on Short-eared Owl habitat could include the loss of nesting locations if the water-table rises, while death of the tree canopy due to higher water tables could make some areas more suitable for Short-eared Owl use.

Habitat Alteration or Degradation due to Sensory Disturbances

Sensory disturbances generated during construction activities such as blasting, quarrying, hauling and clearing may occur during all hours, degrading Short-eared Owl habitat causing avoidance of the ROW and adjacent areas of the LSA. High levels of noise may cause acoustic masking (disrupting prey detection) reducing the forage efficiency of Short-eared Owls (Senzakiet et al. 2016). Construction noise may also be less continuous and more impulsive than traffic noise, initiate a startle response (Francis and Barber, 2013) and limit the ability to acclimatize to the disturbance. Human presence can also disturb Short-eared Owls during nesting, incubation or roosting (COSEWIC, 2021). Light pollution may provide some benefit to Short-eared Owls as predation attempts on songbirds attracted to artificial lights have been recorded: in those instances, the artificial lights provided improved hunting conditions as the lights illuminated passing songbirds making them easier to detect (Canario et al., 2012).

Habitat Alteration or Degradation due to Habitat Structural Change

Changes to vegetation structure during road construction activities will alter Short-eared Owl habitat near the Project Footprint due to vegetation clearing activities and removals. It is anticipated that restoration of laydown areas and access roads will reverse some of the habitat alteration or degradation caused by road construction, but most areas will remain free of tall vegetation. The conversion of certain areas into early successional habitat, such as construction access roads and laydown areas undergoing restoration, and along the road corridor during the operations phase, may create foraging habitat for Short-eared Owl. The value of this habitat will be linked to the availability of prey. Presence of voles in successional habitats appear to be related to the availability of downed woody debris (Craig et al., 2016; Le Borgne



and Fortin, 2020; Vanderwel et al., 2010), and as such, the amount of downed woody debris will be a determining factor whether the successional habitats are suitable for voles and therefore also Short-eared Owls. The creation of open habitats next to forested conifer ecosystems may provide roosting habits for Short-eared Owls.

Habitat Alteration or Degradation due to Introduction of Invasive Plants

The introduction and spread of noxious and invasive plant species have potential to affect open habitats used by Short-eared Owls. Invasive plant species can impact on multiple ecosystem aspects including structure, diversity and function (CFIA, 2008). Once established in a new habitat, most invasive species are nearly impossible to eradicate (Pimentel et al. 2005). One of the pathways of spread for invasive plants is construction activities and equipment. Construction equipment has the potential to transport and spread invasive plants, with cleared areas, including roadsides being susceptible to invasion (Hansen and Clevenger, 2005). While invasive plants are known to spread along transportation corridors, few invasive species have been found in naturally occurring open boreal habitats used by Short-eared Owls (Langor et al. 2014). In some cases, Short-eared Owls have been found to roost in tall invasive wetland plants such as European Common Reed and Reed Canary Grass (*Phalaris arundinacea*).

Operations

Habitat Alteration or Degradation due to Accidental Spills

Accidental spills that occur during the operations phase could result in the degradation or alteration of Short-eared Owl habitat. Spills during operations would most likely originate from accidental releases from vehicles, and accidental spills and releases during road operations may occur due to mechanical failure, human error, poor visibility or slippery road conditions. The road is forecasted to have low traffic volumes, and traffic along the roadway will be primarily personal and commercial vehicles and transport trucks associated with the community. While estimate frequency of spills is low (0.00000019 spills per mile, or 0.00000012 spills per kilometer [Harwood and Russell, 1990]), its predicted that minor spills and release are possible. While by Short-eared Owls occupy all open habitat types, wetlands are the primary open habitats in the RSA. Boreal wetlands are often hydrologically connected through subsurface flows (Smerdon et al., 2005), resulting in large watersheds throughout which pollutants can spread.

Habitat Alteration or Degradation due to Hydrological Changes

Alterations to Short-eared Owl habitat due to changes to hydrology could also occur during the operations phase due to culvert and crossing structure maintenance. Localized changes to hydrology could occur if culvert maintenance along the road is ignored, either in terms of repairs to the structure or removal of accumulated debris. The area affected would be dependent on the amount of time the culvert remains blocked as well as the size of the impounded area.

Habitat Alteration or Degradation due to Sensory Disturbances

Sensory disturbances resulting from road operations may degrade habitat for Short-eared Owls adjacent to the Project Footprint, reducing utilization of the area or masking vocalizations of individuals that remain or noise from prey. Most sensory impacts during operations will be related to traffic noise, which has been found to degrade bird habitat either through complete avoidance of areas near roads or decreased habitat value (Ware et al. 2015; Summers et al. 2011). Foraging efficiency of Short-eared Owls has been found to decline with increasing traffic noise levels, with the effects of acoustic masking (disrupting prey detection) extending more than 120 m away from a road, even at low levels of traffic noise (40 dB [Amplitude])



(Senzaki et al., 2016). The predicted maximum vehicles travelling on the proposed road during the operations phase is 500 per day, largely taking place during daylight hours. Short-eared Owls may hunt during the day and night but are considered to be crepuscular (COSEWIC, 2021; Wiggins et al. 2020).

Habitat Alteration or Degradation due to Habitat Structural Change

Edge effects during operations will have similar impacts of Short-eared Owl and their habitat. Open early seral habitats are preferred by Short-eared Owl. Maintenance activities, including removal of roadside vegetation during road operations, will maintain these open habitats. In areas of existing Short-eared Owl maintenance activities will result in a minimal edge effect as the early seral vegetation maintained along the ROW will be structurally similar to adjacent vegetation. In areas where tall vegetation is removed use by Short-eared Owls may increase use.

Habitat Alteration or Degradation due to Introduction of Invasive Plants

The introduction and spread of noxious and invasive plant species could also occur during operations and will have similar potential impacts on Short-eared Owl habitat. Transportation corridors are avenues of dispersal for invasive plants (Langor et al. 2014), and given the longer timeframe, operation of the road has the potential to have larger impacts than construction in terms of habitat Alteration or Degradation from introduction of invasive species. A number of potential invasive plants, including Reed Canary Grass and European Common Reed, may be used by Short-eared Owls for roosting (COSEWIC, 2021). While the timeframe is longer, introductions of plants into Short-eared Owl habitat are likely still limited by the climate of the RSA, and limited ability to spread beyond disturbed areas of the road ROW (Kent et al., 2018).

13.3.11.3 Alteration in Movement

Alteration in Short-eared Owl movement may result from habitat alteration and anthropogenic disturbance during construction and throughout operations. The pathways or activities which may result in alteration in Short-eared Owl movement include the following:

Construction and operations activities clear vegetation → Structural differences between cleared and natural vegetation act as a barrier → Alteration in movement Short-eared Owl.

Construction and operations activities cause sensory disturbances (light, noises, dust) → Disturbances cause avoidance response → Alteration in movement of Short-eared Owl.

Construction

Alteration in Movement due to Loss of Connectivity

The connectivity of Short-eared Owl habitat is not expected to be affected as they prefer open habitats and are known to use anthropogenic habitats like road ROWs. Gaps in cover created by anthropogenic activities are known to impede movement of birds, but the effect is species- and habitat-dependant (Desrochers and Hannon, 1997; Grubb and Doherty, 1999). Bird species that have shown reluctance to cross gaps like those created by roads are generally forest species where the road creates a distinctive edge between the road and preferred habitats, with larger gaps acting as a greater barrier (Grubb and Doherty, 1999). Larger birds such as raptors continue to fly over roads only at higher elevations (Johnson et al. 2017; Husby, 2017). Additionally, many raptors have been found to show little response to roads especially with low to moderate traffic (Planillo et al. 2015). Short-eared Owl is known to be



sensitive to fragmentation; however, Open Bog and Open Shore Fen habitats will be minimally affected and may use trees along the corridor as hunting perches (ECCC, 2018).

Alteration in Movement due to Sensory Disturbance

Short-eared Owl movement may be altered by sensory disturbances. Construction activities such as noise, lighting and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of Short-eared Owls, including shifts in territories, as they avoid the project ROW and supportive infrastructure. While Short-eared Owl's breed in habitats largely void of human disturbances (Kämpfer et al., 2023), they are known to perch along roads and also hunt in open habitats at airports, which generate significant amounts of noise (Fajardo et al. 1994; COSEWIC, 2021). Other boreal forest owl species have been found to be unaffected by the presence of noise sources on the landscape and do not alter site occupancy as a result (Shonfield and Bayne, 2017). Short-eared Owls may also be attracted to light sources used during construction activities as they could attract avian prey and lighting improves predation success (Canario et al., 2012).

Operations

Alteration in Movement due Habitat Structural Change

Short-eared Owl is expected to have the same response to changes in habitat connectivity during operations as during construction phase. Maintenance activities will maintain vegetation in an early seral state; however, as in the construction phase, avoidance of these areas is unlikely as Short-eared Owl prefer more open habitats including anthropogenically disturbed sites and are unlikely to treat changes as a barrier to movement.

Alteration in Movement due to Sensory Disturbance

Vehicle noise is anticipated be the primary sensory impact on Short-eared Owl during operations. Traffic noise has been found to lower abundance and promote avoidance in many in many bird species (McClure et al. 2013) and high traffic roads have been shown to affect distribution when noise exceeded 56 dB (Hirvonen, 2001). Short-eared Owl can often be seen perching along roadsides and may use the road ROW for hunting between maintenance activities (Fajardo et al. 1994; Martinez et al., 1998).

13.3.11.4 Injury or Death

The creation of the road may lead to both direct and indirect Short-eared Owl mortality. There could be increases in Short-eared Owl injury or death stemming from increased vehicle traffic or clearing activities during both construction and operation of the road, with indirect mortalities arising from increased predator encounters. The pathways or activities which may result in Short-eared Owl injury or death include the following:

Equipment and vehicles moving within Project footprint → Collisions with Short-eared Owl within Project Footprint → Injury or Death of Short-eared Owl.

Construction and operations activities clear vegetation → Incidental encounters with individuals or nests → Injury or Death of Short-eared Owl.

Construction and operations activities clear vegetation → Increased access for Lesser Yellowlegs Predators → Injury or Death of Short-eared Owl.



Construction

Injury or Death due to Collisions with Vehicles

Movement of construction equipment and vehicles within Project Footprint could result in increased death and injury of Short-eared Owl. Collisions with vehicles is among the top three causes of bird mortalities in Canada (Calvert et al., 2013). Vehicles will be travelling between camps and construction locations; these trips could occur at all hours and encounters with birds would not be unexpected. Collisions can be of particular importance for Short-eared Owls as they often fly low across roads while hunting (Fajardo et al. 1994). In Ontario between 1970-2018, 80% of Short-eared Owls admitted to the Owl Foundation for treatment had injuries either confirmed or likely sustained from collision with a vehicle (COSEWIC, 2021). Traffic speed is of particular importance with higher speeds resulting in increased deaths for owls (Gagné et al., 2015).

Injury or Death due to Incidental Take

Short-eared Owls and their nests are protected under the SARA which prohibits the damage or destruction of nests for bird species listed as threatened (GOC, 2025). Short-eared Owls and its habitat are also protected under Ontario's ESA. Vegetation clearing in Short-eared Owl habitat during road construction, and/or movement of equipment/vehicles through vegetated areas, may result in injury or death to birds, hatchlings, and/or eggs if management of vegetation is carried out during the breeding season, even after mitigation measures have been applied. Short-eared Owls nest on the ground, usually on small knolls or hummocks with adjacent vegetation 0.6 m in height or less to provide cover for the female and nestlings, formed as a scraped-out bowl lined with grasses and downy feathers (Wiggins et al., 2020). The female generally is reluctant to flush, and nests are often only found by flushing the female (Holt and Leasure, 1993).

Injury or Death due to Changes to Predator-Prey Dynamics

Linear features are known to facilitate predator movement in the boreal (Dickie et al., 2017; Benoit-Pepin et al., 2024) and creation of new roads connected to human activity is known to spread predators into previously unoccupied areas (Lantham et al. 2011). As ground nesting birds Short-eared Owls are particularly susceptible to predators. Their eggs and young are susceptible, and predation of nests has been identified as the most significant source of reproductive failure in both Scotland and Alaska (COSEWIC, 2021). Possible nest predators include corvids and Red Fox, and adults are additionally preyed upon by other raptors (e.g., Red-tailed Hawk [*Buteo jamaicensis*], Great Horned Owl and Northern Harrier) (Wiggins et al., 2020; COSEWIC, 2021). Red Foxes have been documented taking advantage of roads for movement (Towerton et al., 2016; Kuskemoen, 2020) and may also be drawn to forage at the roadside as well (Silva et al., 2009). Great Horned Owls have also been found to select for linear features due to these types of disturbances creating suitable hunting habitat (Shonfield and Bayne, 2023).

Operations

Injury or Death due to Collisions with Vehicles

Vehicles traveling along the road during operations could collide with Short-eared Owl causing injury or death. Birds are more likely to collide with vehicles if they forage, roost or nest near the road (Kociolek et al. 2011). It has been estimated that more than 14,000 birds are killed annually due to collisions with vehicles, or approximately one bird every 3 km per year (Bishop and Brogan, 2013). Traffic speed is of



particular importance with higher speeds resulting in increased deaths for owls (Gagné et al., 2015), given the lower level of control in the operations phase, collision numbers may be higher than during construction. Collisions with vehicles will likely occur due to Short-eared Owl behavior which includes flying low over roads, with the highest levels during the spring and summer as recently fledged juvenile raptors and breeding adults are generally more susceptible to road-based mortality (Hanmer and Robinson, 2021). Low traffic levels (maximum 500 a day) traveling mostly during the day and speed controls should mitigate but not eliminate the effect.

Injury or Death due to Incidental Take

Injury or death of Short-eared Owl may occur during the operations phase as vegetation clearing related to maintenance is also scheduled to occur during operations. Though smaller in scale, periodic clearing of the ROW may occur during operations as part of line-of-sight maintenance or infrastructure repairs. If maintenance occurs during the breeding season nest and individuals could be injured or killed, Short-eared Owl nest sites are usually well camouflaged on the ground which would make them vulnerable to maintenance activities. Short-eared Owl behavior may reduce the likelihood of incidental take as this species typically nests more than 200 m from road edges (Meyer et al., 2016).

Injury or Death due to Changes to Predator-Prey Dynamics

Effects on Short-eared Owl from predators during operations are a continuation of the same impacts as described for the construction phase. Maintenance clearing during operations will maintain openness along the ROW which will allow predators increased access to open areas near the road exposing Short-eared Owl to increased predation. While some studies have found a positive effect on bird survival due to roads and resulting predator avoidance of roads, it is often attributed to higher levels of human presence (Singer et al. 2020); given the low traffic levels, positive effects are unlikely for this project. The placement of nests more than 200 m from road edges may reduce this effect (Meyer et al., 2016).

13.3.11.5 Threats Assessment

Each of the four potential effects categories were evaluated based on the threats assessment criteria outlined in the TISG and is based on IUCN-CMP unified threat classification system, referenced from NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk (NatureServe, 2012). Threats are assessed prior to any mitigative measures being applied. The threat assessment process is generally done at the population level but can be done at a more regional level. Short-eared Owls, which have breeding territories that are between 50 and 100 ha in size (COSEWIC, 2020), were evaluated at the RSA level.

Scope is small for all threats as the percent of the population affected is less than 10% of the available habitat and population within the RSA. Severity ranges from serious to slight for the threats, threats related to vegetation removals are serious as within the scope based on the high degree of habitat loss and alteration, hydrologic changes and spills are rated as moderate which are less likely to occur but would be damaging. Degradation of habitat by sensory disturbance is rated as moderate as Short-eared Owls show some aversion to disturbance. Collisions are also rated as moderate due to the number of reported injuries in Ontario from vehicle collisions, and all other Threats as slight. Magnitude is rated as low for all threats.

Irreversibility is high for hydrological changes and very high for vegetation remove as the roadbed will likely never be removed but hydrological mitigations could be done. Irreversibility is also high for spills, edge effects, invasive species, and predation because while the effects can technically be reversed it



would take time and considerable effort. The rest of the threats were deemed low and can be easily reversed. The degree of effect was low for all except vegetation loss which was moderate.

A summary of the threat assessment for Short-eared Owl habitat loss, alteration or degradation of habitat, alteration in movement, and injury or death prior to the consideration of mitigation measures, is presented in **Table 13-39**.

Table 13-39: Summary of Threat Assessment For Potential Effects on Short-eared Owl

Threat	Scope	Severity	Magnitude	Irreversibility	Degree of Effect
Habitat Loss – Clearing Activities	Small	Serious	Low	Very High	Moderate
Habitat Loss – Hydrological Changes	Small	Moderate	Low	High	Low
Habitat Alteration or Degradation – Accidental Spills	Small	Moderate	Low	High	Low
Habitat Alteration or Degradation – Hydrological Changes	Small	Moderate	Low	High	Low
Habitat Alteration or Degradation – Sensory Disturbance	Small	Moderate	Low	Low	Low
Habitat Alteration or Degradation – Habitat Structure Change	Small	slight	Low	High	Low
Habitat Alteration or Degradation – Invasive Species	Small	slight	Low	High	Low
Alteration in Movement – Loss of Connectivity	Small	slight	Low	Low	Low
Alteration in Movement – Sensory Disturbance	Small	slight	Low	Low	Low
Injury or Death – Incidental Take	Small	slight	Low	Low	Low
Injury or Death – Changes to Predator-Prey Dynamics	Small	slight	Low	High	Low
Injury or Death – Collisions with Vehicles	Small	Moderate	Low	Low	Low

13.3.12 Lake Sturgeon (Hudson Bay – James Bay Population)

This section describes the nature of the potential effects, the pathways that link the project activities and the effects, and the indicators that can be used to assess and measure the effects. **Table 13-42** summarizes the potential effects, effects pathways, and effect indicators for the Lake Sturgeon and Lake Sturgeon Habitat VC. The potential effects of accidental spills on Lake Sturgeon and Lake Sturgeon habitat are discussed in this section and are further assessed in Section 23 – Accidents and Malfunctions.

13.3.12.1 Changes to Quantity and Quality of Fish Habitat

The following potential effects to Quantity and Quality of Fish Habitat may occur as a result of project construction and operations.



13.3.12.1.1 Destruction or Loss of Fish Habitat

Construction of permanent structures (culverts and bridges) at waterbody crossings → Loss of instream and riparian habitat → Reduction in total available habitat for Lake Sturgeon

Similar to the Fish and Fish Habitat Section (Section 10), Lake Sturgeon potential effects and indicators were selected based on review of similar environmental assessments for linear projects (such as roadways, transmission lines, and pipelines) in Ontario and within Canada, comments provided during the engagement process, and professional judgement. The potential effects fall within five categories:

- Destruction of Fish Habitat;
- Harmful Alteration or Disruption of Fish Habitat;
- Barriers to Fish Passage;
- Injury or Death of Fish; and
- Increased Harvest.

The destruction of Lake Sturgeon fish habitat is described as a reduction in total available habitat for the species, as defined by the *Fisheries Act*. This loss renders the habitat no longer suitable for fish to utilize during any stage of their life cycle. Indigenous communities have identified the loss of fish habitat as a concern related to the roadway construction and have emphasized that fish habitat loss should be avoided, especially in spawning areas (Bikowski, V.A. and Saddique 2024, in draft). Lake Sturgeon habitat loss may result from vegetation clearing and construction of wetland and watercourse crossings. The pathways or activities which may result in loss or destruction of Lake Sturgeon habitat include the following:

Construction

The most significant impacts on Lake Sturgeon habitat are expected during the construction phase, as the WSR project will span multiple watercourses and waterbodies. Additional services roads, such as those to aggregate pits, are also expected to impact watercourses and waterbodies. Impacts will include fish habitat loss due to placement of infrastructure (e.g., bridge footings or embankments) rendering the habitat unusable for fish and other aquatic species.

The road width is expected to be 11.5 m along the route alignment, expanding to 17 m in watercourses or waterbody crossings where an embankment is required. Bridges will be approximately the same width as the roadway (11.5 m). Based on these dimensions, the direct placement of the road would total approximately 9,150 square meters of fish habitat destruction, considering the bankfull width of the waterbodies that will be crossed. However, the actual destruction will be considerably less as there are a proposed total of six (6) bridge structures, 19 steel box culverts (steel plate arches) and six (6) large diameter corrugated steel pipe culverts identified.

Only of portion of these watercourses and waterbodies have the potential to support Lake Sturgeon based on their habitat characteristics. All of these locations have been identified to be crossed using bridge structures. These watercourses and waterbodies are:

- Winisk Lake (WB-1);
- Winiskesis Channel (WC-3);
- Muketei River (WC-26); and
- WC-27 (inferred based on direct connection to WC-3 and Winisk Lake).



As a result, the only direct impact to Lake Sturgeon aquatic habitat will be where footings/piers in the water for bridges are required. Bridge footings will have a small individual footprint approximately 12.5 m x 5 m in size (62.5m² / footing). With approximately 11 in-water footings/piers, there is an expected destruction of 562.5 m² of aquatic Lake Sturgeon habitat. This will result in a small loss of fish habitat where bridge footings are placed. These crossing structures are summarized in **Table 13-40**. Additional fish habitat destruction will occur from clearing riparian vegetation in buffer areas that surround watercourses. This is anticipated at 1,285 m² of riparian habitat associated with watercourse where Lake Sturgeon may be present.

Table 13-40: Structure Types and Spans that may affect Lake Sturgeon

WC Number	Width (m)	Maximum Span (m)	Stream Width (m)	Number of Spans	Foundation Type	Number of Piers	Area of Aquatic Impact (m ²)	Area of Riparian Impact (m ²)
WC-1	253	253	250	7	Footing	7	437.5	115
WC-3	48	48	46	2	Footing	1	62.5	230
WC-26	35.0	35.0	30	1	Footing	0	0	322
WC-27	48	48	48	2	Footing	1	62.5	598

Operation

Operation of the roadway is unlikely to result in significant loss of fish habitat (Lake sturgeon or otherwise), as repairs will be generally made to the roadway surface which are unlikely to cause fish habitat loss. Should major repairs be required that necessitate in-water works, minor losses of fish habitat may occur.

13.3.12.1.2 Harmful Alteration and Disruption of Fish Habitat

Lake Sturgeon habitat alteration or degradation may result from vegetation clearing and construction of wetland and watercourse crossings. The pathways or activities which may result in alteration or degradation of Lake Sturgeon habitat include the following:

Placement of materials for construction of roadway and waterbody crossings (bridges) → Alteration and disruption of Lake Sturgeon habitat

Construction and maintenance activities → Erosion, deposition and transportation of sediment into waterbodies → Reduction in surface water quality → Alteration and disruption of Lake Sturgeon habitat

Accidental spills and air contaminant/greenhouse gases (GHG) emissions during construction and maintenance activities → Reduction in surface water quality → Alteration and disruption of Lake Sturgeon habitat

Construction of permanent or temporary structures (bridges) at waterbody crossings → Change in hydrology (change to surface water drainage patterns and flows) → Alteration and disruption of Lake Sturgeon habitat

Construction of permanent or temporary structures (bridges) at waterbody crossings → Change to riparian habitat → Alteration and disruption of Lake Sturgeon habitat

Construction and maintenance activities → Introduction of invasive species → Alteration and disruption of Lake Sturgeon habitat



Construction

Habitat Alteration/Disruption Due to Placement of Materials

Materials such as rip-rap, boulder, or other armouring materials may be placed in the waters along watercourse banks or shoreline area of lakes (i.e., Winisk Lake) during construction to prevent erosion of the road embankment or provide scour protection near culverts and bridge crossings. These materials may be eventually covered in-water once the construction is complete and may continue to function as fish habitat. However, these will likely be a change from the baseline conditions and may change how Lake Sturgeon utilize these areas.

Habitat Alteration/Disruption Due to Erosion or Sedimentation

Increases in the concentration of suspended sediment can result directly from soil disturbance and grading activities during construction of the road, re-suspension of bed materials at water crossings and/or indirectly from site run-off. This could increase total suspended solids and turbidity in the downstream aquatic ecosystems and result in a negative effect on surface water quality. These suspended sediments might be naturally occurring and released due to disturbance or may be deposited from construction activities (in-fill for road embankment). Site run-off, caused by an increase in relatively non-permeable road surfaces may also increase suspended sediment concentrations and cause deposition downstream. These released sediments can affect fish species at all stages of their life cycles (Anderson et al., 1996; Kemp et al., 2011). Fine sediment can result in downstream sediment deposition that alters substrate composition or channel morphology and modifies the suitability of habitat for spawning, overwintering, foraging, and rearing. The availability of food, such as benthic invertebrates or vegetation, may also be affected due to smothering and/or substrate changes caused by deposited sediments (Jones et al., 2011). Effects could also include changes in invertebrate abundance and/or community structure (Rosenberg and Wiens, 1978). Increases in suspended and settled sediments may also interfere with gas exchange, such as reduction of available dissolved oxygen level that may be intolerable to some aquatic life, or in certain instances cause fish death. These effects may extend beyond the initial construction and can last several years before the systems are flushed of sediments (Taylor and Roff, 1986).

Overall, past studies have documented that deposited sediment from erosion and sedimentation can modify the availability and suitability of fish habitat through (CCME 1999):

- Changes in-water clarity: reduced visibility due to turbid waters and available light penetration can create behavioral changes in local aquatic biota. Changes may be observed as alteration in movement patterns (i.e., migration) and foraging success, ultimately leading to reduction of habitat quality and/or quantity (Cavanagh et al. 2014; Wood and Armitage 1997). Some turbidity is tolerable by Lake Sturgeon as they can use moderately turbid environments (MNRF, 2010).
- Potential effects on available forage species: increases in suspended and settled sediments may lead to a reduction of available dissolved oxygen to levels intolerable by some benthic invertebrates and forage species and may clog gills of zooplankton (Chapman et al. 2017). This may affect Lake Sturgeon as they are primarily benthic feeders (Golder, 2011).
- Deposited sediments: suspended sediments mobilized by construction activities are ultimately deposited downstream from the point of release/mobilization. Deposition of such material can have direct effects on habitat quality and Lake Sturgeon such as:
 - Reduced specialized habitat areas such as a decrease in distinction between riffle-run-pool habitat types in a stream which reduces habitat quality and species richness;



- Filling of interstitial spaces used by forage and benthic dwelling species (i.e., benthic invertebrates) (Lenat et al. 1981); and
- Decreased reproduction success by reduction of spawning areas, smothering of eggs and emergence of fish fry (Kempinger, 1988).

Water Quality Changes due to Accidental Spills and Emission of Air Contaminant, Fugitive Dust and Greenhouse Gases

Accidental spills of chemical or hazardous materials (e.g., petroleum products, ammonium nitrate) during construction has the potential to enter nearby waterbodies along the WSR. Changes to fish habitat and water quality from spills of fuel or other materials can negatively affect fish populations directly, or cause changes to their habitat. Release from spills may also affect food sources, such as plants or benthic invertebrate populations used as food sources (Kajpust, 2022; Barton and Wallace, 1979). As chemical and hazardous materials often accumulate in the benthos, Lake Sturgeon may be exposed to high levels of contaminants and pollutants.

Changes in-water quality (and thus fish habitat quality) due to air contaminant and fugitive dust emissions, including greenhouse gas emissions, may also occur as result of the Project. Dust emissions during construction are predicted to be localized but have the potential to change water quality which may influence fish habitat availability. Fossil fuel emissions from vehicles, construction equipment and generators can release sulfite and nitrate species which can induce acidification and/or eutrophication of waterbodies (Environment Canada 1994; Schindler, 1998). The effects of air contaminants are unlikely to be localized and caused exclusively by the Project but will be additive with increased greenhouse gas emissions.

Habitat Alteration Due to Changes in Hydrology or Groundwater

Potential changes in surface water drainage patterns and increases or decreases in flows and surface water levels in waterbodies, as well changes to groundwater, are described in detail in Sections 7 and 8 of this EAR/IS. The installation of bridge structures and embankments, along with associated culverts, may change hydrology near the roadway beyond the natural range of variation and lead to changes in fish habitat quantity and quality. Culverts typically have a greater impact on fish habitat (Wellman et al., 2000) than bridges, but bridges also cause changes in fish habitat (Belcher, 2022). These disturbances generally are concentrated downstream of the effect but can also take place on the upstream side if channel restriction causes changes to water impoundment. This impoundment may flood or alter habitat outside of the typical watercourse boundaries and floodplains. In addition, these structures can reduce flow rates both upstream and downstream of the crossing. Changes to water levels and flow can affect spawning, rearing, feeding, migration, and overwintering habitat of fish-bearing waterbodies as well as affect waterbody productivity and food availability. Changes to water levels and flow can also alter the presence of macrophytes, which provide cover, spawning material or food for fish.

Groundwater inputs are seasonally important to the baseflow of local waterbodies and natural environment features (e.g., vegetation, fish and fish habitat, and wetlands). Construction activities have the potential to locally influence the contribution of groundwater discharge to the baseflow of waterbodies. Specifically, Project construction may lead to changes in the local hydrogeological environment by increasing, decreasing or redirecting groundwater flows. These changes in groundwater flow can result in local groundwater table lowering or raising and alteration of flow pathways. These potential changes in groundwater flow pathways are potentially linked to surface water quantity (i.e., water levels) and subsequently fish habitat quantity and quality



Habitat Alteration Due to Removal of Riparian Vegetation

The removal of riparian vegetation adjacent to fish habitat is required for construction of the road. Removal of riparian zones is linked to changes in fish abundance and distribution (Jones III et al., 1999). The removal of vegetation could cause changes in-water temperature due to reduced shading potential (McGurk, 1989). This in turn could make habitats less suitable for spawning or feeding if temperatures exceed the tolerance range of cold or cool-water fish species or invertebrate species (MacDonald et al., 2003). Habitat structure of watercourses may also change if overhead cover or terrestrial inputs (such as the input of woody debris) into watercourses are reduced, decreasing the amount of available habitat for fish. Removal of riparian vegetation may also result in changes in food supply (plants and organic debris that fall into the waterbody and terrestrial insects.)

Dust emissions caused by construction of the roadway may also affect riparian vegetation by changing plant communities that may alter habitat structure, channel stability and overhead cover and a result adversely affect fish habitat.

Introduction of Invasive Species

The introduction and spread of aquatic invasive plants during construction have the potential to reduce the suitability and availability of fish habitat as plant species may not be conducive to native fish or can change water quality form acidification and nutrient enrichment. The introduction of invasive plant species could occur as result of stowaways accidentally brought to the site. One example is construction equipment that is transported from outside the region that is not properly cleaned/disinfected may transfer invasives plants to the study area.

Operations

Water Quality Changes due to Accidental Spills and Emission of Air Contaminant, Fugitive Dust and Greenhouse Gases

Similar to the effects of construction, there could be effects to water quality during the operations phase of the Project from accidental spills and emission of air contaminant, fugitive dust and greenhouse gases. Although the exact frequency of spills is difficult to calculate, estimates show accident rates for trucks and releases at 1.9×10^{-7} spills per mile travelled for mine trucks (0.00000019 spills per mile, or 0.00000012 spills per kilometer), (Harwood and Russell, 1990). These estimates are also not developed strictly for the Project but show that spills over the course of the operation of the roadway are likely to occur. Although the initial usage of the roadway will be primarily personal and commercial vehicles and transport trucks with low traffic volumes, its predicted that minor spills and release are probable over the lifetime of the Project. In addition, similar to construction, vehicles and equipment during operations will release air contaminants and also fugitive dust emission in areas where the road has a gravel surface.

Introduction of Invasive Species

The introduction of invasive plants during operation will have similar potential effect that may reduce the availability and quality of fish habitat as plant species not conducive to fish become prevalent in areas. Road access also increases the likelihood of introduction of invasive fish species (Kaufman et al., 2009).



13.3.12.1.3 Changes in Fish Access to Habitats

Alteration in Lake Sturgeon movement may result from the installation of water control structures and disturbance during construction and throughout operations. Linear features, such as roadways, that cross streams have the potential to impede fish movement by creating barriers to fish passage (Januchowski-Hartley et al. 2014). A barrier to fish passage is considered any structure or activity that would make it more difficult (or impossible) for a fish to traverse. The pathways or activities which may result in alteration in Lake Sturgeon movement include the following:

Installation of temporary flow isolation structures for instream construction of bridges → Localized temporary barriers to Lake Sturgeon access to habitats

Construction

Road construction will require either bridge footings or embankment structures to cross watercourses and waterbodies, while allowing water to flow past the road. Temporary obstructions to fish passage will occur during construction, particularly if work must be completed in isolation, as fish would be unable to pass unless a properly maintained flow channel is provided.

These effects will occur at all sites where embankments are constructed. Sites with bridge construction may also need temporary embankments for bridge footing construction. Construction will occur within dry, isolated streambeds, with temporary barriers in place. While downstream flow will be maintained during construction, there may be brief interruptions in flow during construction to facilitate works.

Operation

Bridge footings are not expected to restrict fish passage (Cocchiglia et al., 2012), as fish can generally pass bridge footings. This is because bridge footings occupy only a small portion of the available fish habitat at a crossing. Since bridges are planned at all watercourses and waterbodies where Lake Sturgeon are expected to be present, there are no expected operational effects on Lake sturgeon passage.

13.3.12.1.4 Changes in Public Access to Fish Habitats

The development of the WSR could result in a negative effect on the abundance of Lake Sturgeon, through increased access to waterbodies where populations are present. Access to previously undisturbed areas introduces opportunity for increased harvesting by First Nations and public recreational fishing in populations that have not previously experienced such pressure. This potential effect could be amplified where other proposed roads in the region (i.e., Northern Road Link and Marten Falls Community Access Road) are constructed and connect the WSR to the provincial highway system (refer to Section 21 – Cumulative Effects). The introduction of the WSR ROW and additional access road to aggregate source area ARA-4 will increase land quantity and access for harvesting, including potential expansion of outdoor tourism and recreational land use, which are currently limited within the LSA. The primary potential effect identified by increased access is pressure on historically inaccessible or remote waterbodies from an increase in harvesting/fishing. Increased harvest is described as increased mortality and removal of fish from waterbodies and watercourses caused by recreational or commercial fishing. Indigenous harvesting may also occur with increased access for First Nations traditional harvesting. Potential for increased harvesting is likely to come from a number of different groups including; recreational and tourism outfitters, workers during the construction and operations phases of the Project, and local Indigenous community members. The pathways in which project activities may result in a change in public access to fish/fish habitat are described below.



Project construction → Increased access to fish habitat for work crews → Increased harvest of Lake Sturgeon

Project operations → Increased public and First Nations access to fish habitat for the public → Increased harvest of Lake Sturgeon

Construction

Construction and temporary workers may contribute to increased harvest during construction. These workers may exploit the local watercourses to capture fish during their time-off or post-shift. Harvest of Lake Sturgeon is not expected to be significant by construction workers due to the limited number of locations where they occur, and the difficulty in capturing them with recreational fishing gear.

Operations

The majority of potential effects of excessive harvesting as result of an increase in access to fish habitats are expected to occur during the operations phase of the Project. The road itself and access road to aggregate source area ARA-4 are in previously undisturbed and inaccessible areas which could cause effects to the local fish populations through additional harvest (Hunt and Lester, 2009). Studies suggest that the higher quality road, the more pressure is expected on a fishery (Hunt, 2011). A lake trout study in Ontario showed reduction of a lake trout population by approximately 72% in only a few months once a new forestry access road was built that was able to access Michaud Lake (Gunn and Sein, 2000). Road density, and associated overfishing also was shown to be a contributing factor on salmon habitats in British Columbia (Bradford and Irvine, 2000). Lake Sturgeon is very susceptible to overfishing as it is slow growing. In Ontario populations of Lake Sturgeon that were overfished in the late 1800s and early 1900s have still not recovered (Velez-Espino and Koops 2008).

First Nations communities are most likely to utilize the area and in particular Webequie First Nation, being in close proximity to the road. However, many community members of First Nations have raised concerns regarding a potential influx of southern Ontario fishers reducing their ability to harvest fish (Bikowski and Saddique, 2024, in draft; Stantec 2024, in draft).

Spatially, it is expected that effects from increased harvesting will not be evenly spread throughout the waterbodies crossed by the road. Studies have shown that angling effort increases based on the type and proximity of the road to waterbodies and watercourses (Kaufman et al., 2009). In addition, the proximity of a population centre greatly increases the pressure on fish, with fish stocks generally being more highly exploited near these centers (de Kerckhove et al., 2015). Therefore, it is conceivable that the greatest pressure on the waterbodies will be in proximity to Webequie First Nation, and any other developments that may occur along the roadway in the future.

The roadway may also increase the opportunity for new business or development opportunities (such as the tourism outfitters or lake-side development) which could have negative effects on the fish population (Hunt and Lester, 2009). Many remote fish lodges are currently fly-in only and some could be established relatively close on lakes that display suitable fish populations.

Recreational fishing, although not present in the LSA could also place additional pressure on the more frequently edible sport-fish species found in the area. While First Nations have identified Walleye and Whitefish as the primary country food source that is routinely consumed by community members in the area, Lake Sturgeon are also eaten occasionally when captured.



The proposed WSR current straddles two Ontario Fisheries Management Zones (FMR 2 and FMR 3). Beyond the fisheries limits typical of the zone, none of the waterbodies within the RSA are subject to any current fishing restrictions or enforcement and it acknowledged that First Nations actively exercise their Aboriginal and Treaty Rights to harvest fish. The potential for an increase in harvesting of Lake Sturgeon is expected to be limited to the Project Footprint and the LSA, as additional roads would be required for recreational anglers to access and harvest Lake Sturgeon in the RSA.

13.3.12.2 Changes to Lake Sturgeon Populations

13.3.12.2.1 Injury or Death

The Injury or Death effect is defined as physical injury to fish (fatal or non-fatal) as a result of the proposed works. This includes injuries or death to 'fish' as defined by the *Fisheries Act*. The pathways in which project activities may result in an injury or death effect to Lake Sturgeon are described below.

Placement of materials for construction of roadway and instream construction of waterbody crossings (bridges and culverts) → Injury or death of Lake Sturgeon

Blasting (i.e., use of explosives) of rocks → Shockwaves/overpressure from explosion, chemical residues from explosives entering waterbodies → Injury or death of fish

Dewatering, fish salvage from areas isolated for in-water work prior to construction → Injury or death of Lake Sturgeon

Maintenance activities that require in-water work → Injury or death of Lake Sturgeon

Accidental spills → overland flow with surface run-off → Reduction in surface water quality → Injury or death of Lake Sturgeon

Construction

There may be multiple causes of Lake Sturgeon Injury or Death during construction, including but not limited to:

- Physical injury or mortality of Lake Sturgeon caused by placement of materials in watercourses or equipment maneuvering in watercourses.
- Blasting near waterbodies could potentially cause the death of fish (Dunlop, 2009). Blasting work is currently not expected within waterbodies but will be required during construction for the extraction of bedrock to process aggregate at locations near waterbodies.
- Pumps will be used to dewater locations for construction, and these could potentially cause Lake Sturgeon to be impinged or otherwise trapped on pump intakes or screens if not properly designed.
- Fish salvage operations during construction aims to prevent death/injury to the majority of Lake Sturgeon, but there is potential for Injury or Death of Lake Sturgeon during salvage operations as well.

Blasting operations required to break-up aggregate materials from bedrock may be required for construction. Blasting has the potential to cause the death or injury of fish if completed in-water or adjacent to water. This occurs from the release of shockwaves that can cause internal damage to the fish (Wright and Hopky 2008) or fish eggs (Faulkner et al 2006). The effects and their magnitude can be



variable, and is based on the distance, type of explosive, and amount of explosive used in detonation but even relatively small charges can cause fish death if placed close to water (Hubbs and Rehnitzer 1952).

Impact avoidance and mitigation measures will be implemented to avoid/prevent the injury and/or death of fish. However, the potential for death and/or injury to fish exists, particularly in watercourses and waterbodies within Project Footprint and immediately outside the Project Footprint in the LSA. Risk of injury and/or death of fish is expected to be highest during in-water works conducted as part of the construction phase of the Project.

Operation

During operations, there are a small number of pathways where Injury or Death of Lake Sturgeon may occur. These include:

- Accidental releases of substances (oils, fuels, etc.) causing the death of Lake Sturgeon during both the construction and operation phases of the Project.
- Embankment/Culvert Repairs where in-water work is required.

13.3.12.3 Threats Assessment

Each of the four potential effects categories were evaluated based on the threats assessment criteria outlined in the TISG and is based on IUCN-CMP unified threat classification system, referenced from NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk (NatureServe, 2012). Threats are assessed prior to any mitigative measures being applied. The threat assessment process is generally done at the population level but can be done at a more regional level. Lake Sturgeon, which can travel hundreds of kilometers as part of their reproduction (COSEWIC, 2020), were evaluated at the tertiary watershed level which is the Lake Sturgeon specific RSA level.

Scope is small for all threats as the percent of the population affected is less than 10% of the available habitat and population within the RSA. Severity of the threats ranges from slight to serious: threats related to construction of permanent structures, materials placement, surface water quality and accidental spills are serious within the scope based on the high degree of habitat loss and alteration; Increased harvest is serious within the scope based on the high potential for population impacts; changes in hydrology are rated as moderate; and all other threats are slight. Magnitude is rated as low for all threats.

Irreversibility is high for construction of permanent structures and for materials placement as the bridges could technically be removed at the end of operations, but footings and armouring may be left in place due to cost. Irreversibility is also high for accidental spills, change in hydrology, and invasive species, because while the effects can technically be reversed it would take time and considerable effort. Increased access could be reversed with a large commitment of resources but may not be practical. The rest of the threats were deemed moderate or low and can be reversed with reasonable commitment of resources. The degree of effect was low for all threats. A summary of the threat assessment for Short-eared Owl habitat loss, alteration or degradation of habitat, alteration in movement, and injury or death prior to the consideration of mitigation measures, is presented in **Table 13-41**.



Table 13-41: Summary of Threat Assessment For Potential Effects on Lake Sturgeon

Threat	Scope	Severity	Magnitude	Irreversibility	Degree of Effect
Destruction/Loss of Fish Habitat – Construction of Permanent Structures	Small	Serious	Low	High	Low
Harmful Alteration and Disruption of Fish Habitat – Material placement.	Small	Serious	Low	High	Low
Harmful Alteration and Disruption of Fish Habitat – Reduced Surface Water Quality	Small	Serious	Low	Medium	Low
Harmful Alteration and Disruption of Fish Habitat – Accidental Spills and Emission of Air Contaminant	Small	Serious	Low	High	Low
Harmful Alteration and Disruption of Fish Habitat – Change in Hydrology.	Small	Moderate	Low	High	Low
Harmful Alteration and Disruption of Fish Habitat – Removal of riparian vegetation.	Small	Slight	Low	Medium	Low
Harmful Alteration and Disruption of Fish Habitat – Introduction of invasive species.	Small	Slight	Low	High	Low
Harmful Alteration and Disruption of Fish Habitat – Road maintenance activities.	Small	Slight	Low	Medium	Low
Changes in Fish Access to Habitats – Isolation structures for instream construction of bridges.	Small	Slight	Low	Low	Low
Injury or death of fish – Material placement	Small	Slight	Low	High	Low
Injury or death of fish – Blasting	Small	Slight	Low	Low	Low
Injury or death of fish – Dewatering and Fish Salvage.	Small	Slight	Low	Low	Low
Injury or death of fish – Maintenance activities that require in-water work.	Small	Slight	Low	Low	Low
Changes in Public Access to Fish Habitats – Increased harvest	Small	Serious	Low	High	Low

Table 13-42 summarizes the potential effects, pathways and indicators for each species within the SAR and SAR Habitat VC.



Table 13-42: Potential Effects, Pathways and Indicators for Species at Risk VC

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
Caribou					
Construction	Habitat Loss	Loss of habitat from vegetation clearing and ground disturbance.	Habitat availability (i.e., quantity and quality)	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Degradation	<p>Damage and removal of vegetation during construction causes habitat alteration.</p> <p>Heavy equipment use, quarry development, and human presence cause sensory disturbances that degrade habitat.</p> <p>Climate change and/or releases to the environment could cause changes to terrestrial habitat quality.</p>	<p>Habitat availability (i.e., quantity and quality)</p> <p>Habitat distribution (i.e., configuration and connectivity)</p>	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Change in movement of Caribou	<p>Clearing of vegetation could create forest gaps leading to avoidance of construction area.</p> <p>Equipment, recontouring of terrain, and construction of quarries creating physical barriers.</p> <p>Alteration of hydrology results in displacement of species at risk from the area.</p>	<p>Habitat distribution (i.e., configuration and connectivity)</p> <p>Survival and Reproduction</p>	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Injury or Death of Caribou	<p>Collisions with Project vehicles.</p> <p>Fly rock from blasting at quarries.</p> <p>Chemical or hazardous material spills in the Project footprint.</p>	Survival and Reproduction	Direct	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
Operations	Habitat Loss	Loss of habitat from vegetation clearing and ground disturbance.	Habitat availability (i.e., quantity and quality)	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Degradation	Introduction of invasive and/or noxious plant species that alter the landscape and forage availability.	Habitat availability (i.e., quantity and quality)	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8)

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
		Regular road use by vehicles could create sensory disturbances that degrade habitat. Road maintenance may result in incidental destruction of nests or dens.			<ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Change in movement of Caribou	Regular road use by vehicles could create sensory disturbances that alter movement and distribution of species at risk. Predators and competitors expanding ranges along linear features.	Habitat availability (i.e., quantity and quality) Survival and Reproduction	Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Injury or Death of Caribou	Increase in public access could affect species at risk survival and reproduction through vehicle strikes and increased hunting pressure. Increase in alternate prey sources leads to increased predator populations and increased potential for spread of disease. Attraction to improperly discarded waste along the road may result in behavioural changes.	Survival and Reproduction	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
Wolverine					
Construction	Habitat Loss	Site preparation, quarry and road creation and other activities during construction could remove vegetation and disturb the ground resulting in a loss of wolverine habitat.	Changes to Wolverine habitat availability (quantity – hectare)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Degradation	Site preparation, quarry and road creation and other activities during construction may remove or damage vegetation, and/or disturb the ground altering and degrading wolverine habitat. Heavy equipment use, blasting at quarries or pits, vegetation clearing, earth hauling, construction lighting and other human disturbances may cause sensory disturbances that may degrade wolverine habitat. Site preparation, removal of vegetation, construction of the road and other activities may change drainage patterns and/or alter soil moisture regimes, leading to impacts in surface water and/or groundwater. These changes could degrade the habitat of some of wolverine's prey species (e.g., beaver) as well as riparian corridors thereby resulting in altered and/or degraded foraging and movement habitat for wolverine.	Changes to Wolverine habitat availability (quantity – hectare and quality) Changes to abundance and distribution of Wolverine (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Alteration in Movement	Since wolverine are known to avoid gaps in habitat (i.e., habitat fragmentation) the removal of vegetation (i.e., clearing) during construction could result in wolverine changing their movement patterns.	Changes to abundance and distribution of Wolverine (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12)

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
		Activities that generate noise, light and other sensory disturbances result may result in wolverine changing movement patterns to avoid areas that contain such activities.			<ul style="list-style-type: none"> Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Injury or Death	<p>The movement of vehicles, equipment and machinery could result in collisions that result in the injury or death of wolverine.</p> <p>Construction activities that clear vegetation can increase access for predators of wolverine resulting in the death or injury of the latter.</p> <p>Construction activities that clear vegetation and cause ground disturbance could alter habitat structure and availability, causing wolverines to spend extra energy because they have changed their movements between den sites and foraging areas resulting in the injury or death of the SAR.</p> <p>Construction of the road results in increased access to humans in wolverine habitat leading to injury or death of wolverine.</p>	Changes to survival, abundance and distribution of Wolverine (number/ha)	Direct	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
Operations	Habitat Loss		Changes to Wolverine habitat availability (quantity – hectare)	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Degradation	<p>Quarry and pit creation and operations, maintenance and other activities during operations may remove or damage vegetation, and/or disturb the ground altering and degrading wolverine habitat.</p> <p>Heavy equipment use, blasting at quarries or pits, vegetation clearing, earth hauling, construction lighting and other human disturbances may cause sensory disturbances that may degrade wolverine habitat.</p> <p>Follow-up maintenance activities may change drainage patterns and/or alter soil moisture regimes, leading to impacts in surface water and/or groundwater. These changes could degrade the habitat of some of wolverine’s prey species (e.g., beaver) as well as riparian corridors thereby resulting in altered and/or degraded foraging and movement habitat for wolverine.</p>	<p>Changes to Wolverine habitat availability (quantity – hectare and quality)</p> <p>Changes to abundance and distribution of Wolverine (number/ha)</p>	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Alteration in Movement	Maintenance activities that control vegetation (i.e., including that cleared during construction) could result in a loss of connectivity between habitats, leading to wolverines changing their movement patterns in response to habitat fragmentation.	Changes to abundance and distribution of Wolverine (number/ha)	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Injury or Death	<p>The movement of vehicles could result in collisions that cause the injury or death of wolverine.</p> <p>Operational activities that clear vegetation may permit increased access to wolverine habitat by predator thereby resulting in the injury or death of the SAR.</p>	Changes to survival abundance and distribution of Wolverine (number/ha)	Direct	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
Myotis Bats					
Construction	Habitat Loss	Site preparation and vegetation clearing and ground disturbance leads to loss of Little brown myotis and northern myotis habitat.	Changes to little brown myotis and northern myotis habitat availability (quantity – hectare)	Direct	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Degradation	Site preparation and vegetation clearing and ground disturbance leads to structural changes and degradation or alteration of little brown myotis and northern myotis habitat. Sensory disturbance from construction activities leads to degradation or alteration of little brown myotis and northern myotis habitat. Hydrological changes to ground or surface water leads to loss of little brown myotis and northern myotis habitat.	Changes to Little brown myotis and northern myotis habitat availability (quantity – hectare and quality) Changes to abundance and distribution of little brown myotis and northern myotis (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Alteration in Movement	Changes to vegetation structure from construction activities decreases connectivity altering little brown myotis and northern myotis movement and usage of RSA. Sensory disturbance during construction activities causes little brown myotis and northern myotis to avoid and alter movement within RSA.	Changes to abundance and distribution of little brown myotis and northern myotis (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Injury or Death	Collisions with construction related vehicles or equipment cause injury or death. Clearance activities related to road construction potentially results in little brown myotis and northern myotis loss of maternity habitat of young. Construction activities increase predator access along roadway and access roads decreasing little brown myotis and northern myotis survival. Construction activities alter habitat structure causing increased energy expenditures and decreased little brown myotis and northern myotis survival.	Changes to survival abundance and distribution of little brown myotis and northern myotis (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
Operations	Habitat Loss	Site preparation and vegetation clearing and ground disturbance leads to loss of little brown myotis and northern myotis habitat.	Changes to little brown myotis and northern myotis habitat availability (quantity – hectare)	Direct	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Degradation	Maintenance related to vegetation clearing and ground disturbance leads to structural changes and degradation or alteration of little brown myotis and northern myotis habitat.	Changes to little brown myotis and northern myotis habitat availability (quantity – hectare and quality)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9)

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
		Maintenance activities cause changes to ground or surface water leads and degradation or alteration of little brown myotis and northern myotis habitat. Sensory disturbance from traffic leads to degradation or alteration of little brown myotis and northern myotis habitat.	Changes to abundance and distribution of little brown myotis and northern myotis (number/ha)		<ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Alteration in Movement	Maintenance activities maintain fragmented habitat structure altering movement of little brown myotis and northern myotis within RSA. Sensory disturbance from traffic and human activity causes little brown myotis and northern myotis to avoid road and alter movement within RSA.	Changes to abundance and distribution of little brown myotis and northern myotis (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Injury or Death	Collisions with road traffic during operations cause injury or death. Clearance activities related to ROW maintenance potentially results in little brown myotis and northern myotis loss of maternity habitat and mortality of young. Maintenance activities maintain predator access along roadway and access roads decreasing little brown myotis and northern myotis survival. Maintenance activities alter habitat structure causing increased energy expenditures and decreased little brown myotis and northern myotis survival.	Changes to survival abundance and distribution of little brown myotis and northern myotis (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
Upland Birds – Evening Grosbeak					
Construction	Habitat Loss	Site preparation and vegetation clearing and ground disturbance leads to loss of Evening Grosbeak habitat.	Changes to Evening Grosbeak habitat availability (quantity – hectare)	Direct	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16)
	Habitat Alteration or Degradation	Introduction of invasive species to Evening Grosbeak habitat due to construction activities. Site preparation and vegetation clearing and ground disturbance leads to structural changes and degradation or alteration of Evening Grosbeak habitat. Accidental spill during construction leads to degradation or alteration of Evening Grosbeak habitat. Sensory disturbance from construction activities leads to degradation or alteration of Evening Grosbeak habitat.	Changes to Evening Grosbeak habitat availability (quantity – hectare and quality) Changes to abundance and distribution of Evening Grosbeak (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16)
	Alteration in Movement	Changes to vegetation structure from construction activities alter Evening Grosbeak movement and usage of RSA. Sensory disturbance during construction activities causes Evening Grosbeak to avoid and alter movement within RSA.	Changes to abundance and distribution of Evening Grosbeak (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16)

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
	Injury or Death	Collisions with construction related vehicles or equipment cause injury or death. Clearance activities related to road construction potentially results in Evening Grosbeak loss of nests and mortality of young. Construction activities increase predator access along roadway and access roads decreasing Evening Grosbeak survival.	Changes to survival abundance and distribution of Evening Grosbeak (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16)
Operations	Habitat Loss	Maintenance related to vegetation clearing and ground disturbance leads to loss of Evening Grosbeak habitat.	Changes to Evening Grosbeak habitat availability (quantity – hectare)	Direct	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16)
	Habitat Alteration or Degradation	Introduction of invasive species to Evening Grosbeak habitat due to maintenance activities. Maintenance related to vegetation clearing and ground disturbance leads to structural changes and degradation or alteration of Evening Grosbeak habitat. Accidental spills during operations leads to degradation or alteration of Evening Grosbeak habitat. Sensory disturbance from traffic leads to degradation or alteration of Evening Grosbeak habitat.	Changes to Evening Grosbeak habitat availability (quantity – hectare and quality) Changes to abundance and distribution of Evening Grosbeak (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16)
	Alteration in Movement	Maintenance activities retain fragmented habitat structure altering movement of Evening Grosbeak within RSA. Sensory disturbance from traffic and human activity causes Evening Grosbeak to avoid road and alter movement within RSA.	Changes to abundance and distribution of Evening Grosbeak (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Injury or Death	Collisions with road traffic during operations cause injury or death. Clearance activities related to ROW maintenance potentially results in Evening Grosbeak loss of nests and mortality of young. Maintenance activities maintain predator access along roadway and access roads decreasing Evening Grosbeak survival.	Changes to survival abundance and distribution of Evening Grosbeak (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
Wetland Birds – Olive-Sided Flycatcher and Rusty Blackbird					
Construction	Habitat Loss	Site preparation and vegetation clearing and ground disturbance leads to loss of Olive-sided Flycatcher and/or Rusty Blackbird habitat. Hydrological changes to ground or surface water leads to loss of Olive-sided Flycatcher and/or Rusty Blackbird habitat.	Changes to Wetland Birds habitat availability (quantity – hectare)	Direct	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Degradation	Introduction of invasive species to Olive-sided Flycatcher and/or Rusty Blackbird habitat due to construction activities.	Changes to Wetland Birds habitat availability (quantity – hectare and quality)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7)

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
		<p>Site preparation and vegetation clearing and ground disturbance leads to structural changes and degradation or alteration of Olive-sided Flycatcher and/or Rusty Blackbird habitat.</p> <p>Hydrological changes to ground or surface water leads to loss of Olive-sided Flycatcher and/or Rusty Blackbird habitat.</p> <p>Accidental spill during construction leads to degradation or alteration of Olive-sided Flycatcher and/or Rusty Blackbird habitat.</p> <p>Sensory disturbance from construction activities leads to degradation or alteration of Olive-sided Flycatcher and/or Rusty Blackbird habitat.</p>	Changes to abundance and distribution of Wetland Birds (number/ha)		<ul style="list-style-type: none"> ▪ Groundwater Resources (Section 8) ▪ Atmospheric Environment (Section 9) ▪ Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> ▪ Wildlife and Wildlife Habitat (Section 12) ▪ Non-Traditional Land and Resource Use (Section 16) ▪ Aboriginal and Treaty Rights and Interests (Section 19)
	Alteration in Movement	<p>Changes to vegetation structure from construction activities alter Olive-sided Flycatcher and/or Rusty Blackbird movement and usage of RSA.</p> <p>Sensory disturbance during construction activities causes Olive-sided Flycatcher and/or Rusty Blackbird to avoid and alter movement within RSA.</p>	Changes to abundance and distribution of Wetland Birds (number/ha)	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> ▪ Atmospheric Environment (Section 9) ▪ Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> ▪ Wildlife and Wildlife Habitat (Section 12) ▪ Non-Traditional Land and Resource Use (Section 16) ▪ Aboriginal and Treaty Rights and Interests (Section 19)
	Injury or Death	<p>Collisions with construction related vehicles or equipment cause injury or death.</p> <p>Clearance activities related to road construction potentially results in Olive-sided Flycatcher and/or Rusty Blackbird loss of nests and mortality of young.</p> <p>Construction activities increase predator access along roadway and access roads decreasing Olive-sided Flycatcher and/or Rusty Blackbird survival.</p>	Changes to survival abundance and distribution of Wetland Birds (number/ha)	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> ▪ Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> ▪ Wildlife and Wildlife Habitat (Section 12) ▪ Non-Traditional Land and Resource Use (Section 16) ▪ Aboriginal and Treaty Rights and Interests (Section 19)
Operations	Habitat Loss	<p>Maintenance related to vegetation clearing and ground disturbance leads to loss of Olive-sided Flycatcher and/or Rusty Blackbird habitat.</p> <p>Hydrological changes to ground or surface water leads to loss of Olive-sided Flycatcher and/or Rusty Blackbird habitat.</p>	Changes to Wetland Birds habitat availability (quantity – hectare)	Direct	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> ▪ Surface Water Resources (Section 7) ▪ Groundwater Resources (Section 8) ▪ Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> ▪ Wildlife and Wildlife Habitat (Section 12) ▪ Non-Traditional Land and Resource Use (Section 16) ▪ Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Degradation	<p>Introduction of invasive species to Olive-sided Flycatcher and/or Rusty Blackbird habitat due to maintenance activities.</p> <p>Maintenance related to vegetation clearing and ground disturbance leads to structural changes and degradation or alteration of Olive-sided Flycatcher and/or Rusty Blackbird habitat.</p> <p>Maintenance activities cause changes to ground or surface water leads and degradation or alteration of Olive-sided Flycatcher and/or Rusty Blackbird habitat.</p> <p>Accidental spills during operations leads to degradation or alteration of Olive-sided Flycatcher and/or Rusty Blackbird habitat.</p> <p>Sensory disturbance from traffic leads to degradation or alteration of Olive-sided Flycatcher and/or Rusty Blackbird habitat.</p>	<p>Changes to Wetland Birds habitat availability (quantity – hectare and quality)</p> <p>Changes to abundance and distribution of Wetland Birds (number/ha)</p>	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> ▪ Surface Water Resources (Section 7) ▪ Groundwater Resources (Section 8) ▪ Atmospheric Environment (Section 9) ▪ Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> ▪ Wildlife and Wildlife Habitat (Section 12) ▪ Non-Traditional Land and Resource Use (Section 16) ▪ Aboriginal and Treaty Rights and Interests (Section 19)

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
	Alteration in Movement	Maintenance activities maintain fragmented habitat structure altering movement of Olive-sided Flycatcher and/or Rusty Blackbird within project areas. Sensory disturbance from traffic and human activity causes Olive-sided Flycatcher and/or Rusty Blackbird to avoid road and alter movement within RSA.	Changes to abundance and distribution of Wetland Birds (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Injury or Death	Collisions with road traffic during operations cause injury or death. Clearance activities related to ROW maintenance potentially results in Olive-sided Flycatcher and/or Rusty Blackbird loss of nests and mortality of young. Maintenance activities maintain predator access along roadway and access roads decreasing Olive-sided Flycatcher and/or Rusty Blackbird survival.	Changes to survival abundance and distribution of Wetland Birds (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
Shorebird – Lesser Yellowlegs					
Construction	Habitat Loss	Site preparation and vegetation clearing and ground disturbance leads to loss of Lesser Yellowlegs habitat. Hydrological changes to ground or surface water leads to loss of Lesser Yellowlegs habitat.	Changes to Lesser Yellowlegs habitat availability (quantity – hectare)	Direct	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Degradation	Hydrological changes cause alterations in wetlands degrading Lesser Yellowlegs breeding habitat. Introduction of invasive species to Lesser Yellowlegs habitat due to construction activities. Site preparation and vegetation clearing and ground disturbance leads to structural changes and degradation or alteration of Lesser Yellowlegs habitat. Accidental spill during construction leads to degradation or alteration of Lesser Yellowlegs habitat. Sensory disturbance from construction activities leads to degradation or alteration of Lesser Yellowlegs habitat.	Changes to Lesser Yellowlegs habitat availability (quantity – hectare and quality) Changes to abundance and distribution of Lesser Yellowlegs (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Alteration in the Movement of Lesser Yellowlegs	Changes to vegetation structure from construction activities alter Lesser Yellowlegs movement and usage of RSA. Sensory disturbance during construction activities causes Lesser Yellowlegs to avoid and alter movement within RSA.	Changes to abundance and distribution of Lesser Yellowlegs (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Injury or Death of Lesser Yellowlegs	Collisions with construction related vehicles or equipment cause injury or death. Clearance activities related to road construction potentially results in Lesser Yellowlegs loss of nests and mortality of young.	Changes to survival abundance and distribution of Lesser Yellowlegs (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs:

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
		Construction activities increase predator access along roadway and access roads decreasing Lesser Yellowlegs survival. Increased human access leads to injury or death of Lesser Yellowlegs from trapping or shooting.			<ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
Operations	Habitat Loss	Maintenance related to vegetation clearing and ground disturbance leads to loss of Lesser Yellowlegs habitat. Hydrological changes to ground or surface water leads to loss of Lesser Yellowlegs habitat.	Changes to Lesser Yellowlegs habitat availability (quantity – hectare)	Direct	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Degradation	Introduction of invasive species to Lesser Yellowlegs habitat due to maintenance activities. Maintenance related to vegetation clearing and ground disturbance leads to structural changes and degradation or alteration of Lesser Yellowlegs habitat. Accidental spills during operations leads to degradation or alteration of Lesser Yellowlegs habitat. Sensory disturbance from traffic leads to degradation or alteration of Lesser Yellowlegs habitat.	Changes to Lesser Yellowlegs habitat availability (quantity – hectare and quality) Changes to abundance and distribution of Lesser Yellowlegs (number/ha)	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Alteration in Wildlife Movement	Maintenance activities maintain fragmented habitat structure altering movement of Lesser Yellowlegs within RSA. Sensory disturbance from traffic and human activity causes Lesser Yellowlegs to avoid road and alter movement within RSA.	Changes to abundance and distribution of Lesser Yellowlegs (number/ha)	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Injury or Death of Lesser Yellowlegs	Collisions with road traffic during operations cause injury or death. Clearance activities related to ROW maintenance potentially results in Lesser Yellowlegs loss of nests and mortality of young. Maintenance activities maintain predator access along roadway and access roads decreasing Lesser Yellowlegs survival. Increased human access leads to injury or death of Lesser Yellowlegs from trapping or shooting.	Changes to survival abundance and distribution of Lesser Yellowlegs (number/ha)	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
Nightjar – Common Nighthawk					
Construction	Habitat Loss	Site preparation and vegetation clearing and ground disturbance leads to loss of Common Nighthawk habitat. Hydrological changes to ground or surface water leads to loss of Common Nighthawk habitat.	Changes to Common Nighthawk habitat availability (quantity – hectare)	Direct	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Alteration or Degradation of Common Nighthawk Habitat	Hydrological changes cause alterations in wetlands degrading Common Nighthawk breeding habitat. Introduction of invasive species to Common Nighthawk habitat due to construction activities. Site preparation and vegetation clearing and ground disturbance leads to structural changes and degradation or alteration of Common Nighthawk habitat. Accidental spill during construction leads to degradation or alteration of Common Nighthawk habitat. Sensory disturbance from construction activities leads to degradation or alteration of Common Nighthawk habitat.	Changes to Common Nighthawk habitat availability (quantity – hectare and quality) Changes to abundance and distribution of Common Nighthawk (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Alteration in Wildlife Movement	Changes to vegetation structure from construction activities alter Common Nighthawk movement and usage of RSA. Sensory disturbance during construction activities causes Common Nighthawk to avoid and alter movement within RSA.	Changes to abundance and distribution of Common Nighthawk (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Wildlife Injury or Death	Collisions with construction related vehicles or equipment cause injury or death. Clearance activities related to road construction potentially results in Common Nighthawk loss of nests and mortality of young. Construction activities increase predator access along roadway and access roads decreasing Common Nighthawk survival.	Changes to survival abundance and distribution of Common Nighthawk (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
Operations	Habitat Loss	Maintenance related to vegetation clearing and ground disturbance leads to loss of Common Nighthawk habitat. Hydrological changes to ground or surface water leads to loss of Common Nighthawk habitat.	Changes to Common Nighthawk habitat availability (quantity – hectare)	Direct	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Wildlife Habitat Alteration or Degradation	Introduction of invasive species to Common Nighthawk habitat due to maintenance activities.	Changes to Common Nighthawk habitat availability (quantity – hectare and quality)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8)

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
		Maintenance related to vegetation clearing and ground disturbance leads to structural changes and degradation or alteration of Common Nighthawk habitat. Accidental spills during operations leads to degradation or alteration of Common Nighthawk habitat. Sensory disturbance from traffic leads to degradation or alteration of Common Nighthawk habitat.	Changes to abundance and distribution of Common Nighthawk (number/ha)		<ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Alteration in Common Nighthawk Movement	Maintenance activities maintain fragmented habitat structure altering movement of Common Nighthawk within RSA. Sensory disturbance from traffic and human activity causes Common Nighthawk to avoid road and alter movement within RSA.	Changes to abundance and distribution of Common Nighthawk (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Injury or Death of SAR	Collisions with road traffic during operations cause injury or death. Clearance activities related to ROW maintenance potentially results in Common Nighthawk loss of nests and mortality of young. Maintenance activities maintain predator access along roadway and access roads decreasing Common Nighthawk survival.	Changes to survival abundance and distribution of Common Nighthawk (number/ha)	Direct	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
Bald Eagle					
Construction	Habitat Loss	Site preparation and vegetation clearing and ground disturbance leads to loss of Bald Eagle habitat. Hydrological changes to ground or surface water leads to loss of Bald Eagle habitat.	Changes to Bald Eagle habitat availability (quantity – hectare)	Direct	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Degradation	Hydrological changes cause alterations in wetlands degrading Bald Eagle breeding habitat. Introduction of invasive species to Bald Eagle habitat due to construction activities. Site preparation and vegetation clearing and ground disturbance leads to structural changes and degradation or alteration of Bald Eagle habitat. Accidental spill during construction leads to degradation or alteration of Bald Eagle habitat. Sensory disturbance from construction activities leads to degradation or alteration of Bald Eagle habitat.	Changes to Bald Eagle habitat availability (quantity – hectare and quality) Changes to abundance and distribution of Bald Eagle (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Alteration in Bald Eagle Movement	Changes to vegetation structure from construction activities alter Bald Eagle movement and usage of RSA. Sensory disturbance during construction activities causes Bald Eagle to avoid and alter movement within RSA.	Changes to abundance and distribution of Bald Eagle (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
	Bald Eagle Injury or Death	Collisions with construction related vehicles or equipment cause injury or death. Clearance activities related to road construction potentially results in Bald Eagle loss of nests and mortality of young. Construction activities increase predator access along roadway and access roads decreasing Bald Eagle survival. Increased human access leads to injury or death of Bald Eagle from trapping or shooting.	Changes to survival abundance and distribution of Bald Eagle (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
Operation	Habitat Loss/Destruction	Maintenance related to vegetation clearing and ground disturbance leads to loss of Bald Eagle habitat. Hydrological changes to ground or surface water leads to loss of Bald Eagle habitat.	Changes to Bald Eagle habitat availability (quantity – hectare)	Direct	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Degradation	Introduction of invasive species to Bald Eagle habitat due to maintenance activities. Maintenance related to vegetation clearing and ground disturbance leads to structural changes and degradation or alteration of Bald Eagle habitat. Accidental spills during operations leads to degradation or alteration of Bald Eagle habitat. Sensory disturbance from traffic leads to degradation or alteration of Bald Eagle habitat.	Changes to Bald Eagle habitat availability (quantity – hectare and quality) Changes to abundance and distribution of Bald Eagle (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Alteration in Wildlife Movement	Maintenance activities maintain fragmented habitat structure altering movement of Bald Eagle within RSA. Sensory disturbance from traffic and human activity causes Bald Eagle to avoid road and alter movement within RSA.	Changes to abundance and distribution of Bald Eagle (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Species at Risk Injury or Death	Collisions with road traffic during operations cause injury or death. Clearance activities related to ROW maintenance potentially results in Bald Eagle loss of nests and mortality of young. Maintenance activities maintain predator access along roadway and access roads decreasing Bald Eagle survival. Increased human access leads to injury or death of Bald Eagle from trapping or shooting.	Changes to survival abundance and distribution of Bald Eagle (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
Short-eared Owl					
Construction	Habitat Loss/Destruction	Site preparation and vegetation clearing and ground disturbance leads to loss of Short-eared Owl habitat. Hydrological changes to ground or surface water leads to loss of Short-eared Owl habitat.	Changes to Short-eared Owl habitat availability (quantity – hectare)	Direct	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Degradation	Hydrological changes cause alterations in wetlands degrading Short-eared Owl breeding habitat. Introduction of invasive species to Short-eared Owl habitat due to construction activities. Site preparation and vegetation clearing and ground disturbance leads to structural changes and degradation or alteration of Short-eared Owl habitat. Accidental spill during construction leads to degradation or alteration of Short-eared Owl habitat. Sensory disturbance from construction activities leads to degradation or alteration of Short-eared Owl habitat.	Changes to Short-eared Owl habitat availability (quantity – hectare and quality) Changes to abundance and distribution of Short-eared Owl (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Alteration in Wildlife Movement	Changes to vegetation structure from construction activities alter Short-eared Owl movement and usage of RSA. Sensory disturbance during construction activities causes Short-eared Owl to avoid and alter movement within RSA.	Changes to abundance and distribution of Short-eared Owl (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Species at Risk Injury or Death	Collisions with construction related vehicles or equipment cause injury or death. Clearance activities related to road construction potentially results in Short-eared Owl loss of nests and mortality of young. Construction activities increase predator access along roadway and access roads decreasing Short-eared Owl survival.	Changes to survival abundance and distribution of Short-eared Owl (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
Operations	Habitat Loss/Destruction	Maintenance related to vegetation clearing and ground disturbance leads to loss of Short-eared Owl habitat. Hydrological changes to ground or surface water leads to loss of Short-eared Owl habitat.	Changes to Short-eared Owl habitat availability (quantity – hectare)	Direct	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Degradation	Introduction of invasive species to Short-eared Owl habitat due to maintenance activities. Maintenance related to vegetation clearing and ground disturbance leads to structural changes and degradation or alteration of Short-eared Owl habitat. Accidental spills during operations leads to degradation or alteration of Short-eared Owl habitat. Sensory disturbance from traffic leads to degradation or alteration of Short-eared Owl habitat.	Changes to Short-eared Owl habitat availability (quantity – hectare and quality) Changes to abundance and distribution of Short-eared Owl (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
	Alteration in Wildlife Movement	Maintenance activities maintain fragmented habitat structure altering movement of Short-eared Owl within RSA. Sensory disturbance from traffic and human activity causes Short-eared Owl to avoid road and alter movement within RSA.	Changes to abundance and distribution of Short-eared Owl (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Species at Risk Injury or Death	Collisions with road traffic during operations cause injury or death. Clearance activities related to ROW maintenance potentially results in Short-eared Owl loss of nests and mortality of young. Maintenance activities maintain predator access along roadway and access roads decreasing Short-eared Owl survival.	Changes to survival abundance and distribution of Short-eared Owl (number/ha)	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
Lake Sturgeon					
Construction	Destruction of Fish Habitat	Construction of permanent structures (culverts and bridges) at waterbody crossings leads to reduction in total available habitat for Lake Sturgeon.	Area of Waterbodies crossed (m ²). Fish spawning, nursery or rearing areas (m ²). Habitat quantity and quality changes (m ²): <ul style="list-style-type: none"> Aquatic habitat destruction (in m²); and Riparian habitat destruction (in m²). 	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Fish and Fish Habitat (Section 10) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Disruption of Fish Habitat	Clearing of vegetation could lead to increased sedimentation into the waterbodies. Material placed in-water may alter Lake Sturgeon habitat substrates. Construction of permanent or temporary structures (bridges) at waterbody crossings could change hydrology. Construction of permanent or temporary structures (bridges) at waterbody crossings could change riparian habitat. Accidental spills and air contaminant/GHG emissions could cause changes to water quality. Introduction of invasive species due to construction and maintenance activities.	Number of Waterbodies Crossed. Area of Waterbodies crossed (m ²). Fish spawning, nursery or rearing areas (m ²). Habitat quantity and quality changes (m ²).	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Fish and Fish Habitat (Section 10) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Barriers to Fish Passage	Installation of temporary flow isolation structures for instream construction of bridges could act as localized temporary barriers to Lake Sturgeon habitat.	Number of Waterbodies Crossed. Area of Waterbodies crossed (m ²). Fish spawning, nursery or rearing areas (m ²). Habitat quantity and quality changes (m ²).	Direct and Indirect	The assessment of this VC informs and is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Fish and Fish Habitat (Section 10) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Injury or Death of Fish	Placement of materials of roadway and instream construction may injure or kill Lake Sturgeon Injury or death to Lake Sturgeon may result from blasting. Lake Sturgeon death as a result of fish salvage or dewatering.	Lake Sturgeon Abundance and Distribution	Direct and Indirect	The assessment of this VC is informed by the effects assessment for other VCs: <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) The assessment of this VC informs and is informed by the effects assessment for other VCs:

Project Phase	Potential Effect	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
		Spills/releases of contaminants resulting in-water quality degradation and could kill Lake Sturgeon directly.			<ul style="list-style-type: none"> Fish and Fish Habitat (Section 10) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Increased Access	Fishing access may improve during construction resulting in increased harvest by workers, First Nations, and recreational anglers.	Lake Sturgeon Abundance and Distribution	Direct and Indirect	<p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Fish and Fish Habitat (Section 10) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
Operations	Destruction of Fish Habitat	In water maintenance activities of permanent structures (bridges) at waterbody crossings leads to reduction in total available habitat for Lake Sturgeon.	<p>Area of Waterbodies crossed (m²).</p> <p>Fish spawning, nursery or rearing areas (m²).</p> <p>Habitat quantity and quality changes (m²).</p> <ul style="list-style-type: none"> Aquatic habitat destruction (in m²); Riparian habitat destruction (in m²). 	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Fish and Fish Habitat (Section 10) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Habitat Alteration or Disruption of Fish Habitat	<p>Clearing of vegetation could lead to increased sedimentation into the waterbodies.</p> <p>Material placed in-water may alter Lake Sturgeon habitat substrates.</p> <p>Maintenance activities at waterbody crossings could change riparian habitat.</p> <p>Accidental spills and air contaminant/GHG emissions could cause changes to water quality.</p> <p>Introduction of invasive species due to construction and maintenance activities.</p>	<p>Number of Waterbodies Crossed.</p> <p>Area of Waterbodies crossed (m²).</p> <p>Fish spawning, nursery or rearing areas (m²).</p> <p>Habitat quantity and quality changes (m²).</p>	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) Atmospheric Environment (Section 9) Vegetation and Wetlands (Section 11) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Fish and Fish Habitat (Section 10) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Barriers to Fish Passage	Installation of temporary flow isolation structures for instream maintenance of bridges could act as localized temporary barriers to Lake Sturgeon habitat.	<p>Number of Waterbodies Crossed.</p> <p>Area of Waterbodies crossed (m²).</p> <p>Fish spawning, nursery or rearing areas (m²).</p> <p>Habitat quantity and quality changes (m²).</p>	Direct and Indirect	<p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Fish and Fish Habitat (Section 10) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Injury or Death of Fish	Maintenance activities requiring in-water work may injure or kill Lake Sturgeon.	Lake Sturgeon Abundance and Distribution	Direct and Indirect	<p>The assessment of this VC is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Surface Water Resources (Section 7) Groundwater Resources (Section 8) <p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Fish and Fish Habitat (Section 10) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)
	Increased Access	Fishing access may improve during operations resulting in increased harvest of Lake Sturgeon by First Nations and recreational anglers.	Lake Sturgeon Abundance and Distribution	Direct and Indirect	<p>The assessment of this VC informs and is informed by the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Fish and Fish Habitat (Section 10) Non-Traditional Land and Resource Use (Section 16) Aboriginal and Treaty Rights and Interests (Section 19)

13.4 Mitigation and Enhancement Measures

This section presents the proposed mitigation measures to eliminate, reduce, control, or offset potential adverse effects to Species at Risk (SAR) and SAR habitat during the construction and operations phases of the Project (as described in **Section 13.3** (Potential Effects, Pathways and Indicators)). In Section 11.4 (Mitigation and Enhancement Measures for Vegetation and Wetlands), approaches designed to ameliorate or eliminate the potential impact of the Project on vegetation, wetlands and riparian areas were discussed. Many of these measures can minimize SAR habitat loss or alteration of in the short-term (e.g., Vegetation and Invasive Species Management Plan, Erosion and Sediment Control Plan, Wildlife Management Plan). Other measures, such as the restoration of non-permanent worksites and the implementation of environmental monitoring and inspection programs during operation, will facilitate the enhancement of SAR habitat in the long-term.

The Project has strived to avoid potential effects to the natural environment. (Refer to Section 3, which describes the evaluation process that was used to identify the preliminary preferred route). When complete avoidance was not practicable, mitigation measures have been proposed, including aspects of the Project design that reduced negative (adverse) effects prior to the onset of construction. These measures are expected to reduce the resulting adverse net effects on wildlife habitat quality and quantity, survival and reproduction, and injury or death.

Certain adverse effects (including net effects) cannot be fully avoided or mitigated. Such cases are often compensated for by undertaking positive environmental activities, including measures that involve habitat restoration or habitat off-setting. This section and Appendix E (Mitigation Measures) outline key mitigation and enhancement measures to reduce potential adverse effects on SAR and SAR Habitat. Additional measures will be provided in the Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) that will be developed for the project.



Indigenous community members will have an active role in developing and implementing management plans.



An Environment Committee will be established to facilitate communication and engagement during construction and operations of the Project. Committee members will include Webequie First Nation Elders and Knowledge Holders, other First Nations with interest in participating, and appropriate project representatives, to: facilitate communication and engagement during construction and operations of the Project; facilitate use of Indigenous Knowledge in project activities; facilitate evaluation of land use information; and facilitate development of appropriate monitoring programs, protocols and management plans as it relates to Species at Risk VC.

Section 13.4.2 (Wildlife SAR and SAR Habitat) describes mitigation and enhancement measures that are applicable across species groups. (SAR and SAR Habitat) describes mitigation and enhancement measures that are applicable across species groups. However, some potential effects are either species-specific or specific to a group of species. Measures to address such potential effects are described in the in the Sections that follow; those being Caribou (**13.4.3**), Wolverine (**13.4.4**), SAR bats (**13.4.5**), SAR birds (**13.4.6**) and Lake Sturgeon (**13.4.7**). The effectiveness of mitigation will be evaluated during construction and operations, as part of the follow-up monitoring program for the Project, and measures will be modified or enhanced as necessary through adaptive management.

13.4.1 Habitat Availability and Key Mitigation Measures

In this EAR/IS, the term *habitat availability* refers to the amount of habitat that is available to a species or species group during, or after Project implementation, that is, habitat likely to be used without negative consequences to survival, reproduction, or population of wildlife. Habitat availability is reduced through direct habitat loss, or indirectly through habitat alteration and degradation. Direct habitat loss and destruction are a quantitative measure, and an example of this would be from the physical development footprint of the Project. Habitat can also become unavailable to species indirectly through avoidance. An example of this is habitat degradation from sensory disturbances, such as noise, light, and scent, which often deter SAR wildlife. Further, altered habitat that has been reduced in quality might continue to be used by SAR at their own detriment; for example, increasing habitat edges can attract predators which put their prey species at higher risk of injury or death.

The Project has taken steps to limit potential adverse effects on habitat availability, particularly for sensitive habitats, during the construction and operations phases. Baseline studies for species and species' groups that were conducted have been used to inform the recommended mitigation measures and follow-up monitoring program to be implemented during the construction and operational phases of the Project. Environmental management plans will also be developed for each respective phase. The frameworks for the Construction Environmental Management Plan and Operation Environmental Management Plan are described in Appendix E.

During construction, the following key mitigation measures, in addition to those described in **Sections 13.4.2 – 13.4.7** (Mitigation and Enhancement Measures for SAR and SAR Habitat, Caribou, Wolverine, SAR bats, SAR birds and Lake Sturgeon) and those specified in Appendix E, will be applied and monitored:

- Habitat delineation and mapping activities will work as precautionary protective measures. This will include construction fencing being installed to clearly delineate the boundaries of the work areas. The goal of the fencing is to prevent habitat damage and destruction beyond the limits of the work area. Delineation and fencing will also restrict human access to sensitive habitats.
- Restrictions will be put in place to reduce the stopping of vehicles and equipment along the roadway. Maps will be created identifying no-go zones and the importance of these zones will be shared during environmental training and awareness program for workers.
- All vegetation clearing will be undertaken using the appropriate equipment to minimize and avoid impacts outside of the work zone (Project Footprint). Cleared vegetation will be disposed of according to best management practices, such as chipping, spreading, compacting or transporting logs or timber to Webequie First Nation for community use.
- The CEMP to be prepared and implemented for the Project will identify the protocols and procedures for the stockpiling and management of vegetation and soils, including how disturbed areas will be stabilized and monitored.
- Additionally, petroleum handling and storage procedures have been developed, including spills prevention and emergency response to avoid impacts to soil, groundwater, surface water, vegetation and SAR (refer to Sections 5.2 and 5.3 of Appendix E: Mitigation Measures).



- Timing for construction activities will be established to reduce the potential impact on wildlife species and their habitat. The timing windows⁵ for construction activities (e.g., vegetation clearing) have been determined in consultation with the MECP and Canadian Wildlife Service (CWS)-ECCC.

Site-specific erosion and sediment control and construction staging plans, along with air and dust control measures will be developed and approved prior to construction to address potential deposition of dust and/or sediment that can change soil quality, alter vegetation and wetlands, which can adversely influence wildlife habitat. Water will be used to control dust from exposed excavations, disturbed ground surfaces, pits, quarries and traffic areas. Erosion and sediment control measures may include use of sediment fencing, silt curtains, and temporary erosion control cover (e.g., straw mulch, wood chips, erosion control blanket, etc.) to prevent the migration of sediment off-site. (Please refer to Sections 5.16 and 5.18 of Appendix E: Mitigation Measures).

The effectiveness of mitigation measures will be evaluated during construction and operations, with mitigation measures being modified or enhanced as necessary through adaptive management.

13.4.2 SAR and SAR Habitat

The following section outlines key measures that are applicable to mitigate potential effects on SAR (wildlife) habitat, inclusive of habitat loss/destruction, habitat Alteration or Degradation, SAR movement patterns and SAR injury/mortality. A summary of the potential effects, mitigation measures, and predicted net effects of the Project on SAR are presented in **Table 13-43**. For more detailed descriptions of proposed mitigations measures to prevent or limit the effect of construction and operations on specific species or species groups, please refer to **Sections 13.4.3** (Caribou), **13.4.4** (Wolverine), **13.4.5** (SAR bats), **13.4.6** (SAR birds) and **13.4.7** (Lake Sturgeon).

13.4.2.1 SAR Habitat Alteration or Degradation

13.4.2.1.1 Construction

Habitat Structural Change

Vegetation clearing and ground disturbances during the construction phase may alter the structure of SAR habitat and increase the short-term availability of early successional habitat. Mitigation measures to reduce changes to vegetation communities and species compositions are described in Section 11.4 (Mitigation and Enhancement Measures for Vegetation and Wetlands) and Appendix E (Mitigation Measures). The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary (i.e., through adaptive management). The alteration of degradation of SAR habitat will be minimized by:

- Following approval conditions, authorizations or permits issued for the Project, including those from CWS-ECCC and MECP.

⁵ In wildlife biology, timing windows are specific periods of the year when certain activities can be conducted with minimal impact on wildlife. Timing windows vary based on the ecological needs of certain species (or species groups) and are often tied to life cycles, with stages that involve breeding, nesting or young often being considered the most important to avoid.



- Retaining trees, shrubs, and coarse woody debris (CWD) in environmentally sensitive areas where it is safe to do so. Known sensitive ecological features will be clearly marked and have associated setbacks to minimize the likelihood of habitat change.
- To the extent possible, progressively reclaiming areas during construction and restoring the habitat to resemble pre-construction conditions. Ideally, this would mean that all non-permanent worksites are restored as soon as possible after work in a certain area has been completed. The restoration work would include the removal of construction debris, decompaction and amendments to soils, and revegetating disturbed areas.
- Restoration activities will incorporate approaches designed to permit natural regeneration of vegetation, and, when necessary, the establishment of self-sustaining species that are indigenous to the area by transplanting individuals or using root or stem cuttings. All planting must be carried out under appropriate weather conditions (e.g., low or no wind, low or no rainfall, soft or thawed ground).
- Having qualified personnel conduct site visits and inspections to verify that site-specific environmental protection measures have been implemented correctly, maintained and, as necessary, repaired, until the vegetation has been re-established (e.g., erosion and sediment control).
- Conducting follow-up monitoring to evaluate the effectiveness of mitigation and enhancement measures.

Although these measures will be implemented to mitigate against the impacts of structural changes on SAR habitat at the Project site during the construction phase, net effects are anticipated to remain in the LSA. As a result, additional discussion on the topic of 'Habitat Structural Change' has been carried forward to **Section 13.5** (Characterization of Net Effects).

Hydrological Changes

Hydrological changes in surface and/or groundwater levels may cause an alteration in wetlands or riparian areas, potentially degrading habitat for SAR. During development, the Project Team considered consolidation and compression processes of the peat layers associated with placement of fill for road construction, which could reduce the permeability of the peatlands and thus alter groundwater directions and pathway. Mitigation measures to reduce changes to hydrology and drainage patterns are provided in Section 7.4 (Mitigation Measures – Effects on Surface Water Resources), Section 8.4 (Mitigation Measures – Effects on Groundwater Resources) and Appendix E (Mitigation Measures). The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary. These measures include:

- Development of a Surface Water and Storm Water Management and Monitoring Plan as part of the CEMP and implementing it during the construction phase.
- Ensuring that any short-term water takings from surface water and/or groundwater sources for construction purposes are carried out in accordance with O. Reg. 387/04, as amended by O. Reg. 64/16 under the *Ontario Water Resources Act* and industry best standards. Appropriate permits (e.g., permit to take water) and registrations (e.g., Environmental Activity Sector Registry registration) will be obtained prior to the commencement of work.
- Following any conditions, permits or authorizations relating to environmental approvals for the Project, including those from ECCC, MNR and MECP, during the construction phase of the Project.
- Minimizing areas where site grading or ground hardening occurs. This can include designing areas used for temporary infrastructure, including access roads and storage yards, efficiently, and incorporating the use of coarse materials (i.e., with the same or higher permeability compared to surrounding native soils) in the base of permanent roads to permit infiltration and groundwater recharge.



- Utilizing industry Best Management Practices (BMPs) to ensure dewatering (pumping) volumes are minimal.
- Restoring disturbed areas (resulting from temporary supportive infrastructure) by decompacting the soil, and either replacing it, or supplementing it with similar native soils, prior to planting or seeding self-sustaining indigenous vegetation.
- Timing construction of permanent and/or temporary waterbody crossing structures with low-flow conditions to minimize diversions of surface water and including temporary flow diversions or bypass pumping during construction to minimize environmental effects (including flow volumes) upstream and downstream of the site. These measures will provide SAR with continued access to a source of surface water, and, in some cases, foraging opportunities.
- Further minimizing potential changes to water quantity by designing permanent water body crossings with bridges or culverts whenever possible. The use of single-span elements will limit the encroachment of structures into stream channels and thus minimize their impact(s) on discharge.
- Installing localized drainage cross-culverts at regular intervals in low-lying areas to prevent water from ponding on either side of the roadway, instead maintaining existing hydrological flow paths.
- Designing the roadway and swales with low impact development procedures in mind. The designs include permanent swales that are designed to convey, treat, and attenuate stormwater runoff from the road, thereby improving the removal of contaminants over traditional channel roadside ditch designs.
- Ensuring all mitigation measures implemented during the construction phase comply with relevant federal and provincial regulations and guidelines regarding the collection and storage of explosives and solid waste (e.g., federal Explosives Act).
- Testing discharge water quality to ensure it meets Ontario Provincial Water Quality Objectives, with detailed plans in place for monitoring and contingency measures recommended. Construction workers may be required to temporarily stop their work so contingency measures can be employed.
- Avoiding the use of herbicides during the construction phase and avoiding the use of road salt and sand on the ROW for de-icing. However, sand may be applied in select locations based on road safety concerns.

Although these measures will be implemented to mitigate against hydrological changes to SAR habitat at the Project site during the construction phase, net effects are anticipated to remain in the LSA. As a result, additional discussion about the subject of 'Hydrological Changes' has been carried forward to **Section 13.5** (Characterization of Net Effects).

Deposition of Dust and Other Airborne Particles

The Project is expected to generate airborne contaminants, dust emissions and/or depositions during the construction and operations phases of the Project. Mitigation measures designed to minimize the risk of air and dust emissions and depositions, which can cause chemical changes to the environment and impact SAR habitat, are described in Section 9.4 (Mitigation of Effects on Atmospheric Environment) and Appendix E (Mitigation Measures). The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary. These measures include:

- Developing an Air Quality and Dust Control Management Plan as part of the CEMP. Recommendations from this plan will be implemented during construction. Typical mitigation measures include using environmentally certified equipment to conduct the work, ensuring such equipment is maintained regularly, minimizing the idling of equipment, and setting speed limits within the Project Footprint and LSA.



- Incorporating noise abatement, emission and pollution control equipment on vehicles, equipment and machinery operating in the Project Footprint, and ensuring that all vehicles, equipment and machinery are regularly inspected to ensure they are in good working order.
- Following industry best management practices and adhering to relevant federal and/or provincial thresholds regarding the deposit of acidifying compounds on plants.
- Where practicable, using multi-passenger vehicles to transport personnel to the job site and limit vehicle emissions.
- Turning off vehicles and equipment when not in use and minimizing idling unless weather and/or safety conditions require they remain turned on.
- When practicable, retaining compatible vegetation on steep slopes, drainage ways, areas prone to wind erosion and adjacent to waterbodies and waterways.
- Minimizing the burning of wooden logs, branches and other vegetation that has been removed from the LSA (current objective is \leq ten percent). Ensure any slash pile burning from clearing operations has been approved by the appropriate regulatory agencies and complies with O. Reg. 207/96, subject to agreements with nearby First Nations.
- Minimizing dust-generating activities during periods of high wind to limit dust emissions.
- Where necessary, implementing dust control measures, such as water sprays or dust control solutions that can be applied on the road surface. The use of chloride containing compounds will be minimized to the extent possible. Sprays may also be used to increase moisture levels in the air on dry days. Water application rates shall be carefully monitored to ensure there is no erosion of sediments, or pooling and/or runoff of water.
- Should magnesium chloride, or other chemical dust suppressants be required, they will not be applied within 50 m of a water crossing or beyond the road footprint. In general, the use and application of dust suppressants, where applicable, will be conducted in accordance with MTO OPSS – Construction Specification for Dust Suppressants.
- Using temporary cover on soil and fill stockpiles (e.g., wood chips, straw, tarps) or alternately, keeping them moist during construction (i.e., by applying water) to minimize drifting of soils.
- Within the western half of the WSR Project Footprint, where more stable soil conditions are found, using a chip seal treatment on the road, which is similar to asphalt pavement, and consists of a tar slurry and gravel.
- Within the eastern portion of the LSA, where there are peatlands with relatively poor soil conditions, using a granular A-type gravel on the driving surface.

It is anticipated that implementation of these measures will effectively mitigate potential impacts to SAR habitat from the deposition of dust and other airborne particles during the construction phase. As a result, the topic 'Deposition of Dust and Other Airborne Particles' has not been carried forward to **Section 13.5** (Characterization of Net Effects).

Accidental Spills

Chemical or hazardous materials stored on the Project site, or spills of such materials along the road (e.g., petroleum products, ammonium nitrate) could affect SAR survival and reproduction. Spills, should they occur, are predicted to be generally localized in nature. Given the types of activities that will be associated with the project, the most likely types of spills would be fuel and/or oil-based products from machinery and equipment. Mitigation measures designed to minimize the potential risks of accidental spills and contingency measures for appropriate rapid response in the event of a spill are described in Section 6.4 (Mitigation of Effects on Geology, Terrain and Soils), Section 23.5 (Accidents and



Malfunctions), and Appendix E (Mitigation Measures). The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary through adaptive management. These measures include:

- Development of a Petroleum Handling and Storage Plan as part of the CEMP to minimize the chance of accidental spills or leaks in the Project Footprint or LSA, and a Spill Prevention and Emergency Response Plan to ensure an effective and efficient clean-up response should any spills or leaks occur. This plan will be developed in accordance with all applicable contract specifications, environmental legislation, permits and authorizations.
- Handling and storing all petroleum products in compliance with the Ontario *Technical Standards and Safety Act* and transporting all petroleum products in accordance with the federal *Transportation of Dangerous Goods Act* and *Ontario Dangerous Goods Transportation Act*.
- Making personnel aware of the Petroleum Handling and Storage Plan and the Spill Prevention and Emergency Response Plan; educating them to appropriately handle and store all products in compliance with provincial and federal legislation and guidelines.
- Storing and maintaining all vehicles and equipment at least 30 m from waterbodies and operating them in a way that prevents the release of deleterious substances into waterbodies or waterways, which could negatively impact SAR habitat.
- Storing, transferring and dispensing fuels in areas well set back from waterbodies (e.g., 50 m setback from the ordinary high watermark) in designated areas at temporary construction camps and laydown areas along the road.
- Only transporting fuel and hazardous materials in approved containers in licenced vehicles. Such containers will be routinely inspected for leaks.
- Incorporating signage and reduced speed limits within the LSA to reduce the risk of vehicle accidents and spills.
- Delaying construction during heavy precipitation or run-off events, to minimize the extent spilled substances may travel.
- Maintaining on-site spill kits that can be used to manage and adsorb any spilled material that is visible on the water's surface. Such kits will be provided in fuel and hazardous materials storage and handling facilities, in on-site work areas and/or in vehicles and equipment. All personnel will be trained in spill response practices and procedures.
- Reporting any major spill of petroleum or other hazardous material to the MECP Spill Action Centre, immediately after occurrence of the environmental accident (as per Ontario Regulation 675/98).
- Containing and immediately cleaning up any spill that is identified as "non-reportable" under subsection 6(2) of Ontario Regulation 224/07 in accordance with the Emergency Response Plan developed for the site.
- Removing any contaminated soil and/or vegetation from the local area and subsequently replacing the soils that have been exposed to spilled material as soon as possible.
- Allowing indigenous vegetation to regenerate local areas where soil and/or vegetation removal has occurred, occasionally enhancing re-establishment by planting or seeding programs that use self-sustaining species indigenous to the area.

It is anticipated that the implementation of these measures will effectively mitigate any potential effects to SAR habitat from accidental spills at the Project site during construction. As a result, the topic of 'Accidental Spills' has not been carried forward to **Section 13.5** (Characterization of Net Effects).



Sensory Disturbance

Loud noises, lights, smells and other sensory disturbances associated with human activity have the potential to cause the displacement of individuals, loss of habitat, and changes in predator-prey relationships. Atmospheric environmental conditions, including vibration and noise are discussed in Section 9, while visual environmental conditions, including light, are discussed in Section 18. Mitigation measures designed to minimize sensory disturbances in the RSA are discussed in Section 9.4 (Mitigation Measures – Effects on Atmospheric Environment), 18.4 (Mitigation Measures -Effects on Visual Environment), and Appendix E (Mitigation Measures). Additional measures will be provided in the CEMP and OEMP for the Project. The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary. These measures include:

- Developing a Noise and Vibration Management Plan that includes guidance to mitigate the effects of noise and vibration from construction activities, a Light Management Plan that will describe procedures and BMPs to control light emissions from construction activities, and a Construction Blasting Management Plan with protocols to reduce sensory impacts on SAR.
- Following the conditions, permits or authorizations relating to environmental approvals that were issued for the Project, including those from ECCC, MNR, and MECP.
- Avoiding new disturbances (e.g., clearing and grubbing) beyond the Project Footprint to the extent practicable, particularly at waterbody crossing sites.
- Minimizing the extent of vegetation cleared at all navigable waterbody crossings within the Project Footprint to reduce sensory impacts on SAR.
- To the extent practicable, maximizing efforts to retain vegetation and landforms along the ROW to provide screening (buffering) of Project activities and components on adjacent lands.
- Ensuring temporarily disturbed areas within the Project Footprint are restored (i.e., allowed to naturally regenerate and/or seeded to permit the establishment of self-sustaining native vegetation) as soon as possible after construction has been completed in that area.
- Adhering to timing windows and restrictions to avoid sensitive life-cycle periods for SAR (e.g., maternity roosting, breeding).
- If adherence to the timing windows and restrictions is not possible, the proponent's contractor will develop site specific mitigation measures and effectiveness monitoring in consultation with appropriate regulatory agencies (e.g., MECP, CWS-ECCC).
- Requiring the Contractor to comply with noise By-laws, and, where applicable, using noise control measures as agreed to by the adjacent Indigenous communities and municipal authorities.
- Requiring all vehicles and equipment supplied by the Contractor for use on the Project to be effectively 'sound-reduced' through the use of noise abatement equipment such as silencers, mufflers, and acoustic shields. Noise abatement equipment will be maintained in good working order.
- Where practicable, turning off vehicles and equipment when not in use.
- To the extent possible, having construction activities typically occur during daylight hours, typically within one (1) 10-hour shift per day, within the hours of 7:00 to 19:00, unless otherwise regulated by adjacent Indigenous communities or municipal authorities with a written exemption that can be provided to the proponent upon request.
- Enforcing speed limits for vehicles and prohibiting the recreational use of vehicles (e.g., snowmobiles, all-terrain vehicles [ATVs]) by Project personnel on the Project Footprint.



- Preparing and Submitting a Construction Blasting Management Plan for the Project to the Contractor prior to the initiation of blasting activities. Blasting restriction ‘windows’ for the protection of aquatic and wildlife species will be addressed in the plan.
- Carrying out blast operations in accordance with Department of Fisheries and Oceans (DFO) guidelines (where applicable) and Ontario Provincial Standard Specification 120 General Specification for the Use of Explosives.
- Blasting will be completed as quickly as possible to shorten the duration of disturbance.

Although these measures will be implemented to mitigate against the potential sensory impacts during the construction phase, net effects will remain for SAR in the LSA and RSA. Therefore, additional discussion about the topic ‘Sensory Disturbance’ has been carried forward to the net effect characterization (**Section 13.5**).

Invasive Plant Species

The construction of roads produces edge environments that can influence adjacent habitat not only by changing abiotic conditions (e.g., increased light, chemical changes in the soil or water), but also by introducing noxious or exotic species to an area (i.e., via new access pathways). Further, materials used in construction of roads often create environmental conditions in which tolerant invasive species can thrive. Mitigation measures designed to minimize the introduction and/or spread of invasive plant species are discussed in Section 11.4 (Mitigation Measures – Effects of Invasive Plants on Vegetation and Wetlands) and Appendix E (Mitigation Measures). The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary. These measures include:

- Developing an invasive species management and monitoring plan as part of the Vegetation and Invasive Species Management Plan in the CEMP and implementing the plan during construction. This plan would include measures to detect, control (i.e., remove) and monitor areas containing exotic species.
- Following all environmental approval conditions, authorizations or permits issued for the Project, including those from ECCC, MNR and MECP.
- Holding information sessions, producing education materials and/or installing signage to familiarize workers with potential invasive species, as well as what they should do when invasive species are encountered in the LSA (i.e., appropriate reporting procedures). Such sessions or materials should be delivered prior to the start of construction and repeated whenever new personnel become engaged in Project-related construction activities.
- Reducing the potential of introducing invasive plants by including visual inspections (of vehicles, machinery and equipment) as part of standard operating procedures during construction. Particular attention should be paid to the undersides, wheels, wheel arches, guards, radiator grills and other attachments as applicable.
- Removing any invasive materials found, including seeds or other plant materials, by scraping or washing the exterior surfaces of vehicles and equipment. Removal activities will be conducted at least 30 m away from any watercourse, waterbody or vegetation community, with the material being isolated until it can be safely removed from the RSA.
- Such measures are aimed at ensuring construction machinery and vehicles arrive on the site in a clean condition, free of mud and debris that could harbor seeds of invasive vegetation species.
- Prohibiting the recreational use of motorized vehicles by Contractors and limiting the use of off-road vehicles during construction.



- Minimizing soil disturbance to the extent practicable, to reduce the loss of topsoil and preserving a base layer that is sufficient to permit natural regeneration. Disturbed areas will be contoured to minimize soil erosions and encourage the growth of native vegetation. Where necessary, these areas may be enhanced by planting and/or seeding self-sustaining indigenous species as soon as possible following disturbance.
- Where practicable, using local soil banks from grading operations for re-vegetation and restoration treatments, and when not practical, incorporating transplants from the RSA, and/or using an approved plant species of importance to Indigenous communities and/or native seed mix that has been sourced from a reputable supplier.
- Confirming imported fill or soil is free of contaminants, including seeds or materials from invasive species, to reduce the potential of their introduction or spread in the LSA.
- Targeting invasive non-native species for removal through manual, mechanical and/or chemical methods. To the extent possible, mechanical means such as mowing, tilling, digging or pulling will be used for vegetation rather than chemical methods.
- Herbicides are not proposed for use to control weeds. However, if mechanical control methods prove ineffective in weed management, and represent a concern with respect to the spread to abutting natural areas, then the use of herbicides may be considered by the Proponent. Should herbicide be used as a method of invasive plant control, all herbicides will be applied by a licensed applicator in accordance with Ontario regulations.

It is anticipated that the implementation of these measures will mitigate potential effects from invasive or noxious plants on SAR habitat at the Project site. As a result, the topic 'Introduction of Invasive Plants' has not been carried forward to **Section 13.5** (Characterization of Net Effects).

13.4.2.1.2 Operations

Habitat Structural Change

During the operations phase of the Project, repairs to the roadway and clearing of the ROW will periodically be required. However, it is expected that these activities will not result in disturbance beyond the area impacted because of construction, and will therefore cause no, or negligible, additional change in the composition of SAR habitat. Aggregate (sand, gravel) and rock material will be required for road maintenance and repair activities and may involve additional vegetation clearing; however, these areas will be progressively rehabilitated during the construction and operation phases of the Project. A Vegetation Management and Monitoring Plan and a Wildlife Management and Monitoring Plan will also be developed and implemented as part of the OEMP. It is anticipated that these measures will only partially mitigate the potential effects of habitat structural change at the Project site. As a result, this topic has been carried forward to Section 12.5 (Characterization of Net Effects).

Hydrological Changes

It is not anticipated that the operations phase of the Project will result in hydrological changes beyond the area impacted because of the construction phase. As a result, the discussion of net effects in **Section 13.5** is applicable to both phases of the Project. In addition, the following will occur:

- Mitigation measures from the Surface Water and Stormwater Management and Monitoring Plan will be reviewed and updated as necessary as part of the OEMP. They will subsequently be implemented.



- Any conditions, permits or authorizations relating to environmental approvals, including those from ECCC, MNR and MECP, will be adhered to during the operations phase of the Project.
- Neither road salt, nor sand is currently proposed to be used on the WSR for winter maintenance activities (i.e., de-icing). However, sand may be applied in select locations based on road safety concerns.
- Herbicides are not proposed for use to control weeds. However, if mechanical control methods prove ineffective in weed management, and represent a concern with respect to the spread to abutting natural areas, then the use of herbicides may be considered by the Proponent. Should herbicides be used as a method of invasive plant control, all herbicides will be applied by a licensed applicator in accordance with Ontario regulations.

It is anticipated that the potential effects of hydrological change on SAR will be reduced but not eliminated. Therefore, discussion of hydrological change has been carried forward to the net effect characterization (Section 12.5).

Deposition of Dust and Other Airborne Particles

The operations phase of the WSR will result in vehicles regularly travelling along the road from Webequie to the eastern terminus of the supply road. In addition to the anticipated passage of vehicles (estimated to be less than 500 each day) from Webequie to the job site, machinery and equipment (e.g., heavy-duty trucks for visual patrols, snow clearing, road maintenance and aggregate hauling) will use the roadway. These vehicles, machinery and equipment will result in the generation of gas exhaust and/or dust emissions. However, it is anticipated that any associated disturbance would be limited to the area that was impacted during the construction phase of the Project. Some of the measures recommended to minimize impacts to wildlife because of dust and other airborne emissions include:

- Reviewing and updating (as necessary) the Air Quality and Dust Control Management Plan as part of the OEMP. This plan will include a procedure for documenting compliance with applicable standards and conditions (as identified in authorizations, permits and licences for the site).
- Integrating a monitoring program (as described in the Air Quality and Dust Control Management Plan) and measures to control or limit particulate emissions that result from handling of soil or aggregates by mobile equipment, or from passenger vehicles.
- Placing a permanent Maintenance Storage Facility (MSF) near the WSR for the storage of equipment and materials (i.e., for inspection, maintenance and repair activities).
- Installing a dedicated diesel generator set(s) at the MSF that will include energy efficiency measures.
- Completing regular inspections and maintenance to ensure the road meets minimum operational standards for roads.
- Having a water-spraying truck readily available for use by the maintenance crew on an 'as needed' basis during operations, particularly between the months of May and November.
- Training members of the Webequie community involved in the operations phase in techniques that would facilitate eco-driving and encouraging them to follow recommended practices to minimize fuel use (e.g., avoidance of vehicle idling).
- Ensuring equipment is well maintained to mitigate fuel usage (e.g., tires, alignment, mechanized features are optimized).
- To the extent possible, using logs, branches, and other biomass for purposes such as the production of timber or roundwood that could be used in Webequie for landscaping, erosion control or construction projects, rather than burning them. An objective of burning no more than 10% of cleared living biomass has been incorporated into Project plans.



It is anticipated that implementation of these measures will effectively mitigate potential impacts to SAR habitat from the deposition of dust and other airborne particles on the Project Site during operations. Since it is not expected to cause net effects in either the LSA or RSA, the topic 'Deposition of Dust and Other Airborne Particles' has not been carried forward to **Section 13.5** (Characterization of Net Effects).

Accidental Spills

The spill of contaminants along the road could occur during the operations phase as vehicles and equipment travel along the WSR. Should they occur, spills are predicted to be generally localized in nature and are unlikely to result in disturbance beyond any area impacted during the construction phase of the Project. In addition, there will be a Spill Prevention and Emergency Response Management component in the OEMP. Therefore, the mitigation measures that were described in **Section 13.4.2.2** (Construction) will also be effective in minimizing the potential risks of accidental spills during the operations phase of the Project, and this topic has not been carried forward to **Section 13.5** (Characterization of Net Effects).

Sensory Disturbance

Sources of artificial light, noise and other sensory disturbances have the potential to cause the loss of SAR habitat, changes in predator-prey relationships and the displacement of individuals. It is not anticipated that the WSR will be illuminated along its entire length; however, lighting may be required at certain locations for safety and security, such as the eastern and western terminus points of the road, and at supportive infrastructure sites, such as construction camps, rest and maintenance areas, aggregate (rock) sites and the MSF. Mitigation measures designed to minimize impacts to SAR wildlife include:

- To the extent practicable, limiting the use of lighting during operations of the Project while still allowing for safety.
- Using light shields for illumination fixtures on a site-specific basis to minimize and reduce light trespass where this is a concern to SAR wildlife. A Noise Management Plan will also form a portion of the OEMP.

Impacts from other sources of sensory disturbance are expected to be minimal during the operations phase of the Project. With the predicted low volume of vehicular traffic on the road, operational sensory disturbance is expected to have little effect on SAR beyond what occurs during the construction phase. However, net effects will remain for SAR in the LSA and RSA, and additional discussion about potential impacts from sensory disturbance during the operations phase has been carried forward to the net effect characterization (**Section 13.5**).

Invasive Plant Species

The distance that invasive species will be able to travel outside of the ROW will, in part, vary with the conditions of adjacent habitats. It will also depend on how similar habitat conditions are to where the species originated from. Many plant species that are native to northern Ontario have never been exposed to significant landscape change. Although they may be more tolerant of cold conditions, they are generally less tolerant of sudden changes in temperature or moisture levels compared to plants in southern Ontario.

During the operations phase of the Project, occasional clearing of the ROW will be required, as will road maintenance activities. These activities are unlikely to result in disturbance beyond the footprint that was impacted during the construction phase, and will likely cause no, or negligible, additional habitat



alteration. Some of the mitigation measures described in **Section 13.4.2.2** (Construction) can also be effectively applied during the operations phase of the Project. These include:

- Reviewing, updating as necessary, and implementing the Invasive Species Monitoring and Management Plan that was prepared for the construction phase. This plan will include a reporting system for the operations phase.
- Holding information sessions, circulating education materials that will familiarize individuals that travel the road with harmful invasive species, and/or introducing BMPs to prevent the introduction or spread of exotic species within the LSA. Signage placed near major river crossings will assist in raising awareness of invasive aquatic plants.
- Conducting visual inspections of equipment and vehicles that travel along the WSR, paying particular attention to wheels, wheel arches, undersides and other attachments to which invasive species, or their components (e.g., seeds, buds, sprouts) may adhere.
- Removing components of invasive species (e.g., seeds, buds, cuttings) by washing vehicles and equipment prior to moving them from one portion of the LSA to another. Such components should be isolated until they can be safely removed from the site.
- Targeting invasive species that establish themselves along the WSR for removal through manual, mechanical and/or chemical methods. Mechanical methods of removal, such as mowing, tilling, digging or pulling of vegetation is preferred over chemical methods.
- Monitoring areas where invasive species were removed the year following remediation. The effectiveness of measures will be modified or enhanced, as necessary through adaptive management.

It is anticipated that the application of these measures will effectively mitigate against any potential impacts to SAR habitat from invasive or noxious plants at the Project site from the operations phase. As a result, additional discussion about potential impacts of invasive species on SAR habitat has not been carried forward to **Section 13.5** (Characterization of Net Effects).

13.4.2.2 Alteration in the Movement of SAR

13.4.2.2.1 Construction

Loss of Connectivity

The movement patterns of SAR are expected to change as habitat conditions are altered by equipment, installation of fencing, recontouring of the land and berming of soil, thereby creating short-term physical barriers to SAR movement. Depending on the species, barriers can cause habitat fragmentation (i.e., division of habitats into smaller, isolated patches), reduce gene flow between isolated populations, change behaviour and disrupt migration and/or movement routes (e.g., to avoid predators). Mitigation measures to reduce changes to vegetation communities and species compositions are described in Section 11.4 (Mitigation of Effects on Vegetation and Wildlife Management), **Section 13.4.2.2** (SAR Habitat), and Appendix E (Mitigation Measures). The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary. These measures include:

- Phasing construction to create segments of low or no activity to permit unimpeded wildlife passage through those areas.



- Minimizing the size of the construction footprint to the extent possible and restricting vegetation removal near sensitive habitats (refer to **Sections 13.4.3 – 13.4.7** for additional information).
- Progressively restoring areas that are no longer being actively used for construction. Progressive restoration or reclamation will minimize the effect of recontoured or cleared areas that are acting as a barrier to movement.
- Incorporating wildlife crossings and passages in the road design and, where practicable, progressively installing these features during the construction phase. While wolverine themselves are not well known to use wildlife overpasses or underpasses, some of their prey do.
- Removing any windrowed/slash materials that have been unintentionally piled in a manner that creates barriers.

Although these measures will be implemented to mitigate against potential loss of connectivity during the construction phase, net effects will remain for SAR (and SAR habitat) in the LSA and RSA. Therefore, additional discussion about the subject ‘Loss of Connectivity’ has been carried forward to the net effect characterization (**Section 13.5**).

Sensory Disturbance

Sensory disturbances from equipment, vehicles, and other aspects of construction can also cause certain SAR to avoid the LSA in the short-term. Conversely, other SAR species may be attracted to portions of the LSA that they did not previously inhabit because such areas provide novel opportunities for feeding (foraging) or shelter (e.g., camps or areas that are converted to early successional habitat). The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary⁶.

These measures include:

- Designing and implementing plans to manage artificial light, noise and vibrations as Part of the CEMP.
- Avoiding activities (such as heavy machinery use) that are likely to disturb SAR wildlife during sensitive periods in their life cycle. Species specific and group specific timing windows are described in **Sections 13.4.3 – 13.4.7**.
- Designing and Implementing a Construction Waste Management Plan (including hazardous, contaminated and controlled materials) as part of the CEMP. The Waste Management Plan will include procedures to verify that wastes have been collected, stored, transported and disposed of in an environmentally responsible manner. It is recommended that:
 - Areas of human activity (e.g., camps, rest areas) be kept clear of refuse (e.g., gray water, sewage) to avoid attracting wildlife (particularly carnivores and omnivores).
 - Food wastes be collected on site, temporarily stored in wildlife-proof containers, and transported out of the RSA to be recycled or disposed of at a licenced disposal facility.
 - Petroleum-based products and other materials that could attract wildlife be stored in a secure area that wildlife cannot access.

⁶ Traffic can cause Caribou to avoid roads and cross more often at night (Laurian et al. 2008; Seilers and Helldin 2005). However, this barrier effect is related to traffic levels with secondary roads not found to act as a barrier (Loosen et al., 2021). With the low volume of vehicular traffic on the road (~500 vehicles/day), the WSR is expected to have little effect on Caribou usage of the area because of sensory disturbances.



- Informing all Project personnel about the hazards of feeding wildlife and prohibiting such activity.
- Lighting only those areas required to ensure worker safety, and angling or shielding lights so that they illuminate only targeted areas.

Although these measures will be implemented to mitigate against potential sensory impacts to SAR habitat at the Project Site during the construction phase, net effects will remain in the LSA. Therefore, additional discussion about the topic ‘Sensory Disturbance’ has been carried forward to the net effect characterization (**Section 13.5**).

13.4.2.2.2 Operations

Loss of Connectivity

Should appropriate mitigation measures not be incorporated, creation of the road could cause long-term impacts to SAR by fragmenting habitat and disrupting their movement patterns. Efforts to mitigate these impacts may involve creating corridors for SAR wildlife, maintaining wildlife crossings, or implementing other infrastructural approaches that are more conducive to the movement of SAR and SAR migration. Recommendations include:

- Maintaining posted lower speed limits in sensitive habitats and identified crossing areas.
- Ensuring maintenance activities occur outside of sensitive life cycle periods (e.g., nesting season for SAR birds, roosting season for SAR bats).
- Ensuring snow removal activities (i.e., plowing) do not create continuous barriers to the movement of SAR.
- Maintaining any wildlife corridors or passages that were created during construction of the road. Where practicable, creating new ones in areas where a need is identified (e.g., a ‘new’ wildlife crossing area that was identified through construction monitoring, or other reporting procedures).

Although these measures will be implemented to mitigate against the potential loss of habitat connectivity for SAR at the Project site due to the operations phase, net effects will remain in the LSA and RSA. As a result, additional discussion about the topic ‘Loss of Connectivity’ has been carried forward to **Section 13.5** (Characterization of Net Effects).

13.4.2.3 Injury or Death of SAR

13.4.2.3.1 Construction

Increased Access

The creation of the WSR provides more opportunities for humans to access the area, which could result in increased injury or death of SAR. To address the potential effects of increased human access to the LSA, following measures will be implemented:

- Road access restrictions will be implemented during construction to prevent individuals that are not Project personnel from entering the Project Footprint.
- Personal firearms will be prohibited from construction camps.
- A Construction Waste Management Plan will be developed prior to construction and implemented during the construction phase. The plan will include procedures to check that the collection, storage,



transportation and disposal of all wastes generated will be conducted in a safe, environmentally responsible manner that complies with federal and provincial legislation.

- Camps and rest areas will be kept clean, with food waste being stored appropriately to avoid wildlife conflicts (i.e., because food waste can attract carnivores and omnivores).
- Petroleum-based products and other toxic materials that can attract wildlife will be stored in secured areas.
- Educational (informational) sessions shall be provided to all Project personnel that makes them aware wildlife have the right-of-way (barring circumstances in which there is imminent risk to the health and safety of workers and/or the public).
- Temporary access roads, laydowns and construction areas will be fenced, or otherwise blocked, until vegetation has re-established itself.
- A Construction Blasting Management Plan will be included as part of the CEMP and implemented during the construction phase. The Blasting Management Plan will include policies and actions to minimize the risk of SAR being struck by fly rock.
- Open excavations and blasting areas will be fenced off when left unattended to avoid injury to, or death of SAR.

Although these measures will be implemented to mitigate against potential impacts from increased access to the Project site during the construction phase, net effects will remain in the LSA. As a result, additional discussion about impacts on SAR from increased access to the Project site has been carried forward to **Section 13.5** (Characterization of Net Effects).

Collisions with Vehicles and Equipment

To minimize the potential for the injury or death of SAR from collisions with project vehicles and equipment, during construction the following measures will be implemented:

- Enforcing speed limits on the ROW and access roads.
- Enforcing access restrictions to the road during the construction phase.
- Integrating safe travel protocols in the Health and Safety Management Plan. These protocols will include wildlife and SAR awareness training and reporting protocols.
- Should movement corridors be identified during monitoring, posting and enforcing reduced speeds at the location(s) of the corridor(s).
- Incorporating wildlife crossings and passages in the road design and, where practicable, progressively installing these features as part of the construction phase.

It is anticipated that the implementation of these measures will partially mitigate potential injury and/or death to SAR at the Project site during the construction phase but will not eliminate the threat completely. As a result, the topic 'Collisions with Vehicles' has been carried forward to **Section 13.5** (Characterization of Net Effects).



13.4.2.3.2 Operations

Increased Access

The creation of the WSR provides increased opportunities for humans to access the area. This may result in higher levels of injury or death of SAR. To limit public access during the operations phase, the following measures will be implemented:

- Conducting regular inspections of the road and rest areas during operations (e.g., 1-2 times per week), with litter being collected when found, and waste in receptacles being appropriately disposed of.
- Managing roadkill by removing it from the ROW and appropriately disposed of (e.g., to brush areas adjacent to the Project Footprint) within 48 hours of detection.
- Limiting the number of rest areas and pull-off areas along road (i.e., to those required for the safety of WSR users). It is recommended that each of these rest areas contain a wildlife-proofed waste receptacle.
- Fencing all maintenance turnaround areas (for use by operations personnel only) to restrict public access.
- Fencing and/or gating access roads to aggregate areas and other operational infrastructure.
- Implementing access restrictions on the WSR to reduce hunting, trapping or poaching opportunities in sensitive wildlife habitats or during sensitive timing windows for SAR throughout the operations phase.

Although these measures will be implemented to mitigate against potential increased access to the Project site during the operations phase, net effects will remain in the LSA. As a result, additional discussion about the topic 'Increased Access' has been carried forward to **Section 13.5** (Characterization of Net Effects).

Changes to Predator-Prey Dynamics

Linear features are known to facilitate access for predators (Stein, 2000; Dickie et al. 2022), which means the WSR could increase predator-prey encounters. Although predators will likely avoid the Project Footprint during construction, they could use the WSR to gain access to previously inaccessible areas during the operations phase. The WSR could also facilitate increased travel speeds for predators and prey, also resulting in higher rates of encounter. Measures that will be employed to mitigate these encounters will involve:

- Temporarily disturbed areas and access roads will be reclaimed. During this process any barriers to movement will be removed unless they were intentionally placed as movement barriers
- Limit the creation of temporary access roads
- Maintaining ROWs with reduced forage, which may attract herbivores.
- Where practicable, incorporating measures to reduce the effectiveness of predators will be explored further during the future the detail design phase of the Project.

Although these measures will be implemented to mitigate against potential changes to predator-prey relationships in the LSA during the operations phase, net effects will remain. As a result, additional discussion about the topic 'Increased Access' has been carried forward to **Section 13.5** (Characterization of Net Effects).



Collisions with Vehicles and Equipment

Mitigation measures that can be implemented during the operations phase to minimize potential injury to or death of SAR include:

- Ensuring maintenance activities take place away from sensitive habitats during critical life cycle time periods (e.g., nesting season, calving season).
- Lowering the posted speed limit in known areas with SAR habitat and/or movement corridors.
- Maintaining line of site for drivers.
- Controlling roadside vegetation.
- Implementing wildlife sighting and incident reporting procedures.
- Maintaining any wildlife passages that were created, or signage that was erected to identify wildlife corridors during the construction phase.

It is anticipated that these measures will partially mitigate against potential SAR injury and/or death at the Project site during the operations phase but will not eliminate the risk completely. As a result, the topic of 'Collisions' has been carried forward to **Section 13.5** (Characterization of Net Effects).



Table 13-43: Summary of Potential Effects, Mitigation Measures and Predicted Net Effects for Species at Risk VC

Component	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
Species at Risk	<ul style="list-style-type: none"> ▪ Changes to the availability of Species at Risk Habitat ▪ Changes to the distribution of Species at Risk and SAR Habitat 	<ul style="list-style-type: none"> ▪ Construction 	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation clearing and grubbing ▪ Construction and use of road and supportive infrastructure 	Habitat Loss – Clearance Activities	<ul style="list-style-type: none"> ▪ To the extent practicable, sensitive habitats and habitats identified as important to SAR were avoided during the route selection process. ▪ A Vegetation and Invasive Species Management Plan, Wildlife Management Plan and Site Restoration and Monitoring Plan will be developed as part of the CEMP and implemented during the construction phase. ▪ These components of the CEMP will be updated, as necessary, for implementation during the operations phase as part of OEMP. ▪ Where practicable, existing roads and trails will be used for access to reduce the removal of habitat. ▪ Qualified project personnel will identify sensitive habitats that are important to SAR prior to and during construction (e.g., critical habitat, areas of high use). Should any be found, they will be assessed by a qualified biologist or resource specialist, and an appropriate course of action will be determined, in consultation with regulatory agencies (e.g., MECP, CWS-ECCC) as required. ▪ The Project Footprint will be limited, where practicable, and the extent of clearing for the road minimized at quarries, pits, and other temporary areas. ▪ To the extent practicable, temporary work areas will be placed in strategic locations that avoid habitats, structures and features identified either as being important or of high use to SAR (e.g., large trees, CWD). ▪ Construction fencing will be used to demarcate the boundaries of the work zone to prevent habitat destruction beyond the limits of the work area. Suitable setbacks will be established based on the Wildlife Management Plan. ▪ Vegetation removal will be avoided during species-specific, or group-specific timing windows when practicable. If adherence to timing windows is not possible, specific mitigation and monitoring measures will be developed in cooperation with MECP, CWS-ECCC, or other appropriate regulatory agencies. ▪ Authorizations, permits or other approvals will be obtained from the appropriate regulatory agencies prior to the removal of any SAR habitat. ▪ Temporary areas of disturbance will be progressively reclaimed during the construction phase and restored to a functional state as soon as possible after the completion of work. ▪ Restoration activities will include the removal of debris, soil decompaction and amendment, and other techniques to promote the re-establishment of self-sustaining vegetation native to the area. Where necessary, vegetation may be enhanced by transplanting from within the RSA or seeding and/or planting native species from approved stock and a reputable supplier. Species of importance to Indigenous communities will form part of the preferred list. ▪ Reclamation activities will be carried out under appropriate environmental conditions. ▪ Qualified personnel will carry out site visits and inspections to verify environmental protection measures have been correctly implemented and are maintained until vegetation has re-established itself. ▪ On-site restoration will be prioritized. Where appropriate, off-site restoration opportunities will be investigated and implemented (i.e., should insufficient area be available in the LSA). ▪ Ecological (effectiveness) monitoring will be completed to verify reclamation and restoration efforts have been successful. ▪ Refer also to Section 11.4 (Mitigation of Effects on Vegetation and Wetlands) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.19 – Aggregate Pit Decommissioning ▫ Section 5.20 – Quarry Site Selection and Development ▫ Section 5.21 – Site Decommissioning and Rehabilitation 	Yes

Component	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
Species at Risk	<ul style="list-style-type: none"> ▪ Changes to the Availability of SAR Habitat (due to Altered Habitat Composition) ▪ Changes to the Distribution of SAR 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation clearing and grubbing ▪ Construction and use of supportive infrastructure ▪ Decommissioning and site restoration (reclamation) <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation management 	Habitat Alteration or Degradation – Habitat Structural Change	<ul style="list-style-type: none"> ▪ All approval conditions will be followed, including any issued by MECP or CWS-ECCC as part of permits or authorizations. ▪ Where practicable, large trees, shrubs, CWD and other structures that are important to SAR will be retained in situ. Key ecological features will be clearly marked and have associated setbacks to reduce habitat change in those areas. ▪ Construction footprints will be minimized to the extent possible, particularly in the vicinity of sensitive habitats (i.e., such habitat will be buffered from work areas). ▪ To the extent possible, temporary work areas will be progressively reclaimed/restored as soon as possible following construction with a goal of recreating habitats that resemble pre-construction conditions. ▪ Restoration approaches will prioritize natural regeneration of vegetation, and, when necessary, the establishment of native self-sustaining species via transplants, or root or stem cuttings within the LSA. Where appropriate, SAR habitat may be enhanced by planting or seeding self-sustaining species indigenous to the area. Restoration will occur under appropriate environmental conditions. ▪ Qualified staff will carry out site visits to ensure environmental protection measures have been correctly implemented. They will also complete ecological monitoring to evaluate the effectiveness of habitat retention, reclamation and restoration efforts. ▪ Refer also to Section 11.4 (Vegetation and Wetlands) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.6 – Working Within or Near Fish Bearing Watercourses ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.19 – Aggregate Pit Decommissioning ▫ Section 5.21 – Site Decommissioning and Rehabilitation 	Yes
Species at Risk	<ul style="list-style-type: none"> ▪ Changes to the Availability of SAR Habitat and SAR Habitat Composition (because of Hydrological Changes) ▪ Changes to the Distribution of SAR 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Temporary watercourse diversions ▪ Road construction ▪ Bridge and culvert installation ▪ Construction and use of supportive Infrastructure <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation management ▪ Repair and/or rehabilitation of culverts and bridges at water crossings 	Habitat Alteration or Degradation – Hydrological Changes	<ul style="list-style-type: none"> ▪ A Surface Water and Storm Water Management and Monitoring Plan will be developed as part of the CEMP and implemented. ▪ An Erosion and Sediment Control Plan will be developed as part of the CEMP and implemented. ▪ All conditions, permits and authorizations will be followed, including any issued by MECP or CWS-ECCC ▪ Short-term water takings will be completed in accordance with O. Reg 387/04 as amended by O. Reg 64/16 under the Ontario Water Resources Act and industry best standards. Appropriate permits and registrations will be obtained prior to work commencement. ▪ Areas of the construction footprint that require ground hardening and site grading will be minimized. ▪ Industry Best Management Practices will be used to minimize dewatering. ▪ In areas that were temporarily disturbed by supportive infrastructure, soil decompaction and soil amendments will be employed, as will process that facilitate the regrowth of vegetation indigenous to the area. Self-sustaining native vegetation may be planted or seeded as part of site remediation efforts. ▪ To the extent possible, permanent waterbody crossings shall be designed with single-span elements (e.g., bridges or culverts). Where not possible, temporary waterbody structures will be used. ▪ Permanent and temporary waterbody crossings will be designed and constructed to accommodate anticipated water flows during their lifespan. They will be constructed during low-flow conditions to prevent water from ponding. ▪ Waterbody crossings will be installed during low-flow conditions. Temporary flow diversions or bypass pumping will also be employed. ▪ Cross-culverts will be installed at regular intervals in lowland areas to prevent water from ponding on either side of the roadway. 	Yes

Component	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
					<ul style="list-style-type: none"> ▪ The roadway and swales will be designed with low impact development procedures in mind. These designs include permanent swales designed to convey, treat and attenuate stormwater runoff, and reducing consolidation and compression of peat layers. ▪ All mitigation measures implemented will comply with relevant federal and provincial regulations and guidelines regarding the collection and storage of explosives and solid waste (e.g., federal Explosives Act). ▪ Surface Water, Stormwater and ESC plans from the CEMP will be reviewed, and updated as required, prior to implementation during the operations phase. ▪ Road maintenance activities will regularly check culverts and other crossings for blockages to flow. ▪ Discharge water quality will be regularly tested to ensure it meets Ontario Provincial Water Quality objectives. Plans for contingency measures and monitoring will be developed in the event objectives are not met. ▪ The use of herbicides will be minimized during construction, and neither road salt nor sand is currently proposed to be used on the ROW for winter maintenance activities. However, sand may be applied in select locations based on road safety concerns. ▪ Refer also to Section 7.4 (Surface Water), Section 8.4 (Groundwater) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.7 – Temporary Watercourse Crossings ▫ Section 5.11 – Bridge and Culvert Installation ▫ Section 5.16 – Erosion and Sediment Control ▫ Section 5.22 – Water Quality Monitoring 	
Species at Risk	<ul style="list-style-type: none"> ▪ Changes to the Availability of SAR Habitat and SAR Habitat Composition (as a result of Dust and Other Airborne particles) ▪ Changes to the Distribution of SAR 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road construction ▪ Vegetation clearing and grubbing ▪ Blasting ▪ Construction and use of supportive infrastructure ▪ Bridge and culvert installation <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation management ▪ Repair and/or rehabilitation of culverts and bridges at water crossings ▪ Road usage 	Habitat Alteration or Degradation – Dust and Other Airborne particles	<ul style="list-style-type: none"> ▪ An Air Quality and Dust Control Management Plan will be developed as part of the CEMP that includes a procedure for documenting compliance. ▪ An Air Quality Monitoring Program will be developed prior to and implemented during the construction phase. It will be reviewed and may be updated, as necessary, for the operations phase. ▪ Emission and pollution-control equipment will be implemented on vehicles and machinery operating in the LSA. ▪ Vehicles, equipment and machinery will be regularly inspected to ensure emission and pollution mechanisms are functioning within expected parameters (and maintained/repared when necessary). ▪ Best management practices will be followed regarding the deposit of acidifying compounds on plants. All federal and provincial thresholds will be met. ▪ Carpooling/multi-passenger vehicle use will be encouraged for personnel travelling to/from job site. ▪ Idling will be minimized unless weather and/or safety requires vehicles or equipment to remain turned on. ▪ Where practicable, compatible vegetation will be retained on steep slopes and areas prone to wind erosion. ▪ Dust-generating activities will be minimized during periods of high wind. ▪ To the extent possible, logs, branches and other biomass (not maintained on site) will be used in products that can be used by the Webequie community for landscaping, erosion control, or construction. Burn no more than 10% of cleared living biomass. ▪ Dust control measures, such as water sprays and dust control solutions will be applied when required. The use of chlorine-containing compounds will be minimized to the extent possible. ▪ If chemical dust suppressants are necessary, they will not be applied within 100m of any waterbody, or outside of the Project Footprint. ▪ A chip-seal treatment will be incorporated on the driving surface in the western half of the WSR. ▪ A granular A-type gravel will be used on the driving surface in the eastern half of the WSR. ▪ Temporary cover (e.g., wood chips) will be used on soil and fill stockpiles where necessary if they cannot be kept moist. 	No

Component	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
					<ul style="list-style-type: none"> ▪ A permanent Maintenance Storage Facility will be placed near the WSR for storage of equipment and materials. ▪ Dedicated diesel generator sets will be installed that include energy efficient measures. ▪ Regular inspections and maintenance activities will be completed so roadway continues to meet standards. ▪ A water-spraying truck will be readily available for use by maintenance crew as needed during operations. ▪ Education programs for members of the Webequie community involved in operations phase of the project to encourage eco-driving. ▪ Refer also to Section 9.4 (Atmospheric Environment) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.18 – Dust Control Practices ▫ Section 5.20 – Quarry Site Selection and Development Requirements 	
Species at Risk	<ul style="list-style-type: none"> ▪ Changes to the Availability of SAR Habitat and SAR Habitat Composition (because of Habitat Contamination – Spills) ▪ Changes to the Distribution of SAR 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road construction ▪ Vegetation clearing and grubbing ▪ Construction and use of supportive infrastructure ▪ Bridge and culvert installation <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Repair and/or rehabilitation of culverts and bridges at water crossings ▪ Road usage 	Alteration or Degradation of SAR Habitat – Accidental Spills	<ul style="list-style-type: none"> ▪ A Petroleum Handling and Storage Plan and a Spill Prevention and Emergency Response Plan will form part of the CEMP. Personnel shall be adequately trained to execute these plans. ▪ All petroleum products will be stored and handled according to Ontario <i>Technical Standards and Safety Act</i>. All petroleum products will be transported according to Transportation of Dangerous Goods Act (Canada) and Ontario Dangerous Goods Transportation Act ▪ Personnel will be trained to appropriately handle and store all products in compliance with the above Acts. ▪ Fuels and other hazardous materials will be maintained, stored, transferred and dispense in designated areas, a minimum of 50 m away from waterbodies. ▪ Only approved containers and licenced vehicles will be used to transport fuel or hazardous materials. Containers will be regularly inspected for leaks and will be repaired or replaced, as necessary. ▪ Vehicles, machinery, and equipment shall have pollution control mechanisms in good working order. ▪ Signage will be installed to make people aware of reduced speed limits within the LSA to reduce the risk of spills. ▪ Construction shall be delayed during heavy precipitation or run-off events. ▪ Emergency cleanup equipment shall be readily available (i.e., on-site spill kits) in all fuel and hazardous materials storage and handling facilities, at on-site work areas and/or in vehicles and equipment. The equipment shall be well maintained. ▪ Major spills of petroleum or other hazardous products will be reported to MECP's Spill Action Centre. ▪ 'Non-reportable' spills (according to O. Reg. 224/07) will be contained and cleaned up immediately. Subsequently, contaminated soil and/or vegetation will be removed or replaced as soon as practicable. ▪ Refer also to Section 6.4 (Geology, Terrain and Soils), Section 11.4 (Vegetation and Wetlands), Section 23.5 (Accidents and Malfunctions) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.2 – Petroleum Handling and Storage ▫ Section 5.3 – Spill Prevention and Emergency Response ▫ Section 5.5 – Materials Handling and Storage ▫ Section 5.6 – Working Within or Near Fish Bearing Watercourses ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.17 – Concrete Washout Management Practices ▫ Section 5.20 – Quarry Site Selection and Development Requirements 	No

Component	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
Species at Risk	<ul style="list-style-type: none"> ▪ Changes to the Availability of SAR Habitat and SAR Habitat Composition (resulting from Sensory Disturbance) ▪ Changes to the Distribution of SAR 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road construction ▪ Vegetation clearing and grubbing ▪ Blasting ▪ Construction and use of supportive infrastructure <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation management ▪ Road usage 	Alteration or Degradation of SAR Habitat – Sensory Disturbance	<ul style="list-style-type: none"> ▪ A Noise and Vibration Management Plan and a Light Management Plan will be developed as part of the CEMP. Measures identified in these plans shall be implemented. ▪ A Construction Blasting Management Plan for the Project will be prepared and submitted to the Contractor prior to initiation of activity. ▪ All permits, conditions or authorizations relating to environmental approvals will be followed. ▪ To the extent possible, the extent of vegetation clearing will be minimized beyond the Project Footprint. ▪ Vegetation Protection Zones (i.e., buffers/setbacks) will be maintained to reduce sensory impacts near sensitive habitats. ▪ The extent of vegetation cleared at all navigable waterbody crossings shall be minimized. ▪ To the extent practicable, the retention of vegetation and landforms will be maximized along the ROW and the extent of disturbed areas within the ROW will be reduced. ▪ All vehicles and equipment supplied by the Contractor will be effectively 'sound reduced' (i.e., they should have appropriate noise abatement equipment correctly installed). When not required for use, vehicles and equipment should be shut down. ▪ Timing windows and restrictions will be implemented to avoid sensitive life-cycle periods (e.g., breeding, overwintering). If adherence to the timing windows and restrictions is not possible, the proponent's contractor will develop site specific mitigation and monitoring in consultation with appropriate regulatory agencies (e.g., MNR, CWS-ECCC). ▪ To the extent possible, construction activities will be completed during daylight hours, typically between 7:00 and 19:00, unless otherwise regulated by adjacent Indigenous communities or municipal authorities. In the latter case, a written exemption will be provided to the proponent upon request. ▪ Speed limits will be enforced for vehicles; the use of recreational ATVs by personnel will be prohibited within the LSA. ▪ Blasting operations will be completed in accordance with federal guidelines and provincial specifications. Blasting will be completed as quickly as possible to minimize the period of disturbance. ▪ The use of artificial lights will be limited to that required for safety during the operations phase of the project, and the use of light shields considered in specific circumstances. ▪ Refer also to Section 9.4 (Atmospheric Environment), Section 18.4 (Visual Environment) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.4 – Noise Control ▫ Section 5.12 – Blasting Near a Watercourse ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.18 – Dust Control Practices ▫ Section 5.20 – Quarry Site Selection and Development Requirements 	Yes
Species at Risk	<ul style="list-style-type: none"> ▪ Changes to the Availability of SAR Habitat and SAR Habitat Composition (due to Invasive Species) 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation clearing and grubbing ▪ Decommissioning and site restoration (reclamation) <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation management ▪ Road usage 	Alteration or Degradation of SAR Habitat – Introduction of Invasive Plants	<ul style="list-style-type: none"> ▪ An Invasive Species Management and Monitoring component will be included as part of the Vegetation and Invasive Species Management Plan in the CEMP. The plan shall be implemented during the construction phase. ▪ The invasive species monitoring plan will be reviewed and updated as necessary to form part of the OEMP. The plan will be implemented during the operations phase. ▪ All environmental approval conditions, authorizations or permits issued for the Project will be followed, including those from MECP and ECCC. ▪ Information sessions, educational materials and/or signage will be provided to familiarize construction personnel with potential invasive species. ▪ Reporting procedures will also be developed for and implemented by personnel should they encounter aggressive invasive species in the Project Footprint. 	No

Component	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
					<ul style="list-style-type: none"> ▪ Recreational use of personal motorized all-terrain vehicles and snowmobiles will be prohibited from use during construction. ▪ Visual inspections of vehicles and equipment will form part of standard operating procedures during the construction phase (i.e., to look for invasive species components). ▪ Should materials be found, they will be removed by scraping or washing all exterior surfaces in designated areas at least 30 m away from watercourses, waterbodies and native vegetation communities. ▪ Invasive species components will be appropriately contained (isolated) until they can be safely removed from the RSA. ▪ Soil disturbance will be minimized to the extent possible. Disturbed areas will be allowed to regenerate naturally. Where necessary, regeneration may be supplemented by transplanting species from within the RSA or seeding of self-sustaining native species from an approved list and reputable supplier. ▪ Imported fill/soil will be inspected to ensure it is free of contaminants, including the seeds of exotic species. ▪ Self-sustaining native species will be used in all restoration activities. Where practicable, local soil banks from grading operations will be used in revegetation. ▪ The Invasive Species Management and Monitoring Plan will be reviewed and updated, as necessary, for implementation during the operations phase. ▪ Informational sessions will be held, or education materials circulated to familiarize road users with BMPs to prevent the introduction and spread of invasive species in the LSA. ▪ Visual inspections of vehicles, machinery and equipment that use the WSR during the operations phase will also be conducted. Invasive species or their components will be managed by washing or scraping vehicles at least 30 m away from waterbodies and naturally occurring vegetation communities. ▪ Invasive species that establish themselves along the WSR will be targeted for removal. Mechanical methods of removal will be prioritized over chemical methods. ▪ If herbicides are used, they will be applied by a licenced applicator in accordance with Ontario regulations. ▪ Areas where invasive species were removed shall be monitored the year following remediation. The effectiveness of measures will be modified or enhanced, as necessary through adaptive management. ▪ Refer also to Section 11.4 (Vegetation and Wetlands) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.5 – Materials Handling and Storage ▫ Section 5.19 – Aggregate Pit Decommissioning ▫ Section 5.21 – Site Decommissioning and Rehabilitation ▫ Section 5.23 – Prevention of the Transfer of Invasive Species. 	
Species at Risk	<ul style="list-style-type: none"> ▪ Changes to the abundance and distribution of Species at Risk 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation clearing and grubbing ▪ Road construction ▪ Blasting ▪ Construction and use of supportive infrastructure <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Road usage 	Alteration in Movement – Loss of Connectivity and Sensory Disturbance	<ul style="list-style-type: none"> ▪ Plans to manage artificial light, noise and vibrations will be developed as part of the CEMP (e.g., Noise and Vibration Management Plan, Light Management Plan, Construction Blasting Management Plan) and will be implemented during construction. ▪ The construction footprint will be minimized to the extent possible and vegetation removal will be restricted near sensitive habitats. ▪ Construction will be phased so there are sections of inactivity where SAR can cross the ROW unimpeded during the construction phase. ▪ Lower speed limits will be posted near sensitive habitats and identified crossing areas in the LSA. ▪ Activities that are likely to disturb SAR during sensitive periods in their life cycle (e.g., using heavy machinery or blasting in proximity to active nests) will be avoided. ▪ Areas no longer being actively used for construction (i.e., temporary areas of disturbance) will be progressively restored or reclaimed. 	Yes

Component	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
					<ul style="list-style-type: none"> ▪ The piling of logs, branches and other biomass will be avoided or minimized if they will impede the movement of SAR. ▪ Where practicable, wildlife crossings and passages will be incorporated in the road design. ▪ A Construction Waste Management Plan will be designed as part of the CEMP and implemented during construction. It will be reviewed and updated, as necessary, for the operations phase. ▪ Project personnel will be educated about the dangers of feeding wildlife, and the importance of maintaining camps, rest areas and other locations free of refuse to reduce attracting wildlife that prey on SAR. ▪ Food wastes will be collected on site, temporarily stored in wildlife-proof containers, and transported out of the RSA to be recycled or disposed of at a licenced disposal facility. ▪ Petroleum-based products and other materials that could attract wildlife be stored in a secure area that wildlife cannot access. ▪ During the operations phase, maintenance activities will be performed outside of sensitive life cycle periods for SAR. ▪ Artificial lighting will be used only where it is required for the health and safety of Project personnel and the public. Lighting will be angled or shielded so that only targeted areas are illuminated. ▪ Refer also to Section 9.4 (Atmospheric Environment), Section 11.4 (Vegetation and Wetlands), Section 18.4 (Visual Environment) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.2 – Petroleum Handling and Storage ▫ Section 5.4 – Noise Control ▫ Section 5.5 – Materials Handling and Storage ▫ Section 5.9 – Fish Passage ▫ Section 5.12 – Blasting Near a Watercourse ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.20 – Quarry Site Selection and Development Requirements 	
Species at Risk	<ul style="list-style-type: none"> ▪ Changes to the abundance and distribution of Species at Risk 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road construction ▪ Blasting ▪ Construction and use of supportive infrastructure ▪ Delivery of materials and equipment ▪ Decommissioning and site reclamation (restoration) <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Road usage 	Injury or Death – Increased Access	<ul style="list-style-type: none"> ▪ All Project personnel will be provided with information to make them aware SAR have the right-of-way if encountered during the construction phase (unless there is imminent risk to human health and safety). ▪ Road access restrictions will be implemented during construction and operations to reduce hunting opportunities. ▪ Firearms will be prohibited from construction camps. ▪ A Construction Waste Management Plan will be developed and implemented for the construction phase. The plan will include procedures to check that the collection, storage, transportation and disposal of all wastes generated will be conducted in a safe, environmentally responsible manner that complies with federal and provincial legislation. ▪ Camps, rest areas and other locations in the Project Footprint will be kept free of waste, which will instead be stored appropriately to avoid attracting SAR or their predators. ▪ Petroleum-based products and other toxic materials that may attract SAR or their predators will be kept in secured areas that cannot be easily accessed. ▪ Temporary access roads, laydowns and construction areas will be fenced, or otherwise blocked until vegetation has reestablished itself. ▪ A Construction Blasting Management Plan will be developed and implemented. It will include measures to reduce the risk of SAR being struck by fly rock. ▪ Open excavations and blasting areas will be fenced off when left unattended. ▪ The number of rest-areas and pull-offs will be limited during the operations phase. ▪ Maintenance turnaround areas will be fenced to limit public access. ▪ Regular inspections of the road and rest areas will be conducted during the operations phase. 	No

Component	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
					<ul style="list-style-type: none"> ▪ Refer also to Section 11.4 (Vegetation and Wetlands) and the following in Appendix E (Mitigation Measures) <ul style="list-style-type: none"> ▫ Section 5.2 – Petroleum Handling and Storage ▫ Section 5.5 – Materials Handling and Storage ▫ Section 5.12 – Blasting Near a Watercourse ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.20 – Quarry Site Selection and Development Requirements 	
Species at Risk	<ul style="list-style-type: none"> ▪ Changes to the abundance and distribution of Species at Risk 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road construction ▪ Construction and use of supportive infrastructure ▪ Delivery of materials and equipment <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Road usage 	Injury or Death – Collisions with Vehicles	<ul style="list-style-type: none"> ▪ Speed limits will be enforced on the ROW and access roads during the construction phase. ▪ Access to the Project Footprint will be restricted during the construction phase. ▪ The Health and Safety Management Plan will include safe road travel protocols and SAR awareness training. ▪ Signage indicating reduced speeds will be posted in portions of the LSA where critical habitat or SAR movement corridors have been identified. ▪ Maintenance activities will facilitate line of site for drivers. ▪ The ROW will be maintained with less palatable food (forage) for herbivores to avoid attracting them to the area. ▪ SAR sighting and incident reporting procedures will be implemented. ▪ Refer also to the following in Appendix E (Mitigation Measures) <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.20 – Quarry Site Selection and Development Requirements 	Yes
Species at Risk	<ul style="list-style-type: none"> ▪ Changes to the abundance and distribution of Species at Risk 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road construction ▪ Vegetation clearing and grubbing ▪ Construction and use of supportive infrastructure <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Road usage ▪ Road maintenance 	Injury or Death of SAR – Changes to Predator-Prey Dynamics	<ul style="list-style-type: none"> ▪ Where practicable, wildlife crossings and passages will be incorporated in the road design. ▪ Areas that are no longer being actively used for construction will be progressively restored or reclaimed. ▪ To avoid attracting predators, the WSR will be regularly monitored, with waste and roadkill being removed promptly. ▪ Refer also to the following in Appendix E (Mitigation Measures) <ul style="list-style-type: none"> ▫ Section 5.2 – Petroleum Handling and Storage ▫ Section 5.5 – Materials Handling and Storage ▫ Section 5.9 – Fish Passage ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.20 – Quarry Site Selection and Development Requirements 	Yes

13.4.3 Caribou



Indigenous community members asked about mitigation for impacts to Caribou for design and operation of the road, e.g., to prevent mortality from drivers, allow caribou to crossroad corridor. Sections 13.4.3.2 and 13.4.3.4 outline proposed mitigation measures to reduce the risk of injury and death of Caribou during the construction and operations phases of the Project.

The following subsections outline key mitigation measures that will be implemented to mitigate potential effects on Caribou habitat loss, habitat alteration or degradation, alteration in Caribou movement patterns and Caribou injury or death. A summary of the potential effects, mitigation measures, and predicted net effects for Caribou are in **Table 13-44**. Mitigations were developed in consideration of provincial guidance documents including Best Management Practices for Renewable Energy, Energy Infrastructure and Energy Transmission Activities and Woodland Caribou in Ontario (OMNR 2013). For more detailed descriptions of proposed mitigations measures to prevent or limit the effect of construction and operations on Caribou, refer to the following sections in Appendix E (Mitigation Measures):

- Section 5.1 – Clearing and Grubbing;
- Section 5.2 – Petroleum Handling and Storage;
- Section 5.3 – Spill Prevention and Emergency Response;
- Section 5.4 – Noise Control;
- Section 5.7 – Temporary Watercourse Crossings;
- Section 5.11 – Bridge and Culvert Installation;
- Section 5.12 – Blasting Near a Watercourse;
- Section 5.14 – Wildlife and Wildlife Habitat;
- Section 5.16 – Erosion and Sediment Control;
- Section 5.18 – Dust Control Practices;
- Section 5.19 – Aggregate Pit Decommissioning;
- Section 5.20 – Quarry Site Selection and Development;
- Section 5.21 – Site Decommissioning and Rehabilitation; and
- Section 5.23 – Prevention of the Transfer of Invasive Species.

For descriptions of additional measures to mitigate the effects of the Project on other SAR and SAR habitat, please refer to **13.4.4** (Wolverine), **13.4.5** (little brown myotis and northern myotis), **13.4.6** (SAR Birds) and **13.4.7** (Lake Sturgeon). **Section 13.4.2** discusses mitigation measures for SAR and SAR (wildlife) habitat more generally. Section 12.4 describe mitigation measures for potential Project effects on wildlife and wildlife habitat.

13.4.3.1 Caribou Habitat Loss

13.4.3.1.1 Construction and Operations

Clearance Activities

Vegetation clearing and ground disturbances during the construction phase will result in the loss of structures that provide shelter for Caribou, reduce sources of foraging material, and change other environmental attributes that they depend on for survival and reproduction. Mitigation measures designed to eliminate or minimize the potential impact of the Project on vegetation communities and plant species are described in Section 11.4 (Mitigation and Enhancement Measures for Vegetation and Wetlands) and Appendix E (Mitigation Measures).

Avoiding the loss of Caribou habitat started prior the project design stage with the identification of critical Caribou habitat during the baseline studies. Based on the results of habitat modelling, areas of high use by Caribou were avoided during route selection where practicable. Calving and winter habitat areas are considered the most important habitat features for Caribou because they are critical for foraging and protection during sensitive periods. Aquatic feeding and calving areas were not identified during baseline studies due to the complexity in finding such habitat features, but areas of Late Winter Cover were identified during the baseline and the route avoided these areas to the extent practicable

Permanent habitat loss will be minimized during the construction phase by:

1. Developing a Vegetation and Invasive Species Management Plan, Wildlife Management Plan and Site Restoration and Monitoring Plan in advance of construction. These plans will form subcomponents of the CEMP and will be implemented following Project initiation. In development of these plans provincial best management guidance documents will be followed, including the Best Management Practices for Renewable Energy, Energy Infrastructure and Energy Transmission Activities and Woodland Caribou in Ontario (OMNR 201). To the extent possible, restoration and management plans will be developed in cooperation with Local Rights Holders, relevant Federal and/or Provincial Agencies and other Stakeholders.
2. Reviewing and updating, as necessary, the Vegetation and Invasive Species Management Plan, Wildlife Management Plan and Site Restoration and Monitoring Plan prior to the operations phase.
3. Where practicable, placing construction camps, laydown yards and other temporary construction areas in strategic locations that avoid habitat identified as of high use, or otherwise critical for caribou.
4. Using existing roads, trails and other areas of disturbance to access the Project Footprint to the extent practicable, thereby minimizing the loss of habitat to create new access roads.
5. Reducing the extent of clearings at quarries, borrow pits and other temporary areas.
6. Installing construction fencing to clearly delineate the boundaries of the work areas to prevent habitat damage and destruction beyond the limits of the work area. Suitable setbacks will be established based on the Wildlife Management Plan.
7. It is recommended that vegetation clearing in the vicinity of winter use or calving areas occur outside species-specific timing windows. For example, vegetation in suitable winter use areas will be removed in winter when Caribou are less likely to be using areas.
8. If adherence to these windows is not possible, specific mitigation and monitoring measures will be developed in cooperation with MECP, CWS-ECC, or other appropriate regulatory agencies.



9. Subsequently, an appropriate course of action will be determined, in consultation with regulatory agencies (e.g., MECP, CWS-ECCC) if required. It may be necessary to apply for and receive permits, authorizations or approvals from the appropriate regulatory agencies prior to the removal of Caribou habitat.
10. Areas of temporary disturbance will be reclaimed during the construction phase, in alignment with the Best management practices for renewable energy, energy infrastructure and energy transmission activities and Woodland Caribou in Ontario. These areas will be restored to a functional state as soon as possible following the completion of work.
11. Restoration activities will include the removal of debris, soil decompaction and amendment, and other techniques to promote the re-establishment of self-sustaining vegetation native to the area.
12. Where necessary, reclamation efforts may involve vegetation being enhanced by transplanting species from within the RSA, and/or seeding or planting self-sustaining native species from approved stock and a reputable supplier. Species of importance to Indigenous communities will be included along with species from pre-construction conditions.
13. Reclamation activities will be carried out under appropriate environmental conditions.
14. Qualified personnel will carry out site visits and inspections to verify environmental protection measures have been correctly implemented and are maintained until vegetation has re-established itself.
15. On-site restoration opportunities will be prioritized. Where appropriate, off-site restoration will be investigated and implemented (i.e., should insufficient area be available in the LSA).

The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary. Although it is anticipated that these measures will mitigate against the impacts of clearance activities on Caribou during construction and operations, net effects will remain. As a result, additional discussion about the topic 'Clearance Activities' has been carried forward to **Section 13.5** (Characterization of Net Effects).

13.4.3.2 Habitat Alteration or Degradation

13.4.3.2.1 Construction and Operations

Habitat Structural Change

Vegetation clearing and ground disturbances during the construction phase may alter the structure of Caribou habitat and increase the short-term availability of early successional species. Mitigation measures to reduce changes to vegetation communities and species compositions are described in Section 11.4 (Mitigation and Enhancement Measures for Vegetation and Wetlands) and Appendix E (Mitigation Measures). The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary (through adaptive management). In addition to the measures discussed in **Section 13.4.2.1** (Mitigation of Effects of Habitat Structural Change), alteration or degradation of Caribou habitat will be minimized by:

- Following all approval conditions for the Project, including any issued by MECP or CWS-ECCC.
- Keeping construction footprints as small as possible and minimizing or restricting vegetation clearing near sensitive areas, particularly if known to be of high use to Caribou. Key ecological features will be clearly marked (e.g., flagged or fenced) and a vegetation buffer will be established between them and the work area.



- To the extent practicable, temporary work areas will be reclaimed, and natural vegetation will be allowed to natural regenerate. When necessary, reclamation may involve augmenting vegetation by transplanting vegetation from the RSA, or planting or seeding native self-sustaining species from approved stock and a reputable supplier. The goal of reclamation is to restore habitats to pre-construction conditions, incorporating species of importance to Indigenous communities as appropriate.
- Completing restoration and reclamation activities under appropriate environmental conditions.
- Having qualified staff carry out site visits to ensure environmental protection measures have been correctly implemented. They will also complete ecological monitoring to evaluate the effectiveness of habitat retention, reclamation and restoration efforts.

The creation of early successional habitat may benefit Caribou as this will create areas of browse in construction clearances and near the road during both construction and operations phases. However, the use of less palatable species may reduce Caribou being attracted to the area, instead continuing to browse in the areas they used pre-construction. Although these measures will be implemented to mitigate against the impacts of habitat structural change on Caribou during the construction and operations phases, potential effects will not be eliminated entirely. As a result, additional discussion about this subject has been carried forward to **Section 13.5** (Characterization of Net Effects).

Hydrological Changes

Hydrological changes in surface and/or groundwater levels may cause alteration or degradation of Caribou habitat. During development, the Project Team considered the consolidation and compression processes of the peat layers associated with placement of fill for road construction, which could reduce the permeability of the peatlands and thus alter groundwater directions and pathway. Mitigation measures to reduce changes to hydrology and drainage patterns are provided in Section 7.4 (Mitigation Measures – Effects on Surface Water Resources), Section 8.4 (Mitigation Measures – Effects on Groundwater Resources), and Appendix E (Mitigation Measures). Mitigation measures designed to reduce the effects of hydrological changes on SAR and SAR Habitat are listed in **Section 13.4.2.1**. Additional measures to reduce potential impacts of hydrological changes on Caribou calving habitat during road construction include:

- Designing and construction temporary and permanent waterbody crossings to accommodate anticipated water flows during their lifespan.
- Installing cross-culverts at regular intervals in lowland areas to prevent water from ponding on either side of the roadway.
- Avoiding the use of road salt or sand for winter maintenance activities during the construction and operations phases. However, sand may be applied in select locations based on road safety concerns.

The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary. Although measures will be implemented to mitigate against the impacts of hydrological changes on Caribou habitat, it is anticipated that net effects will remain. As a result, additional discussion about the topic 'Hydrological Changes' has been carried forward to **Section 13.5** (Characterization of Net Effects).



Sensory Disturbance

Loud noises, lights, smells, dust, and human activity could potentially cause displacement of individuals and loss of foraging or resting habitat. During road construction, activities such as blasting, grading, and vegetation clearing could cause Caribou to avoid the ROW. Mitigation measures designed to minimize sensory disturbances in the RSA are discussed in Section 9.4 (Mitigation Measures – Effects on Atmospheric Environment), 18.4 (Mitigation Measures -Effects on Visual Environment), and Appendix E (Mitigation Measures). Additional measures will be provided in the CEMP and OEMP for the Project. On top of the measures described in **Section 13.4.2.1** (Mitigation Measures – Effects of Sensory Disturbance on SAR and SAR Habitat), potential effects from sensory disturbance during construction will be mitigated by:

- Implementing the mitigation measures identified in the Noise and Vibration Management Plan, the Light Management Plan and the Construction Blasting Plan (all of which form parts of the CEMP).
- Prohibiting the recreational use of personal motorized vehicles (e.g., snowmobiles, all-terrain vehicles) by Project personnel and enforcing speed limits in the Project Footprint.
- Adhering to recommended construction timing “windows” for Caribou.
- If adherence to timing windows or restrictions is not possible, having the Contractor develop -site specific mitigation and monitoring plans in consultation with qualified biologists and the appropriate regulatory agencies.
- The Contractor will be responsible for obtaining any permits or authorizations required to implement the plans.

It is anticipated that these measures will effectively mitigate any potential short-term changes to the movement of Caribou caused by sensory disturbance at the Project site (i.e., during the construction phase). As a result, the topic of ‘Sensory Disturbance’ has not been carried forward to Section 12.5 (Characterization of Net Effects).

Invasive Plant Species

An Invasive Plant Management Plan will be developed to reduce the potential for invasive plant species to be introduced into terrestrial and aquatic habitats; however, there is little indication that invasive plants have negative effects on Caribou in Ontario and no Net Effect is predicted. It is therefore anticipated that the measures described in **Section 13.4.2.1** (Mitigation Measures – Effects of Invasive Plant Species on SAR and SAR Habitat) will effectively mitigate any potential effects from invasive plants during construction or operations on Caribou. As such, invasive plant species are not discussed in relation to Caribou in **Section 13.5** (Characterization of Net Effects).

13.4.3.3 Alteration in Caribou Movement

13.4.3.3.1 Construction and Operations

Loss of Connectivity

To minimize potential effects on Caribou from barriers being developed by equipment, recontouring and berming of soil, installation of fencing, etc., the mitigation measures identified in **Section 13.4.2.2**. (Measures to Mitigate Against Potential Effects in the Movement of SAR) will be implemented. The effectiveness of these measures will be evaluated during the construction phase and modified or enhanced if necessary. Although it is anticipated that these measures will reduce impacts, they will not



eliminate them entirely. As a result, the topic 'Loss of Connectivity' has been carried forward to **Section 13.5** (Characterization of Net Effects).

Sensory Disturbance

To minimize the potential effects of sensory disturbance during construction on the Caribou movement, in addition to the measures described in Section 9.4 (Mitigation Measures – Effects on Atmospheric Environment), **Section 13.4.2.1** (Mitigation Measures – Effects of Sensory Disturbance on SAR Movement), Section 18.4 (Mitigation Measures – Effects on Visual Environment), and Appendix E (Mitigation Measures) the following measures will be implemented:

- Noise abatement equipment shall be installed on machinery. Project personnel will ensure such equipment is correctly installed and maintained.
- Where practicable, vehicles and equipment will be turned off when not in use (i.e., to minimize unnecessary noise).
- The use of artificial lighting will be minimized, being employed only where necessary to ensure health and safety of Project personnel and the public.
- Lighting will be directed, or light shields will be used to reduce the amount of light outside of the ROW.
- Vegetation protection zones (i.e., buffers or setbacks) will be maintained to reduce sensory impacts.

To minimize the potential effects of sensory disturbance on Caribou during the operations phase, the following will supplement the measures identified in **Section 13.4.2.1** (Mitigation Measures for the Potential Effects of Sensory Disturbance on SAR Movement).

- Speed limits will be posted in areas where high use is known, or key habitat for Caribou has been identified.
- Maintenance activities will occur outside of critical life cycle periods, such as calving season for Caribou.

It is anticipated that these measures, along with those described in **Section 13.4.2.1**. (Measures to Mitigate Against Potential Effects of Sensory Disturbance on SAR Movement) and those in Appendix E (Mitigation Measures) will effectively alleviate potential changes to Caribou movement caused by sensory disturbance during the construction phase. This topic has therefore not been carried forward to **Section 13.5** (Characterization of Net Effects).

13.4.3.4 Injury or Death

13.4.3.4.1 Construction and Operations

Increased Access

The creation of the WSR provides additional opportunities for humans to access the area, which could result in increased injury or death of Caribou during both the construction and operations phases. The measures described in **Section 13.4.2** (Mitigation of Effects on SAR and SAR Habitat) will be implemented to reduce the risk of injury and death of Caribou during the construction and operations phases. The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary. Although measures will be implemented to mitigate



against the impacts of increased access on Caribou, it is anticipated that net effects will remain in the LSA. As a result, additional discussion about the topic 'Increased Access' has been carried forward to **Section 13.5** (Characterization of Net Effects).

Changes to Predator-Prey Dynamics

Increased encounters with predators may occur since linear features are known to facilitate access and boost the travel speeds of both predators and prey (Stein, 2000; Dickie et al. 2022). During the construction phase, it is likely that Caribou predators (wolves) will avoid the LSA. During operations, however, predators could use the ROW to enter regions that were previously less accessible to them. In addition, the WSR will facilitate higher movement rates, which could lead to higher encounter rates between predators and prey.

Mitigation measures described in **Section 13.4.2.3.2** (Mitigation of Effects of Altered Predator-Prey Relationships on SAR and SAR Habitat) will be implemented to reduce injury or death of Caribou. These include:

- Blocking off temporarily areas of disturbance until restoration or reclamation activities have been successfully completed.
- During detailed design, including measures that reduce the effectiveness of predators (e.g., wolves) such as incorporating switchbacks or bends in temporary access routes.
- Maintaining ROWs with reduced or less palatable forage for Caribou and other ungulates.

The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary. Although measures will be implemented to mitigate against potential changes to predator-prey dynamics, it is anticipated that net effects will remain in the LSA. As a result, additional discussion about potential impacts from altered predator-prey dynamics has been carried forward to **Section 13.5** (Characterization of Net Effects).

Collisions with Project Vehicles

WSR traffic volumes are expected to be relatively low (less than 500 vehicles per day) reducing the likelihood of Caribou-vehicle collisions. The mitigation measures described in **Section 13.4.2.3** (Mitigation of Effects of Collisions on SAR) will be also used to minimize potential impacts on Caribou in the Project Footprint. In addition,

- The use of road salt will be avoided during winter maintenance activities to reduce attracting Caribou to the Project Footprint.
- During the growing season, the ROW will be maintained in a manner that reduces forage attractive to Caribou or other ungulates.
- Road maintenance activities will not occur during sensitive life cycle periods, such as calving season.
- Speed limits will be enforced in known Caribou crossing areas and other sensitive habitats.

The effectiveness of mitigation will be evaluated during the construction and operations phases, with measures being modified or enhanced as necessary. That said, there remain potentially negative effects on Caribou from increased vehicles in the Project Footprint. As a result, the topic of collisions has been carried forward to the net effects characterization (**Section 13.5**).



Introduction of Disease

Improved access may also introduce disease through the spread of new species into the area. For Caribou the potential spread of white-tailed deer is important because white-tailed deer may introduce brain worm (*P. tenuis*) to the RSA. While white-tailed deer are expected to spread north in Ontario (Kennedy-Slaney et al. 2018) and have been found to use linear features to expand in boreal forests (Darlington et al. 2022) currently no records of deer have been confirmed north of Lake Nipigon and deer not expected to move into the project at densities which would transmit the disease to the Caribou population in the foreseeable future. This topic is not further discussed in **Section 13.5** (Characterization of Net Effects). **Table 13-44** provides summaries of the potential effects and mitigation measures for Species at Risk VC – caribou during the construction and operations phases.



Table 13-44: Summary of Potential Effects, Mitigation Measures, and Predicted Net Effects for Species At Risk Sub VC – Caribou

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
Caribou	<ul style="list-style-type: none"> ▪ Changes to Caribou habitat availability ▪ Changes to abundance and distribution of Caribou and Caribou habitat 	Construction	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation clearing and grubbing. ▪ Construction and Use of Supportive Infrastructure 	Habitat Loss – Clearance Activities	<ul style="list-style-type: none"> ▪ Areas of critical Caribou habitat were avoided during route selection (e.g., areas of Late Winter Cover). ▪ Areas where modelling suggested there was high use by Caribou were also avoided. ▪ Qualified Project personnel will look for aquatic feeding areas, calving areas and other areas of high use for Caribou prior to construction. ▪ Access to the WSR will incorporate existing roads, trails and other areas of disturbance. ▪ Where practicable, temporary construction areas will be placed in strategic locations that avoid high use areas and critical Caribou habitat. ▪ A Vegetation and Invasive Species Management Plan, Wildlife Management Plan and Site Restoration and Monitoring Plan will be developed in advance of construction. ▪ These plans will be reviewed, and updated as necessary, prior to implementation during operations. ▪ The extent of vegetation clearing at quarries, borrow pits and other temporary areas will be minimized to the extent practicable. ▪ The boundaries of work areas will be clearly delineated to prevent habitat destruction beyond the limits of the work area. ▪ If any potential habitat is found, work in the area will cease, the boundaries of the habitat will be delineated, and the habitat will be assessed by a qualified biologist or resource specialist. ▪ Vegetation clearing in the vicinity of potential Caribou aquatic feeding areas should be conducted in the winter, when it is unlikely the species will be using such areas. ▪ Vegetation clearing in the vicinity of potential calving areas should not be conducted during the months of May and June. ▪ If these timing windows cannot be adhered to, an appropriate course of action will be determined in consultation with the appropriate regulatory agency or agencies (e.g., MECP, CWS-ECCC) and will likely involve monitoring measures. Permissions, authorizations or approvals will be required prior to the removal of Caribou habitat. ▪ Areas of temporary disturbance will be reclaimed during the construction phase with techniques that promote natural regeneration. ▪ Areas of temporary disturbance will be restored to a functional state as soon as possible following completion of work in alignment with the Best management practices for renewable energy, energy infrastructure and energy transmission activities and Woodland Caribou in Ontario. ▪ Where necessary, reclamation efforts may include the transplant, seeding or planting of self-sustaining species native to the area. ▪ Qualified personnel will carry out site visits and inspections to ensure environmental protection measures have been correctly installed and are maintained until vegetation has been reestablished. ▪ Off-site restoration opportunities will be investigated if on-site restoration opportunities are not available. ▪ Refer also to the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.20 – Quarry Site Selection and Development 	Yes

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
Caribou	<ul style="list-style-type: none"> ▪ Changes to Caribou habitat availability ▪ Changes to abundance and distribution of Caribou and Caribou habitat 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation clearing and grubbing. ▪ Decommissioning and Site Restoration/Reclamation <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation management 	Habitat Alteration or Degradation – Habitat Structural Change	<ul style="list-style-type: none"> ▪ Environmental approval conditions for the Project will be followed. ▪ Construction footprints will be kept as small as possible. Vegetation clearing will be minimized near critical Caribou habitats, areas of high use by Caribou and other sensitive habitats. ▪ Key Caribou habitats and features will be clearly delineated, and an appropriate vegetation buffer will be established between these areas and the work zone. ▪ To the extent practicable, areas of temporary disturbance will be reclaimed quickly. Restoration will encourage the regeneration of natural vegetation, occasionally augmented by planting and seeding, if deemed necessary. ▪ Restoration will be carried out under suitable environmental conditions. ▪ Qualified staff will carry out site visits to ensure environmental protection measures (e.g., fencing) have been implemented correctly. ▪ Qualified staff will complete ecological monitoring to evaluate the effectiveness of habitat retention, reclamation and restoration efforts. ▪ Refer also to Section 13.4.2. (Mitigation of Effects for SAR and SAR Habitat) ▪ Refer also to the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.16 – Erosion and Sediment Control 	Yes
Caribou	<ul style="list-style-type: none"> ▪ Changes to Caribou habitat availability ▪ Changes to abundance and distribution of Caribou and Caribou habitat 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Temporary Watercourse Diversions ▪ Road Construction ▪ Bridge and Culvert Installation <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Repair and/or rehabilitation of culverts and bridges at water crossings; 	Habitat Alteration or Degradation – Hydrological Changes	<ul style="list-style-type: none"> ▪ During development, the consolidation and compression processes of peat layers were considered regarding fill placement for the road. ▪ Temporary and permanent waterbody crossings will be designed to accommodate anticipated water flows during their lifespan. ▪ Cross-culverts will be installed at regular intervals in lowland areas to prevent water from ponding on either side of the roadway. ▪ Road maintenance should regularly check culverts and other crossings for blockages. ▪ Road salt will not be used for winter maintenance activities (i.e., de-icing) during construction or operations. ▪ Section 7.4 (Surface Water), Section 8.4 (Groundwater) and Section 13.4 (SAR and SAR Habitat) contain detailed mitigation measures. ▪ Refer also to Section 13.4.2. (Mitigation of Effects for SAR and SAR Habitat) ▪ Refer also to the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.7 – Temporary Watercourse Crossings ▫ Section 5.11 – Bridge and Culvert Installation 	Yes
Caribou	<ul style="list-style-type: none"> ▪ Changes to Caribou abundance and distribution 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road Construction ▪ Vegetation Clearing and Grubbing ▪ Blasting <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation Management ▪ Road Usage 	Habitat Alteration or Degradation – Sensory Disturbance	<ul style="list-style-type: none"> ▪ The mitigation measures identified in the Noise and Vibration Management Plan, the Light Management Plan and the Construction Blasting Plan will be implemented ▪ The recreational use of personal motorized vehicles (e.g., ATVs, snowmobiles) by Project personnel will be prohibited during construction. ▪ Speed limits will be enforced in the Project Footprint. ▪ Recommended construction timing “windows” for Caribou will be followed. ▪ If adherence to timing windows or restrictions is not possible, the Contractor will develop site-specific mitigation and monitoring plans in consultation with qualified biologists and the appropriate regulatory agencies. ▪ The Contractor will be responsible for obtaining any permits or authorizations required to implement the plans. ▪ Refer also to Section 13.4.2. (Mitigation of Effects for SAR and SAR Habitat) 	No

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
					<ul style="list-style-type: none"> ▪ Refer also to the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.3 – Spill Prevention and Emergency Response ▫ Section 5.4 – Noise Control ▫ Section 5.12 – Blasting Near a Watercourse ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.18 – Dust Control Practices 	
Caribou	<ul style="list-style-type: none"> ▪ Changes to Caribou abundance and distribution 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road construction ▪ Vegetation clearing and grubbing ▪ Blasting ▪ Construction and use of supportive infrastructure <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation Management ▪ Road Usage 	Alteration in Caribou Movement – Sensory Disturbance	<ul style="list-style-type: none"> ▪ Noise abatement equipment shall be installed on machinery. Project personnel will ensure such equipment is correctly installed and maintained. ▪ Where practicable, vehicles and equipment will be turned off when not in use (i.e., to minimize unnecessary noise). ▪ The use of artificial lighting will be minimized, being employed only where necessary to ensure health and safety of Project personnel and the public. ▪ Lighting will be directed, or light shields will be used to reduce the amount of light outside of the ROW. ▪ Vegetation protection zones (i.e., buffers or setbacks) will be maintained to reduce sensory impacts. ▪ Speed limits will be posted in areas where high use is known, or key habitat for Caribou has been identified. ▪ Maintenance activities will occur outside of critical life cycle periods, such as calving season for Caribou. 	
Caribou	<ul style="list-style-type: none"> ▪ Changes to Caribou survival and reproduction 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ All construction activities <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Road Usage 	Injury or Death – Increased Access	<ul style="list-style-type: none"> • All Project personnel will be provided with information to make them aware Caribou have the right-of-way if encountered during construction. ▪ Public access to road will be restricted during the construction and operations phases. ▪ Firearms will be prohibited in camps and construction areas. ▪ A Construction Waste Management Plan will be developed and implemented. ▪ Camps, rest areas and other locations in the Project Footprint will be kept free of waste that could attract Caribou or their predators. ▪ Petroleum-based products and other toxic materials that can attract Caribou or their predators will be appropriately stored in wildlife-proof containers and/or in areas not easily accessed by wildlife. ▪ Temporary areas of disturbance will be blocked until the vegetation has been re-established. Areas will be reclaimed as soon as practicable with procedures that encourage natural regeneration, occasionally augmented by transplanting, planting and seeding native self-sustaining species. ▪ A Construction Blasting Management Plan will be developed and implemented. It will include measures to reduce the risk of Caribou being struck by fly rock. ▪ Open excavations and blasting areas will be fenced off when left unattended. ▪ The number of rest-areas and pull-offs will be limited during the operations phase. ▪ Maintenance turnaround areas will be fenced to limit public access. ▪ Regular inspections of the road and rest areas will be conducted during the operations phase. ▪ Refer also to Section 13.4.2. (Mitigation of Effects for SAR and SAR Habitat) ▪ Refer also to the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.2 – Petroleum Handling and Storage ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.21 – Site Decommissioning and Rehabilitation 	Yes

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
Caribou	<ul style="list-style-type: none"> ▪ Changes to Caribou survival and reproduction ▪ Changes to predator access, habitat use and population 	Operations	Operations Phase: <ul style="list-style-type: none"> ▪ Road Usage ▪ Vegetation management 	Injury or Death – Changes to Predator-Prey Dynamics	<ul style="list-style-type: none"> ▪ Where practicable, wildlife crossings and passages will be incorporated in the road design. ▪ Areas that are no longer being actively used for construction will be blocked until they are progressively restored or reclaimed. Restoration will occur as soon as practicable following the completion of work with processes that encourage natural regeneration. ▪ To avoid attracting Caribou predators, the WSR will be regularly monitored, with waste and roadkill being removed promptly. ▪ Temporarily disturbed areas and access roads will be blocked until vegetation has had a chance to reestablish itself. Areas will be reclaimed as soon as practicable ▪ During detailed design, measures that reduce the effectiveness of travel by predators (e.g., wolves) will be incorporated, such as incorporating switchbacks or bends in temporary access routes. ▪ Vegetation along ROW will be cleared to reduce attractants for Caribou and other ungulates. ▪ Refer also to Section 13.4.2. (Mitigation of Effects for SAR and SAR Habitat) ▪ Refer also to the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.14 – Wildlife and Wildlife Habitat 	Yes
Caribou	<ul style="list-style-type: none"> ▪ Changes to Caribou survival and reproduction 	Construction and Operations	Construction Phase: <ul style="list-style-type: none"> ▪ Construction and Use of Supportive Infrastructure ▪ Materials and Equipment Delivery Operations Phase: <ul style="list-style-type: none"> ▪ Road Usage 	Injury of Death – Collisions	<ul style="list-style-type: none"> ▪ The use of road salt will be avoided during winter maintenance activities to reduce attracting Caribou to the Project Footprint. ▪ During the growing season, the ROW will be maintained in a manner that reduces forage attractive to Caribou or other ungulates. ▪ Road maintenance activities will not occur during sensitive life cycle periods, such as calving season. ▪ Speed limits will be enforced in known Caribou crossing areas and other sensitive habitats. ▪ Refer also to Section 13.4.2. (Mitigation of Effects for SAR and SAR Habitat) ▪ Refer also to the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.14 – Wildlife and Wildlife Habitat 	Yes
Caribou	<ul style="list-style-type: none"> ▪ Changes to Caribou survival and reproduction 	Operations	Operations Phase: <ul style="list-style-type: none"> ▪ Road Usage ▪ Vegetation management 	Injury or Death – Disease	<ul style="list-style-type: none"> ▪ Temporary areas of disturbance will be blocked until the vegetation has been reestablished. ▪ Disturbed areas will be reclaimed as soon as practicable with procedures that encourage natural regeneration, occasionally augmented by transplanting, planting and seeding native self-sustaining species. ▪ Vegetation along ROW will be cleared to reduce attractants for white-tailed deer, Caribou and other ungulates. ▪ Refer to also to the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.14 – Wildlife and Wildlife Habitat 	No

13.4.4 Wolverine

The following Section outline key mitigation measures that will be implemented to mitigate potential effects on wolverine and their habitat, including habitat loss, habitat alteration or degradation, wolverine movement patterns and wolverine injury or death. For more detailed descriptions of proposed mitigation measures to prevent or limit the effect of construction and operations on wolverine, refer to the following sections in Appendix E (Mitigation Measures):

- Section 5.1 – Clearing and Grubbing;
- Section 5.3 – Spill Prevention and Emergency Response;
- Section 5.4 – Noise Control;
- Section 5.7 – Temporary Watercourse Crossings;
- Section 5.8 – Temporary Watercourse Diversions;
- Section 5.11 – Bridge and Culvert Installation;
- Section 5.12 – Blasting Near a Watercourse;
- Section 5.14 – Wildlife and Wildlife Habitat;
- Section 5.16 – Erosion and Sediment Control;
- Section 5.18 – Dust Control Practices;
- Section 5.19 – Aggregate Pit Decommissioning;
- Section 5.20 – Quarry Site Selection and Development;
- Section 5.21 – Site Decommissioning and Rehabilitation; and
- Section 5.23 – Prevention of the Transfer of Invasive Species.

For descriptions of additional measures to mitigate the effects of the Project on the habitat of other SAR and SAR habitats, please refer to Sections **13.4.3** (Caribou), **13.4.5** (little brown myotis and northern myotis), **13.4.6** (SAR birds) and **13.4.7** (Lake Sturgeon). **Section 13.4.2** discusses mitigation measures for SAR and SAR (wildlife) habitat more generally, and Section 12.4 describes measures to mitigate potential Project effects on wildlife and wildlife habitat.

13.4.4.1 Habitat Loss

13.4.4.1.1 Construction and Operations

Clearance Activities

Wolverines in northern Ontario are quite adaptable and can be found in various habitats, including coniferous forests, mixed forests and tundra. Wolverines are often found in coniferous forests because these areas provide dense cover and support their primary prey (i.e., small mammals and carrion), though they will also use rocky terrain and meadow habitats for hunting. Wolverine dens are located in areas where deadfall or boulders are present. Vegetation clearing, grubbing and the placement of materials during the construction phase may result in a loss of habitat that wolverines use to survive (i.e., habitat that provides shelter, food, water and space).

Mitigation measures designed to eliminate or minimize the potential impact of the Project on vegetation communities and plant species are described in Section 11.4 (Mitigation and Enhancement Measures for Vegetation and Wetlands) and Appendix 5 (Mitigation Measures). Permanent loss of wolverine habitat



was minimized during Project planning by using existing roads, trails and other areas of disturbance to the extent possible during the route selection process and minimizing the creation of new access roads. Additionally, the preliminary preferred route was chosen to avoid critical and sensitive habitat areas to the extent practicable.

Dense coniferous forests were identified during the baseline study as Late Winter Cover for moose and Caribou, and the preliminary preferred route avoided these areas where practicable. Mature mixedwoods are rare in the Project Footprint, except on the far west side. These mature forests were recognized as important areas for SAR bats, and were also avoided during route selection, where practicable.

In addition to those described in **Section 13.4.2** for SAR and SAR habitat, specific mitigation measures to minimize wolverine habitat loss include:

- Following all conditions of environmental approval for the Project, including any issued by MECP or CWS-ECCC.
- Maintaining vegetation buffers (or setbacks) of 30 m around waterbodies and limiting the clearance of riparian vegetation.
- Having qualified biologists or resource specialists review aerial imagery and make note of vegetation communities that may contain fallen trees (e.g., areas of blowdown) while conducting aerial surveys (targeting Caribou) prior to construction.
- Avoiding, where practicable, placement of camps, laydown areas, temporary access routes and other temporary construction infrastructure in areas of mature coniferous and mixed forests with suitable habitat for denning (i.e., locations where it is likely denning is occurring).
- Minimizing the Project Footprint and limiting vegetation clearing to the extent necessary for construction (i.e., a phased approach that would be accompanied by progressive restoration).
 - Maintaining a cleared ROW of 35 m to the extent practicable, unless a specific area is required for construction.
- Clearly marking a vegetation protection zone (buffer or setback) between key ecological features for wolverine (e.g., confirmed wolverine den sites) and the Project Footprint. A minimum setback distance of 2km from den sites will be implemented between June 2 and January 31 of the calendar year, unless den use continues beyond this date, in which these measures will continue to be implemented.
- Conducting all project-related activities outside of the denning period for wolverine (January 15 to May 31) in areas where suitable habitat has been identified.

If adhering to this timing window is not practicable, qualified biologists or resource specialists will survey areas of suitable habitat to search for evidence denning or other key habitats. A buffer of 8 km (4 km radius) will be implemented adjacent to wolverine dens in active use.

- Having qualified personnel conduct site visits to verify that environmental protection measures have been correctly implemented. If not, corrections will be made prior to construction resuming.
- To the extent practicable, reclaiming disturbed areas using processes that facilitate natural regeneration. When necessary, reclamation may involve the use of locally sourced transplants, and/or planting or seeding native self-sustaining species from approved stock and a reputable supplier, with the goal of restoring habitats to pre-construction conditions. Species of importance to Indigenous communities will be incorporated, as appropriate.
- Completing restoration activities under the appropriate environmental conditions.



- Completing ecological monitoring to evaluate the effectiveness of habitat retention, reclamation and restoration efforts. Mitigation measures may be modified or enhanced as necessary.

Although these measures will be implemented to mitigate against potential changes to wolverine habitat, it is anticipated that net effects will remain in the LSA. As a result, additional discussion about the topic 'Clearance Activities' has been carried forward to **Section 13.5** (Characterization of Net Effects).

13.4.4.2 Habitat Alteration or Degradation

13.4.4.2.1 Construction

Habitat Structural Change

Vegetation clearing and ground disturbances during the construction phase may alter the structure of habitats that wolverines use. Mitigation measures to reduce changes to vegetation communities and species compositions are described in Section 11.4 (Mitigation and Enhancement Measures for Vegetation and Wetlands) and Appendix E (Mitigation Measures). The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary (adaptive management). In addition to the measures discussed in **Section 13.4.2.1** (Mitigation of Effects of Habitat Structural Change on SAR and SAR Habitat), alteration or degradation of wolverine habitat will be minimized by:

- Following all approval conditions for the Project, including any issued by MECP or CWS-ECCC.
- Maintaining vegetation protection zones of 30 m around waterbodies and limiting the clearing of riparian vegetation.
- Having qualified biologists or resource specialists review aerial imagery and make note of vegetation communities that contain areas of blowdown or large boulders (i.e., suitable locations for dens).
- To the extent practicable, locating temporary construction infrastructure outside of coniferous forests, mixed forests and other vegetation communities containing suitable sites for denning.
- Keeping the Project Footprint as small as possible and limiting vegetation clearing to the extent necessary for construction (i.e., develop the ROW in a phased approach that will be accompanied by progressive reclamation).
- Clearly marking a vegetation protection zone (buffer or setback) between key ecological features for wolverine (e.g., confirmed wolverine den sites) and the Project Footprint. A minimum setback distance of 2 km (1 km radius) from den sites known to be in regular use will be implemented between June 2 and January 31 of the calendar year, unless evidence suggests that the den is still active during this period (as per direction received from MECP in March 2021 relating to a confirmed den site).
- All project activities, including vegetation clearing, will be conducted outside of the denning period for wolverine (February 1 to June 1) in areas where suitable habitat has been identified, unless evidence suggests denning continues beyond June 1.
 - If adhering to this timing window is not practicable, qualified biologists or resource specialists will survey areas of suitable habitat to search for evidence denning or other key habitats prior to the onset of active construction. A buffer of 4km (2km radius) will be implemented adjacent to Wolverine dens in active use.



- To the extent practicable, progressively reclaiming areas using restoration techniques that facilitate natural regeneration. Where necessary, natural regeneration may be augmented by transplanting plants from the RSA, or planting or seeding self-sustaining Indigenous species from approved stock and a reputable supplier.
- Completing restoration activities under appropriate environmental conditions.
- Having qualified personnel carry out site visits to ensure environmental protection measures have been correctly implemented. They will also complete ecological monitoring to evaluate the effectiveness of habitat retention, reclamation and restoration efforts.
- Adapting mitigation measures as necessary, pending the results of monitoring.

13.4.4.2.2 Operations

It is not anticipated that additional wolverine habitat will be disturbed during the operations phase beyond that affected during construction. However, it will take time for reclamation efforts to be successful, meaning areas that were temporarily disturbed during construction may continue to fragment habitat while successional processes are occurring. The ROW associated with the WSR itself would be considered a loss of high-quality denning habitat while it is operational.

Although the measures described in **Section 13.4.4.2.1** will be implemented to mitigate against the impacts of habitat structural change on wolverine during the construction and operations phases, it is not anticipated that potential effects will be eliminated entirely. As a result, additional discussion about potential impacts of 'Structural Change' has been carried forward to **Section 13.5** (Characterization of Net Effects).

Hydrological Changes

Hydrological changes to surface water and/or groundwater could impact the habitat of aquatic furbearers, such as beaver, on which wolverine prey. During development, the Project Team considered the consolidation and compression processes of the peat layers, since the placement of fill for road construction could reduce the permeability of the peatlands and alter groundwater pathways. Mitigation measures designed to reduce changes to hydrology and drainage patterns are provided in Section 7.4 (Mitigation Measures – Effects on Surface Water Resources), Section 8.4 (Mitigation Measures – Effects on Groundwater Resources), and Appendix E (Mitigation Measures). Mitigation measures designed to reduce the effects of hydrological changes on SAR and SAR Habitat, more generally, are listed in **Section 13.4.2.1**. These measures include:

- Designing temporary crossings to accommodate anticipated water flows during their lifespan.
- Installing cross-culverts at regular intervals in lowland areas to prevent water from ponding on either side of the roadway and allow overland flow to follow existing hydrological flow paths

The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary. Although these measures will be implemented to mitigate against hydrological changes to the habitat of prey species, it is anticipated that net effects will remain in the LSA. As a result, **Section 13.5** (Characterization of Net Effects) includes further discussion about the topic 'Hydrological Changes.'



13.4.4.3 Alteration in Movement

13.4.4.3.1 Construction

Loss of Connectivity and Sensory Disturbance

The presence of the WSR and associated ROW could act as a movement barrier for both wolverine and its prey. Wolverines are highly sensitive to disturbance and will likely avoid areas of human activity during the construction phase. In addition to bypassing the Project Footprint, wolverine may avoid habitat in the LSA because of sensory disturbances. Furbearers (prey species) may also avoid the ROW because of sensory disturbances from traffic noise and the presence of vehicles, as well as because the road itself can create open inhospitable conditions (Jaeger et al. 2004). Mitigation measures to reduce changes to vegetation communities and species compositions are described in Section 11.4 (Mitigation of Effects on Vegetation and Wildlife Management), **Section 13.4.2.2** (SAR and SAR Habitat), and Appendix E (Mitigation Measures).

To minimize potential impacts from physical barriers arising from actions such as recontouring the ground, erecting fencing, and creating berms, the following measures are recommended to accompany those listed in **Section 13.4.2.2** and Appendix E (Mitigation Measures):

- Construction of the WSR will be completed in phases, with construction sites having breaks in between to permit wildlife passage. The physical breaks between construction sites should be at least 1km, and preferably more if the presence of wolverine has been confirmed or is considered highly probable.
- Progressive restoration will take place in areas of temporary disturbance (i.e., to the extent practicable, as soon as these areas are no longer needed for construction).
- Windrowed and slash materials will not be excessively piled to create unintentional barriers to the movement of wolverine or its prey species.
- Since activities can act as a barrier for aquatic furbearers (e.g., dewatering, cofferdams), temporary cofferdams and wildlife passages or corridors will be implemented during construction, as needed. In-water works will also be completed during periods when aquatic furbearers are less active, including their breeding seasons.

Sensory Disturbance

- Construction of each phase of the WSR (i.e., each site) will be completed as quickly as possible to reduce the period of disturbance. Access to designated areas (i.e., construction footprints) will be restricted to Project personnel working in that area.
- Construction will occur outside of the denning season for wolverine (February 1 to June 1), to the extent practicable, wherever potentially suitable den habitat has been identified.
- If adhering to this timing window is not practicable, qualified biologists or resource specialists will survey areas of suitable habitat to search for evidence of active den sites prior to the onset of active construction. A buffer of 8 km will be implemented adjacent to wolverine dens in active use (i.e., 4 km radius). The area to be surveyed will include a 2km distance from the outer edge of the Project Footprint.
- Logs, CWD and other physical control measures will be used to block human access to areas of temporary disturbance until reclamation efforts have been completed and successive revegetation has occurred. Signage, flagging, or other markers may accompany the blockage.



- Logs, CWD and other physical control measures may remain in place if long-term human access concerns are present.
- Restoration efforts will focus on natural regeneration at the location of temporary disturbance, where practicable. Active restoration will be used if deemed necessary by a qualified professional.

13.4.4.3.2 Operations

Loss of Connectivity

Although WSR traffic levels are expected to be relatively low (500 per day), which will minimize the traffic barrier effect, additional mitigation measures will be implemented to reduce other physical barriers. These include:

- Ensuring maintenance activities take place outside of critical life cycle periods for wolverine (e.g., denning season) and their prey (e.g., breeding season).
- Ensuring maintenance activities take place outside of sensitive habitats and identified wildlife crossing areas.
- Ensuring plowing activities don't create continuous or unintentional barriers to the movement of wolverine or their prey.
- Maintaining any wildlife passes that were created during construction of the road. Adding new ones, as practicable, where a need has been identified (e.g., wildlife crossing areas detected through reporting).

The effectiveness of these measures will be evaluated during the construction phase and modified or updated as necessary for implementation during the operations phase. The combination of proposed mitigation measures and anticipated low traffic levels results in the potential effects of the Project on Wolverine movement being low. Although measures are expected to minimize the impacts of reduced habitat connectivity, they will not eliminate the effects entirely. As a result, both the topics of 'Loss of Connectivity' and 'Sensory Disturbance' have been carried forward to Section 12.5 (Characterization of Net Effects).

13.4.4.4 Injury or Death

13.4.4.4.1 Construction

Increased Access

The injury or death of wolverine and their prey could increase with the development of the WSR since the ROW will provide additional opportunities for humans to access the LSA. Although they are a protected species, unplanned encounters between wolverine and humans could lead to negative effects on individuals. The measures described in **Section 13.4.2** (Mitigation of Effects on SAR and SAR Habitat) will be implemented to reduce the risk of injury and death of wolverine during the construction phase. The effectiveness of mitigation will be evaluated, with measures being modified or enhanced as necessary. Although measures will be implemented to mitigate against the impacts of increased access on wolverine, it is anticipated that net effects will remain in the LSA. As a result, additional discussion about the topic 'Increased Access' has been carried forward to **Section 13.5** (Characterization of Net Effects).



Changes to Predator-Prey Dynamics

Wolverines may encounter predators (e.g., wolves) more frequently since linear features are known to facilitate access, increase line of sight, and boost travel speeds. Mitigation of predator-prey encounters were addressed in **Section 13.4.2.3.2** (SAR and SAR Habitat, Injury or Death, Changes to Predator-Prey Dynamics) and will include:

- Blocking areas of temporary disturbance until they can be restored to a functional state.
- Keeping the Project Footprint free of refuse, sewage and other materials that may attract predators. Appropriately storing petroleum products and other materials toxic to wolverine in wildlife-proof containers prior to removing them appropriately from the LSA.
- Incorporating measures to reduce the movement rates of large predators, such as curves or bends in temporary access roads, during detailed design.

During construction, it is anticipated that most predators, including wolves, will avoid the Project Footprint. Nevertheless, effectiveness monitoring will be conducted during the construction phase, with mitigation measures being modified or enhanced as necessary. Although these measures will be implemented to mitigate against changes to predator-prey dynamics during construction, it is anticipated that net effects will remain in the LSA. As a result, additional discussion about the potential impacts of altered predator-prey relationships has been carried forward to the net effects characterization **Section 13.5**.

Incidental Take

Wolverine dens could be destroyed or damaged during construction activities including vegetation clearing and bridge and culvert installation. Vegetation and water crossing maintenance activities also have the potential to destroy or damage these wildlife structures. Mitigation measures include:

- Following all approval conditions for the Project, including any issued by MECP or CWS-ECCC.
- Clearing vegetation outside of the denning period for Wolverine (February 1 to June 1) in areas where suitable habitat has been identified.
 - If adhering to this timing window is not practicable, qualified biologists or resource specialists will survey areas of suitable habitat to search for evidence denning or other key habitats prior to the onset of active construction. A buffer of 4km will be implemented around wolverine dens in active use (i.e., circle with radius of 2km).
- Training personnel to identify dens and be aware of the correct protocols to follow if a potential den site is identified.
- If an active den is encountered, construction work will stop immediately, and the appropriate project personnel and regulatory agencies will be contacted. The den will be marked, and a buffer established. No work will take place within the buffer until clearance is issued by the MECP.

The effectiveness of mitigation will be evaluated, with measures being modified or enhanced as necessary. Although measures will be implemented to mitigate against the impacts of incidental take on wolverine, it is anticipated that net effects will remain in the LSA. As a result, additional discussion about this topic has been carried forward to **Section 13.5** (Characterization of Net Effects).



13.4.4.4.2 Operations

Increased Access

The measures described in **Section 13.4.2.3** (Mitigation of Effects on SAR, Injury or Death from Increased Access) and Appendix E (Mitigation Measures) will be implemented to reduce the risk of wolverines being injured or killed during operations. These measures include:

- Fencing and/or gating access roads to aggregate areas and other operational infrastructure.
- Limiting pull-off areas along the WSR.
- Blocking areas of temporary disturbance until they can be restored to a functional stage (ideally ones that mimic pre-construction conditions). Restoration approaches will facilitate natural regeneration, but may be supplemented as necessary, with self-sustaining species native to the area.

The effectiveness of mitigation will be evaluated, with measures being modified or enhanced as necessary. Although these measures will be implemented to mitigate against potential impacts from increased access on wolverines during operations, it is anticipated that net effects will remain in the LSA. As a result, additional discussion about these effects has been carried forward to the net effects characterization (**Section 13.5**).

Changes to Predator-Prey Dynamics

Wolverines may encounter predators (e.g., wolves) more frequently since linear features are known to facilitate access, improve line of sight, and increase travel speeds. During construction, it is anticipated that most predators, including wolves, will avoid the Project Footprint. During operations, however, predators are more likely to use the ROW to facilitate their movements, which could result in higher encounter rates. Mitigation of predator-prey encounters were addressed in **Section 13.4.2.3.2** (SAR and SAR Habitat, Injury or Death, Changes to Predator-Prey Dynamics) and will include:

- Blocking areas that have been reclaimed following temporary disturbance until they can be restored to a functional state, and preferably ones that resemble pre-construction conditions.
- Incorporating measures that reduce predatory efficiency during operations, such as maintaining vegetation along the ROW that is 2 m in height or less and avoiding the snow removal unless it is required for site access.

During operations, effectiveness monitoring will be conducted, with mitigation measures being modified or enhanced as necessary. Despite measures being implemented to minimize changes to predator-prey dynamics, it is anticipated that net effects will remain for wolverine in the LSA during the operations phase. As a result, additional discussion about the potential impacts of altered predator-prey relationships has been carried forward to the net effects characterization (**Section 13.5**).

Incidental Take

Wolverine dens could be destroyed or damaged during construction activities including vegetation clearing and bridge and culvert installation. Vegetation and water crossing maintenance activities also have the potential to destroy or damage these wildlife structures. Mitigation measures include:

- Conducting road maintenance activities, particularly ones that involve vegetation clearing, outside of the denning period for Wolverine (February 1 to June 1) in areas where suitable habitat has been identified.



- If adhering to this timing window is not practicable, qualified biologists or resource specialists will survey areas of suitable habitat to search for evidence of den sites or other key habitats. A buffer of 4km will be implemented around wolverine dens in active use (i.e., circle with radius of 2km).
- Training operations personnel to identify dens and be aware of the correct protocols to follow should a potential den site be identified.
 - If an active den is encountered, construction work will stop immediately, and the appropriate project personnel and regulatory agencies will be contacted. The den will be marked, and a buffer established. No work will take place within the buffer until clearance is issued by the MECP.

Table 13-45 provides summaries of the potential effects and mitigation measures for Species at Risk VC – wolverine during the construction and operations phases.



Table 13-45: Summary of Potential Effects, Mitigation Measures and Predicted Net Effects for Species at Risk VC – Wolverine

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
Wolverine	<ul style="list-style-type: none"> ▪ Changes to wolverine habitat availability (quantity) ▪ Changes to abundance and distribution of wolverine and wolverine habitat 	Construction	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation clearing and grubbing. ▪ Road construction. ▪ Construction and Use of Supportive Infrastructure ▪ Construction of permanent waterbody crossings. <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Aggregate extraction and processing 	Habitat Loss – Clearance Activities	<ul style="list-style-type: none"> ▪ During route selection, existing roads, trails and other areas of disturbance were used to the extent practicable. ▪ Areas containing habitat important to wolverine habitat were also avoided during routing to the extent practicable. ▪ All conditions of environmental permits, authorizations and approvals will be followed. ▪ Minimum 30 m buffer to be maintained around waterbodies. ▪ Riparian vegetation to be retained to the extent practicable. ▪ Temporary construction infrastructure to be placed outside of areas where potential denning habitat (for wolverine) has been identified, to the extent practicable. ▪ Minimize the Project Footprint, and the extent of vegetation clearing at quarries, borrow pits and other temporary areas. ▪ Clearly delineate the boundaries of the work areas to prevent habitat destruction beyond their limits. ▪ As per direction from MECP (December 2025), all project-related activities shall be avoided within a 4 km radius of active dens sites between January 15 and May 31 of the calendar year, unless den use continues beyond that period. ▪ To the extent practicable, all project activities will be conducted outside of the denning period for wolverine in areas where suitable denning habitat has been identified. ▪ If this timing window cannot be adhered to, qualified biologists shall conduct surveys of suitable habitat to search for evidence of active dens, with a 4 km setback being implemented should any be found. ▪ Qualified personnel will conduct site visits to ensure environmental protection measures have been implemented. ▪ Progressive restoration will be conducted in areas of temporary disturbance with processes that facilitate natural regeneration. ▪ Qualified personnel to conduct effectiveness monitoring. ▪ Refer also to Section 13.4 (Measures to mitigate against potential impacts on SAR and SAR Habitat) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.20 – Quarry Site Selection and Development 	Yes
Wolverine	<ul style="list-style-type: none"> ▪ Changes to wolverine habitat availability ▪ Changes to abundance and distribution of wolverine and wolverine habitat 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation clearing and grubbing. ▪ Decommissioning and Site Restoration/Reclamation <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation management 	Habitat Alteration or Degradation – Changes to Habitat Structural Change	<ul style="list-style-type: none"> ▪ Follow all environmental approval conditions for the Project, including any from MECP or CWS-ECCC. ▪ Maintain vegetation buffers of at least 30 m around waterbodies, and limit clearing of riparian vegetation. ▪ Have qualified biologists identify areas with high potential of having Wolverine den sites. ▪ Keep temporary construction infrastructure outside of vegetation communities with high potential of having wolverine den sites, to the extent practicable. ▪ Keep construction footprints as small as possible and minimize/restrict clearing near confirmed den sites and other sensitive areas. ▪ Implement vegetation protection zone (vegetation buffer or setback) with a minimum distance of 2km (1km radius) from dens known to be in active use during denning season (February 1 – June 1). 	Yes

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
					<ul style="list-style-type: none"> ▪ All project activities including vegetation clearing to be conducted outside of period of February 1 to June 1. ▪ If activity must occur during denning season, qualified biologists will survey areas with high potential of containing den sites for evidence they are in use. ▪ Should an active den be confirmed, no Project activity shall be conducted within a 2km radius (4km diameter) of it. ▪ To the extent practicable, areas to be reclaimed quickly with natural vegetation. Natural regeneration is to be encouraged, occasionally augmented by planting and seeding. ▪ Qualified personnel to conduct site visits to verify environmental protection measures have been installed correctly. ▪ Qualified personnel to conduct ecological effectiveness monitoring. ▪ Refer also to Section 13.4 (Measures to mitigate against potential impacts on SAR and SAR Habitat) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.16 – Erosion and Sediment Control 	
Wolverine	<ul style="list-style-type: none"> ▪ Changes to wolverine habitat availability ▪ Changes to abundance and distribution of wolverine and wolverine habitat 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Temporary Watercourse Diversions ▪ Road Construction ▪ Bridge and Culvert Installation <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Repair and/or rehabilitation of culverts and bridges at water crossings 	Habitat Alteration or Degradation – Hydrological Changes	<ul style="list-style-type: none"> ▪ During development, the Project team considered the consolidation and compression processes of peat layers associated with the placement of fill. ▪ Temporary crossings will be designed to accommodate anticipated water flows during their lifespan. ▪ Cross-culverts will be installed at regular intervals in lowland areas to prevent water from ponding on either side of the roadway. ▪ Road maintenance should regularly check culverts and other crossings for blockages. ▪ See Section 7 (Surface Water) and Section 8 (Groundwater) for detailed mitigation measures. ▪ Refer also to Section 13.4 (Measures to mitigate against potential impacts on SAR and SAR Habitat) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.7 – Temporary Watercourse Crossings ▫ Section 5.11 – Bridge and Culvert Installation ▫ Section 5.16 – Erosion and Sediment Control 	Yes
Wolverine	<ul style="list-style-type: none"> ▪ Changes to abundance and distribution of wolverine 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road Construction ▪ Vegetation clearing and grubbing ▪ Blasting ▪ Construction and use of supportive Infrastructure <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Road usage 	Alteration in Movement – Loss of Connectivity and Sensory Disturbance	<ul style="list-style-type: none"> ▪ Measures from Light Management Plan, Noise and Vibration Management Plan and Construction Blasting Management Plan to be prepared and implemented. ▪ Construction of the WSR will be phased with work areas leaving physical breaks to allow Wolverine and their prey to pass unimpeded through the Project Footprint. ▪ Construction of each phase will be completed as quickly as possible to reduce the period of disturbance. ▪ Construction to occur outside of denning season for wolverine (February 1 to June 1, unless den is active outside of this period). If this window cannot be adhered to, qualified biologists will survey areas with high potential of den sites. ▪ A vegetation buffer of 8 km (4 km radius) will be maintained around dens in active use between January 15 and May 31, and 2 km (1 km radius) around those dens outside of the denning period (i.e., between June 2 and January 31). ▪ Progressive restoration will be implemented as soon as practicable following completion of work in areas of temporary disturbance. ▪ Logs, CWD and other physical control measures will be used to block human access to areas of temporary disturbance until reclamation has been completed. 	Yes

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
					<ul style="list-style-type: none"> ▪ Logs, CWD and other physical control measures may remain in place if longterm human access concerns are present. ▪ Slash materials will not be unintentionally piled in a manner that creates barriers. ▪ Natural regeneration approaches to be used during reclamation, occasionally supplemented by transplants, planting and/or seeding native self-sustaining species. ▪ Temporary cofferdams, wildlife passages and corridors will be implemented during construction, as needed. ▪ Access to designated areas to be restricted to Project personnel working in that area. ▪ Ensure maintenance activities take place outside of critical life cycle periods for wolverine and their prey. ▪ Ensure maintenance activities take place outside of sensitive habitats and identified wildlife crossing areas. ▪ Snow clearing & other maintenance activities should ensure breaks are left for wildlife passage. ▪ Maintain any wildlife passes that were created, and/or signage installed to identify wildlife corridors. ▪ Refer also to Section 13.4 (Measures to mitigate against potential impacts on SAR and SAR Habitat) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.4 – Noise ▫ Section 5.12 – Blasting Near a Watercourse ▫ Section 5.14 – Wildlife and Wildlife Habitat 	
Wolverine	<ul style="list-style-type: none"> ▪ Changes to wolverine survival and reproduction ▪ Changes to wolverine predator access, habitat use and population 	Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road Construction ▪ Vegetation clearing and grubbing <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Road Usage ▪ Vegetation management 	Injury or Death – Changes to Predator-Prey Dynamics	<ul style="list-style-type: none"> ▪ Block any temporarily disturbed areas and access roads until all restoration, including revegetation, has been completed. ▪ Keep work areas free of refuse, sewage and other wildlife attractants. ▪ Appropriately store petroleum-based products and other materials toxic to Wolverine and its prey. ▪ Quickly remove roadkill, which can act as a predator attractant. ▪ Include measures that reduce the movement of large predators during construction and operations (e.g., avoid snow removal unless necessary for site access). ▪ Post lowered speed limits identified travel corridors. ▪ Control roadside vegetation to permit line-of-site for drivers, while maintaining vegetation below 2 m, to the extent practicable. ▪ Refer also to Section 13.4 (Measures to mitigate against potential impacts on SAR and SAR Habitat) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.5 – Materials Handling and Storage ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.21 – Site Decommissioning and Rehabilitation 	Yes

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
Wolverine	<ul style="list-style-type: none"> ▪ Changes to wolverine survival and reproduction 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ All construction activities <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Road Usage 	Injury or Death – Incidental Take	<ul style="list-style-type: none"> ▪ Conduct construction and operations activities outside of the denning period for wolverine (February 1 to June 1) where suitable habitat has been identified. If this is not practicable, have biologists survey for active dens & implement appropriate vegetation buffer when located. ▪ Carry out activities that cause sensory disturbance greater than 2km away from Project Footprint between February 1 and June 1 unless den is deemed active, and greater than 1km between June 2 and January 31. ▪ Restrict public access to road during construction. ▪ Train Project personnel to identify wolverine dens and make them aware of protocols to follow should a den site be found. ▪ Prohibit firearms in camps and construction areas. ▪ Clearly identify the boundaries of work areas. ▪ Limit pullout areas along road. ▪ Refer also to Section 13.4 (Measures to mitigate against potential impacts on SAR and SAR Habitat) and Appendix E– Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.21 – Site Decommissioning and Rehabilitation 	No

13.4.5 SAR Bats

Habitat areas that include maternity roosting sites are the most important habitat features for SAR bats as they are critical for survival and reproduction. As mentioned in **Section 13.3.5**, potential negative effects for these species include habitat loss, habitat alteration or degradation, and injury or death. This subsection outlines key mitigation measures that will be implemented to mitigate potential effects of the Project on SAR bats and their habitats. Such measures include identifying and confirming sensitive sites and roosting areas prior to construction, building on the current understanding of habitat use in the LSA and RSA through monitoring, and implementing protective measures during construction and operations.

A summary of the potential effects, mitigation measures, and predicted net effects on SAR bats can be found in **Table 13-47**. Detailed descriptions of proposed mitigation measures to prevent or limit the effect of the construction and operations on SAR bats can also be found by referring to the following sections in Appendix E (Mitigation Measures):

- Section 5.1 – Clearing and Grubbing;
- Section 5.3 – Spill Prevention and Emergency Response;
- Section 5.4 – Noise Control;
- Section 5.11 – Bridge and Culvert Installation;
- Section 5.12 – Blasting Near a Watercourse;
- Section 5.14 – Wildlife and Wildlife Habitat;
- Section 5.16 – Erosion and Sediment Control;
- Section 5.18 – Dust Control Practices;
- Section 5.19 – Aggregate Pit Decommissioning;
- Section 5.20 – Quarry Site Selection and Development;
- Section 5.21 – Site Decommissioning and Rehabilitation; and
- Section 5.23 – Prevention of the Transfer of Invasive Species.

For descriptions of additional measures to mitigate the effects of the Project on the habitat of other SAR and SAR habitats, please refer to **13.4.3** (Caribou), **13.4.4** (Wolverine), **13.4.6** (SAR birds) and **13.4.7** (Lake Sturgeon). **Section 13.4.2** discusses mitigation measures for SAR and SAR (wildlife) habitat more generally, and Section 12.4 describes measures to mitigate potential Project effects on wildlife and wildlife habitat.

13.4.5.1 Habitat Loss

13.4.5.1.1 Construction

Clearance Activities

Minimizing permanent habitat loss for SAR bats began during Project planning when alternative routes and supportive infrastructure locations were evaluated. Baseline studies did not confirm any hibernacula or maternity roost colonies and there were no high-use areas detected during acoustic surveys. However, some SAR bats are known to occur at low densities and areas of suitable maternity roosting habitat have been identified in the LSA. As such, project components were sited to provide an avoidance buffer of



upland area to minimize impacts to potential roosting areas, where practicable. Measures designed to mitigate against the effects of clearance activities on SAR were described in **Section 13.4.2.1.1** (SAR and SAR Habitat, Habitat Loss, Construction). Other mitigation measures to minimize the potential impacts of vegetation clearing on SAR bats during the construction phase include:

- Developing a CEMP that includes a Site Restoration and Monitoring Plan, Vegetation and Invasive Species Management Plan and Wildlife Management Plan.
- Implementing the CEMP during the construction phase.
- Following all environmental conditions of approval for the Project, including those issued by CWS-ECCC, and MECP.
- Maintaining vegetation buffers (setbacks) of at least 30 m around waterbodies and minimizing the clearing of riparian vegetation, to the extent practicable.
- Having qualified biologists or resource specialists delineate (with flagging, fencing or another appropriate marker) a vegetation setback (i.e., buffer or protection zone) of 120 m from any maternity roosting habitat identified during monitoring for construction.
- Avoiding vegetation removal within this protection zone, to the extent practicable, until there has been engagement with and approval from the appropriate regulatory agencies (e.g., MECP, CWS-ECCC).
- Training Project personnel to identify potential maternity roosting habitat and be aware of protocols to follow should any be found during construction.
- Should any potential maternity roosting areas for SAR bats be discovered by Project personnel during construction, work will cease, the feature will be documented (e.g., photographs, notes) and a qualified biologist or resource specialist will delineate a 120 m setback from outer extent of the habitat.
 - This setback (buffer) will be flagged in which vegetation removal will be avoided to the extent practicable.
 - The proponent and local Indigenous communities will be notified.
 - This zone of protective forest vegetation will remain in place (along with the identified maternity roosting habitat) until the appropriate regulatory agencies have been contacted (e.g., MECP, MNR, CWS-ECCC), and any required permissions or other authorizations are received to clear it.
- Minimizing the extent of clearings at camps, access roads and other temporary construction areas.
- Installing construction fencing to clearly delineate the boundaries of the work areas and prevent habitat damage or destruction beyond the limits of the work area.
- Progressively reclaiming areas with temporary habitat loss from construction-related disturbance and degradation (e.g., access roads, construction camps, laydown areas, etc.) and restoring them to a functional stage, with natural vegetation regeneration expected over time. When necessary, natural regeneration may be supplemented with transplants or seeds from the RSA, or self-sustaining native plants and seeds from an approved list and reputable supplier.



13.4.5.1.2 Operations

Clearance Activities

Measures to mitigate against the impacts of clearance activities during the operations phase include:

- Reviewing and updating, as necessary, the Site Restoration and Monitoring Plan, Vegetation and Invasive Species Management Plan and Wildlife Management Plan for incorporation into the OEMP and implementing them.
- Continuing to follow conditions of environmental approval issued by regulatory agencies that are applicable to the operations phase.
- Maintaining vegetation buffers (setbacks) of at least 30 m around waterbodies throughout the operations phase, and minimizing the clearing of riparian vegetation, to the extent practicable.
- Minimizing the extent of clearings at quarries, pits and other temporary areas.
- Restricting access to restored areas (i.e., that were formerly disturbed) until such a time as habitat has been returned to a functional stage, ideally resembling pre-construction conditions.

Although these measures will be implemented to mitigate against the potential effects of vegetation clearance on SAR bats, it is anticipated that net effects will remain in the LSA. As a result, additional discussion about potential impacts from 'Clearance Activities' can be found in the net effects characterization (**Section 13.5**).

13.4.5.2 Habitat Alteration or Degradation

13.4.5.2.1 Construction

Habitat Structural Change

Vegetation clearing during the construction phase may alter the structure and/or composition of habitat used by SAR bats. Mitigation measures to reduce changes to vegetation communities and species compositions are described in Section 11.4 (Mitigation and Enhancement Measures for Vegetation and Wetlands) and Appendix E (Mitigation Measures). The effectiveness of mitigation will be evaluated during construction, with measures being modified or enhanced as necessary (i.e., adaptive management). In addition to the measures discussed in **Section 13.4.2.2.1** (Mitigation of Effects of Habitat Alteration or Degradation on SAR and SAR Habitat, Construction), during construction, potential impacts on SAR bat habitat will be minimized by:

- To the extent practicable, minimizing construction footprints and maintaining vegetation in upland habitats that contain features that appear suitable for maternity roosting (e.g., large cavity trees or snags).
- To the extent practicable, maintaining vegetation structure and composition in other sensitive habitats that bat utilize (e.g., wetland foraging habitat).
- Progressively reclaiming any areas of temporary disturbance from construction activities (e.g., access roads, construction camps, laydown areas), and restoring them to a functional stage, with natural regeneration expected over time. Where necessary, natural revegetation will be supplemented by transplanting species from within the RSA, or planting and/or seeding self-sustaining species native to the area obtained from a reputable supplier.
 - Reclamation will occur as soon as possible following the completion of work in each area.



Although these measures will be implemented to mitigate against potential impacts on SAR bats during the construction phase, net effects will likely remain in the LSA. Therefore, the topic 'Habitat Structural Change' has been carried forward to the Characterization of Net Effects (**Section 13.5**).

Hydrological Changes

During Project planning, the study team factored in processes that may accompany road construction (e.g., loading from the placement of fill), which consolidate and compress peat layers. These processes can result in reduced permeability, thereby altering the natural flow directions and pathways of groundwater. Although baseline studies did not confirm the presence of maternity roosting habitat for SAR bats in the LSA, suitable habitat appeared to be present. Should maternity roosting habitat be detected for either of these species during the construction phase, measures will be implemented to sustain the hydrological conditions in associated groundwater recharge zones.

In addition to the measures described in **Section 13.4.2.2.1** (Mitigation of the Effects of Habitat Alteration or Degradation on SAR and SAR Habitat), hydrological changes caused by road construction, which could impact aquatic habitat used by SAR bats for foraging, will be minimized by:

- Developing and Implementing Surface and Stormwater Management and Monitoring Plans, and Erosion and Sediment Control Plans as part of the CEMP.
- Designing temporary crossings to accommodate anticipated water flows during their lifespan.
- Installing localized drainage cross-culverts at regular intervals along the WSR in lowland areas.
- Allowing overland flow to follow existing hydrological flow paths.
- Implementing Best Management Practices that minimize soil compaction and dewatering.

The effectiveness of mitigation will be evaluated during construction and operations, with measures being modified or enhanced as necessary. Although these measures will be implemented to mitigate against potential impacts to SAR bat habitat during the construction phase, net effects will likely remain in the LSA. Therefore, the topic 'Hydrological Changes' has been carried forward to the Characterization of Net Effects (**Section 13.5**).

Sensory Disturbance

Artificial light, loud noises, vibrations and other sensory disturbance have the potential to cause SAR bats to be displaced and/or reduce their use of certain habitats (i.e., those subjected to sensory disturbance). Mitigation measures designed to minimize sensory disturbances in the LSA are discussed in Section 9.4 (Mitigation Measures – Effects on Atmospheric Environment), Section 18.4 (Mitigation Measures – Effects on Visual Environment), and Appendix E (Mitigation Measures). **Section 13.4.2.2.1** discusses control measures designed to mitigate potential impacts from Habitat Alteration or Degradation on SAR and SAR Habitat during the construction phase. In addition, the following list identifies measures to minimize the effects of sensory disturbance on SAR bats:

- Following all environmental conditions of approval for the Project, including those issued by CWS-ECCC, and MECP.
- Restricting access to the ROW to Project personnel during the construction phase.
- Restricting construction traffic to designated areas, where practicable.
- Prohibiting the use of personal motorized vehicles during the construction phase in the LSA.



- Conducting blasting outside of sensitive timing windows for SAR bats (i.e., from just before breeding begins in the late spring until after pups have matured and left the roost in the late summer or fall). In Northern Ontario, the active season for these species extends from May 1 to August 31.
 - If it is determined that there is a need to conduct blasting within 500 m of probable maternity roosting habitat for these two species during the previously mentioned window, qualified biologists will carry out pre-blasting sweeps to assess habitat occupancy.
 - Should habitat use be confirmed, a minimum 500 m setback from the habitat will be flagged or otherwise marked. The vegetation barrier will be maintained between the Project Footprint and maternity-roosting habitat. Blasting in that area will be subject to federal or provincial authorizations (e.g., CWS-ECCC, MECP) and will likely require site-specific mitigation measures and/or adherence to SAR permitting requirements.
- Maintaining a vegetation barrier of at least 120 m between the Project Footprint and critical habitat for SAR bats between May 1 and August 31 unless approval is received from the appropriate regulatory agency.
 - Removal of critical habitat, or its buffer will be subject to federal or provincial species at risk permitting requirements and site-specific mitigation measures that would be developed in consultation with CWS-ECCC, MECP, or other regulatory agencies. Local Indigenous communities will be notified.
- If any other previously unidentified bat maternity roosting habitat is encountered during construction:
 - The contractor will immediately halt work in that location and notify the proponent.
 - They will also clearly flag or otherwise mark a setback 120 m from the feature and document its location.
 - Local Indigenous communities will be notified.
 - Activity will not resume in that location until qualified personnel have assessed the feature (i.e., for occupancy) and determined a suitable course of action, after consulting the appropriate regulatory agencies, as necessary.
- Minimizing the use of nighttime lighting in the vicinity of suitable maternity roosting areas for SAR bats during their active seasons, to the extent practicable. Use of light shields, or angling light away from vegetation may also reduce light trespass beyond the ROW.
- Posting and enforcing speed limits in sensitive areas.
- Blocking and then progressively restoring areas of temporary disturbance as soon as practicable following completion of work. Restoration approaches will encourage natural regeneration, and may be supplemented, as necessary, by transplants from the RSA, or seeds and plants from approved suppliers. Species of importance to Indigenous people will be incorporated, as appropriate.

These, and other mitigation measures described in **Section 13.4.2.2** (Mitigation – Effects of Sensory Disturbance on SAR) are expected to minimize the potential effects of physical and sensory barriers on the movement of SAR bats; however, their effectiveness will be monitored during construction and modified as necessary. As negative effects on bats may remain even after these measures have been implemented, sensory disturbance has been carried forward to the net effects characterization (**Section 13.5**).



13.4.5.2.2 Operations

Habitat Structural Change

In addition to the measures discussed in **Section 13.4.2.2.2** (Mitigation of Effects of Habitat Structural Change on SAR and SAR Habitat), during operations, alteration or degradation of SAR bat habitat will be minimized by:

- Reviewing and updating, as necessary, the Site Restoration and Monitoring Plan, Vegetation and Invasive Species Management Plan and Wildlife Management Plan for incorporation into the OEMP and implementing this plan.
- Maintaining vegetation buffers (setbacks) of at least 30 m around waterbodies throughout the operations phase. and minimizing the clearing of riparian vegetation, to the extent practicable.
- Minimizing the extent of clearings at quarries, pits and other temporary areas.
- Progressively reclaiming areas of temporary disturbance from operation of the WSR (including quarries and access roads), restoring them to a functional stage, with natural regeneration expected over time.
 - Reclamation will occur as soon as practicable following the decommission of quarries, pits or other work areas during the operations phase.
- To the extent practicable, maintaining vegetation structure and composition in other sensitive habitats that bat utilize (e.g., wetland foraging habitat) around pits, quarries and other work areas during the operations phase.

The effectiveness of mitigation will be evaluated throughout operations, with measures being modified or enhanced as necessary. Although these measures will be implemented to mitigate against potential impacts to SAR bat habitat, it is anticipated that net effects will remain in the LSA. Therefore, the topic 'Habitat Structural Change' has been carried forward to the Characterization of Net Effects (**Section 13.5**).

Hydrological Changes

In addition to the measures described in **Section 13.4.2.2.2** (Mitigation of the Effects of Hydrological Changes on SAR and SAR Habitat), hydrological changes caused by the operation of the WSR that could impact aquatic habitat used by SAR bats for foraging will be minimized by:

- Reviewing, and updating (as necessary) Surface and Stormwater Management and Monitoring Plans, and Erosion and Sediment Control Plans developed as part of the CEMP. Implementing these measures throughout operations.
- Maintaining localized drainage cross-culverts at regular intervals along the WSR in lowland areas, to permit overland flow to follow pre-construction hydrological flow paths.
- Continuing to implement Best Management Practices that minimize soil compaction and retain permeability.
- Continuing to implement BMPs that minimize dewatering during operations.

The effectiveness of mitigation will be evaluated during operations, with measures being modified or enhanced as necessary. Although these measures will be implemented to mitigate against potential impacts to SAR bat habitat during the operations phase, net effects will likely remain in the LSA.



Therefore, the topic 'Hydrological Changes' has been carried forward to the Characterization of Net Effects (**Section 13.5**).

Sensory Disturbance

During the operations phase, measures to mitigate sensory disturbance from activities at quarries, vehicular traffic, and lighting will include:

- Reviewing the Noise and Vibration Management Plan, Light Management Plan, Wildlife Management Plan and the Construction Blasting Plan developed as part of the CEMP. Updating these plans, as necessary, prior to implementation during the operations phase.
- Continuing to follow any environmental conditions of approval that are applicable to the operations phase.
- Restricting public access to quarries and other work areas during operations phase.
- Completing operations activities, such as blasting, that are likely to cause sensory disturbance outside of the period of May 1 to August 31.
 - If it is determined that there is a need to conduct blasting within 500 m of probable maternity roosting habitat for these species during the previously mentioned window, the procedures outlined for the construction phase will be applicable (e.g., complete pre-blasting surveys, contact regulatory agencies and notify local Indigenous communities).
 - If it is determined that there is a need to conduct other (non-blasting) activities that may cause sensory disturbance within 120m of probable maternity roosting habitat for SAR bats, procedures established during the construction phase will be followed.
 - Removal of critical SAR bat habitat, or its buffer will be subject to federal or provincial species at risk permitting requirements and site-specific mitigation measures that would be developed in consultation with CWS-ECCC, MECP, or other regulatory agencies. Local Indigenous communities will be notified.
- Using nighttime lighting only where necessary for health and safety reasons during operations, thereby minimizing light trespass in the vicinity of suitable maternity roosting areas for SAR bats during their active seasons.
- Restricting access to areas of reclamation until the habitat has returned to a functional state.
- Maintaining reduced speed limits in sensitive areas.

These, and other mitigation measures described in **Section 13.4.2.2.1** (Mitigation for the Effects of Sensory Disturbance on SAR) are expected to minimize the potential effects of sensory disturbance on SAR bats during operations; however, their effectiveness will be monitored and modified as necessary. As negative effects may remain even after these measures have been implemented, the topic of 'Sensory Disturbance' has been carried forward to the net effects characterization (**Section 13.5**).



13.4.5.3 Alteration in Movement

13.4.5.3.1 Construction and Operations

Loss of Connectivity

The construction of the WSR and associated access roads could act as a movement barrier for SAR bats. Bat overpasses consisting of a gantry with a diamond mesh metal grate such as that used on the A83 highway near Niort, France (refer to Claireau et al., 2019) could mitigate against alteration in the movement of these species from lost habitat connectivity in high-use areas (e.g., upland forest). However, this mitigation measure has primarily been used in Europe and has not been appropriately monitored for effectiveness (Berthinussen and Altringham, 2012). Its effectiveness for *Myotis* bats is also unknown. As a result, it is anticipated that a loss of habitat connectivity will still impact SAR bat populations in the LSA even if mitigation measures are implemented. Additional discussion about potential effects from 'Loss of Connectivity' has been carried forward to the net effects characterization section (**Section 13.5**).

Sensory Disturbance

During construction and operations, SAR bats could alter their movement in response to sensory disturbances such as road construction, blasting at quarries and traffic on the WSR. Mitigation methods for sensory disturbance are similar to those used to reduce habitat alteration and degradation, and include:

- Maintaining posted lower speed limits in sensitive habitats and identified foraging areas.
- Ensuring maintenance activities take place outside critical time periods such as the maternity roosting season.
- Ensuring maintenance activities are located at least 120 m away from maternity roosting habitats.

These, and other mitigation measures described in Section 9.4 (Mitigation Measures – Effects on Atmospheric Environment), **Section 13.4.2.2** (Mitigation Measures – Effects of Habitat Alteration and Degradation on SAR), Section 18.4 (Mitigation Measures – Effects on Visual Environment), and Appendix E (Mitigation Measures) are expected to minimize potential impacts of sensory disturbance on SAR bats. However, the effectiveness of mitigation measures will be monitored during operations and modified as necessary. It is anticipated that negative impacts to bats may continue even after these measures have been implemented. As such, the topic 'Sensory Disturbance' has been carried forward to the net effects characterization (**Section 13.5**).

13.4.5.4 Injury or Death

13.4.5.4.1 Construction and Operations

The following mitigation measures will minimize the potential injury and death of SAR bats during the construction and operations phases.

Incidental Take

- Preparing and following the requirements of the Wildlife Management Plan and Construction Blasting Plan prior to construction. These plans will be reviewed and updated, as necessary, prior to being implemented during the operations phase.



- Following all environmental conditions of approval for the Project, including any issued by MNR, CWS-ECCC or MECP.
- Avoiding any blasting activity within 500 m of suitable maternity roosting habitat for SAR bats during their maternity roosting period (May 1 – August 31).
 - If it is determined that there is a need to conduct blasting within 500 m of probable maternity roosting habitat for SAR bats between May 1 and August 31, qualified biologists will carry out pre-blasting ground sweeps to assess habitat occupancy.
 - Should use of the maternity roosting habitat be confirmed, a 500 m setback from the habitat will be flagged, or otherwise appropriately marked. The activity (blasting) will be subject to federal or provincial species at risk authorizations, depending on jurisdiction. The activity will also likely require site-specific mitigation measures developed in cooperation with the relevant regulatory agency (e.g., CWS-ECCC, MECP).
- Blasting, regardless of location, shall have control measures for fly-rock generated so there is no danger from projectiles.
- To the extent practicable, avoiding other construction or maintenance-related activities within 120 m of suitable maternity roosting habitat for SAR bats between May 1 and August 31.
 - If there is a proposal to remove potential maternity roosting habitat during this window, qualified biologists will carry out pre-clearance ground sweeps to assess habitat occupancy.
 - Removal of confirmed maternity roosting habitat or its buffer will be subject to federal or provincial (depending on jurisdiction) species at risk permitting requirements and site-specific mitigation measures that would be developed in consultation with MNR, MECP, and CWS/ECCC. Local Indigenous communities will be notified.
- If any other previously unidentified bat maternity roosting habitat is encountered during construction:
 - The contractor will immediately halt work in that location and notify the proponent.
 - They will also clearly flag or otherwise mark a setback 120 m from the feature and document its location.
 - The incident may need to be reported to the appropriate regulatory agencies.
 - Local Indigenous communities will be informed.
 - Activity will not resume in that location until qualified personnel have assessed the feature (i.e., for occupancy) and determined a suitable course of action, after consulting the appropriate regulatory agencies, as necessary.
- Restricting construction traffic to designated areas, and limit pullout areas along the road.
- Restricting access to the ROW to Project personnel during the construction phase.
- Prohibiting the use of personal recreational vehicles during Construction within the LSA.
- Restricting traffic to approved access routes during construction.
- Posting and enforcing speed limits in sensitive areas during construction and operations phases.

Although these measures, and those described in **Section 13.4.2** (SAR and SAR Habitat) and Appendix E (Mitigation Measures) will be carried out, it is anticipated that incidental take could still occur in the LSA. Therefore, additional discussion about potential impacts from ‘Incidental Take’ has been carried forward to the **Section 13.5** (Characterization of Net Effects). **Table 13-46** provides summaries of the potential effects and mitigation measures for Species at Risk VC – bats during the construction and operations phases.



Table 13-46: Summary of Potential Effects, Mitigation Measures and Predicted Net Effects for Species at Risk VC – SAR Bats

Indicators	Project Phase	Project Component or Activity	Potential Effect	Mitigation Measures	Predicted Net Effect
<ul style="list-style-type: none"> ▪ Changes to SAR bat habitat availability (quantity – hectare and quality) ▪ Changes to abundance and distribution of SAR bats and SAR bat habitat (number/ha) 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation clearing and grubbing ▪ Construction and Use of Supportive Infrastructure <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation management 	Habitat Loss – Clearance Activities	<ul style="list-style-type: none"> ▪ Suitable maternity roosting habitat (upland area) was avoided during routing. ▪ Develop a CEMP that includes plans for site restoration and monitoring, vegetation management and wildlife management and implement during construction. Review and update, as necessary, prior to operations (i.e., implement OEMP). ▪ Follow all environmental conditions of approval for the Project during construction and operations. ▪ Maintain vegetation buffers of 30 m or more around waterbodies. ▪ Minimize the clearing of riparian vegetation to the extent practicable. ▪ Maintain protective forest cover leading to, and 120 m surrounding any identified maternity roosting habitat, to the extent practicable. ▪ Train personnel to identify potential maternity roosting habitat and make them aware of procedures to follow in case of discovery. ▪ Upon discovery of potential habitat, work will cease, the proponent and local Indigenous communities will be informed. Qualified personnel will document the feature and delineate a 120 m setback if the habitat is confirmed to be in use. ▪ Protective vegetation buffers will be retained around critical habitat until the appropriate regulatory agencies have been contacted. ▪ Minimize the extent of clearings at quarries, borrow pits and other temporary areas. ▪ Use construction fencing to clearly delineate the boundaries of the work areas and prevent habitat loss beyond the limits of the Project Footprint. ▪ Progressive reclamation to occur when work in temporary areas of disturbance has been completed, including when quarries are decommissioned. ▪ Restoration approaches will facilitate revegetation with self-sustaining species indigenous to the study area. ▪ Restrict access to areas where reclamation has occurred until habitat has been restored. ▪ Refer also to Section 13.4 (Measures to mitigate against potential impacts on SAR and SAR Habitat) and to the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.20 – Quarry Site Selection and Development 	Yes
<ul style="list-style-type: none"> ▪ Changes to SAR bat habitat availability (quantity – hectare and quality) ▪ Changes to abundance and distribution of SAR bats and SAR bat habitat (number/ha) 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road construction ▪ Vegetation clearing and grubbing <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation management 	Habitat Alteration or Degradation – Habitat Structural Change	<ul style="list-style-type: none"> ▪ Prepare CEMPs and OEMPs that include plans for site restoration and monitoring, vegetation management and wildlife management. Implement the measures from these plans during construction and operations. ▪ Follow all environmental conditions of approval for the Project during construction and operations. ▪ Keep construction footprints as small as possible and minimize/restrict clearing in upland habitats that appear to contain suitable maternity roosting habitat. ▪ Maintain vegetation buffers of at least 30 m around waterbodies and, to the extent practicable, maintain vegetation in riparian areas. ▪ To the extent practicable, maintain vegetation structure and composition in other sensitive habitats that SAR bats use. ▪ Do not conduct vegetation clearing in habitat that appears suitable for maternity use/roosting within the maternity roosting period, which occurs between May 1 and August 31, unless authorized in by the appropriate federal or provincial agency (MECP, CWS-ECCC). Species at risk permits and site-specific measures may be required. ▪ Reclaim areas of temporary disturbance as soon as possible, in alignment with the Best management practices for renewable energy, energy infrastructure and energy transmission activities and Woodland Caribou in Ontario. Prioritize restoration approaches that facilitate natural 	Yes

Indicators	Project Phase	Project Component or Activity	Potential Effect	Mitigation Measures	Predicted Net Effect
				<ul style="list-style-type: none"> revegetation, occasionally augmented by transplanting, planting and/or seeding self-sustaining native species. ▪ Complete effectiveness monitoring. ▪ Refer also to Section 13.4 (Measures to mitigate against potential impacts on SAR and SAR Habitat) and to the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.14 – Wildlife and Wildlife Habitat 	
<ul style="list-style-type: none"> ▪ Changes to SAR bat habitat availability (quality) ▪ Changes to abundance and distribution of SAR bats (number/ha) 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road construction ▪ Vegetation Clearing and Grubbing ▪ Construction and use of Supportive Infrastructure ▪ Bridge and Culvert Installation <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation management 	Habitat Alteration or Degradation – Hydrological Changes	<ul style="list-style-type: none"> ▪ Prepare CEMPs and OEMPs that include plans for surface and stormwater management and erosion and sediment control. Implement the measures from these plans during construction and operations. ▪ Follow all environmental conditions of approval for the Project during construction and operations. ▪ Groundwater moisture regimes to be maintained in areas where maternity roosting habitat is identified. ▪ Design and install temporary crossings that accommodate anticipated water flows during their lifespan. ▪ Implement BMPs that minimize dewatering and soil compaction. ▪ Complete effectiveness monitoring. ▪ Refer also to Section 13.4 (Measures to mitigate against potential impacts on SAR and SAR Habitat) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1- Clearing and Grubbing ▫ Section 5.7 – Temporary Watercourse Crossings ▫ Section 5.11 – Bridge and Culvert Installation ▫ Section 5.16 – Erosion and Sediment Control 	Yes
<ul style="list-style-type: none"> ▪ Changes to SAR bat habitat availability (quality) ▪ Changes to abundance and distribution of SAR bats 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road Construction ▪ Vegetation Clearing and Grubbing ▪ Blasting <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation Management ▪ Road Usage 	Habitat Alteration or Degradation – Sensory Disturbance	<ul style="list-style-type: none"> ▪ Prepare and implement CEMPs and OEMPs that contain plans for noise and vibration management, light management and construction blasting. ▪ Follow all environmental conditions of approval for the Project during construction and operations. ▪ Prohibit the recreational use of personal motorized vehicles by Project personnel during construction. ▪ Restrict access to the construction footprint to Project personnel during the construction phase. ▪ Restrict construction traffic to designated areas, where practicable. ▪ Enforce speed limits within in the LSA. ▪ Follow recommended timing “windows” for SAR bats, avoiding construction activities including blasting outside of the period of May 1 to August 31. ▪ If adherence to this timing window is not possible, ground sweeps will be conducted prior to the activity occurring and the Contractor will develop site-specific mitigation and monitoring plans in consultation with qualified biologists and the appropriate regulatory agencies when: <ul style="list-style-type: none"> ▫ Blasting activities are located within 500 m of maternity roosting habitat, or ▫ Other construction activities likely to cause sensory disturbance are located within 120 m of maternity roosting habitat. ▪ The Contractor will be responsible for obtaining any permits or authorizations required to implement mitigation or monitoring plans. ▪ Block off and then progressively restore areas of temporary disturbance as soon as practicable following the completion of work. ▪ Refer also to Section 13.4.2. (Mitigation of Effects for SAR and SAR Habitat) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.3 – Spill Prevention and Emergency Response 	Yes

Indicators	Project Phase	Project Component or Activity	Potential Effect	Mitigation Measures	Predicted Net Effect
				<ul style="list-style-type: none"> ▫ Section 5.4 – Noise Control ▫ Section 5.12 – Blasting Near a Watercourse ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.18 – Dust Control Practices 	
Changes to abundance and distribution of SAR bats and their habitat (number/ha)	Construction and Operations	Construction Phase: <ul style="list-style-type: none"> ▪ Road Construction ▪ Vegetation clearing and grubbing ▪ Blasting ▪ Construction and Use of Supportive Infrastructure Operations Phase: <ul style="list-style-type: none"> ▪ Vegetation management ▪ Road Usage 	Alterations in Movement – Loss of Connectivity	<ul style="list-style-type: none"> ▪ Keep construction footprint as small as practicable and avoid vegetation clearing near maternity roosting sites and other sensitive areas, to the extent practicable. ▪ Promptly restore areas adjacent to the ROW (i.e., processes that facilitate natural regeneration, augmented by planting and seeding when required). ▪ Consideration will be given to the installation of bat crossings in high-use forested areas that would be fragmented by construction of road. ▪ Refer also to Section 13.4.2. (Mitigation of Effects for SAR and SAR Habitat) and the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.14 – Wildlife and Wildlife Habitat 	Yes
Changes to abundance and distribution of SAR bats	Construction and Operations	Construction Phase: Vegetation clearing and grubbing Operations Phase: Vegetation management	Injury/Death – Incidental Take)	<ul style="list-style-type: none"> ▪ Conduct vegetation clearing outside of the maternity roosting period for SAR bats, which occurs between May 1 and August 31, unless authorized by the appropriate federal or provincial agency. Species at risk permits and site-specific measures may be required. ▪ Conducted blasting activities greater than 500 m from suitable roosting habitat during this period. ▪ Refer also to Section 13.4.2. (Mitigation of Effects for SAR and SAR Habitat) and to the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.14 – Wildlife and Wildlife Habitat 	No

13.4.6 SAR Birds

The following subsections outline key mitigation measures that will be implemented to mitigate against potential effects of the Project on SAR birds and their habitats. These effects include habitat loss, habitat alteration or degradation, alteration in movement patterns, and injury or death. Some measures are applicable to more than one group of SAR birds and will be discussed as such. Where mitigation measures are tailored to individual groups or species, they are discussed separately. A summary of the potential effects, mitigation measures, and predicted net effects on SAR birds can be found in **Table 13-47**. Detailed descriptions of proposed mitigation measures to prevent or limit the effect of the construction and operations on SAR birds can also be found by referring to the following sections in **Appendix E (Mitigation Measures)**:

- Section 5.1 – Clearing and Grubbing;
- Section 5.3 – Spill Prevention and Emergency Response;
- Section 5.4 – Noise Control;
- Section 5.7 – Temporary Watercourse Crossings;
- Section 5.11 – Bridge and Culvert Installation;
- Section 5.12 – Blasting Near a Watercourse;
- Section 5.14 – Wildlife and Wildlife Habitat;
- Section 5.16 – Erosion and Sediment Control;
- Section 5.17 – Concrete Washout Management Practices;
- Section 5.18 – Dust Control Practices;
- Section 5.19 – Aggregate Pit Decommissioning;
- Section 5.20 – Quarry Site Selection and Development;
- Section 5.21 – Site Decommissioning and Rehabilitation; and
- Section 5.23 – Prevention of the Transfer of Invasive Species.

For descriptions of additional measures to mitigate the effects of the Project on the habitat of other SAR and SAR habitats, please refer to **Sections 13.4.3** (Caribou), **13.4.4** (Wolverine), **13.4.5** (SAR bats) and **13.4.7** (Lake Sturgeon). **Section 13.4.2** discusses mitigation measures for SAR and SAR (wildlife) habitat more generally, and Section 12.4 describes measures to mitigate potential Project effects on wildlife and wildlife habitat.

13.4.6.1 Habitat Loss

13.4.6.1.1 Construction

Clearance Activities

All SAR Birds

Measures to mitigate against permanent habitat loss for SAR birds began during the planning stage, when the Project team evaluated alternative routes for WSR and associated supportive infrastructure. To the extent practicable, during route selection, the team made use of existing roads and trails while minimizing the creation of new access points. Key habitats for SAR birds were also avoided during the



route selection process, where feasible. Measures designed to mitigate against the effect of clearance activities on SAR were described in **Section 13.4.2.1.1**. Other mitigation measures to be implemented during the construction phase include:

- Developing and implementing a CEMP that includes detailed plans for vegetation management, wildlife management and site restoration and monitoring.
- Following all environmental conditions of approval for the Project, including any issued by CWS-ECCC and/or MECP.
- Minimizing the extent of clearings at temporary areas, including access roads and construction camps.
- Installing construction fencing to clearly delineate the boundaries of the work areas and prevent habitat destruction beyond the limits of the Project footprint.
- Maintaining vegetation buffers (setbacks or protection zones) of at least 30 m around waterbodies. Minimizing the clearing of riparian vegetation to the extent practicable.
- Having qualified biologists or resource specialists conduct ground sweeps prior to the onset of construction to confirm that the nests of SAR birds, and other critical habitats have been identified.
- Having qualified Project personnel carry out site visits to verify that environmental protection measures have been correctly implemented.
- To the extent practicable, avoiding vegetation clearance and activities that disturb the ground between April 25 and August 29 of the calendar year, which is the active season for migratory birds in Northern Ontario.
- To the extent feasible, preserving any used, or potentially used large trees or snags.
- Making Project personnel aware of legislative requirements for SAR birds, their residences and habitats. These include requirements of the Migratory Bird Convention Act and Regulations, the Species at Risk Act and the Endangered Species Act.
- Developing and implementing a protocol for Project personnel to follow should SAR birds, their nests, or eggs be encountered during construction, particularly during the active season.
 - The protocols may include the stoppage of work in the vicinity of the habitat until the proponent and local Indigenous groups have been notified, a qualified biologist or resource specialist makes an assessment, and contact with regulatory agencies has been completed (as necessary).
 - Species-specific mitigation measures, including the establishment of vegetation buffers around active nests and other key habitats may also be required.
- Progressively reclaiming disturbed areas that have caused temporary habitat loss (e.g., access roads, construction camps, laydown areas, etc.) and restoring them to a functional stage, with natural vegetation regeneration expected over time. When necessary, natural regeneration may be supplemented by transplanting species from within the RSA, or planting and/or seeding self sustaining species native to the area from a reputable supplier.
- Qualified biologists or resource specialists will monitor the site to determine the effectiveness of mitigation measures and restoration efforts.

It should be noted that the creation of early successional habitat (e.g., along the ROW and other temporary disturbance) may be of benefit to some SAR birds, but will negatively affects others, particularly forest songbirds and raptors that use mature and old-growth forests.



Forest Songbirds (Evening Grosbeak)

- Mature upland conifer and mixed forests are rare in the LSA, except on the far west side. These habitats, which are also recognized as important areas for bats, were avoided during route selection, where practicable.
- A Vegetation and Invasive Species Management Plan including measures to protect rare vegetation communities will be developed as part of the CEMP and implemented during the construction phase.

Raptors (Bald Eagle)

- To the extent practicable, the clearance of vegetation in the ecosite surrounding suitable nest trees will occur outside of the breeding season for Bald Eagle (March 1 to August 31).
- During the preliminary proposed route selection process, known Bald Eagle nests (i.e., those identified during the baseline study) were avoided, to the extent practicable. A total of 29 Bald Eagle nests were recorded during field studies for the Project. Bald Eagle nests were located primarily along the expansive shoreline of Winisk Lake and among the many lakes west of Webequie. No Bald Eagle nests were located within 1 km of the route alternatives for the WSR.
- If additional Bald Eagle nests are identified during the construction phase their locations will be recorded, and specific mitigation measures shall be implemented including:
 - Temporarily stopping construction within the local work area.
 - Appropriately documenting the nest(s) (e.g., notes made regarding location, photographs).
 - Notifying the proponent and local Indigenous communities.
 - Having a qualified biologist or resource specialist delineate (with flagging, fencing or another appropriate material) a vegetation buffer of 400 m to 800 m from the nest, depending on the sightlines.
 - MNR, CWS-ECCC and/or other appropriate regulatory agencies will be consulted prior to the removal of vegetation in the vicinity of Bald Eagle nests to discuss next steps. Specific authorizations or permits may be required to proceed.

Raptors (Short-eared Owl)

- During the preliminary proposed route selection process, the removal of habitat in fens, bogs and burned areas were avoided, where practicable.
- Restoration of early successional habitat that follows in temporary areas of disturbance (e.g., access roads, laydown areas) will incorporate downed woody debris, to provide suitable habitat for voles, which are a primary prey species of Short-eared Owl. The incorporation of downed woody debris will be particularly important in areas where there is dry ground adjacent to taller vegetation (i.e., >6m in height) such as coniferous forests.
- Although no Short-eared Owl were detected during field studies for the Project, they are a relatively non-vocal species. Should a Short-eared Owl be encountered during the construction phase, its location will be documented in wildlife reporting protocols that were developed for the site.
- Should evidence of breeding activity be encountered during construction within 500 m of the Project Footprint (e.g., territorial behaviour, agitated behaviour, potential nest site):
 - Construction activity in the local work area shall cease.
 - The proponent and local Indigenous communities will be notified.



- A qualified biologist or resource specialist shall conduct a ground survey, and delineate (with flagging, fencing, or another appropriate material) a suitable vegetation buffer (e.g., approximately 500 m from a nest depending on level of activity and sightlines).
- The buffer of protective vegetation will remain in place until the appropriate regulatory agencies have been contacted, and any required permits or authorizations obtained.

Shorebirds (Lesser Yellowlegs)

No confirmed shorebird migratory stopover or staging areas were identified during baseline studies. However, the species was detected in treed bog and treed fen habitats during the baseline. To the extent possible, these habitats were avoided during route selection. Additional measures include:

- To the extent practicable, construction will occur outside of the nesting season for Lesser Yellowlegs (i.e., late-April to July) in the vicinity of suitable breeding habitat (i.e., a radial distance of 6km from any confirmed nest or observation point of a Lesser Yellowlegs with confirmed or probable breeding evidence).
- To the extent practicable, any clearance activities, or other construction work that results in habitat loss will avoid areas of suitable breeding habitat and their surrounding buffer, until it is confirmed that the habitat has not been used for two (2) consecutive years.
- If important habitat (e.g., nesting areas, foraging areas or stopover habitat) for Lesser Yellowlegs is identified during the construction phase:
 - A temporary work stoppage will occur in the vicinity of the habitat.
 - The sensitive habitat will be documented. It will be delineated, as appropriate, by a qualified biologist or resource specialist.
 - The proponent, local indigenous communities, and the appropriate regulatory agencies will be contacted (e.g., CWS-ECCC, MECP).
 - Feature specific mitigation measures will be implemented including the establishment of vegetation buffers (e.g., 100m radius around migratory stopover habitat) based on the guidance of appropriate regulatory agencies. These measures will remain in place until permits or other authorizations have been obtained (e.g., from CWS-ECCC, MECP).

13.4.6.1.2 Operations

Clearance Activities

All SAR Birds

It is anticipated that the amount of SAR bird habitat destroyed during the operations phase will be less than that affected during construction. However, it will take time for reclamation efforts to be successful, meaning that areas of temporary disturbance (from construction) may not be fully functional until successional processes are complete. The ROW associated with the WSR itself would be considered 'lost' habitat while the road is operational. To reduce impacts, the following measures will be implemented:

- All environmental conditions of approval for the Project will be followed.
- The CEMP will be reviewed, and updated as necessary, for implementation during the operations phase. The OEMP will include direction relating to vegetation management, wildlife management and effectiveness monitoring.



- To the extent practicable, habitat loss for SAR birds will be mitigated by reducing the extent of clearings at quarries, borrow pits, and other temporary work areas.
- Areas of temporary disturbance will be reclaimed as soon as practicable following completion of work in each area in alignment with the Best Management Practices for renewable energy, energy infrastructure and energy transmission activities and Woodland Caribou in Ontario (e.g., shortly after a quarry site is decommissioned).
- Reclamation approaches will facilitate the natural regeneration of vegetation. However, these approaches may be augmented via transplants from within the RSA, or planting and seeding self-sustaining species indigenous to the study area from approved stock and a reputable supplier.

There is a predicted negative effect of clearance activities on SAR birds, even after implementation of the measures outlined in **Section 13.4.6.1** (above). As such, additional discussion about the potential impacts of vegetation clearing has been carried forward to **Section 13.5** (Net Effects Characterization).

13.4.6.2 Habitat Alteration or Degradation

The Project may result in changes to the structure, composition and/or hydrology of habitat that is used by SAR birds. Mitigation measures to reduce changes to vegetation communities and species compositions are described in Section 11.4 (Mitigation and Enhancement Measures for Vegetation and Wetlands) and Appendix E (Mitigation Measures). Measures designed to mitigate against hydrological changes are provided in Section 7.4 (Mitigation Measures for the Effects on Surface Water Resources), Section 8.4 (Mitigation Measures for the Effects on Groundwater Resources), and Appendix E (Mitigation Measures). The effectiveness of mitigation will be evaluated during the construction and operations phases, with measures being modified or enhanced as necessary (through adaptive management).

In addition to those made in **Section 13.4.2.2** (Measures to Mitigate Against Habitat Alteration or Degradation of SAR Habitat), the following measures will be implemented to minimize negative effects on SAR birds from habitat alteration or degradation.

13.4.6.2.1 Construction

Habitat Structural Change (Edge Effects)

SAR Birds

During the planning stage, to the extent possible, the Project team incorporated existing areas of disturbance in the preliminary preferred route; however, few exist in the RSA except near the community of Webequie. Other measures designed to reduce edge effects in the LSA include:

- Developing and implementing a CEMP that includes detailed plans for vegetation management, wildlife management and site restoration and monitoring.
- Following all approval conditions for the Project, including any issued by MECP or CWS-ECCC.
- Maintaining vegetation buffers (protection zones) of at least 30 m around waterbodies.
- Limiting vegetation clearance in riparian areas to the extent practicable.
- Minimizing (restricting) clearance activities near other sensitive habitats in a manner that keeps the ROW as narrow as possible, and using construction fencing, or other appropriate markers to delineate the boundary of the work area.



- Keeping construction footprints as small as practicable, phasing work so that only the necessary amount of vegetation is cleared at any one time and using progressive restoration to reclaim areas as soon as each work area is no longer required for construction or operations.
- Reclamation approaches will facilitate natural regeneration (i.e., succession) and will occasionally be augmented by planting or seeding self-sustaining species native to the RSA or transplanting self-sustaining species from within the RSA.
- All restoration activities will be conducted under appropriate environmental conditions.
- Qualified Project personnel will carry out site visits to that verify environmental protection measures have been implemented and that any required modifications or corrections are made in a timely manner. They will also conduct effectiveness monitoring.

It should be noted that the creation of early successional habitat (e.g., along the ROW and other temporary disturbance) may be of benefit to some SAR birds, but will negatively affects others, particularly forest songbirds and raptors that use mature and old-growth forests.

Bald Eagle

- To the extent practicable, the clearing of vegetation within ecosites containing suitable nest trees will occur outside of the critical periods for Bald Eagle (March 1 to August 31).
- Should an active Bald Eagle nest be encountered during the construction phase, its location will be noted and the measures outlined in **Section 13.4.6.1** (Habitat Loss – Construction – Bald Eagle) shall be implemented.

Short-eared Owl

- To the extent practicable, the clearing of vegetation within ecosites containing suitable habitat for Short-eared Owl will occur outside of the critical period of disturbance for this species (April 1 – August 31).
- Should evidence of breeding activity be encountered during construction within 500 m of the Project Footprint (e.g., territorial behaviour, agitated behaviour, potential nest site), the location will be noted and the measures outlined in **Section 13.4.6.1** (Habitat Loss – Construction – Short-eared Owl) shall be implemented.

Hydrological Changes

All SAR Birds

Hydrological changes would impact primarily on SAR birds that use wetland habitats, including Lesser Yellowlegs, Olive-sided Flycatcher, Canada Warbler and Rusty Blackbird. They could also affect SAR that are ground-nesters, such as the Common Nighthawk and Short-eared Owl. In addition to the measures described in Section 7.4 (Measures to Mitigate Effects on Surface Water Resources), Section 8.4 (Measures to Mitigate Effects on Groundwater Resources), and Appendix E (Mitigation Measures), the following have been implemented, or will be implemented during road construction:

- During Project Planning, the Study Team considered how consolidation and compression processes could impact the peat layers (i.e., reduced permeability from placement of fill) and alter groundwater flow directions and pathways.
- Temporary crossings will be designed to accommodate anticipated water flows during their lifespan.



- Cross-culverts will be installed at regular intervals in lowland areas to prevent water from ponding on either side of the roadway, instead permitting surface water to follow hydrological flow paths that preceded construction.

13.4.6.2.2 Operations

Habitat Structural Change (Edge Effects)

All SAR Birds

It is not anticipated that the amount of habitat altered during operations will exceed the area disturbed during the construction phase. However, since it will take time for restoration efforts to be successful, areas with altered habitat structure will continue to fragment habitat while successional processes are occurring. The ROW itself would be considered a loss of late successional habitat for SAR birds until the WSR has been decommissioned and reclamation activities have been completed. In addition to the measures described in **Section 13.4.2.2** (Measures to Mitigate the Effects of Habitat Structural Change on SAR and SAR Habitat), the following are recommended to reduce impacts of habitat structural change (edge effects) during the operations phase:

- Avoid re-opening access roads and laydown areas during maintenance activities.
- Restrict brushing and clearing of ROW within the limits of the original clearance.

Implementation of control measures during construction and operations is expected to minimize potential impacts of structural changes on SAR bird habitat but not eliminate them entirely. There is a predicted negative effect of the Project on all SAR birds, which is carried forward to the net effects characterization (**Section 13.5**).

Hydrological Changes

All SAR Birds

In addition to the measures described in Section 7.4 (Measures to Mitigate Effects on Surface Water Resources), Section 8.4 (Measures to Mitigate Effects on Groundwater Resources), and Appendix E (Mitigation Measures), the following have been implemented, or will be implemented during the operations phase:

- Culverts and other crossings will be regularly maintained (i.e., kept in good repair).
- Culverts and other crossings will be regularly checked during road maintenance activities for blockages. Such blockages will be appropriately as soon as feasible after being documented.

Implementation of mitigation measures is expected to minimize potential impacts from hydrological changes on SAR birds and their habitat but not eliminate the effects completely. There is a predicted negative effect for Common Nighthawk, Short-eared Owl, Lesser Yellowlegs and other wetland songbirds which is carried forward to the net effects characterization (**Section 13.5**).



Sensory Disturbance

All SAR Birds

Control measures relating to Sensory Disturbance are described in Section 9.4 (Mitigation Measures – Effects on Atmospheric Environment), 18.4 (Mitigation Measures – Effects on Visual Environment), and Appendix E (Mitigation Measures). **Section 13.4.2.2.1** also discusses measures designed to mitigate potential impacts from Habitat Alteration or Degradation on SAR and SAR Habitat during the construction and operations phases.

Implementation is expected to minimize, but not eliminate, the potential effect of sensory disturbance on SAR birds. There is a predicted negative effect for all SAR birds which has been carried forward to the net effects characterization (**Section 13.5**).

13.4.6.3 Alteration in Movement

13.4.6.3.1 Construction and Operations

Loss of Connectivity

SAR Birds

For many birds, the presence of a road or ROW can act as a barrier. Avoidance of the road can be related to sensory disturbances like noise from vehicles and machinery, but it can also be related to the open conditions of the road itself (Tremblay and St. Clair, 2009). During construction and operations, SAR birds may avoid crossing the road or using the adjacent areas. This is particularly true for small, forest-dwelling species for whom ROW avoidance minimizes the chance of predation. Mitigation measures to reduce changes to vegetation communities and species compositions are described in Section 11.4 (Mitigation of Effects on Vegetation and Wildlife Management), **Section 13.4.2.2** (SAR and SAR Habitat) and Appendix E (Mitigation Measures). Additional measures designed to mitigate against the loss of habitat connectivity include:

- Developing a CEMP that includes detailed plans for vegetation management, wildlife management, site restoration and effectiveness monitoring. Reviewing and updating these plans, as necessary, for implementation during the operations phase.
- Following all conditions of approval for the Project.
- Constructing the WSR in phases, with construction areas having physical breaks in between (i.e., where habitat is maintained).
- Maintaining a minimum 30 m vegetation buffer (protection zone) around waterbodies.
- Retaining as much riparian vegetation as is practicable.
- Keeping construction footprints as small as possible and minimizing (or restricting) vegetation clearing near sensitive areas.
- Using progressive restoration in areas of temporary disturbance and conducting reclamation activities as soon as practicable following the completion of work.
- Incorporating bridge designs instead of causeways at larger watercourse crossings to allow waterfowl to cross under the road.



Sensory Disturbance

All SAR Birds

To mitigate against potential sensory impacts on SAR birds, the following measures shall be implemented:

- Phasing the development of the WSR temporally as well as physically (i.e., completing construction in a few work areas before moving onto others).
- Completing each phase as quickly as possible to minimize the length of disturbance.
- Completing construction and maintenance activities (i.e., operations) outside of the active period for SAR birds in Northern Ontario (April 25 – August 29) to the extent practicable.
- Logs, CWD and/or other physical control measures will be used to block human access to areas where reclamation efforts have been focused until successful revegetation has occurred.

The effectiveness of mitigation measures will be evaluated during the construction phase and modified or updated as necessary for the operations phase. Implementation of these control measures is expected to minimize potential impacts on bird movement patterns but will not eliminate them entirely. There is a predicted negative effect for Evening Grosbeak and wetland songbirds, which has been carried forward to the net effects characterization (**Section 13.5**).

13.4.6.4 Injury or Death

13.4.6.4.1 Construction

Increased Access

All SAR Birds

For SAR birds, harvest, both legal and illegal, could increase during the construction phase of the WSR. The measures described in **Section 13.4.2** to mitigate against potential impacts of increased access on SAR are applicable to SAR birds. During construction, these measures include:

- Preparing and implementing a Wildlife Management Plan as part of the CEMP.
- Limiting road access to Project personnel to reduce hunting opportunities during the construction phase.
- Prohibiting firearms from construction camps.
- Keeping camps and rest areas clean and having food waste stored properly to deter any wildlife conflicts that may occur (because of refuse attracting SAR birds and/or their predators).
- Fencing, or otherwise blocking, temporary access roads, laydowns and construction areas until native vegetation has been re-established.

Lesser Yellowlegs

Historically, Lesser Yellowlegs have been harvested by indigenous communities near Hudson Bay; however, this is not the case in the RSA.



Collisions with Vehicles

All SAR Birds

In general, for bird communities, road mortality has been found to be a major factor, although mortality rates vary since different species react differently to roads. To lower the potential for bird injury or death, the measures described in **Section 13.4.2** (i.e., to mitigate against collisions for SAR, more generally) will be implemented. These include:

- Setting speed limits for construction vehicles and enforcing them on the ROW and access roads.
- Enforcing restricted access to approved routes during construction.
- Prohibiting the use of personal recreational vehicles during construction in the LSA.
- Integrating safe road travel protocols in the Health and Safety Management Plan, including wildlife awareness training, and collision reporting protocols.

Bald Eagle (Raptors)

Bald Eagles are opportunistic scavengers that can be attracted to roadsides where they can be hit by vehicles. Raptors that feed on roadkill are particularly susceptible. Additional measures mitigate against potential collisions between Bald Eagle and vehicles:

- Roadkill will be removed from ROW as soon as practicable.

Short-eared Owl

Short-eared Owls are a low-flying species, which is commonly observed when they are foraging. In addition, Short-eared Owls are a crepuscular species, making them particularly susceptible to collisions at dawn and dusk. The low traffic levels anticipated along the WSR will help to reduce potential vehicle-owl collisions. In addition, it will be important to:

- Establish and enforce slower speed limits in areas where suitable foraging habitat for Short-eared Owl occurs immediately adjacent to the road.
- Provide Project personnel with educational training about this SAR and implement a reporting program should they be encountered during construction.
- Ensure Project personnel that are responsible for driving are made aware that the species is most active in the early morning and early evening and remind personnel to be particularly alert during these times.
- Post signage in suitable locations to alert Project personnel to reduced speed limits in such areas.

Common Nighthawk

Common Nighthawk are known to rest along gravel roads where they can be vulnerable to vehicle collisions. Road kills can be frequent in areas where there are concentrations of foraging nighthawks (Environment Canada, 2015). To mitigate against Common Nighthawks colliding with vehicles, the following will occur:

- If any areas are identified with large numbers of Common Nighthawk strikes during construction monitoring, signage with reduced speed limits will be posted specifically in these areas.



- During the construction phase, educational training about this SAR will be completed and a reporting program implemented.

Implementation of these measures is expected to mitigate potential impacts to SAR birds because of increased access during the construction phase. However, a predicted negative effect remains for all SAR bird species, which is further discussed in **Section 13.5** (Characterization of Net Effects).

Incidental Take

All SAR Birds

The nests, eggs and young of SAR birds could be disturbed or destroyed during construction along the ROW. Mitigation measures include:

- Developing plans for wildlife management and construction blasting as part of the CEMP and implementing them during construction.
- Identifying and establishing buffers around known sensitive features (e.g., stopover areas, nesting habitat) during prior to construction.
- Implementing control measures for fly-rock so there is no danger posed by projectiles.
- Making Project personnel aware of the requirements of the Migratory Bird Convention Act and Regulations and establishing a process for staff to follow should any active bird nests be found during construction.
- Providing environmental orientation as part of health and safety training for all Project personnel, including instruction to staff that wildlife always have the right of way (except in instances where there is imminent risk to the health and safety of workers and/or the public).
- Scheduling vegetation removal to occur outside the migratory bird nesting period (April 25 to August 29) to the extent practicable.
- Using trained personnel to look for signs of bird breeding behaviour and identify active bird nests.
- If an active nest is located:
 - Construction work will stop immediately, and the appropriate Project personnel will be contacted.
 - Local Indigenous communities will be notified.
 - The nest will be marked, and a protective vegetation buffer established based on species requirements.
 - No work will resume within this buffer until site-specific mitigation measures have been developed (in consultation with MECP, MNR or CWS-ECCC as appropriate) and implemented.
 - Species at Risk permitting or other authorizations may be required.
- Limiting the use of blasting to areas where other methods, such as drilling and standard excavation, are not possible, and having any blasting activity occur outside of established buffers. Vegetation buffers (protection zones) are often species-specific and shall be determined by a qualified biologist based on established protocols (in cooperation with the appropriate regulatory agency, when necessary).
- Site-specific blasting plans shall be developed when blasting is likely to be required. Blasting, regardless of location, shall have control measures for fly-rock generated so there is no danger from projectiles.



Implementation of these control measures is expected to minimize the effect of incidental take on SAR birds during the construction phase, but it will not eliminate them entirely. There is a predicted negative effect for all SAR bird species, discussion of which has been carried forward to the net effects characterization (**Section 13.5**).

Raptors (Short-eared Owl)

Although Short-eared Owls have been documented to most frequently nest at distances greater than 200 m from roads, the irregular use of the WSR may cause them to nest within this distance. As such, it will be particularly important to avoid vegetation clearing and activities that disturb the ground during their breeding season.

Bank Swallow

While not present in the RSA, the nests, eggs and young of SAR birds could be disturbed or destroyed during construction if they are allowed to establish at aggregate sites. The following mitigation should be implemented.

- In areas where operations will be carried out during the breeding season, contour aggregate piles to have a slope of less than 70 degrees.
- Install scaring devices to deter Bank Swallows from establishing colonies.
- Use of geotextiles as exclusion netting.

These same methods may be used during operations.

Changes to Predator-Prey Relationships

All SAR Birds

Increased predator-prey encounters may occur during the construction phase since linear features are known to increase edge effects and can facilitate access for predators. During construction, mitigation measures will involve:

- Clearly delineating the boundaries of work areas to prevent habitat damage and destruction beyond the limits of the work area. Construction fencing or other appropriate markers will be used.
- Blocking any temporarily disturbed areas and/or access roads until reclamation is complete.
- Incorporating measures that reduce the efficiency of land predators (such as red fox) during Construction. For example, maintaining vegetation along the ROW that is 2 m in height or less and avoiding the snow removal unless it is required for site access.

Forest SAR Birds

- Maintaining a feathered multi-layer edge in forested ecosites during vegetation removal, to the extent practicable.

Implementation of these control measures is expected to minimize potential changes to the predator-prey relationships of SAR birds during construction but not eliminate them. There is a predicted negative effect for all SAR bird species, which is carried forward to the net effects characterization (**Section 13.5**).



13.4.6.4.2 Operations

Increased Access

To lower the potential for the injury or death of SAR birds during the operations phase, the measures described in **Section 13.4.2** (i.e., to mitigate against increased access to SAR and SAR habitat) are applicable and will be implemented. These include:

- Reviewing the CEMP and updating it as necessary prior to implementation during operations.
- Following all environmental conditions of approval for the Project, including any issued by CWS-ECCC or MECP.
- Limiting the number of pull-offs and rest areas along the road.
- Fencing all maintenance turnaround areas (with strategic locations accessible to Operations personnel only).
- Blocking off temporary areas of disturbance, such as access roads and decommissioned quarry sites until vegetation has been successfully re-established.

Implementation of these control measures is expected to minimize potential effects of increased access on SAR birds during Operations. There is no predicted negative effect for all SAR birds, and increased access is not carried forward to the net effects characterization (**Section 13.5**).

Collisions with Vehicles

All SAR Birds

To lower the potential for the injury or death of SAR birds during the operations phase, the measures described in **Section 13.4.2** to mitigate against vehicle collisions (with SAR) are applicable and will be implemented. These measures are expected to minimize the effect of vehicle collisions on SAR birds but will not eliminate the risk of injury or death. There is a predicted negative effect, which is carried forward to the net effects characterization (**Section 13.5**).

Incidental Take

All SAR Birds

To reduce the chance of incidental take during the operations phase, the following measures shall be implemented:

- Mowing and brushing will be timed to occur outside of bird nesting periods (mid-April until the end of August).
- All hazard trees will be assessed for potential use by raptors or cavity nesting species prior to removal.
- If birds within the area of operations are displaying breeding behavior, the precautionary principle will be applied.
- Mitigation measures, which may include stopping all activities and having a search conducted by qualified personnel, will be implemented.



Raptors (Short-eared Owl)

Short-eared Owls prefer to nest in early successional habitats adjacent to habitats with taller vegetation (i.e., where vegetation is greater than 6 m in height). Development of the WSR will create such habitat. As such, it will be particularly important to avoid vegetation clearing and activities that disturb the ground during the breeding season for this species. (April 1 – August 31).

Implementation of these control measures is expected to minimize the potential of incidental take affecting SAR birds during the construction phase, but it will not eliminate the risk entirely. There is a predicted negative effect for all SAR bird species, discussion of which has been carried forward to the net effects characterization (**Section 13.5**).

Changes to Predator-Prey Relationships

During the operations phase, measures to reduce changes to predator-prey relationships will include:

- Minimizing maintenance activities that clear vegetation along the ROW.
- Avoiding the creation of abrupt edges between the ROW and natural vegetation during maintenance activities.
- Removing roadkill from the ROW as soon as practicable, to reduce the likelihood that predators will be attracted to the Project Footprint.

Implementation of these control measures is expected to minimize the potential alteration of predator-prey relationships on SAR birds but not eliminate them. There is a predicted negative effect for all SAR bird species, which is carried forward to the net effects characterization. **Table 13-47** provides summaries of the potential effects and mitigation measures for Species at Risk VC – birds during the construction and operations phases.



Table 13-47: Summary of Potential Effects, Mitigation Measures for Species at Risk VC – SAR Birds

Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
<ul style="list-style-type: none"> Changes to SAR bird habitat availability 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> Vegetation clearing and grubbing. Road Construction. Construction and Use of Supportive Infrastructure. Construction of permanent waterbody crossings. <p>Operations Phase:</p> <ul style="list-style-type: none"> Aggregate Extraction and Processing. 	Habitat Loss – Clearance Activities	<p>Construction</p> <p><i>All SAR Birds</i></p> <ul style="list-style-type: none"> To the extent practicable, identified areas of critical bird habitat were avoided during Project planning. A CEMP will be developed that includes detailed plans for vegetation management, wildlife management, site restoration and monitoring. All conditions of approval for the Project will be followed. The boundaries of work areas will be clearly delineated using construction fencing to prevent habitat destruction beyond the Project Footprint. The extent of clearing in temporary work areas will be minimized. Minimum 30 m vegetation buffers will be maintained around waterbodies. Riparian vegetation will be retained to the extent practicable. To the extent feasible, vegetation clearing and activities that cause ground disturbance will be avoided between April 25 and August 29 of the calendar year, which is the active season for migratory birds in the RSA. Qualified biologists or resource specialists will conduct ground sweeps prior to the onset of construction to verify that nests of SAR birds, and other critical habitats have been identified. A protocol will be developed for Project personnel to follow should they encounter eggs, nests of young of SAR birds during construction. Project personnel will be informed of legislative requirements for SAR birds, including migratory species, and will be made aware of reporting protocols in the event of encounters with SAR birds. Temporary areas of disturbance will be reclaimed as soon as feasible following construction with native vegetation. Habitat restoration activities will be conducted under appropriate weather conditions. Qualified biologists or resource specialists will conduct monitoring to evaluate the effectiveness of mitigation measures. <p><i>Forest Songbirds (Evening Grosbeak)</i></p> <ul style="list-style-type: none"> A Vegetation and Invasive Species Management Plan will be developed as part of the CEMP that includes measures to protect rare vegetation communities. The plan will be implemented during construction. To the extent practicable, the clearance of mature coniferous or mixed forests will be avoided as they are rare in the LSA. Where complete avoidance is not possible, vegetation clearing will be minimized. <p><i>Raptors (Bald Eagle)</i></p> <ul style="list-style-type: none"> During route selection, the locations of Bald Eagle nests were avoided to the extent practicable. Qualified Project personnel will search for active nesting locations during pre-construction and construction. If an active nest is identified, work in the immediate vicinity will cease; the nest will be appropriately documented, and a suitable vegetation protection zone (buffer) will be implemented. This buffer can be 400m to 800m, depending on sightlines. The proponent and local Indigenous communities will be notified. Where practicable, used or potentially used large trees and snags will be retained in situ. CWS-ECCC and MNR will be consulted prior to the removal of any trees in the vicinity of confirmed nest sites. Specific permits or authorizations may be required. 	<p>Yes</p> <p>Evening Grosbeak Olive-sided Flycatcher Rusty Blackbird Lesser Yellowlegs Common Nighthawk Bald Eagle Short-eared Owl</p>

Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
				<p><i>Raptors (Short-eared Owl)</i></p> <ul style="list-style-type: none"> ▪ During route selection process, the removal of habitat in fens, bogs and burned areas was avoided to the extent practicable. ▪ Restoration of early successional habitat in temporary areas of disturbance will incorporate downed woody debris to provide suitable habitat for voles, a primary prey species of the Short-eared Owl. ▪ Should any Short-eared Owl be encountered during the construction phase, its location will be documented in wildlife reporting protocols that were developed for the site. ▪ Should evidence of Short-eared Owl breeding activity be encountered during construction within 500 m of the Project Footprint, it will be appropriately documented, and the proponent and local Indigenous communities will be notified. ▪ A qualified biologist or resource specialist shall conduct a ground survey, and delineate (with flagging, fencing, or another appropriate material) a suitable vegetation buffer (e.g., approximately 500 m from a nest depending on level of activity and sightlines). ▪ The buffer of protective vegetation will remain in place until the appropriate regulatory agencies have been contacted, and any required permits or authorizations obtained. <p><i>Shorebirds (Lesser Yellowlegs)</i></p> <ul style="list-style-type: none"> ▪ During the baseline no confirmed migratory stopover or staging areas were identified. ▪ To the extent practicable, construction will occur outside of the nesting season for Lesser Yellowlegs (late April to July) in the vicinity of suitable breeding habitat. ▪ Qualified personnel will search for evidence of nesting habitat, foraging areas and stopover habitat for Lesser Yellowlegs prior to and during construction. If found, the habitat will be documented, the proponent and local Indigenous groups will be informed, and a species-appropriate setback will be established based on guidance from regulatory agencies (e.g., 100m radius around mapped stopover habitat). <p>Operations</p> <p><i>All SAR Birds</i></p> <ul style="list-style-type: none"> ▪ The CEMP will be reviewed and updated as necessary for implementation during Operations. ▪ To the extent practicable, the extent of clearing at quarries, borrow pits and other temporary work areas will be reduced. ▪ Areas that were temporarily disturbed will be reclaimed as soon as practicable following completion of work in each area. <p>Reclamation approaches will facilitate natural regeneration but may be supplemented with transplants from within the RSA, or planting and seeding self-sustaining native species from approved stock.</p> <ul style="list-style-type: none"> ▪ Refer also to Section 11 (Vegetation and Wetlands), Section 12 (Wildlife and Wildlife Habitat) and the following in Appendix E (Mitigation Measures): <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.20 – Quarry Site Selection and Development 	
<ul style="list-style-type: none"> ▪ Changes to SAR bird habitat availability ▪ Changes to abundance and distribution of SAR birds and their habitat 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation clearing and grubbing. ▪ Decommissioning and Site Restoration/Reclamation <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation management. 	Habitat Alteration or Degradation – Habitat Structural Change (and Edge Effects)	<p>Construction</p> <p><i>All SAR Birds</i></p> <ul style="list-style-type: none"> ▪ When selecting the preliminary preferred route, existing areas of disturbance were used where practicable. ▪ A CEMP will be developed that includes detailed plans for vegetation management, wildlife management, site restoration and monitoring. ▪ All conditions of approval for the Project will be followed. ▪ Minimum 30 m vegetation buffers will be maintained around waterbodies. Riparian vegetation will be retained to the extent practicable. 	<p>Yes</p> <p>Evening Grosbeak Olive-sided Flycatcher Rusty Blackbird Lesser Yellowlegs Bald Eagle Short-eared Owl</p> <p>No</p>

Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
				<ul style="list-style-type: none"> ▪ The extent of clearing near other sensitive habitats will be minimized, particularly for temporary work areas. ▪ Construction fencing will be used to delineate the boundaries of work areas, and construction footprints will be kept as small as practicable. ▪ Qualified Project personnel will verify that environmental protection measures have been correctly installed and make any necessary adjustments or modifications. ▪ The ROW will be kept as narrow as practicable, and construction will be phased spatially and temporally. ▪ Shortly after a work area becomes inactive, disturbed habitats shall be reclaimed using approaches that facilitate natural regeneration. Occasionally, restoration will involve transplanting species from within the RSA or planting and seeding self-sustaining species native to the area from approved stock and a reputable supplier. ▪ All restoration activities will be conducted under appropriate environmental conditions. <p><i>Raptors (Bald Eagle)</i></p> <ul style="list-style-type: none"> ▪ To the extent practicable, the clearing of vegetation within ecosites containing suitable nest trees will occur outside of the critical periods for Bald Eagle (March 1 to August 31). ▪ Should an active Bald Eagle nest be encountered during the construction phase, its location will be noted and the measures outlined in the Table above (i.e., under Habitat Loss – Clearance Activities – SAR Birds) will be implemented. <p><i>Raptors (Short-eared Owl)</i></p> <ul style="list-style-type: none"> ▪ To the extent practicable, the clearing of vegetation within ecosites containing suitable habitat for Short-eared Owl will occur outside of the sensitive period for this species (April 1 – August 31). ▪ Should evidence of breeding activity be encountered during the construction phase within 500 m of the Project Footprint, the location will be noted and the measures outlined in the Table above (i.e., under Habitat Loss – Clearance Activities – SAR Birds) will be implemented. <p>Operations</p> <p><i>All SAR Birds</i></p> <ul style="list-style-type: none"> ▪ The re-opening of temporary access roads and laydown areas will be avoided to the extent practicable. ▪ Brushing or clearing of the ROW will not extend beyond the limits of the original area of disturbance (i.e., Project Footprint). ▪ Refer also to Section 11 (Vegetation and Wetlands), Section 12 (Wildlife and Wildlife Habitat) and the following in Appendix E (Mitigation Measures): <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.16 – Erosion and Sediment Control 	Common Nighthawk
<ul style="list-style-type: none"> ▪ Changes to SAR bird habitat availability ▪ Changes to abundance and distribution of SAR birds and their habitat 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation clearing and grubbing ▪ Construction and Use of Supportive Infrastructure. ▪ Construction of road, including earth excavation, grading and hauling operations. ▪ Construction of permanent waterbody crossing. <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Road drainage system maintenance and repairs. ▪ Access road maintenance. 	Habitat Alteration or Degradation – Hydrological Changes	<p>Construction</p> <p><i>SAR birds that inhabit wetlands and/or nest on the ground</i></p> <ul style="list-style-type: none"> ▪ During Project planning, the study team considered consolidation and compression processes of the peat layers. ▪ Temporary crossings will be designed to accommodate anticipated water flows during their lifespan. ▪ Cross-culverts will be installed at regular intervals in lowland areas to prevent water from ponding on either side of the roadway. ▪ Qualified Project personnel will verify that environmental protection measures have been correctly installed and make any necessary adjustments or modifications. 	<p>Yes</p> <p>Olive-sided Flycatcher Rusty Blackbird Lesser Yellowlegs Common Nighthawk Short-eared Owl</p> <p>No</p> <p>Evening Grosbeak Bald Eagle</p>

Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
				<p>Operations</p> <ul style="list-style-type: none"> ▪ Culverts will be regularly maintained (i.e., inspected and repaired as necessary) ▪ Culverts and other crossings should be regularly checked for accumulated debris and blockages. Accumulated debris will be appropriately removed. ▪ Refer also to Section 7 (Surface Water Resources), Section 8 (Groundwater Resources), Section 11 (Vegetation and Wetlands), Section 12 (Wildlife and Wildlife Habitat) and the following in Appendix E (Mitigation Measures): <ul style="list-style-type: none"> ▫ Section 5.7 – Temporary Watercourse Crossings ▫ Section 5.11 – Bridge and Culvert Installation ▫ Section 5.16 – Erosion and Sediment Control ▫ Section 5.22 – Water Quality Monitoring 	
<ul style="list-style-type: none"> ▪ Changes to abundance and distribution of SAR birds 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation clearing and grubbing. ▪ Construction and Use of Supportive Infrastructure. ▪ Construction of road, including earth excavation, grading and hauling operations. ▪ Construction of permanent waterbody crossing. <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Road Usage. ▪ Access road maintenance. ▪ Vegetation management. 	Alteration in Movement – Loss of Connectivity	<p>Construction</p> <p><i>All SAR Birds</i></p> <ul style="list-style-type: none"> ▪ When selecting the preliminary preferred route, existing areas of disturbance were used where practicable. ▪ A CEMP will be developed that includes detailed plans for vegetation management, wildlife management, site restoration and monitoring. ▪ All conditions of approval for the Project will be followed. ▪ Minimum 30 m vegetation buffers will be maintained around waterbodies. Riparian vegetation will be retained to the extent practicable. ▪ The ROW will be kept as narrow as practicable. ▪ Construction of the ROW will be phased, so that areas of connected habitat remain available. ▪ Construction footprints will be kept as small as practicable. Clearing will be minimized/restricted near sensitive areas. ▪ Bridge designs will be used instead of causeways at larger watercourse crossings. ▪ Temporary area(s) of disturbance will be reclaimed as soon as practicable following the completion of work in that area. ▪ Restoration approaches will encourage natural regeneration. Occasionally, these will be augmented by planting and seeding self sustaining species indigenous to the RSA (i.e., as necessary). ▪ All restoration will be conducted under the appropriate environmental conditions. ▪ The effectiveness of restoration will be evaluated throughout construction, with modifications made as necessary prior to operations. <p>Operations</p> <ul style="list-style-type: none"> ▪ The CEMP will be reviewed and updated as necessary to prepare an OEMP. The OEMP will be implemented during operations. ▪ During maintenance activities, vegetation will be retained to the extent practicable, and the width of the ROW will be limited. <p>The effectiveness of mitigation measures and restoration efforts will be evaluated.</p> <ul style="list-style-type: none"> ▪ Refer also to Section 12 (Wildlife and Wildlife Habitat) and the following in Appendix E (Mitigation Measures): <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.21 – Site Decommissioning and Rehabilitation ▫ Section 5.14 – Wildlife and Wildlife Habitat 	<p>Yes</p> <p>Evening Grosbeak Olive-sided Flycatcher Rusty Blackbird Lesser Yellowlegs</p> <p>No</p> <p>Bald Eagle Common Nighthawk Short-eared Owl</p>

Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
<ul style="list-style-type: none"> ▪ Changes to SAR bird survival and reproduction ▪ Changes to SAR bird species richness 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ All construction activities. <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Road Usage. 	Injury or Death – Increased Access	<p>Construction</p> <p><i>All SAR Birds</i></p> <ul style="list-style-type: none"> ▪ As part of the CEMP, a Wildlife Management Plan will be prepared. ▪ Access to the Project Footprint will be restricted to Project personnel during construction. ▪ Firearms will be prohibited from camps and construction areas. ▪ Camps and rest areas will be kept clean (free of food waste) to reduce encounters with scavengers. Appropriately store petroleum products and other toxic materials that may attract predators to the Project Footprint. ▪ Areas of temporary disturbance will be blocked off until they revegetation has occurred. <p>Operations</p> <ul style="list-style-type: none"> ▪ The CEMP will be reviewed and updated, as necessary, to develop an OEMP. ▪ All conditions of environmental approval will be followed. ▪ Pullout areas along road will be limited. ▪ All maintenance areas will be fenced, with strategic locations accessible to operations personnel. ▪ Areas of temporary disturbance (e.g., decommissioned quarry sites or access roads) will be reclaimed as soon as practicable following use. ▪ Refer also to Section 12 (Wildlife and Wildlife Habitat), Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.20 – Quarry Decommissioning ▫ Section 5.21 – Site Decommissioning and Rehabilitation 	<p>No</p> <p>Evening Grosbeak Olive-sided Flycatcher Rusty Blackbird Lesser Yellowlegs Common Nighthawk Bald Eagle Short-eared Owl</p>
<ul style="list-style-type: none"> ▪ Changes to SAR bird survival and reproduction 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road Construction. ▪ Vegetation clearing and grubbing. ▪ Blasting. ▪ Construction and Use of Supportive Infrastructure. ▪ Materials and Equipment Delivery. <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Road Usage. 	Injury or Death – Collisions with Vehicles	<p>Construction</p> <p><i>All SAR Birds</i></p> <ul style="list-style-type: none"> ▪ Speed limits for construction vehicles will be enforced on the ROW, in camps and along access roads. ▪ Access to the road during construction will be limited to Project personnel. ▪ Safe travel protocols will be integrated in the Health and Safety Management Plan. <p><i>Bald Eagle</i></p> <ul style="list-style-type: none"> ▪ Any roadkill that may act as an attractant to Bald Eagle or other raptors will be removed as soon as practicable. <p><i>Short-eared Owl</i></p> <ul style="list-style-type: none"> ▪ Slower speed limits will be enforced in areas where suitable foraging habitat for Short-eared Owl occurs adjacent to the road. ▪ Project personnel will be provided with educational training Short-eared Owl and will implement a reporting program should any be encountered during construction. ▪ Project personnel that drive vehicles and/or operate machinery shall be made aware that the species is most active in the early morning and early evening. Personnel will be reminded to be particularly alert during these times. ▪ Signage to be posted in suitable locations to alert Project personnel about the reduced speed limits in such areas. <p><i>Common Nighthawk</i></p> <ul style="list-style-type: none"> • During construction monitoring, if any areas are identified as having high numbers of bird strikes, signage will be posted and reduced speed limits will be enforced. • Educational training about this SAR bird and others will be completed for Project personnel and a reporting program implemented. 	<p>Yes</p> <p>Evening Grosbeak Olive-sided Flycatcher Rusty Blackbird Lesser Yellowlegs Common Nighthawk Bald Eagle Short-eared Owl</p>

Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
				<p>Operations</p> <p><i>All SAR Birds</i></p> <ul style="list-style-type: none"> ▪ Line of sight will be maintained along roadways. ▪ Potential movement corridors will be identified, and signage indicating reduced speeds posted in those areas. ▪ Speed limits on proponent-controlled sections of road will be enforced. <p><i>Bald Eagle</i></p> <ul style="list-style-type: none"> ▪ Any roadkill that may act as an attractant to Bald Eagle or other scavengers will be removed as soon as practicable. <p><i>Short-eared Owl</i></p> <ul style="list-style-type: none"> ▪ As a precautionary measure, any maintenance activities that would disturb early successional vegetation or the ground surface adjacent to the ROW or areas of Operation will not occur during the breeding season for Short-eared Owl. ▪ Refer also to Section 11 (Vegetation and Wetlands), Section 12 (Wildlife and Wildlife Habitat), and to the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.14 – Wildlife and Wildlife Habitat 	
<ul style="list-style-type: none"> ▪ Changes to SAR bird survival and reproduction 	<p>Construction and Operations</p>	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road Construction. ▪ Vegetation clearing and grubbing. ▪ Blasting. ▪ Construction and Use of Supportive Infrastructure. ▪ Construction of permanent waterbody crossing. <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Vegetation management. 	<p>Injury or Death – Incidental Take</p>	<p>Construction</p> <p><i>All SAR Birds</i></p> <ul style="list-style-type: none"> ▪ Plans for Wildlife Management and Construction Blasting will form part of the CEMP and be implemented during construction. ▪ Sensitive features will be identified during pre-construction and have vegetation buffers established around them. ▪ The boundaries of such buffers will be clearly delineated (e.g., with fencing) to prevent habitat destruction. ▪ Environmental orientation will be provided as part of health and safety training and will include information about applicable legislation and provides direction regarding what to do in the event of encounters with SAR birds. ▪ Vegetation removal in suitable nesting habitat will be conducted outside of the nesting period for migratory birds (April 25 to August 29). ▪ If removal of vegetation is required during these windows, targeted nest sweeps shall be conducted by qualified personnel. Active nests may require a work stoppage while the proponent and local Indigenous groups are contacted, and a species-specific vegetation buffer implemented. Regulatory agencies may need to be consulted for authorization or permits prior to the resumption of work. ▪ Blasting will also be conducted outside SAR bird nesting windows and will be limited to areas where other methods, such as drilling and standard excavation, are not possible. ▪ Site specific blasting plans will be developed, including control measures for fly-rock to reduce the possibility of injury from projectiles. <p>Operations</p> <p><i>All SAR Birds</i></p> <ul style="list-style-type: none"> ▪ The CEMP will be reviewed and updated for development of an OEMP. It will be implemented during operations. ▪ The boundaries of the vegetation management areas will be clearly delineated to prevent habitat destruction beyond the limits of the work area. ▪ Mowing and brushing shall be timed to occur outside of nesting periods for SAR birds. ▪ Prior to removal, hazard trees will be assessed for potential use by SAR. 	<p>Yes</p> <p>Evening Grosbeak Olive-sided Flycatcher Rusty Blackbird Lesser Yellowlegs Common Nighthawk Bald Eagle Short-eared Owl</p>

Indicators	Project Phase	Project Component or Activity	Potential Effect	Key Mitigation Measures	Predicted Net Effect
				<ul style="list-style-type: none"> ▪ If birds within the work area (e.g., vicinity of quarries or aggregate pits) are displaying breeding behavior, appropriate mitigation measures will be applied, potentially including stopping maintenance activities and establishing buffers around nest. ▪ Refer also to Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.12 – Blasting Near a Watercourse ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.20 – Quarry Site Selection and Development 	
<ul style="list-style-type: none"> ▪ Changes to SAR bird survival and reproduction ▪ Changes to predator access, habitat use and population 	Construction and Operations	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Road Construction. ▪ Vegetation clearing and grubbing. ▪ Construction and Use of Supportive Infrastructure. <p>Operations Phase:</p> <ul style="list-style-type: none"> ▪ Road Usage. ▪ Vegetation management. 	Injury or Death – Changes to Predator-Prey Relationships	<p>Construction</p> <p><i>All SAR Birds</i></p> <ul style="list-style-type: none"> ▪ The boundaries of the work areas will be clearly delineated to prevent habitat damage and destruction beyond the construction footprint. ▪ Temporarily disturbed areas and access roads will be blocked off until reclamation has been completed. <p><i>Upland SAR Birds</i></p> <ul style="list-style-type: none"> ▪ Where practicable, a multilayer vegetation edge will be retained. <p><i>Ground nesting species such as Short-eared Owl</i></p> <ul style="list-style-type: none"> ▪ Measures that discourage the hunting efficiency of red fox and other land predators, will be incorporated as part of restoration activities. ▪ Camps and other temporary work areas will be kept clear of debris, with waste being stored appropriately to avoid attracting corvids and other scavengers that can prey upon eggs and young birds. <p>Operations</p> <p><i>All SAR Birds</i></p> <ul style="list-style-type: none"> ▪ Maintenance activities that clear vegetation along the ROW will be minimized. ▪ Vegetation removal along ROW should stay within original boundaries and not create abrupt edges. <p><i>Bald Eagle</i></p> <ul style="list-style-type: none"> ▪ Roadkill shall be quickly removed to reduce predator attractants. <p><i>Short-eared Owl</i></p> <ul style="list-style-type: none"> ▪ Measures that discourage the efficiency of land predators, such as red fox, will be incorporated during the operations phase. For example, vegetation along the ROW that is 2 m in height or less will be maintained to the extent practicable, while still permitting line of sight for drivers. ▪ Refer also to the following in Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.1 – Clearing and Grubbing ▫ Section 5.14 – Wildlife and Wildlife Habitat ▫ Section 5.21 – Site Decommissioning and Rehabilitation 	<p>Yes</p> <p>Evening Grosbeak Olive-sided Flycatcher Rusty Blackbird Lesser Yellowlegs Common Nighthawk Bald Eagle Short-eared Owl</p>

13.4.7 Lake Sturgeon (Hudson Bay – James Bay population)

13.4.7.1 Changes to Quantity and Quality of Fish Habitat

The following mitigation and enhancement measures are recommended to reduce the potential changes to Quantity and Quality of Fish Habitat. A summary of all the recommended mitigation and enhancement measures are presented in Table 10.12.

13.4.7.2 Destruction/Loss of Fish Habitat

During road construction and operations, the following key mitigation measures will be implemented to avoid and minimize the reduce the destruction/loss of fish habitat. Each of these measures will help reduce one or more of the potential effects of the Project on the quantity and/or quality of fish habitat.

13.4.7.2.1 General Avoidance Measures and Project Planning and Design

Potential effects to fish and fish habitat were avoided to the extent possible during the planning phase and through the alternate route evaluation and preferred route selection. Key avoidance and project planning measures proposed to reduce or eliminate effects on fish habitat include:

- Applicable best management strategies, avoidance and mitigation measures will be applied using the practices within the MNR Environmental Guidelines for Access Roads and Water Crossings (MNR 1990), MNR and DFO protocol for the review and approval of forestry water crossings (MNR and DFO 2021), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a) and applicable Codes of Practice (DFO 2022c), and standard mitigation measures presented in the Ministry of Transportation/Fisheries and Oceans/Ministry of Natural Resources (MTO/DFO/MNR) Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings (MTO/DFO/MNR 2020).
- The preferred route has been selected with consideration to minimize the number of waterbody crossings for the road, where feasible, as well as the Project Footprint will be minimized to the extent possible.
- Permanent culverts and bridge crossings have been designed to accommodate the complete existing bankfull channel width of a watercourse, preserving and minimizing impacts to fish habitat.
- For culverts (i.e., open bottom steel arch) at 17 watercourse crossing locations, the design mitigation will include the infilling of the culvert with material (i.e., aggregate) that resembles the natural substrate present at the watercourse, as well the creation of a low flow channel that mimics the existing stream channel. The same will be done for corrugated steel culverts found at the remaining eight crossings requiring culverts. The purpose is to minimize habitat loss by enabling the channel to function as “naturally” as possible to convey flow; maintain channel form and function; and retain fish passage.
- For larger waterbody crossings bridges have been selected for design and construction which are expected to reduce the total fish habitat loss. These locations are:
 - Winisk Lake crossing (WB-1);
 - Unnamed Tributary to Muketei River crossing (WC-19);
 - Winiskisis Channel crossing (WC-3);



- Muketei River crossing (WC-26);
 - Ekwan River crossing (WC-10); and
 - Unnamed watercourse crossing (WC-27).
- Fish habitat delineation and mapping, Standards, and specifications for protection of fish/fish habitat will be developed in the CEMP and OEMP for implementation to limit accidental disturbances (habitat loss) beyond the Project Footprint. These measures include:
 - Construction and/or silt fencing will be installed to clearly delineate the boundaries of the work areas to prevent habitat damage and destruction beyond work area boundaries. Where feasible, 30 m buffers will be established around riparian areas.
 - Construction personnel and equipment will be directed to avoid entering and crossing any watercourses or areas not required for construction.
 - Work vehicles and equipment will be restricted to designated work areas and access roads.
 - Maps identifying fish habitat, riparian buffers and no-go zones will be created and distributed to construction and operation personnel.
 - Signage and setbacks will be used to identify fish habitat and communicate restrictions for entering riparian areas.
- Channel realignments/infilling will be avoided through Project planning and design to the extent practicable. Channel realignments/infilling will only be undertaken in locations where specific conditions are met and/or where required based on the detail design for each permanent waterbody crossing structure to be determined in the future developed stage of the Project. If required, DFO/MNR permitting and consultation will be undertaken to reduce the risk of negatively impacting the aquatic environment.
- Sensitive habitats will be avoided (e.g., SAR/SOCC habitats, spawning areas, groundwater upwellings, etc.) where permit conditions apply and through project planning and design.
- All temporary construction camps and temporary laydown areas and aggregate source areas (i.e., ARA-2 and ARA-4) and permanent supportive infrastructure (e.g., maintenance and storage facility, rest areas and Maintenance turn-around areas) will be located a minimum of 50 m back from the ordinary high-water mark of a waterbody through detailed planning.
- Refuelling, service, and maintenance of construction and operation vehicles and equipment will generally be carried out in designated areas at temporary construction camps, temporary laydown areas, and operations and maintenance facility located a minimum of 100 from waterbodies. These areas will be designed and constructed to collect and contain minor leaks and spills. If refuelling within 100 of a waterbody cannot be avoided, enhanced spill containment measures will be used. In the event that refuelling, servicing and maintenance is required in the field. There may be locations where this is not possible due to the prevalence of wetlands (i.e., peatland areas); however, in these locations enhanced spill containment measures will be used.
- The number of temporary water crossings required for the Project will be minimized, where possible.

13.4.7.2.2 Habitat Offsetting and Enhancement

The number of temporary and permanent water crossings for the Project will be minimized, where possible. However, even with this avoidance strategy, it is understood that the Project will result in death of fish and Harmful alteration, disruption, and/or destruction HADD of fish habitat within the Project Footprint. As a result, waterbodies where HADD and/or death of fish occur will require habitat offsetting in order to comply with the *Fisheries Act* and conditions anticipated in the *Fisheries Act* authorization(s).



Once the Project design is finalized, any net effects to fish/fish habitat will be offset through habitat creation or habitat enhancement to achieve no net loss of fish habitat and/or productive capacity. Habitat offsetting and enhancement requirements will be determined in consultation with DFO and First Nations during the detail design permitting phase of the Project.

13.4.7.3 Harmful Alteration and Disruption of Fish Habitat

During road construction and operations, the following key mitigation measures will be implemented and monitored to reduce the harmful alteration and/or disruption of fish habitat. Each of these measures will help reduce one or more of the potential effects of the road.

13.4.7.3.1 Temporary Watercourse Crossings

Where temporary watercourse crossings within road ROW are identified to facilitate construction of structures or for haulage of earth/fill for the construction of the WSR, they will be designed and constructed using best management practices and guidance, along with proposed mitigation measures for permanent watercourse crossings identified as part of this EA/IA. Where temporary waterbody crossings are required, these will be minimized to the extent where appropriate. Waterbody crossings may involve temporary bridges (i.e., clear-span bridges, rig mats), ice bridges/snow fills (for winter construction); and may potentially include culverts. As appropriate, some waterbody crossings may use a very short-term rig mat to facilitate clearing and access equipment, before being immediately replaced with a temporary bridge. Where temporary waterbody crossing structures are proposed, the primary preferred structures to be used are clear-span bridges, ice bridges/snow fills (for winter construction), culverts, and rig mats.

Where in-water work is required to install a temporary waterbody crossing structure, such as a culvert, water management may include the use of cofferdams, diversion channels or by-pass pumps to isolate the work zone. Fish within the isolated work zone will be rescued (i.e., safely relocated) by qualified professionals prior to construction under the conditions of a MNR Licence to Collect Fish for Scientific Purposes.

The proponent, or its contractor, will incorporate best management practices for temporary watercourse crossings in the MNR Environmental Guidelines for Access Roads and Water Crossings (MNR 1990), and DFO's Measures to Protect Fish and Fish Habitat (DFO 2022) and applicable Interim Codes of Practice for Temporary Stream Crossings.

To avoid any permanent loss or alteration of fish habitat, temporary crossing materials, if used, will be removed immediately following the completion of construction activities. Upon removal of the crossing materials, the waterbody bed and banks will be returned to their original conditions if needed and disturbed areas will be stabilized, as necessary, to prevent soil erosion.

13.4.7.3.2 Project Planning and Design

Several water crossings have design mitigation that is proposed to reduce and or eliminate effects of alteration and disruption of fish habitat. Specifically, these will limit the placement of materials in water and/or project clearing that will be required, reducing alteration of substrates or vegetation. These include:

- Culverts and bridges are designed to match or exceed expected flow rates to provide capacity for expected water levels and water volumes. This includes consideration of site-specific and discharge rates at crossing to inform on the appropriate sizing of the water crossing structures.



- Bridge designs have been adopted for larger watercourse crossings which are expected to reduce harmful alteration and/or disruption of fish habitat by spanning over the waterbody and minimizing the placement of the structures in-water.
- Similar to the mitigation identified in **Section 13.4.8.1** for habitat loss, culvert design criteria have been used to dictate the function of the culvert including the minimum and maximum water levels in culverts for fish passage, erosion control and the proper hydraulic function of culverts. Culverts will be embedded by 10% to consider low flow conditions and aligned parallel to the waterbody channel on a straight section of uniform gradient. Culverts will be designed for fish passage at the lowest trophic levels of each system and will meet DFO's species specific passage requirements. This will aid in the ability to reduce the risk of the culvert installation introducing velocities which surpass swimming abilities of a waterbody's fishery (MNR and DFO 2021). Open bottom culverts (i.e., steel arch structure culverts with no bottom that do not disturb the bed of a waterbody) have been considered for 17 water crossings that has been determined to be sensitive in the fish/fish habitat assessment. Additional mitigation options may also be implemented for culverts to minimize net habitat alteration or loss and optimize usage and passage by fish such use of baffles, gradient pools, keyed stones, etc., where required. For proposed open bottom culverts and closed culverts (e.g., corrugated steel pipes), substrates will be placed inside the culvert to mimic the existing substrates upstream of the crossing to reduce habitat alteration.
- Culvert length will be minimized to reduce habitat alteration and disruption, where possible.
- Materials placed in-water will be erosion-resistant, or covered with such materials, to reduce erosion and sedimentation and limit downstream habitat alteration and disruption.
- During the construction phase a CEMP will be implemented and during operations an OEMP will be implemented. Management plans will be consistent with the requirements of the Project's permits and authorizations to minimize the potential effects of construction and operations activities on fish and fish habitat. Management Plans will guide the proponent and its contractors in complying with applicable environmental legislation by providing criteria, standard protocols, and commitments to mitigation measures in the EA/IA to eliminate, reduce, and/or offset potential adverse effects to fish and fish habitat. During construction and/or operations, the following key environmental management plans relevant to the Fish and Fish Habitat VC within the broader CEMP and OEMP will be developed and implemented.
 - Erosion and Sediment Control Plan;
 - Fish and Fish Habitat Management Plan;
 - Surface Water and Storm Water Management and Monitoring Plan;
 - Air Quality and Dust Control Management Plan;
 - Construction Blasting Management Plan; and
 - Vegetation and Invasive Species Management Plan.
- The CEMP and OEMP will include the environmental monitoring requirements during the construction and operation phases of the Project to confirm and document compliance with the provisions of the CEMP and OEMP and conditions of applicable permits and approvals. During the construction phase, Environmental Monitor(s) and/or Indigenous Monitor(s) will be on-site to observe and document/log the implementation of mitigation measures implemented to minimize the potential effects of construction on fish and fish habitat. The documentation log will identify any deficiencies and record the actions taken to correct any issues of concern.



13.4.7.3.3 Vegetation Clearing

A vegetation clearing standard will be established to limit the potential effects of the Project on riparian and in-water vegetation (i.e., aquatic plants) that is important for fish and fish habitat, reducing the alteration of fish habitat. Key mitigation measures to be implemented include following:

- Vegetation clearing will be conducted using appropriate equipment to prevent tree dragging and minimal earth disturbance in riparian areas of waterbodies.
- Clearing of riparian habitat will be minimized, where possible, as riparian habitat provides a buffer to fish habitat, regulates water levels, and controls erosion and sediment.
- Vegetation removal within the ROW will be limited to the footprint of structures placed at water crossing and where feasible to retain a 30 m riparian buffer upstream and downstream of the structure crossings to limit habitat alteration and disruption.
- Allow for compatible vegetation to grow back within the ROW, including riparian areas, to heights compatible with safe operation of the road.
- Develop and implement a Vegetation and Invasive Species Management Plan detailing that includes details on vegetation restoration/reclamation and riparian area stabilization using native riparian/wetland seed mixes, if applicable, to stabilize soils/banks to pre-construction condition or better.
- Use of only approved seed mix species and/or plant species of importance to Indigenous communities for site restoration of riparian areas.
- Details on implementation of a post-construction monitoring plan, which will include activities such as examining and documenting the success of revegetation and restoration measures.
- An Erosion and Sediment Control Plan will be developed and implemented to contain, manage site drainage and run-off.

Unless prompt revegetation is required for erosion control, most riparian areas will be left to naturally revegetate following grading and stabilizing activities. However, restoration may include site-specific measures to promote the natural revegetation of disturbed areas, where feasible. Erosion control during construction will be maintained until the disturbed ground has been adequately stabilized with vegetation.

13.4.7.3.4 Storage and Handling of Materials

A Standard for the storage, handling and stockpiling of non-hazardous materials will be established to reduce the potential for erosion and accidental deposition of materials that may impair surface water quality and impact fish or fish habitat. This will reduce/limit the effects of accidental spills and/or changes to water quality. These measures will also limit the introduction of invasive species during construction or operations. Key mitigation measures will include, but are not limited to, the following:

- The temporary storage, handling and disposal of materials used or generated (e.g., organics, soils, woody debris, temporary earth stockpiles, construction debris, etc.) during site preparation, construction and clean-up will be located a minimum 30 m from waterbodies to reduce the risk of that sediment or deleterious substances entering a waterbody.
- Excess material will be managed and monitored to prevent sediment-laden water from entering watercourses and/or waterbodies and affecting fish habitat.
- Materials stored long-term will be covered and stabilized to reduce erosion and sedimentation.
- Waste materials will be hauled off-site for disposal or placed in environmentally stable locations.
- An Erosion and Sediment Control Plan will be developed and implemented to contain, manage site drainage and run-off (see **Section 10.4.1 – Changes to Quantity and Quality of Fish Habitat**).



13.4.7.3.5 Erosion and Sediment Control

An Erosion and Sediment Control Plan will be developed as part of the CEMP and OEMP. This plan will be prepared prior to construction and will include site-specific erosion and sediment control (ESC) drawings and specifications to control erosion and sedimentation from construction and operation activities. The ESC measures as set out in the Erosion and Sediment Control Plan (and approved by relevant regulators) will be installed prior commencing work with the objective to reduce erosion and sediment deposition in fish habitat, and potential habitat alteration or degradation. This will reduce/limit the effects of accidental spills and/or changes to water quality. The ESC measures and procedures will include, but are not limited to:

- Sediment fencing, silt curtains, and erosion control stabilization materials (e.g., straw mulch, wood chips, erosion control blanket, etc.) will be installed to limit the migration of sediment or release of deleterious substances into fish habitat.
- Work will be restricted during high precipitation or run-off events to reduce erosion potential to the extent practicable and in-water work associated with water crossing will be conducted in the dry season or ice-on conditions to minimize risk to negatively impact fish habitat.
- Temporary and/or permanent erosion control measures such as rip-rap or other materials will be placed along road where it interacts with water, to reduce erosion potential.
- Seeding and revegetation will be completed as soon as the final surfaces are prepared to control erosion and help promote establishment of native vegetation. A healthy native vegetation community will also limit the introduction of invasive species.
- Sediment-laden water generated on-site will be pumped into a well-vegetated area at least 30 m from fish habitat to prevent infiltration into fish habitat.
- ESC measures will be installed, monitored, and managed as appropriate to reduce the risk of sediment reaching a waterbody prior to and during construction.
- Disturbed areas will be re-contoured to restore drainage patterns to the approximate pre-construction conditions, where practicable.
- Complete instream construction in isolation of flowing water (i.e., use isolation methods where surface water exists at the time of construction). Isolation measures will follow the DFO Interim Standard for In-water Site Isolation (DFO 2023a).
- Environmental Monitor(s) will be on-site during construction to monitor the installation, use and removal of temporary water crossing structures and during installation of permanent water crossing structures.
- Temporary ESC measures must be:
 - Installed according to the plan;
 - Installed before or immediately after initial disturbance; and
 - Monitored and effectively maintained (e.g., repaired, replaced or supplemented with functional materials) throughout construction until permanent erosion control is established, or restoration is complete.



13.4.7.3.6 Spill Prevention and Response

Spills during construction and operations that occur in high enough concentrations could negatively affect water and sediment quality and cause direct acute/chronic toxicity to fish, affect reproduction survival, and as results changes in abundance and diversity of fish and/or fish habitat Spills, should they occur, are predicted to be generally local in nature; however, literature suggest that the introduction of deleterious materials into a waterbody can have acute and chronic impacts on the aquatic environment. Considering the nature of work associated with the Project, the most plausible types of spills have been identified as petroleum hydrocarbons (i.e., fuel and/or oil) products from machinery and equipment, and potential release of cementitious materials for concrete work at waterbody crossings that may increase water pH and cause mortality or long-term health issues to fish.

Mitigation measures to prevent and respond to accidental spills and protect fish and fish habitat are summarized below and further described in Appendix E (Section 5.2 – Petroleum Handling and Storage, Section 5.3 – Spill Prevention and Emergency Response, Section 5.5 – Material Handling and Storage, Section 5-17 Concrete Washout Management Practices). A Spill Prevention and Emergency Response Management Plan will be developed and implemented during construction. After construction is complete, this plan will be adapted for the operations phase of the Project. Spill prevention and emergency response management measures will include, but not be limited to:

- All vehicles and equipment will be stored at least 30 m from waterbodies and operated in a way that prevents the release of deleterious substances into a waterbody, irrespective of their fish-bearing status.
- Re-fueling, service and maintenance of equipment and vehicles will generally be carried out in designated areas at temporary construction camps, and laydown areas along the road, and will be located at least 50 m away from waterbodies, and outside of fish habitat.
- Any vehicle or equipment that enters a waterbody must be free of fluid leaks and externally cleaned and degreased.
- Storage of above ground fuel storage tanks and other hazardous materials will be located at least 50 m from waterbody, irrespective of their fish-bearing status.
- Fuel and hazardous materials will be transported in approved containers in licensed vehicles and stored in such a way to reduce the risk of any deleterious substances from entering a waterbody.
- Vehicles and equipment will not be permitted to work in-water, unless required. In these cases, works will be conducted under observation by a qualified environmental monitor.
- Concrete truck washout areas will be located a minimum of 50 m away from the ordinary high-water mark of a waterbody and in a non-porous soil location and will be cleaned be cleaned up at the end of the construction activities.
- Fuels and other liquid contaminants will be stored in containers with secondary containment able to store 110% of the capacity of the container.
- Containers will be routinely inspected for leaks.
- Spill mitigation measures (spill kits) will be present on-site in all laydown areas, vehicles, equipment, and other designated locations. In the event of a spill/leak, the following precautions will be implemented:
 - The spill/leak will be contained and either disposed of through site waste handling systems or removed for disposal in approved facilities;
 - Reportable spills (as defined under O. Reg. 675/98) of potentially deleterious materials will be reported to the MECP Spills Action Centre; and



- If the spill is in fish-bearing water or where potential for harm to fish or fish habitat is likely, the MNR and DFO will also be contacted.
- Construction will be modified or delayed during heavy precipitation or run-off events.
- Signage or reduced speed limits will be considered for implementation over bridges to reduce the risk of vehicle accidents and spills.
- Individuals working on-site and handling petroleum or other hazardous materials will be trained in best practices related to the transportation and handling of dangerous goods.

13.4.7.3.7 Dewatering Activities

Dewatering refers to the process of removing groundwater or surface water from a construction site in order to create a dry, stable work environment for excavation, temporary stream flow diversion and/or structural foundation work at waterbody crossings. Dewatering has the potential to change local hydrology and groundwater conditions and may negatively impact the quality and quantity of fish habitat. Dewatering measures to prevent potential harm to fish and fish habitat will include but not be limited to:

- All dewatering will be conducted in compliance with the Ontario Provincial Standard Specification (OPSS) 517 – Construction Specifications for Control of Water from Dewatering Operations, and OPSS 518 – Construction Specification for Dewatering of Pipeline, Utility, and Associated Structure Excavation.
- Dispersal mechanisms (e.g., tarping, filter bags) will be used to minimize risk of erosion, as required.
- Existing stream flows will be maintained without interruption or diminishment during construction, where feasible.
- Fish screens to prevent impingement or entrainment will be utilized to reduce fish mortality. DFO guidance for fish screens (2020) will be followed.
- Complete instream activity in the shortest timeframe practical to minimize the duration and reduce the risk of severe disturbance from dewatering activities.
- Manage temporary flows, withdrawal, and discharge, including all water from dewatering operations to reduce the risk of erosion and/or release of sediments to a waterbody.

13.4.7.3.8 Air Contaminants and Dust Emissions

Construction and operations of the Project are expected to generate air contaminants and fugitive dust emissions that could lead to changes in-water quality, which could affect fish habitat quantity and quality. The air quality measures in Section 9 include the development and implementation of a Dust and Air Quality Management Plan prior to construction and for this plan to be updated for the operations phase of the Project. Section 9 described the specific measures in detail and the following key mitigation measures will be applied to minimize impacts to fish habitat:

- Limit vehicle emissions.
- Vehicles and equipment will be regularly serviced, maintained and inspected to ensure they are good working order per manufacturer specifications.
- Obey all speed limits to limit fugitive dust.
- Exposed excavations, disturbed ground surfaces and the road surface will be sprayed with water as a dust control practice, where deemed necessary.
- Slash pile burning from clearing operations will be subject to permits and approvals by appropriate regulatory agencies and in compliance with O. Reg. 207/96.



- Minimize dust-generating activities, where required, during periods of high wind to limit dust emissions and spread.
- Restore disturbed areas as soon as reasonably possible to minimize duration of soil exposure.
- Multi-passenger vehicles will be used to transport construction personnel to the job site, where practicable.

13.4.7.4 Change in Fish Access to Habitats

Placement of water crossing structures in waterbodies can potentially cause changes in fish accessibility to habitat through the introduction of obstructions or barriers to fish passage during construction and operations, the following key mitigation measures will be implemented and monitored to limit the creation of barriers to fish passage and resulting potential changes in fish access to habitats.

13.4.7.4.1 Project Planning and Design

As part of the project planning and design mitigation is proposed to reduce or eliminate potential changes to access to fish habitat from the placement of water crossing structures in waterbodies, associated with effects of the introduction of barriers to fish passage. Mitigation measures will reduce the effects of both temporary flow isolation structures, as well as those caused by permanent culvert/bridge installations. These design mitigation measures include, but are not limited to:

- Larger watercourse crossings will incorporate bridge designs that span the waterbody and avoid the potential for creation of barriers to fish passage.
- Bridges will be installed at up to six of the larger watercourses along the roadway to reduce barriers to fish passage. The specific locations include:
 - Winisk Lake (WB-1);
 - WC-19 (Unnamed Tributary to Muketei River);
 - Winiskisis Channel (WC-3);
 - Muketei River (WC-26);
 - Ekwan River (WC-10); and
 - WC-27 Crossing.
- Flow and migratory fish passage routes will be maintained at all crossings including bridges and culverts.
- Culvert inlets, outlets, and substrates at water crossings will be designed to replicate existing habitat conditions and characteristics of the watercourse channel upstream and downstream of the crossing.
- Culverts will be appropriately sized to allow fish passage and will maintain the flow and water depth characteristics observed during existing conditions studies.
- Similar to the mitigation identified in **Sections 13.4.8.1 (Injury or Death of Fish)** culverts will be embedded by 10% to consider low flow conditions and aligned parallel to the watercourse on a straight section of uniform gradient. Culverts will be designed for fish passage at the lowest trophic levels of each system and will meet DFO's species specific passage requirements. This will aid in the ability to reduce the risk of the culvert installation introducing velocities which surpass swimming abilities of a waterbody's fishery (MNR and DFO 2021). Open bottom culverts (i.e., steel arch structure culverts with no bottom that do not disturb the bed of a waterbody) have been considered for 17 water crossings that has been determined to be sensitive in the fish/fish habitat assessment. Additional mitigation options may also be implemented for culverts to minimize and avoid the



introduction of barrier to fish passage and facilitate passage by fish such use of baffles, gradient pools, keyed stones, etc., where required.

- Where possible, culverts will be oversized to prevent affects associated with beaver activity.

13.4.7.4.2 Culvert Maintenance and Monitoring

A regular culvert inspection, maintenance program and monitoring will be implemented during the construction and operation phases of the Project. These programs will reduce the effects of culverts being clogged with debris, which could present visual of physical barriers to fish passage. This includes, but is not limited to:

- Culverts will be regularly monitored and maintained during construction and operation to allow for fish passage. Debris removal activities will follow DFO's Code of Practice: Culvert Maintenance (2023) (i.e., gradual removal such that flooding downstream, extreme flows downstream, release of suspended sediment, and avoidance of fish stranding).
- Implement the fish and fish habitat protection procedures for culvert maintenance as documented in the Ministry of Transportation Fisheries – Best Management Practices Manual (MTO, 2020).
- Adjusting maintenance and inspection schedules according to how quickly culverts fill with debris.
- Implementing a beaver dam removal plan to minimize potential effects on fish habitat availability. Where beaver dam removals are required to facilitate the installation or maintenance/repair of water crossing structures, the activity will be completed in consideration of best management practices and environmental permit/approval conditions (once available), including MNR guidelines for access roads (MNR 1990, 2010a,b), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a), Code of Practice for Beaver Dam Removal (DFO 2022c) and Fisheries – Best Management Practices Manual (MTO, 2020).

13.4.8 Changes to Fish Populations

The following mitigation and enhancement measures are recommended to reduce the potential changes to fish populations.

13.4.8.1 Injury or Death of Fish

During instream construction of water crossing structures and or where blasting (i.e., use of explosives) occurs in or near a waterbody there is the potential for physical injury or mortality of fish. During project construction and operations, the following key mitigation measures will be implemented to reduce the unintentional Injury or Death of fish.

13.4.8.1.1 Blasting Restrictions

Where blasting in or near water is proposed to support road construction or in bedrock for aggregate during operations, additional mitigation measures will be implemented to reduce the potential for Injury or Death of fish. These measures include but are not limited to:

- Follow the general avoidance measures and project planning in **Section 13.4.8.1** such as reducing the risk of fish mortality through restricted activity periods (timing windows) and fish rescues/relocations and avoid blasting in or near water, unless absolutely necessary.



- A Blasting Management Plan will be prepared and implemented by the proponent or their contractor(s) for the Project that describes specific measures that would be implemented if blasting is required.
- Use blasting mats to reduce the percussive, or risk of fly rock, injuries to fish, and /or death of fish.
- Establishing setbacks from fish-bearing waters that are protective of fish.
- When blasting is unavoidable, following the DFO Blasting Guidance (Wright and Hopky, 2008) and Ontario Provincial Standard Specification 120 General Specifications for the Use of Explosives (Ontario Provincial Standards 2019).
- Permitting all blasting works appropriately, including applying for Fisheries Act authorization where the potential for HADD and/or death of fish exists.
- Limiting blasting to areas where other methods, such as drilling and standard excavation, are not possible.
- Preparing site-specific blasting plans when blasting is likely to be required.
- No ammonium nitrate-fuel oil mixtures will be used, due to the production of toxic byproducts (i.e., ammonia).

13.4.8.1.2 Restricted Activity Periods / Timing Windows

Activities with the potential to impact fish and fish habitat (e.g., in-water work) or cause risk of Injury or Death to fish during the construction and operation phases of the Project will be conducted within the appropriate restricted activity period or commonly referred to as in-water timing window, as determined by the MNR and DFO. Timing in-water work to avoid sensitive life stages is typically considered an effective means of reducing the risk of negative effects to fish. The typical periods when in-water work should be avoided (i.e., restricted activity periods/timing windows) are identified for each waterbody in Section 10.2. The following measures will be implemented:

- Restricted activity periods will include both Spring and Fall windows to protect fish populations during their spawning, rearing and migratory periods. Based on the species present in the study area, these windows are estimated to typically be:
 - April 1 to June 30 (spring window);
 - September 1 to June 15 (fall/winter window); and
 - Restricted activity periods will be based on the species discovered in each specific waterbody.
- Construction of watercourse crossings will occur outside of restricted activity periods to minimize or avoid risk of injury or mortality to fish.
- Where fish sampling has not been conducted, the most restrictive activity period will be applied to each individual watercourse to be protective of fish and fish habitat.
- For waterbody crossing, the proposed restricted activity periods will be applicable to:
 - Any work below the high-water mark (installation of culverts, construction of bridge piers in-water);
 - Temporary water crossings where an ice bridge, fording or snow fill is proposed; and
 - Where beaver dam removals are required.



13.4.8.1.3 Work Isolation and Fish Rescue

To complete in-water works associated with waterbody crossings, isolation of the work site and fish rescue operations will be conducted. The following measures will be implemented:

- In-water work to allow for construction and repair of waterbody crossing structures will be isolated (i.e., will occur in the dry) from surrounding fish habitat using cofferdams, aquadams, or other methods acceptable to the MNR and DFO such as the requirements in the Interim Code of Practice: Temporary Cofferd Dams and Diversion Channels [DFO 2023b].
- Submission of appropriate notification and acquisition of necessary permits/approvals from regulatory agencies.
- Temporary dam structures to isolate the work zone will be constructed using clean materials that minimize suspended sediment generation.
- Flow will be maintained during in-water works at a level sufficient to sustain aquatic life and prevent upstream impoundment.
- Fish rescues will be conducted to relocate fish prior to in-water work, dewatering or conducting works in wetted channels or wetlands. Fish within the isolated workspaces will be rescued (i.e., salvaged and relocated) by qualified professionals under the conditions of a MNR License to Collect Fish for Scientific Purposes to be acquired, and in accordance with requirements in the DFO Interim Standard for In-water Site Isolation.
- Fish handling will be minimized, including limiting time spent weighing and measuring fish.
- For diversions during isolations, appropriately screened pumps will be used to reduce the risk of entrainment or impingement of fish following the guidance within the interim DFO Code of Practice for end-of-pipe fish protection screens for small water intakes in freshwater (DFO 2020).

13.4.8.2 Changes to Public Access to Fish Habitats

The development of the WSR could result in a negative effect on the abundance and distribution of species, through increased access to waterbodies where fish populations are present. During project construction and operations, the following key mitigation and monitoring measures will be implemented to reduce the effect of increased harvest on fish populations from changes in access.

13.4.8.2.1 Project Planning and Design

Project planning and design will incorporate measures to prevent and/or minimize public access that may lead to increased harvest, including, but not limited to, the following:

- Installing restrictive fencing and/or barricades near waterbody crossing sites, including on bridge structures to deter fishing.
- Siting designated rest areas along the road as far as practical from potential fishing locations.

13.4.8.2.2 Employee Wildlife Orientations and Restrictions

The following restrictions will be implemented for employees and visitors at the project site to limit the increase in fish harvesting:

- Employees or visitors on-site in temporary construction camps or at the permanent maintenance and storage facility will be prohibited from hunting, fishing, or harvesting wildlife.
- Temporary access routes, especially those at or approaching waterbody crossings as well as temporary construction camps and laydowns areas will be revegetated as soon as possible.



- Firearms and angling gear will be prohibited on-site.
- Wildlife orientation and education programs will be delivered on-site to inform personnel about best environmental practices for fish and wildlife in the area.

13.4.8.2.3 Public Access Restrictions

To reduce public access to waterbodies and limit the potential increase in fish harvesting, the following mitigation measures will be implemented:

- Temporary access routes, construction camps and laydown areas that are not required for operation of the roadway will be reclaimed (i.e., revegetated and blocked from public access as soon as feasible).
- Public access to the road route and supportive infrastructure areas (camps, etc.) will be prohibited during construction unless authorized by the proponent.
- Stopping on the roadway during its operations will be prohibited, except in designated rest areas and in emergency situations.
- Fencing or other barricades will be installed near watercourses and on bridges to deter fishing.
- Increased access may require regulatory changes, such as restrictions on fishing in certain locations or changes to harvesting by First Nation community members to prevent additional fishing pressure. However, these legislative changes or changes to First Nation exercise of their rights to harvesting of fish are beyond the direct control the Project.

Table 13-48 provides summaries of the potential effects and mitigation measures for Species at Risk VC – sturgeon during the construction and operations phases.



Table 13-48: Summary of Potential Effects, Mitigation Measures and Predicted Net Effects for Species at Risk VC – Lake Sturgeon

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
Fish Habitat Quantity and Quality	<ul style="list-style-type: none"> ▪ Number of waterbodies crossed. ▪ Area of waterbodies crossed (m²). 	Construction	<ul style="list-style-type: none"> ▪ Construction and Use of Supportive Infrastructure. ▪ Construction of Road. ▪ Construction of Structures at Waterbody Crossings. ▪ Decommissioning of Temporary Construction Camps, and restoration/reclamation of Access Roads and Laydown/Storage Areas. ▪ Emissions, Discharges and Wastes. ▪ Completion of Project-Wide Clean-up, Site Restoration/Reclamation and Demobilization. 	<ul style="list-style-type: none"> ▪ Filling in of watercourses/wetlands will result in a loss of fish habitat. ▪ Filling in of riparian areas will result in a loss of fish habitat. ▪ Placing piers of bridges and culverts in fish habitat will result in a loss of fish habitat. 	Destruction/Loss of fish habitat	<ul style="list-style-type: none"> ▪ Project Routing and Crossing Design: <ul style="list-style-type: none"> ▫ The preferred route has been selected with consideration to minimize the number of waterbody crossings for the road, where feasible, as well as the Project Footprint will be minimized to the extent possible. ▫ Permanent culverts and bridge crossings have been designed to accommodate the complete existing bankfull channel width of a watercourse, preserving and minimizing impacts to fish habitat. ▫ For larger waterbody crossings bridges have been selected for design and construction which are expected to reduce the total fish habitat loss. ▪ Habitat Delineation and Mapping: <ul style="list-style-type: none"> ▫ Construction and/or silt fencing will be installed to clearly delineate the boundaries of the work areas to prevent habitat damage and destruction beyond work area boundaries. Where feasible, 30 m buffers will be established around riparian areas. ▫ Construction personnel and equipment will be directed to avoid entering and crossing any watercourses or areas not required for construction. ▫ Work vehicles and equipment will be restricted to designated work areas and access roads. ▫ Maps identifying fish habitat, riparian buffers and no-go zones will be created and distributed to construction and operation personnel. ▫ Signage and setbacks will be used to identify fish habitat and communicate restrictions for entering riparian areas. ▪ Vegetation Clearing Standard (See Section 5.1): <ul style="list-style-type: none"> ▫ Clearing of riparian habitat will be minimized, where possible, as riparian habitat provides a buffer to fish habitat, regulates water levels, and controls erosion and sediment. ▫ Vegetation removal within the ROW will be limited to the footprint of structures placed at water crossing and where feasible to retain a 30 m riparian buffer upstream and downstream of the structure crossings to limit habitat alteration and disruption. ▪ Erosion and Sediment Control (See Section 5.16, Section 5.22 and Section 5.23): <ul style="list-style-type: none"> ▫ Sediment fencing, silt curtains, and erosion control stabilization materials (e.g., straw mulch, wood chips, erosion control blanket, etc.) will be installed to limit the migration of sediment or release of deleterious substances into fish habitat. ▫ Work will be restricted during high precipitation or run-off events to reduce erosion potential to the extent practicable and in-water work associated with water crossing will be conducted in the dry season or ice-on 	Yes

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
						<p>conditions to minimize risk to negatively impact fish habitat.</p> <ul style="list-style-type: none"> ▫ Temporary and/or permanent erosion control measures such as rip-rap or other materials will be placed along road where it interacts with water, to reduce erosion potential. ▫ Seeding and revegetation will be completed as soon as the final surfaces are prepared to control erosion and help promote establishment of native vegetation. A healthy native vegetation community will also limit the introduction of invasive species. ▫ Sediment-laden water generated on-site will be pumped into a well-vegetated area at least 30 m from fish habitat to prevent infiltration into fish habitat. ▫ ESC measures will be installed, monitored, and managed as appropriate to reduce the risk of sediment reaching a waterbody prior to and during construction. ▫ Disturbed areas will be re-contoured to restore drainage patterns to the approximate pre-construction conditions, where practicable. ▪ Habitat Offsetting + Enhancement: <ul style="list-style-type: none"> ▫ Waterbodies where HADD and/or death of fish occur will require habitat offsetting in order to comply with the <i>Fisheries Act</i> and conditions anticipated in the Fisheries Act authorization(s). Once the Project design is finalized, any net effects to fish/fish habitat will be offset through habitat creation or habitat enhancement to achieve no net loss of fish habitat and/or productive capacity. Habitat offsetting and enhancement requirements will be determined in consultation with DFO and First Nations during the detail design permitting phase of the Project 	
Fish Habitat Quantity and Quality	<ul style="list-style-type: none"> ▪ Fish spawning, nursery or rearing areas (m²). ▪ Habitat quantity and quality changes (m²). 	Construction	<ul style="list-style-type: none"> ▪ Vegetation Clearing and Grubbing. ▪ Construction and Use of Supportive Infrastructure. ▪ Construction of Road. ▪ Construction of Structures at Waterbody Crossings. ▪ Decommissioning of Temporary Construction Camps, and restoration/reclamation of Access Roads and Laydown/Storage Areas. ▪ Emissions, Discharges and Wastes. ▪ Completion of Project-Wide Clean-up, Site Restoration/Reclamation and Demobilization. 	<ul style="list-style-type: none"> ▪ Filling in of watercourses/wetlands will result in a loss of fish habitat. ▪ Filling in of riparian areas will result in a loss of fish habitat. ▪ Placing piers of bridges and culverts in fish habitat will result in a loss of fish habitat. ▪ Clearing of vegetation could lead to increased sedimentation in watercourses from erosion of disturbed areas and decrease in the number of shaded areas along watercourses, in turn, increasing water temperature. 	Destruction/Loss of fish habitat	<ul style="list-style-type: none"> ▪ Project Routing and Crossing Design: <ul style="list-style-type: none"> ▫ Permanent culverts and bridge crossings have been designed to accommodate the complete existing bankfull channel width of a watercourse, preserving and minimizing impacts to fish habitat. ▫ For culverts (i.e., open bottom steel arch) at 17 watercourse crossing locations, the design mitigation will include the infilling of the culvert with material (i.e., aggregate) that resembles the natural substrate present at the watercourse, as well the creation of a low flow channel that mimics the existing stream channel. The same will be done for corrugated steel culverts found at the remaining eight crossings requiring culverts. The purpose is to minimize habitat loss by enabling the channel to function as “naturally” as possible to convey flow; maintain channel form and function; and retain fish passage. ▫ For larger waterbody crossings bridges have been selected for design and construction which are expected to reduce the total fish habitat loss. These locations are: ▪ Habitat Delineation and Mapping: 	No

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
				<ul style="list-style-type: none"> ▪ Channelization due to culvert construction (affecting flow rates/regimes). ▪ Air contaminant/fugitive dust/GHG emissions could cause changes to water quality. 		<ul style="list-style-type: none"> ▫ Construction and/or silt fencing will be installed to clearly delineate the boundaries of the work areas to prevent habitat damage and destruction beyond work area boundaries. Where feasible, 30 m buffers will be established around riparian areas. ▫ Construction personnel and equipment will be directed to avoid entering and crossing any watercourses or areas not required for construction. ▫ Work vehicles and equipment will be restricted to designated work areas and access roads. ▫ Maps identifying fish habitat, riparian buffers and no-go zones will be created and distributed to construction and operation personnel. ▫ Signage and setbacks will be used to identify fish habitat and communicate restrictions for entering riparian areas. ▪ Vegetation Clearing Standard (See Section 5.1). <ul style="list-style-type: none"> ▫ Clearing of riparian habitat will be minimized, where possible, as riparian habitat provides a buffer to fish habitat, regulates water levels, and controls erosion and sediment. ▫ Vegetation removal within the ROW will be limited to the footprint of structures placed at water crossing and where feasible to retain a 30 m riparian buffer upstream and downstream of the structure crossings to limit habitat alteration and disruption. ▪ Erosion and Sediment Control (See Section 5.16, Section 5.22 and Section 5.23): <ul style="list-style-type: none"> ▫ Sediment fencing, silt curtains, and erosion control stabilization materials (e.g., straw mulch, wood chips, erosion control blanket, etc.) will be installed to limit the migration of sediment or release of deleterious substances into fish habitat. ▫ Work will be restricted during high precipitation or run-off events to reduce erosion potential to the extent practicable and in-water work associated with water crossing will be conducted in the dry season or ice-on conditions to minimize risk to negatively impact fish habitat. ▫ Temporary and/or permanent erosion control measures such as rip-rap or other materials will be placed along road where it interacts with water, to reduce erosion potential. ▫ Seeding and revegetation will be completed as soon as the final surfaces are prepared to control erosion and help promote establishment of native vegetation. A healthy native vegetation community will also limit the introduction of invasive species. ▫ Sediment-laden water generated on-site will be pumped into a well-vegetated area at least 30 m from fish habitat to prevent infiltration into fish habitat. 	

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
						<ul style="list-style-type: none"> □ ESC measures will be installed, monitored, and managed as appropriate to reduce the risk of sediment reaching a waterbody prior to and during construction. □ Disturbed areas will be re-contoured to restore drainage patterns to the approximate pre-construction conditions, where practicable. ▪ Habitat Offsetting + Enhancement: <ul style="list-style-type: none"> □ Waterbodies where HADD and/or death of fish occur will require habitat offsetting to comply with the Fisheries Act and conditions anticipated in the Fisheries Act authorization(s). Once the Project design is finalized, any net effects to fish/fish habitat will be offset through habitat creation or habitat enhancement to achieve no net loss of fish habitat and/or productive capacity. Habitat offsetting and enhancement requirements will be determined in consultation with DFO and First Nations during the detail design permitting phase of the Project. 	
Fish Habitat Quantity and Quality	<ul style="list-style-type: none"> ▪ Number of waterbodies crossed. ▪ Area of waterbodies crossed (m²). ▪ Fish spawning, nursery or rearing areas (m²). ▪ Habitat quantity and quality changes (m²). 	Operations	<ul style="list-style-type: none"> ▪ Operation, Maintenance and Repair of Road. ▪ Operation of Pits, Quarries and Maintenance Yard/Facility. ▪ Potential for Accidents and Malfunctions. ▪ Emissions, Discharges and Wastes. 	<ul style="list-style-type: none"> ▪ Maintenance related to clearing of vegetation could lead to increased sedimentation into the watercourse. ▪ Maintenance of roadway for structural integrity (repair and rehabilitation of culverts/bridges material additions). ▪ Spills/releases of contaminants could impact fish habitat. 	Destruction/Loss of fish habitat	<ul style="list-style-type: none"> ▪ Habitat Delineation and Mapping: <ul style="list-style-type: none"> □ Construction and/or silt fencing will be installed to clearly delineate the boundaries of the work areas to prevent habitat damage and destruction beyond work area boundaries. Where feasible, 30 m buffers will be established around riparian areas. □ Construction personnel and equipment will be directed to avoid entering and crossing any watercourses or areas not required for construction. □ Work vehicles and equipment will be restricted to designated work areas and access roads. □ Maps identifying fish habitat, riparian buffers and no-go zones will be created and distributed to construction and operation personnel. □ Signage and setbacks will be used to identify fish habitat and communicate restrictions for entering riparian areas. ▪ Vegetation Clearing Standard (See Section 5.1): <ul style="list-style-type: none"> □ Clearing of riparian habitat will be minimized, where possible, as riparian habitat provides a buffer to fish habitat, regulates water levels, and controls erosion and sediment. □ Vegetation removal within the ROW will be limited to the footprint of structures placed at water crossing and where feasible to retain a 30 m riparian buffer upstream and downstream of the structure crossings to limit habitat alteration and disruption. ▪ Erosion and Sediment Control (See Section 5.16, Section 5.22 and Section 5.23): <ul style="list-style-type: none"> □ Sediment fencing, silt curtains, and erosion control stabilization materials (e.g., straw mulch, wood chips, erosion control blanket, etc.) will be installed to limit the migration of sediment or release of deleterious substances into fish habitat. 	Yes

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
						<ul style="list-style-type: none"> ▫ Work will be restricted during high precipitation or run-off events to reduce erosion potential to the extent practicable and in-water work associated with water crossing will be conducted in the dry season or ice-on conditions to minimize risk to negatively impact fish habitat. ▫ Temporary and/or permanent erosion control measures such as rip-rap or other materials will be placed along road where it interacts with water, to reduce erosion potential. ▫ Seeding and revegetation will be completed as soon as the final surfaces are prepared to control erosion and help promote establishment of native vegetation. A healthy native vegetation community will also limit the introduction of invasive species. ▫ Sediment-laden water generated on-site will be pumped into a well-vegetated area at least 30 m from fish habitat to prevent infiltration into fish habitat. ▫ ESC measures will be installed, monitored, and managed as appropriate to reduce the risk of sediment reaching a waterbody prior to and during construction. ▫ Disturbed areas will be re-contoured to restore drainage patterns to the approximate pre-construction conditions, where practicable. ▪ Habitat Offsetting + Enhancement: <ul style="list-style-type: none"> ▫ Waterbodies where HADD and/or death of fish occur will require habitat offsetting in order to comply with the <i>Fisheries Act</i> and conditions anticipated in the Fisheries Act authorization(s). Once the Project design is finalized, any net effects to fish/fish habitat will be offset through habitat creation or habitat enhancement to achieve no net loss of fish habitat and/or productive capacity. Habitat offsetting and enhancement requirements will be determined in consultation with DFO and First Nations during the detail design permitting phase of the Project. 	
Fish Habitat Quantity and Quality	<ul style="list-style-type: none"> ▪ Number of waterbodies crossed. ▪ Area of waterbodies crossed (m²). ▪ Fish spawning, nursery or rearing areas (m²). ▪ Habitat quantity and quality changes (m²). 	Construction	<ul style="list-style-type: none"> ▪ Vegetation Clearing and Grubbing. ▪ Construction and Use of Supportive Infrastructure. ▪ Construction of Road. ▪ Construction of Structures at Waterbody Crossings. ▪ Decommissioning of Temporary Construction Camps, and restoration/reclamation of Access Roads and Laydown/Storage Areas. ▪ Emissions, Discharges and Wastes. ▪ Completion of Project-Wide Clean-up, Site Restoration/Reclamation and Demobilization. 	<ul style="list-style-type: none"> ▪ Clearing of vegetation could lead to increased sedimentation into the waterbodies. ▪ Material placed in-water may alter fish habitat substrates. ▪ Construction of permanent or temporary structures (culverts and bridges) at waterbody crossings could change hydrology ▪ Construction of permanent or temporary structures (culverts and bridges) at waterbody 	Alteration and disruption of fish habitat	<ul style="list-style-type: none"> ▪ Construction Environmental Management and Monitoring: <ul style="list-style-type: none"> ▫ During the construction phase a CEMP will be implemented. Management plans will be consistent with the requirements of the Project's permits and authorizations to minimize the potential effects of construction and operations activities on fish and fish habitat. Management Plans will guide the proponent and its contractors in complying with applicable environmental legislation by providing criteria, standard protocols, and commitments to mitigation measures in the EA/IA to eliminate, reduce, and/or offset potential adverse effects to fish and fish habitat. During construction and/or operations, the following key environmental management plans relevant to the Fish and Fish Habitat VC within the broader CEMP will be developed and implemented: <ul style="list-style-type: none"> - Erosion and Sediment Control Plan; - Fish and Fish Habitat Management Plan; 	Yes

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
				<p>crossings could change riparian habitat</p> <ul style="list-style-type: none"> ▪ Climate change and/or releases (GHG, dust) to the atmospheric environment could cause changes to water quality. ▪ Introduction of invasive species due to construction and maintenance activities 		<ul style="list-style-type: none"> - Surface Water and Storm Water Management and Monitoring Plan; - Air Quality and Dust Control Management Plan; - Construction Blasting Management Plan; and - Vegetation and Invasive Species Management Plan. <ul style="list-style-type: none"> ▫ The CEMP and OEMP will include the environmental monitoring requirements during the construction and operation phases of the Project to confirm and document compliance with the provisions of the CEMP and conditions of applicable permits and approvals. During the construction phase, Environmental Monitor(s) and/or Indigenous Monitor(s) will be on-site to observe and document/log the implementation of mitigation measures implemented to minimize the potential effects of construction on fish and fish habitat. The documentation log will identify any deficiencies and record the actions taken to correct any issues of concern. <ul style="list-style-type: none"> ▪ Vegetation Clearing Standard (See Section 5.1): <ul style="list-style-type: none"> ▫ Vegetation clearing will be conducted using appropriate equipment to prevent tree dragging and minimal earth disturbance in riparian areas of waterbodies. ▫ Clearing of riparian habitat will be minimized, where possible, as riparian habitat provides a buffer to fish habitat, regulates water levels, and controls erosion and sediment. ▫ Vegetation removal within the ROW will be limited to the footprint of structures placed at water crossing and where feasible to retain a 30 m riparian buffer upstream and downstream of the structure crossings to limit habitat alteration and disruption. ▫ Allow for compatible vegetation to grow back within the ROW, including riparian areas, to heights compatible with safe operation of the road. ▫ Develop and implement a Vegetation and Invasive Species Management Plan detailing that includes details on vegetation restoration/reclamation and riparian area stabilization using native riparian/wetland seed mixes, if applicable, to stabilize soils/banks to pre-construction condition or better: <ul style="list-style-type: none"> - Use of only approved seed mix species and/or plant species of importance to Indigenous communities for site restoration of riparian areas. - Details on implementation of a post-construction monitoring plan, which will include activities such as examining and documenting the success of revegetation and restoration measures. ▪ Stockpiled Materials Standard (See Section 5.5). <ul style="list-style-type: none"> ▫ The temporary storage, handling and disposal of materials used or generated (e.g., organics, soils, woody debris, temporary earth stockpiles, construction debris, etc.) during site preparation, construction and clean-up will be located a minimum 30 m from 	

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
						<p>waterbodies to reduce the risk of that sediment or deleterious substances entering a waterbody.</p> <ul style="list-style-type: none"> ▫ Excess material will be managed and monitored to prevent sediment-laden water from entering watercourses and/or waterbodies and affecting fish habitat. ▫ Materials stored long-term will be covered and stabilized to reduce erosion and sedimentation. ▫ Waste materials will be hauled off-site for disposal or placed in environmentally stable locations. ▪ Erosion and Sediment Control (See Section 5.16, Section 5.22 and Section 5.23): <ul style="list-style-type: none"> ▫ Sediment fencing, silt curtains, and erosion control stabilization materials (e.g., straw mulch, wood chips, erosion control blanket, etc.) will be installed to limit the migration of sediment or release of deleterious substances into fish habitat. ▫ Work will be restricted during high precipitation or run-off events to reduce erosion potential to the extent practicable and in-water work associated with water crossing will be conducted in the dry season or ice-on conditions to minimize risk to negatively impact fish habitat. ▫ Temporary and/or permanent erosion control measures such as rip-rap or other materials will be placed along road where it interacts with water, to reduce erosion potential. ▫ Seeding and revegetation will be completed as soon as the final surfaces are prepared to control erosion and help promote establishment of native vegetation. A healthy native vegetation community will also limit the introduction of invasive species. ▫ Sediment-laden water generated on-site will be pumped into a well-vegetated area at least 30 m from fish habitat to prevent infiltration into fish habitat. ▫ ESC measures will be installed, monitored, and managed as appropriate to reduce the risk of sediment reaching a waterbody prior to and during construction. ▫ Disturbed areas will be re-contoured to restore drainage patterns to the approximate pre-construction conditions, where practicable. ▫ Complete instream construction in isolation of flowing water (i.e., use isolation methods where surface water exists at the time of construction). Isolation measures will follow the DFO Interim Standard for In-water Site Isolation (DFO 2023a). ▫ Environmental Monitor(s) will be on-site during construction to monitor the installation, use and removal of temporary water crossing structures and during installation of permanent water crossing structures. 	

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
						<ul style="list-style-type: none"> ▫ Temporary ESC measures must be: <ul style="list-style-type: none"> - Installed according to the plan; - Installed before or immediately after initial disturbance; and - Monitored and effectively maintained (e.g., repaired, replaced or supplemented with functional materials) throughout construction until permanent erosion control is established, or restoration is complete. ▪ Spill Prevention and Response (See Section 5.3, Section 5.17): <ul style="list-style-type: none"> ▫ All vehicles and equipment will be stored at least 30 m from waterbodies and operated in a way that prevents the release of deleterious substances into a waterbody, irrespective of their fish-bearing status. ▫ Re-fueling, service and maintenance of equipment and vehicles will generally be carried out in designated areas at temporary construction camps, and laydown areas along the road, and will be located at least 50 m away from waterbodies, and outside of fish habitat. ▫ Any vehicle or equipment that enters a waterbody must be free of fluid leaks and externally cleaned and degreased. ▫ Storage of above ground fuel storage tanks and other hazardous materials will be located at least 50 m from waterbody, irrespective of their fish-bearing status. ▫ Fuel and hazardous materials will be transported in approved containers in licensed vehicles and stored in such a way to reduce the risk of any deleterious substances from entering a waterbody. ▫ Vehicles and equipment will not be permitted to work in-water, unless required. In these cases, works will be conducted under observation by a qualified environmental monitor. ▫ Concrete truck washout areas will be located a minimum of 50 m away from the ordinary high-water mark of a waterbody and in a non-porous soil location and will be cleaned up at the end of the construction activities. ▫ Fuels and other liquid contaminants will be stored in containers with secondary containment able to store 110% of the capacity of the container. ▫ Containers will be routinely inspected for leaks. ▫ Spill mitigation measures (spill kits) will be present on-site in all laydown areas, vehicles, equipment, and other designated locations. In the event of a spill/leak, the following precautions will be implemented: <ul style="list-style-type: none"> - The spill/leak will be contained and either disposed of through site waste handling systems or removed for disposal in approved facilities; - Reportable spills (as defined under O.Reg. 675/98) of potentially deleterious materials will be reported to the MECP Spills Action Centre; and 	

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						<ul style="list-style-type: none"> - If the spill is in fish-bearing water or where potential for harm to fish or fish habitat is likely, the MNR and DFO will also be contacted. ▫ Construction will be modified or delayed during heavy precipitation or run-off events. ▫ Signage or reduced speed limits will be considered for implementation over bridges to reduce the risk of vehicle accidents and spills. ▫ Individuals working on-site and handling petroleum or other hazardous materials will be trained in best practices related to the transportation and handling of dangerous goods. ▪ Dewatering Standard (See Section 5.8): <ul style="list-style-type: none"> ▫ All dewatering will be conducted in compliance with the Ontario Provincial Standard Specification (OPSS) 517 – Construction Specifications for Control of Water from Dewatering Operations, and OPSS 518 – Construction Specification for Dewatering of Pipeline, Utility, and Associated Structure Excavation. ▫ Dispersal mechanisms (e.g., tarping, filter bags) will be used to minimize risk of erosion, as required. ▫ Existing stream flows will be maintained without interruption or diminishment during construction, where feasible. ▫ Fish screens to prevent impingement or entrainment will be utilized to reduce fish mortality. DFO guidance for fish screens (2020) will be followed. ▫ Complete instream activity in the shortest timeframe practical to minimize the duration and reduce the risk of severe disturbance from dewatering activities. ▫ Manage temporary flows, withdrawal, and discharge, including all water from dewatering operations to reduce the risk of erosion and/or release of sediments to a waterbody. 	
Fish Habitat Quantity and Quality	<ul style="list-style-type: none"> ▪ Number of waterbodies crossed. ▪ Area of waterbodies crossed (m²). ▪ Fish spawning, nursery or rearing areas (m²). ▪ Habitat quantity and quality changes (m²). 	Operations	<ul style="list-style-type: none"> ▪ Operation, Maintenance and Repair of Road. ▪ Operation of Pits, Quarries and Maintenance Yard/Facility. ▪ Potential for Accidents and Malfunctions. ▪ Emissions, Discharges and Wastes. 	<ul style="list-style-type: none"> ▪ Maintenance related to clearing of vegetation could lead to increased sedimentation into the watercourse. ▪ Maintenance of roadway for structural integrity (repair and rehabilitation of culverts/bridges material additions). ▪ Spills/releases of contaminants could impact fish habitat. 	Alteration and disruption of fish habitat	<ul style="list-style-type: none"> ▪ Operations Environmental Management and Monitoring. <ul style="list-style-type: none"> ▫ During the construction phase a OEMP will be implemented. Management plans will be consistent with the requirements of the Project's permits and authorizations to minimize the potential effects of construction and operations activities on fish and fish habitat. Management Plans will guide the proponent and its contractors in complying with applicable environmental legislation by providing criteria, standard protocols, and commitments to mitigation measures in the EA/IA to eliminate, reduce, and/or offset potential adverse effects to fish and fish habitat. During operations, the following key environmental management plans relevant to the Fish and Fish Habitat VC within the broader OEMP will be developed and implemented: <ul style="list-style-type: none"> - Erosion and Sediment Control Plan; - Fish and Fish Habitat Management Plan; 	Yes

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
						<ul style="list-style-type: none"> - Surface Water and Storm Water Management and Monitoring Plan; - Air Quality and Dust Control Management Plan; - Construction Blasting Management Plan; and - Vegetation and Invasive Species Management Plan. ▫ The OEMP will include the environmental monitoring requirements during the construction and operation phases of the Project to confirm and document compliance with the provisions of the OEMP and conditions of applicable permits and approvals. ▪ Vegetation Clearing Standard (See Section 5.1): <ul style="list-style-type: none"> ▫ Vegetation clearing will be conducted using appropriate equipment to prevent tree dragging and minimal earth disturbance in riparian areas of waterbodies. ▫ Clearing of riparian habitat will be minimized, where possible, as riparian habitat provides a buffer to fish habitat, regulates water levels, and controls erosion and sediment. ▫ Vegetation removal within the ROW will be limited to the footprint of structures placed at water crossing and where feasible to retain a 30 m riparian buffer upstream and downstream of the structure crossings to limit habitat alteration and disruption. ▫ Allow for compatible vegetation to grow back within the ROW, including riparian areas, to heights compatible with safe operation of the road. ▫ Develop and implement a Vegetation and Invasive Species Management Plan detailing that includes details on vegetation restoration/reclamation and riparian area stabilization using native riparian/wetland seed mixes, if applicable, to stabilize soils/banks to pre-construction condition or better: <ul style="list-style-type: none"> - Use of only approved seed mix species and/or plant species of importance to Indigenous communities for site restoration of riparian areas. - Details on implementation of a post-construction monitoring plan, which will include activities such as examining and documenting the success of revegetation and restoration measures. ▪ Stockpiled Materials Standard (See Section 5.5): <ul style="list-style-type: none"> ▫ The temporary storage, handling and disposal of materials used or generated (e.g., organics, soils, woody debris, temporary earth stockpiles, construction debris, etc.) during site preparation, construction and clean-up will be located a minimum 30 m from waterbodies to reduce the risk of that sediment or deleterious substances entering a waterbody. ▫ Excess material will be managed and monitored to prevent sediment-laden water from entering watercourses and/or waterbodies and affecting fish habitat. 	

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
						<ul style="list-style-type: none"> ▫ Materials stored long-term will be covered and stabilized to reduce erosion and sedimentation. ▫ Waste materials will be hauled off-site for disposal or placed in environmentally stable locations. ▪ Erosion and Sediment Control (See Section 5.16): <ul style="list-style-type: none"> ▫ Sediment fencing, silt curtains, and erosion control stabilization materials (e.g., straw mulch, wood chips, erosion control blanket, etc.) will be installed to limit the migration of sediment or release of deleterious substances into fish habitat. ▫ Work will be restricted during high precipitation or run-off events to reduce erosion potential to the extent practicable and in-water work associated with water crossing will be conducted in the dry season or ice-on conditions to minimize risk to negatively impact fish habitat. ▫ Temporary and/or permanent erosion control measures such as rip-rap or other materials will be placed along road where it interacts with water, to reduce erosion potential. ▫ Seeding and revegetation will be completed as soon as the final surfaces are prepared to control erosion and help promote establishment of native vegetation. A healthy native vegetation community will also limit the introduction of invasive species. ▫ Sediment-laden water generated on-site will be pumped into a well-vegetated area at least 30 m from fish habitat to prevent infiltration into fish habitat. ▫ ESC measures will be installed, monitored, and managed as appropriate to reduce the risk of sediment reaching a waterbody prior to and during construction. ▫ Disturbed areas will be re-contoured to restore drainage patterns to the approximate pre-construction conditions, where practicable. ▫ Complete instream construction in isolation of flowing water (i.e., use isolation methods where surface water exists at the time of construction). Isolation measures will follow the DFO Interim Standard for In-water Site Isolation (DFO 2023a). ▫ Environmental Monitor(s) will be on-site during construction to monitor the installation, use and removal of temporary water crossing structures and during installation of permanent water crossing structures. ▫ Temporary ESC measures must be: <ul style="list-style-type: none"> - Installed according to the plan; - Installed before or immediately after initial disturbance; and - Monitored and effectively maintained (e.g., repaired, replaced or supplemented with functional materials) throughout construction until permanent erosion control is established, or restoration is complete. 	

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
						<ul style="list-style-type: none"> ▪ Spill Prevention and Response (See Section 5.2, Section 5.3, and Section 5.17): <ul style="list-style-type: none"> ▫ All vehicles and equipment will be stored at least 30 m from waterbodies and operated in a way that prevents the release of deleterious substances into a waterbody, irrespective of their fish-bearing status. ▫ Re-fueling, service and maintenance of equipment and vehicles will generally be carried out in designated areas at temporary construction camps, and laydown areas along the road, and will be located at least 50 m away from waterbodies, and outside of fish habitat. ▫ Any vehicle or equipment that enters a waterbody must be free of fluid leaks and externally cleaned and degreased. ▫ Storage of above ground fuel storage tanks and other hazardous materials will be located at least 50 m from waterbody, irrespective of their fish-bearing status. ▫ Fuel and hazardous materials will be transported in approved containers in licensed vehicles and stored in such a way to reduce the risk of any deleterious substances from entering a waterbody. ▫ Vehicles and equipment will not be permitted to work in-water, unless required. In these cases, works will be conducted under observation by a qualified environmental monitor. ▫ Concrete truck washout areas will be located a minimum of 50 m away from the ordinary high-water mark of a waterbody and in a non-porous soil location and will be cleaned up at the end of the construction activities. ▫ Fuels and other liquid contaminants will be stored in containers with secondary containment able to store 110% of the capacity of the container. ▫ Containers will be routinely inspected for leaks. ▫ Spill mitigation measures (spill kits) will be present on-site in all laydown areas, vehicles, equipment, and other designated locations. In the event of a spill/leak, the following precautions will be implemented: <ul style="list-style-type: none"> - The spill/leak will be contained and either disposed of through site waste handling systems or removed for disposal in approved facilities; - Reportable spills (as defined under O.Reg. 675/98) of potentially deleterious materials will be reported to the MECP Spills Action Centre; and - If the spill is in fish-bearing water or where potential for harm to fish or fish habitat is likely, the MNR and DFO will also be contacted. 	

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
						<ul style="list-style-type: none"> ▫ Construction will be modified or delayed during heavy precipitation or run-off events. ▫ Signage or reduced speed limits will be considered for implementation over bridges to reduce the risk of vehicle accidents and spills. ▫ Individuals working on-site and handling petroleum or other hazardous materials will be trained in best practices related to the transportation and handling of dangerous goods. ▪ Dewatering Standard (Section 5.9): <ul style="list-style-type: none"> ▫ All dewatering will be conducted in compliance with the Ontario Provincial Standard Specification (OPSS) 517 – Construction Specifications for Control of Water from Dewatering Operations, and OPSS 518 – Construction Specification for Dewatering of Pipeline, Utility, and Associated Structure Excavation. ▫ Dispersal mechanisms (e.g., tarping, filter bags) will be used to minimize risk of erosion, as required. ▫ Existing stream flows will be maintained without interruption or diminishment during construction, where feasible. ▫ Fish screens to prevent impingement or entrainment will be utilized to reduce fish mortality. DFO guidance for fish screens (2020) will be followed. ▫ Complete instream activity in the shortest timeframe practical to minimize the duration and reduce the risk of severe disturbance from dewatering activities. ▫ Manage temporary flows, withdrawal, and discharge, including all water from dewatering operations to reduce the risk of erosion and/or release of sediments to a waterbody. 	
Fish Habitat Quantity and Quality	<ul style="list-style-type: none"> ▪ Number of waterbodies crossed. ▪ Area of waterbodies crossed (m²). ▪ Fish spawning, nursery or rearing areas (m²). ▪ Habitat quantity and quality changes (m²). 	Construction	<ul style="list-style-type: none"> ▪ Vegetation Clearing and Grubbing. ▪ Construction and Use of Supportive Infrastructure. ▪ Construction of Road. ▪ Construction of Structures at Waterbody Crossings. ▪ Decommissioning of Temporary Construction Camps, and restoration/reclamation of Access Roads and Laydown/Storage Areas. ▪ Emissions, Discharges and Wastes. ▪ Completion of Project-Wide Clean-up, Site Restoration/Reclamation and Demobilization. 	<ul style="list-style-type: none"> ▪ Culvert structures, and the associated road culverts or bridge piers in waterbodies could cause a potential barrier to fish movement and access to habitats. ▪ Changes in flow and/or water levels due to culvert construction (affecting flow rates/regimes or causing perched culverts). 	Changes in fish access to habitats	<ul style="list-style-type: none"> ▪ Project Routing and Crossing Design (Section 5.9 and Section 5.11): <ul style="list-style-type: none"> ▫ Larger watercourse crossings will incorporate bridge designs that span the waterbody and avoid the potential for creation of barriers to fish passage. ▫ Bridges will be installed at up to six of the larger watercourses along the roadway to reduce barriers to fish passage. ▫ Flow and migratory fish passage routes will be maintained at all crossings including bridges and culverts. ▫ Culvert inlets, outlets, and substrates at water crossings will be designed to replicate existing habitat conditions and characteristics of the watercourse channel upstream and downstream of the crossing. ▫ Culverts will be appropriately sized to allow fish passage and will maintain the flow and water depth characteristics observed during existing conditions studies. 	Yes

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
						<ul style="list-style-type: none"> ▫ Similar to the mitigation identified in Sections 13.4.8.1 culverts will be embedded by 10% to consider low flow conditions and aligned parallel to the watercourse on a straight section of uniform gradient. Culverts will be designed for fish passage at the lowest trophic levels of each system and will meet DFO's species specific passage requirements. This will aid in the ability to reduce the risk of the culvert installation introducing velocities which surpass swimming abilities of a waterbody's fishery (MNR and DFO 2021). Open bottom culverts (i.e., steel arch structure culverts with no bottom that do not disturb the bed of a waterbody) have been considered for 17 water crossings that has been determined to be sensitive in the fish/fish habitat assessment. Additional mitigation options may also be implemented for culverts to minimize and avoid the introduction of barrier to fish passage and facilitate passage by fish such use of baffles, gradient pools, keyed stones, etc., where required. ▫ Where possible, culverts will be oversized to prevent affects associated with beaver activity. ▪ Culvert Maintenance Programs (See Section 5.11): <ul style="list-style-type: none"> ▫ Culverts will be regularly monitored and maintained during construction and operation to allow for fish passage. Debris removal activities will follow DFO's Code of Practice: Culvert Maintenance (2023) (i.e., gradual removal such that flooding downstream, extreme flows downstream, release of suspended sediment, and avoidance of fish stranding). ▫ Implement the fish and fish habitat protection procedures for culvert maintenance as documented in the Ministry of Transportation Fisheries – Best Management Practices Manual (MTO, 2020). ▫ Adjusting maintenance and inspection schedules according to how quickly culverts fill with debris. ▪ Implementing a beaver dam removal plan to minimize potential effects on fish habitat availability. Where beaver dam removals are required to facilitate the installation or maintenance/repair of water crossing structures, the activity will be completed in consideration of best management practices and environmental permit/approval conditions (once available), including MNR guidelines for access roads (MNR 1990, 2010a,b), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a), Code of Practice for Beaver Dam Removal (DFO 2022c) and Fisheries – Best Management Practices Manual (MTO, 2020). 	
Fish Habitat Quantity and Quality	<ul style="list-style-type: none"> ▪ Number of waterbodies crossed. ▪ Area of waterbodies crossed (m²). ▪ Fish spawning, nursery or rearing areas (m²). ▪ Habitat quantity and quality changes (m²). 	Operations	<ul style="list-style-type: none"> ▪ Operation, Maintenance and Repair of Road. ▪ Operation of Pits, Quarries and Maintenance Yard/Facility. ▪ Potential for Accidents and Malfunctions. ▪ Emissions, Discharges and Wastes. 	<ul style="list-style-type: none"> ▪ Culvert structures, and the associated road culverts or bridge piers in waterbodies could cause a potential barrier to fish movement and access to habitats. 	Change in fish access to habitats	<ul style="list-style-type: none"> ▪ Culvert Maintenance Programs (See Section 5.9 and Section 5.11): <ul style="list-style-type: none"> ▫ Culverts will be regularly monitored and maintained during construction and operation to allow for fish passage. Debris removal activities will follow DFO's Code of Practice: Culvert Maintenance (2023) (i.e., gradual removal such that flooding downstream, extreme flows downstream, release of suspended sediment, and avoidance of fish stranding). 	Yes

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
				<ul style="list-style-type: none"> Changes in flow and/or water levels due to culvert construction (affecting flow rates/regimes or causing perched culverts). 		<ul style="list-style-type: none"> Implement the fish and fish habitat protection procedures for culvert maintenance as documented in the Ministry of Transportation Fisheries – Best Management Practices Manual (MTO, 2020). Adjusting maintenance and inspection schedules according to how quickly culverts fill with debris. Implementing a beaver dam removal plan to minimize potential effects on fish habitat availability. Where beaver dam removals are required to facilitate the installation or maintenance/repair of water crossing structures, the activity will be completed in consideration of best management practices and environmental permit/approval conditions (once available), including MNR guidelines for access roads (MNR 1990, 2010a,b), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a), Code of Practice for Beaver Dam Removal (DFO 2022c) and Fisheries – Best Management Practices Manual (MTO, 2020). 	
Fish Populations	<ul style="list-style-type: none"> Fish abundance; Fish distribution; Fish mortality and/or injury; and Quality and quantity of food species (e.g., benthic invertebrate abundance and diversity). 	Construction	<ul style="list-style-type: none"> Vegetation Clearing and Grubbing. Construction and Use of Supportive Infrastructure. Construction of Road. Construction of Structures at Waterbody Crossings. Decommissioning of Temporary Construction Camps, and restoration/reclamation of Access Roads and Laydown/Storage Areas. Emissions, Discharges and Wastes. Completion of Project-Wide Clean-up, Site Restoration/Reclamation and Demobilization. 	<ul style="list-style-type: none"> Placement of materials of roadway and instream construction may injure or kill fish Physical injuries may result from blasting. Fish death as a result of fish salvage or dewatering. Spills/releases of contaminants resulting in-water quality degradation and could kill fish directly. 	Injury or Death of fish	<ul style="list-style-type: none"> Blasting Restrictions (See Section 5.12): <ul style="list-style-type: none"> A Blasting Management Plan will be prepared and implemented by the proponent or their contractor(s) for the Project that describes specific measures that would be implemented if blasting is required. Use blasting mats to reduce the percussive, or risk of fly rock, injures to fish, and /or death of fish. Establishing setbacks from fish-bearing waters that are protective of fish. When blasting is unavoidable, following the DFO Blasting Guidance (Wright and Hopky, 2008) and Ontario Provincial Standard Specification 120 General Specifications for the Use of Explosives (Ontario Provincial Standards 2019). Permitting all blasting works appropriately, including applying for Fisheries Act authorization where the potential for HADD and/or death of fish exists. Limiting blasting to areas where other methods, such as drilling and standard excavation, are not possible. Preparing site-specific blasting plans when blasting is likely to be required. No ammonium nitrate-fuel oil mixtures will be used, due to the production of toxic byproducts (i.e., ammonia). Timing Windows for Construction: <ul style="list-style-type: none"> Restricted activity periods will include both Spring and Fall windows to protect fish populations during their spawning, rearing and migratory periods. Based on the species present in the study area, these windows are estimated to typically be: <ul style="list-style-type: none"> April 1 to June 30 (spring window); September 1 to June 15 (fall/winter window); and Restricted activity periods will be based on the species discovered in each specific waterbody. 	Yes

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
						<ul style="list-style-type: none"> ▫ Construction of watercourse crossings will occur outside of restricted activity periods to minimize or avoid risk of injury or mortality to fish. ▫ Where fish sampling has not been conducted, the most restrictive activity period will be applied to each individual watercourse to be protective of fish and fish habitat. ▫ For waterbody crossing, the proposed restricted activity periods will be applicable to: <ul style="list-style-type: none"> - Any work below the high-water mark (installation of culverts, construction of bridge piers in-water); - Temporary water crossings where an ice bridge, fording or snow fill is proposed; and - Where beaver dam removals are required. ▪ Work Isolation and Fish Rescue (See Section 5.10): <ul style="list-style-type: none"> ▫ In-water work to allow for construction and repair of waterbody crossing structures will be isolated (i.e., will occur in the dry) from surrounding fish habitat using cofferdams, aquadams, or other methods acceptable the MNR and DFO such as the requirements in the Interim Code of Practice: Temporary Cofferdams and Diversion Channels [DFO 2023b]; and ▫ Submission of appropriate notification and acquisition of necessary permits/approvals from regulatory agencies. ▫ Temporary dam structures to isolate the work zone will be constructed using clean materials that minimize suspended sediment generation. ▫ Flow will be maintained during in-water works at a level sufficient to sustain aquatic life and prevent upstream impoundment. ▫ Fish rescues will be conducted to relocate fish prior to in-water work, dewatering or conducting works in wetted channels or wetlands. Fish within the isolated workspaces will be rescued (i.e., salvaged and relocated) by qualified professionals under the conditions of a MNR License to Collect Fish for Scientific Purposes to be acquired, and in accordance with requirements in the DFO Interim Standard for In-water Site Isolation. ▫ Fish handling will be minimized, including limiting time spent weighing and measuring fish. ▫ For diversions during isolations, appropriately screened pumps will be used to reduce the risk of entrainment or impingement of fish following the guidance within the interim DFO Code of Practice for end-of-pipe fish protection screens for small water intakes in freshwater (DFO 2020). 	

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
Fish Populations	<ul style="list-style-type: none"> ▪ Fish abundance; ▪ Fish distribution; ▪ Fish mortality and/or injury; and ▪ Quality and quantity of food species (e.g., benthic invertebrate abundance and diversity). 	Operations	<ul style="list-style-type: none"> ▪ Operation, Maintenance and Repair of Road. ▪ Operation of Pits, Quarries and Maintenance Yard/Facility. ▪ Potential for Accidents and Malfunctions. ▪ Emissions, Discharges and Wastes. 	<ul style="list-style-type: none"> ▪ Maintenance activities requiring in-water work may injure or kill fish ▪ Fish death as a result of fish salvage or dewatering. 	Injury or Death of fish	<ul style="list-style-type: none"> ▪ Blasting Restrictions (See Section 5.12): <ul style="list-style-type: none"> ▫ A Blasting Management Plan will be prepared and implemented by the proponent or their contractor(s) for the Project that describes specific measures that would be implemented if blasting is required. ▫ Use blasting mats to reduce the percussive, or risk of fly rock, injures to fish, and /or death of fish. ▫ Establishing setbacks from fish-bearing waters that are protective of fish. ▫ When blasting is unavoidable, following the DFO Blasting Guidance (Wright and Hopky, 2008) and Ontario Provincial Standard Specification 120 General Specifications for the Use of Explosives (Ontario Provincial Standards 2019). ▫ Permitting all blasting works appropriately, including applying for Fisheries Act authorization where the potential for HADD and/or death of fish exists. ▫ Limiting blasting to areas where other methods, such as drilling and standard excavation, are not possible. ▫ Preparing site-specific blasting plans when blasting is likely to be required. ▫ No ammonium nitrate-fuel oil mixtures will be used, due to the production of toxic byproducts (i.e., ammonia). ▪ Timing Windows for Construction: <ul style="list-style-type: none"> ▫ Restricted activity periods will include both Spring and Fall windows to protect fish populations during their spawning, rearing and migratory periods. Based on the species present in the study area, these windows are estimated to typically be: <ul style="list-style-type: none"> - April 1 to June 30 (spring window); - September 1 to June 15 (fall/winter window); and - Restricted activity periods will be based on the species discovered in each specific waterbody. ▫ Construction of watercourse crossings will occur outside of restricted activity periods to minimize or avoid risk of injury or mortality to fish. ▫ Where fish sampling has not been conducted, the most restrictive activity period will be applied to each individual watercourse to be protective of fish and fish habitat. ▫ For waterbody crossing, the proposed restricted activity periods will be applicable to: <ul style="list-style-type: none"> - Any work below the high-water mark (installation of culverts, construction of bridge piers in-water); - Temporary water crossings where an ice bridge, fording or snow fill is proposed; and - Where beaver dam removals are required. 	Yes

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
						<ul style="list-style-type: none"> ▪ Work Isolation and Fish Rescue (See Section 5.8, Section 5.8, and Section 5.10): <ul style="list-style-type: none"> ▫ In-water work to allow for construction and repair of waterbody crossing structures will be isolated (i.e., will occur in the dry) from surrounding fish habitat using cofferdams, aquadams, or other methods acceptable the MNR and DFO such as the requirements in the Interim Code of Practice: Temporary Cofferdams and Diversion Channels [DFO 2023b]; and ▫ Submission of appropriate notification and acquisition of necessary permits/approvals from regulatory agencies. ▫ Temporary dam structures to isolate the work zone will be constructed using clean materials that minimize suspended sediment generation. ▫ Flow will be maintained during in-water works at a level sufficient to sustain aquatic life and prevent upstream impoundment. ▫ Fish rescues will be conducted to relocate fish prior to in-water work, dewatering or conducting works in wetted channels or wetlands. Fish within the isolated workspaces will be rescued (i.e., salvaged and relocated) by qualified professionals under the conditions of a MNR License to Collect Fish for Scientific Purposes to be acquired, and in accordance with requirements in the DFO Interim Standard for In-water Site Isolation. ▫ Fish handling will be minimized, including limiting time spent weighing and measuring fish. ▫ For diversions during isolations, appropriately screened pumps will be used to reduce the risk of entrainment or impingement of fish following the guidance within the interim DFO Code of Practice for end-of-pipe fish protection screens for small water intakes in freshwater (DFO 2020). 	
Fish Populations	<ul style="list-style-type: none"> ▪ Fish abundance; ▪ Fish distribution; ▪ Fish mortality and/or injury; and ▪ Quality and quantity of food species (e.g., benthic invertebrate abundance and diversity). 	Construction	<ul style="list-style-type: none"> ▪ Construction of Road. ▪ Construction of Structures at Waterbody Crossings. ▪ Decommissioning of Temporary Construction Camps, and restoration of Access Roads and Laydown/Storage Areas. 	<ul style="list-style-type: none"> ▪ Fishing access may improve during construction resulting in increased harvest by workers, First Nations, and recreational anglers. 	Changes to Public Access to Fish Habitats	<ul style="list-style-type: none"> ▪ Employee Wildlife Orientations and Restrictions: <ul style="list-style-type: none"> ▫ Employees or visitors on-site in temporary construction camps or at the permanent maintenance and storage facility will be prohibited from hunting, fishing, or harvesting wildlife. ▫ Temporary access routes, especially those at or approaching waterbody crossings as well as temporary construction camps and laydowns areas will be revegetated as soon as possible. ▫ Firearms and angling gear will be prohibited on-site. ▫ Wildlife orientation and education programs will be delivered on-site to inform personnel about best environmental practices for fish and wildlife in the area. ▪ Public Access Restrictions: <ul style="list-style-type: none"> ▫ Temporary access routes, construction camps and laydown areas that are not required for operation of the roadway will be reclaimed (i.e., revegetated and blocked from public access as soon as feasible). 	No

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Effect Pathway	Potential Effect	Key Mitigation Measures	Predicted Net Effect
						<ul style="list-style-type: none"> ▫ Public access to the road route and supportive infrastructure areas (camps, etc.) will be prohibited during construction unless authorized by the proponent. ▫ Stopping on the roadway during its operations will be prohibited, except in designated rest areas and in emergency situations. ▫ Fencing or other barricades will be installed near watercourses and on bridges to deter fishing. ▫ Increased access may require regulatory changes, such as restrictions on fishing in certain locations or changes to harvesting by First Nation community members to prevent additional fishing pressure. However, these legislative changes or changes to First Nation exercise of their rights to harvesting of fish are beyond the direct control the Project. ▪ Project Design: <ul style="list-style-type: none"> ▫ Installing restrictive fencing and/or barricades near waterbody crossing sites, including on bridge structures to deter fishing. ▫ Siting designated rest areas along the road as far as practical from potential fishing locations. 	
Fish Populations	<ul style="list-style-type: none"> ▪ Fish abundance; ▪ Fish distribution; ▪ Fish mortality and/or injury; and ▪ Quality and quantity of food species (e.g., benthic invertebrate abundance and diversity). 	Operations	<ul style="list-style-type: none"> ▪ Road Use. ▪ Operation, Maintenance and Repair of Road. 	<ul style="list-style-type: none"> ▪ Fishing access may improve during operations resulting in increased harvest by First Nations and recreational anglers. 	Changes in Public Access to Fish/Fish Habitats	<ul style="list-style-type: none"> ▪ Public Access Restrictions: <ul style="list-style-type: none"> ▫ Temporary access routes, construction camps and laydown areas that are not required for operation of the roadway will be reclaimed (i.e., revegetated and blocked from public access as soon as feasible). ▫ Public access to the road route and supportive infrastructure areas (camps, etc.) will be prohibited during construction unless authorized by the proponent. ▫ Stopping on the roadway during its operations will be prohibited, except in designated rest areas and in emergency situations. ▫ Fencing or other barricades will be installed near watercourses and on bridges to deter fishing. ▫ Increased access may require regulatory changes, such as restrictions on fishing in certain locations or changes to harvesting by First Nation community members to prevent additional fishing pressure. However, these legislative changes or changes to First Nation exercise of their rights to harvesting of fish are beyond the direct control the Project. ▪ Project Design: <ul style="list-style-type: none"> ▫ Installing restrictive fencing and/or barricades near waterbody crossing sites, including on bridge structures to deter fishing. ▫ Siting designated rest areas along the road as far as practical from potential fishing locations. 	Yes

13.5 Characterization of Net Effects

Net effects are defined as the effects of the Project that remain after application of proposed mitigation measures. The effects assessment follows the general process described in Section 5.5 Environmental Assessment / Impact Assessment Approach. The focus of the effects assessment is on predicted net effects, which are the effects that remain after application of proposed mitigation measures. Potential effects with no predicted net effect after implementation of mitigation measures are not carried forward to the net effects characterization or the cumulative effects assessment.

13.5.1 Potential Effect Pathways Not Carried Through for Further Assessment

With the implementation of mitigation measures, the following potential effect pathways are expected to be eliminated.

13.5.1.1 All Species

After the implementation of mitigation measures, the following potential effect pathways and interactions are expected to be eliminated:

- For habitat alteration by deposition of dust and other airborne emissions: No habitat alteration or degradation is expected as impacts are expected to be effectively controlled by the proposed mitigation measures and no net effect is anticipated.
- For habitat alteration by accidental spills: Given effective mitigation measures and the limited spatial extent and severity of spills, habitat contamination through accidental spills is expected to have no net effect on habitat alteration or degradation.
- For habitat alteration by Invasive Plant Species: Mitigation measures included as part of the Vegetation and Invasive Species Management Plan will avoid and limit the introduction and spread of invasive plant species. There is no net effect predicted related to the alteration or degradation of wildlife habitat after implementation
- For Injury or Death due to wildlife attractants: Mitigation measures as outlined will control wildlife interactions with project personnel and worksites during the construction phase. Garbage and other waste are expected to be effectively controlled along the road during operations. There is no net effect predicted related to the wildlife attractants after implementation.

13.5.1.2 Caribou

After the implementation of mitigation measures, the following potential effect pathway and interaction are expected to be eliminated:

- Introduction of brainworm (*P. tenuis*) is not expected to have a net effect as white tailed deer are not expected to enter the RSA in the foreseeable future, their northern range is currently ~275 km south near Lake Nipigon. Mitigation measures including restoration of temporary features and ROW maintenance are designed to make white-tailed deer entry into the RSA unlikely.



13.5.1.3 Olive-sided Flycatcher

After the implementation of mitigation measures, the following potential effect pathways and interactions are expected to be eliminated:

- For habitat loss by changes in hydrology: Mitigation measures included as part of road design will avoid and limit complete loss of habitat by hydrological changes.
- For habitat alteration by changes in habitat structure: Mitigation measures included as part of the Vegetation and Invasive Species Management Plan are expected to result in negligible impacts on Olive-sided Flycatcher due its ability and preference for habitat mosaics and edge habitats.

13.5.1.4 Rusty Blackbird

After the implementation of mitigation measures, the following potential effect pathways and interactions are expected to be eliminated:

- For habitat loss by changes in hydrology: Mitigation measures included as part of road design will avoid and limit complete loss of habitat by hydrological changes
- For habitat alteration resulting in changes in habitat structure: Mitigation measures included as part of the Vegetation and Invasive Species Management Plan are expected to result in negligible impacts on Lesser Yellowlegs due to the existing more open vegetative structure of these areas.

13.5.1.5 Lesser Yellowlegs

All Project Phases

After the implementation of mitigation measures, the following potential effect pathways and interactions are expected to be eliminated:

- For habitat loss by changes in hydrology: Mitigation measures included as part of road design will avoid and limit complete loss of habitat by hydrological changes.
- For habitat alteration resulting in changes in habitat structure: Mitigation measures included as part of the Vegetation and Invasive Species Management Plan are expected to result in negligible impacts on Lesser Yellowlegs due to the existing more open vegetative structure of these areas.
- For injury or death due to increased access: While historically Lesser Yellowlegs have been hunted by some communities on the coast of Hudson Bay, hunting activities are not expected to affect Lesser Yellowlegs as they are not species targeted for harvest locally.

13.5.1.6 Common Nighthawk

After the implementation of mitigation measures, the following potential effect pathways and interactions are expected to be eliminated:

All Project Phases

- For habitat loss by changes in hydrology: Mitigation measures included as part of road design will avoid and limit complete loss of habitat by hydrological changes.
- For habitat alteration resulting in changes in habitat structure: Mitigation measures included as part of the Vegetation and Invasive Species Management Plan are expected to result in negligible impacts on Common Nighthawk due to the use of edge and early seral habitats by nighthawks.



- For alteration of movement due to loss of connectivity: The road is expected to have no effect on connectivity as Nighthawks can fly above roadway and are not known to avoid open areas or habitat gaps.

Operations Phase

- For habitat alteration by sensory disturbance: Given the low amount of traffic along the road and the ability of Common Nighthawk to use anthropogenically disturbed areas a negative effect is not predicted.
- Movement changes by sensory disturbance: Given the low amount of traffic along the road and the ability of Common Nighthawk to use anthropogenically disturbed areas a negative effect is not predicted.

13.5.1.7 Bald Eagle

After the implementation of mitigation measures, the following potential effect pathways and interactions are expected to be eliminated:

All Project Phases

- For habitat loss by changes in hydrology: Mitigation measures included as part of road design will avoid and limit complete loss of habitat by hydrological changes.
- For alteration of movement due to loss of connectivity: The road is expected to have no effect on connectivity as raptors can fly above roadway and are not known to avoid open areas or habitat gaps.
- For injury or death due to increased access: While poaching can affect raptor survivorship, the isolated location of the road is expected avoid any change in survivorship due to hunting or trapping activities.

13.5.1.8 Short-eared Owl

After the implementation of mitigation measures, the following potential effect pathways and interactions are expected to be eliminated:

All Project Phases

- For habitat loss by changes in hydrology: Mitigation measures included as part of road design will avoid and limit complete loss of habitat by hydrological changes.
- For habitat alteration by invasive plants: Mitigation measures included as part of the Vegetation and Invasive Species Management Plan will avoid and limit the introduction and spread of invasive plant species.
- For habitat alteration resulting in changes in habitat structure: Mitigation measures included as part of the Vegetation and Invasive Species Management Plan are expected to result in negligible impacts on Short-eared Owl to the use of road edges and early seral habitats by Short-eared Owl. While fragmentation can affect Short-eared Owls, total area of habitat within a landscape is more important than size of individual patches.
- For alteration of movement due to loss of connectivity: The road is expected to have no effect on connectivity as raptors can fly above roadway and are not known to avoid open areas or habitat gaps.



- Injury or Death due to harvesting is expected to have no effect. While poaching can affect raptor survivorship, the isolated location of the road is expected avoid any change in survivorship due to hunting or trapping activities.

Operations Phase

- For alteration of movement due to sensory disturbance: Given the low amount of traffic along the road and the ability of Short-eared Owls to use roadside areas a negative effect is not predicted.

13.5.1.9 Lake Sturgeon

After the implementation of mitigation measures, the following potential effect pathways and interactions are expected to be eliminated for Lake Sturgeon:

Construction Phase

- For Changes in Public Access to Fish Habitats: Mitigation measures should be able to effectively eliminate the effects of Project construction → Increased access to fish habitat for work crews → Increased harvest of fish.

Operations Phase

- For Destruction or Loss of Fish Habitat: There is not expected to be any additional habitat loss during the operations phase as bridges will be constructed already, and new bridges are not expected to be required.
- For Changes in Fish Access to Habitats: Constructed culverts at waterbody crossings are not expected to alter Lake Sturgeon Movement, as all habitats with Lake Sturgeon potential will have bridge structures.

Potential effects that remain following the implementation of mitigation measures are carried forward for further assessment (**Section 13.5.2 – Predicted Net Effects**).

13.5.2 Predicted Net Effects

An effect on the Species at Risk VC may remain after the implementation of mitigation measures. The predicted net effects include:

- Habitat Loss;
- Habitat Alteration or Degradation;
- Alteration in Movement; and
- Injury or Death.

Table 13-49 presents definitions for net effects criteria, developed with specific reference to the Terrestrial Habitat and Wildlife VC. These criteria are considered together in the assessment, along with context derived from existing conditions and proposed mitigation measures, to characterize predicted net effects from the Project on the Terrestrial Wildlife and Wildlife Habitat.



Table 13-49: Net Effects Assessment Criteria Definitions

Characterization Criteria	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	Direction relates to the value of the effect in relation to the existing conditions	<p>Positive – Net gain or benefit; effect is desirable.</p> <p>Neutral – No change compared with baseline conditions and trends.</p> <p>Negative – Net loss or adverse effect; effect is undesirable.</p>
Magnitude	Magnitude is the amount of change in measurable parameters or the VC relative to existing conditions	<p>Negligible – No measurable change.</p> <p>Low – A measurable change that is not expected to cause significant losses of wildlife species and the net effect will be unlikely to affect the overall population but is above negligible.</p> <p>Moderate – A measurable change that could cause impacts to a wildlife species within the area but likely can be managed. This effect would cause an observable effect to the wildlife species but would be within the adaptive capability of the species.</p> <p>High – An effect that may not be manageable and the change exceeds the ability for a species to continue sustained existence within the area.</p>
Geographic Extent	Geographic extent refers to the spatial area over which a net effect is expected to occur or can be detected within the Project Footprint, Local Study Area and Regional Study Area	<p>Project Footprint – The effect is confined to the Project Footprint or Project Development Area.</p> <p>Local Study Area – The effect is confined to the Local Study Area.</p> <p>Regional Study Area – The effect extends beyond the Local Study Area boundary, but is confined within the Regional Study Area.</p>
Timing	Timing criteria indicate the timing (e.g., dates or seasons) importance of the net effect	<p>Non-sensitive – The effect is expected outside sensitive timing periods.</p> <p>Sensitive – The effect is expected inside sensitive timing periods (calving, nesting, maternity, migration).</p> <p>All – The effect is expected in all seasons.</p> <p>N/A: Timing doesn't factor into the importance of the net effect.</p>
Duration	Duration is the period of time required until the measurable indicators or the VC returns to its existing (baseline) condition, or the net effect can no longer be measured or otherwise perceived	<p>Short-term – Net effect restricted to no more than the duration of the construction phase (approximately 5 years).</p> <p>Medium-term – Net effect extends through the operations phase of the Project (75-year life cycle).</p> <p>Long-term – Net effect extends beyond the operations phase (greater than 75 years).</p> <p>Permanent – Recovery to baseline conditions unlikely.</p>
Frequency	Frequency refers to the rate of occurrence of an effect over the duration of the Project or in a specific phase	<p>Infrequent – The effect is expected to occur rarely.</p> <p>Frequent – The effect is expected to occur intermittently.</p> <p>Continuous – The effect is expected to occur continually.</p>



Characterization Criteria	Description	Quantitative Measure or Definition of Qualitative Categories
Context	Context considers sensitivity and resilience of the VC to project-related change	<p>Low – Wildlife species have high resilience to stress and is not sensitive to activities or natural changes.</p> <p>Moderate – Wildlife species or species group have moderate resilience to stress, is somewhat sensitive to activities or natural changes but has capacity to assimilate change.</p> <p>High – Wildlife species or species group have weak resilience to stress, and is very sensitive to activities, or natural changes with little capacity to assimilate change.</p>
Input from Indigenous Peoples	Views of the Indigenous communities and groups in assigning the criteria to be used and in characterizing the effects	First Nation members are concerned that an increase in public access will impact wildlife survival and reproduction as a result of hunting or vehicle strikes, particularly waterfowl and moose.
Reversibility	Reversibility describes whether a measurable indicator or the VC can return to its existing condition after the project activity ceases	<p>Reversible – The net effect is likely to be reversed after activity completion and rehabilitation.</p> <p>Irreversible – The net effect is unlikely to be reversed.</p>
Likelihood of Occurrence	Likelihood of occurrence is a measure of the likelihood that an activity will result in an effect	<p>Unlikely – The effect is not likely to occur.</p> <p>Possible – The effect may occur, but is not likely.</p> <p>Probable – The effect is likely to occur.</p> <p>Certain – The effect will occur.</p>

13.5.2.1 Caribou (Boreal Population and Eastern Migratory Population)

13.5.2.1.1 Habitat Loss

Clearance Activities

Construction

Road construction will require the removal of 232.40 ha (30.6%) of Category 1 Nursery Areas and 98,483 (48.5%) of Category 2 Seasonal Ranges in the LSA, which are effectively converted to Category 3 Remaining Areas in the Range, increasing that sub-range habitat by 98,797.34 ha (202.6%) in the RSA. The 232.40 ha of Category 1 High Use Habitat estimated to be removed as a result of construction activities represents 0.05% of the known Category 1 features in the Missisa and Ozhiski Caribou Ranges. Overall, the net effect to Caribou is negative due to the loss of suitable nursery areas and seasonal ranges. A summary of the net effect assessment relating to habitat loss due to the construction phase based on the Characterization Criteria is presented in **Table 13-50**.

Table 13-50: Criteria Results for Loss of Caribou Habitat – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as loss of Category 1 and Category 2 habitat is undesirable and considered the be adverse.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible.



Characterization Criteria	Result	Rationale
Geographic Extent	LSA	The effect will extend beyond the Project Footprint into the LSA.
Timing	All Time Periods	Caribou are active year-round when construction activities may take place.
Duration	Permanent	Recovery to baseline habitat conditions following construction is unlikely.
Frequency	Continuous	Once Caribou habitat is removed, the effect will occur continuously.
Context	Moderate	In the context of habitat loss, Caribou are moderately resilient to change and have capacity to adapt as habitat is not limiting in the RSA.
Reversibility	Irreversible	Habitat loss from the road construction will persist beyond project operations and the net effect is unlikely to be reversed.
Likelihood of Occurrence	Certain	Habitat loss will occur as a result of road construction.

Operations

Maintenance of the road, including vegetation trimming and repairs to road infrastructure, may be required over time, which may result in the short-term creation of disturbed habitat in the Project Footprint. Overall, it is probable there will be a neutral effect on Caribou. A summary of the net effect assessment relating to habitat loss due to the operations phase based on the Characterization Criteria is presented in **Table 13-51**.

Table 13-51: Criteria Results for Loss of Caribou Habitat – Operations

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as no destruction of additional habitat is expected due to road operations.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as there will be no additional measurable loss of habitat resulting from road operations.
Geographic Extent	Project Footprint	Vegetation management and road maintenance will be limited to the Project Footprint.
Timing	All Time Periods	Road maintenance may occur at any time during the year.
Duration	Short-term	Any additional destruction of Caribou habitat will be short-term, until vegetation management activities are completed.
Frequency	Infrequent	Road maintenance activities that may cause habitat loss will be rare.
Context	Low	Habitat loss as a result of vegetation management along the road is expected to be minimal and selective. Caribou are expected to be resilient to small, temporary habitat losses that may result from vegetation management.
Reversibility	Reversible	The net effect is reversible as vegetation is expected to regrow once vegetation management is completed.
Likelihood of Occurrence	Unlikely	An additional negative effect is unlikely to occur as removal of habitat is not required for the operation of the road.



13.5.2.1.2 Habitat Alteration or Degradation

Habitat Structural Change

Vegetation removals, creation of the ROW and construction of the paved and gravel road surfaces may alter or degrade Caribou habitat near the Project Footprint, extending into the LSA by changing vegetation height, density, and community composition. The ROW will be 35 m wide with a road surface spanning 12 m composed of gravel (eastern half) and asphalt or chip seal treatment (western half) (refer to **Section 4.3.1: Project Description – Roadway**). After the implementation of mitigation measures, construction of the road may lead to edge effects, including abiotic, direct biotic, and indirect biotic effects on the habitat, along with the physical habitat structural changes. Overall, the net effect is expected to be negative. A summary of the net effect assessment relating to habitat alteration and degradation due to habitat structural change from the construction phase based on the Characterization Criteria is presented in **Table 13-52**.

Table 13-52: Criteria Results for Caribou Habitat Alteration or Degradation from Habitat Structural Change – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	Caribou may use young regenerating stands temporarily but generally require mature boreal ecosystems and avoid regenerating habitats due to predators.
Magnitude	Low	The amount of habitat structural change is expected to have a minimal effect on the population as other factors such as sensory disturbance and predators will influence Caribou use of these areas.
Geographic Extent	LSA	The effects will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	The effects are expected to occur throughout the year.
Duration	Long-term	The effects are expected to extend beyond road operations.
Frequency	Continuous	Vegetation permanently removed will generate continuous habitat structural changes.
Context	Moderate	In the context of habitat alteration from structural change, Caribou are moderately resilient to change and have capacity to adapt as habitat is not limiting in the RSA.
Reversibility	Reversible	The effects are reversible if the cleared vegetation is restored.
Likelihood of Occurrence	Certain	Habitat structural changes will occur as a result of construction.

Operations

Habitat structural changes will occur in the LSA due to vegetation clearing and changes to vegetation community structure initiated during road construction. These vegetation changes will be maintained as a result of road operations, but no new changes are expected to be generated from road operations. Overall, the net effect is expected to be neutral. A summary of the net effect assessment relating to habitat structural changes from the operations phase based on the Characterization Criteria is presented in **Table 13-53**.



Table 13-53: Criteria Results for Caribou Habitat Alteration or Degradation from Habitat Structural Change – Operations

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as no new effects are expected to be generated from road operation, resulting in no change compared with baseline conditions.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as there will be no additional measurable habitat structural changes caused by road operation.
Geographic Extent	LSA	The effects will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	The effects are expected to occur throughout the year.
Duration	Short-term	Any additional habitat structural changes will be short-term, until vegetation management activities are completed.
Frequency	Infrequent	Vegetation management that may lead to temporary habitat structural changes will be infrequent.
Context	Low	Habitat structural changes as a result of vegetation management along the road are expected to be minimal and temporary. Caribou are expected to be resilient to small changes that may result from vegetation management.
Reversibility	Reversible	The effects are reversible if the cleared vegetation is restored.
Likelihood of Occurrence	Unlikely	An additional effect as a result of road operation is unlikely to occur.

Hydrological Changes

Construction

Caribou habitat, particularly Category 1 Nursery Areas and Category 2 Seasonal Ranges may be altered hydrologically, with construction activities such as grading for road installation resulting in changes to both surface and groundwater water causing flooding or drying of vegetation communities. Based on the Groundwater assessment of alteration to groundwater level and flow direction (**Section 8.5**) these changes are certain to result in a net negative effect in the LSA. A summary of the net effect assessment relating to hydrological changes from the construction phase based on the Characterization Criteria is presented in **Table 13-54**.

Table 13-54: Criteria Results for Caribou Habitat Alteration or Degradation Due from Hydrological Changes – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as it is undesirable and considered the be adverse relating to alteration of Caribou Category 1 and Category 2 habitat.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as hydrological changes will cause a measurable change in Caribou habitat but is likely within the adaptive capability of this species.
Geographic Extent	LSA	The effect will extend into the LSA.



Characterization Criteria	Result	Rationale
Timing	All Time Periods	Hydrological changes are expected to occur through the year.
Duration	Permanent	Recovery to baseline hydrological conditions following construction is unlikely.
Frequency	Continuous	The effect of hydrological changes will occur continually.
Context	Moderate	In the context of habitat alteration from hydrological changes, Caribou are moderately resilient to change and have capacity to adapt as habitat is not limiting in the RSA.
Reversibility	Irreversible	Hydrological changes will persist beyond project operations and the net effect is unlikely to be reversed.
Likelihood of Occurrence	Certain	Hydrological changes will occur as a result of road construction.

Operations

Operation of the road is not anticipated to result in further changes to hydrology. It is possible that changes to hydrology may occur as a result of the operations phase due to culvert and drainage blockages requiring maintenance. Overall, the net effect is expected to be negative. A summary of the net effect assessment relating to hydrological changes from the operations phase based on the Characterization Criteria is presented in **Table 13-55**.

Table 13-55: Criteria Results for Caribou Habitat Alteration or Degradation from Hydrological Changes – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as changes to hydrology are undesirable and considered to be adverse relating to alteration of Caribou Category 1 and Category 2 habitat.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect will cause a measurable change in Caribou habitat but is unlikely to affect overall Caribou populations.
Geographic Extent	LSA	Hydrological changes will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	Hydrological changes due to blockages can occur throughout the year.
Duration	Short-term	Hydrological changes are expected to be temporary until maintenance and repair activities are completed.
Frequency	Infrequent	Hydrological changes are expected to be rare.
Context	Low	Caribou are expected to be resilient to small habitat alterations that may result from temporary hydrological changes.
Reversibility	Reversible	Hydrological changes should be restored once maintenance activities are concluded
Likelihood of Occurrence	Possible	Blockages to culverts and drainage features as a result of operations are possible.



Sensory Disturbance

Construction

During construction, activities such as blasting at quarries/pits, earth hauling and vegetation clearing, and the use of lighting around facilities, may reduce the ability of Caribou to use habitat along the ROW and supportive infrastructure due to sensory disturbances. Mitigation measures around timing (hours of work, seasonality) for construction activities are expected to mitigate some of the potential effects but there is a predicted net effect on habitat from noise due to construction activities as well as movement of construction vehicles and equipment. Sensory disturbances have the potential to impact all classes of Caribou habitats, particularly Category 1 High Use Areas. Overall, there will be a net negative effect due to sensory disturbance. A summary of the net effect assessment relating to habitat alteration and degradation caused by sensory disturbance from the construction phase based on the Characterization Criteria is presented in **Table 13-56**.

Table 13-56: Criteria Results for Caribou Habitat Alteration or Degradation from Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is undesirable and considered to be adverse relating to alteration of Caribou habitat.
Magnitude	High	The magnitude of the effect is predicted to be high, as the effect will cause a measurable alteration of Caribou habitat and likely exceeds the ability for the species to continue sustained existence within the area.
Geographic Extent	LSA	Sensory disturbances altering Caribou habitat will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	Sensory disturbances altering Caribou habitat are expected to occur through the year.
Duration	Short-term	Sensory disturbances that alter Caribou habitat are expected to end after the construction phase is completed.
Frequency	Continuous	Sensory disturbances that alter Caribou habitat are expected to be continuous as they are very sensitive to human disturbances.
Context	High	In the context of habitat alteration due to sensory disturbances, Caribou are not resilient and have little capacity to assimilate change. Caribou do not use habitats (e.g., for Nursery Areas) within several kilometres of human disturbances.
Reversibility	Reversible	Sensory disturbances are reversible when noise, movement and light cease to be generated in the Project Footprint and vegetation is restored.
Likelihood of Occurrence	Certain	Sensory disturbances that alter Caribou habitat are certain as mitigation measures cannot entirely minimize light, movement and noise generated to baseline levels.



Operations

Noise and light from vehicles travelling on the road as a result of operations will impact Caribou habitat along the ROW and supportive infrastructure. Additionally, the quarries are expected to be used beyond the construction phase, which will continue to generate sensory disturbances such as noise and movement of vehicles and equipment. It is expected that the road will mainly be used during daylight hours, minimizing effects on Caribou habitat between dusk and dawn; however, road noise, scent, and other sensory disturbances generated during daylight hours has the potential to affect Caribou habitats located up to several kilometres from the ROW. Overall, the effect is expected to be negative. A summary of the net effect assessment relating to habitat alteration and degradation caused by sensory disturbance from the operations phase based on the Characterization Criteria is presented in **Table 13-57**.

Table 13-57: Criteria Results for Caribou Habitat Alteration or Degradation from Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is undesirable and considered to be adverse relating to alteration of Caribou habitat.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as sensory disturbances will cause a measurable change in Caribou habitat but is likely within the adaptive capability of this species.
Geographic Extent	LSA	Sensory disturbances altering Caribou habitat will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	Sensory disturbances altering Caribou habitat are expected to occur through the year.
Duration	Medium-term	Sensory disturbances altering Caribou habitat will extend through the operations phase.
Frequency	Continuous	Sensory disturbances that alter Caribou habitat are expected to be continuous as they are very sensitive to human disturbances and road use can occur at any time of day.
Context	High	In the context of habitat alteration due to sensory disturbances, Caribou are not resilient and have little capacity to assimilate change. Caribou do not use habitats (e.g., for Nursery Areas) within several kilometres of human disturbances.
Reversibility	Reversible	Sensory disturbances are reversible when noise, movement and light cease to be generated in the Project Footprint.
Likelihood of Occurrence	Certain	Sensory disturbances altering Caribou habitat are certain.

13.5.2.1.3 Alteration in Movement

Sensory Disturbance

Construction

Caribou movement will be altered by sensory disturbances generated from construction related activities during the construction phase. Noise, lighting, scent, and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of Caribou as they avoid the road the ROW and supportive infrastructure areas. Mitigation measures focused on sensory disturbance including timing windows, noise and light abatement are



expected to mitigate some of the potential effects but there is a predicted net negative effect from construction activities on Caribou movement. A summary of the net effect assessment relating to alteration in movement due to sensory disturbance from the construction phase based on the Characterization Criteria is presented in **Table 13-58**.

Table 13-58: Criteria Results for Alteration in Caribou Movement from Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is undesirable and considered to be adverse relating to alteration of Caribou movement.
Magnitude	High	The magnitude of the effect is predicted to be high, as the effect will cause a measurable alteration of Caribou movement and likely exceeds the ability for the species to continue sustained existence within the area.
Geographic Extent	LSA	Sensory disturbances altering Caribou movement can occur more than 10 km from the disturbance.
Timing	All Time Periods	Sensory disturbances altering Caribou movement are expected to occur through the year.
Duration	Short-term	Sensory disturbances altering Caribou movement due to construction activities are expected to end after the construction phase.
Frequency	Continuous	Sensory disturbances that alter Caribou movement are expected to be continuous from construction activities as they are very sensitive to human disturbances.
Context	High	In the context of movement alteration due to sensory disturbances, Caribou have weak resilience and are very sensitive with little capacity to assimilate change.
Reversibility	Reversible	Sensory disturbances are reversible when noise, movement, scent and light cease to be generated in the Project Footprint.
Likelihood of Occurrence	Probable	Sensory disturbances altering Caribou movement due to construction are likely as mitigation measures cannot entirely minimize light, scent, movement and noise generated to baseline levels and Caribou are known to avoid areas with human disturbance.

Operations

After the implementation of mitigation measures, road operations are also expected to result in alterations in Caribou movement. While traffic levels are expected to be low, Caribou are likely to experience a net negative effect due to sensory disturbance from road operation. A summary of the net effect assessment relating to alteration in movement due to sensory disturbance from the operations phase based on the Characterization Criteria is presented in **Table 13-59**.



Table 13-59: Criteria Results for Alteration in Caribou Movement from Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is undesirable and considered to be adverse relating to alteration of Caribou movement.
Magnitude	High	The magnitude of the effect is predicted to be high, as the effect will cause a measurable alteration of Caribou movement and likely exceeds the ability for the species to continue sustained existence within the area.
Geographic Extent	LSA	Sensory disturbances altering Caribou movement can occur more than 10 km from the disturbance.
Timing	All Time Periods	Sensory disturbances altering Caribou movement are expected to occur through the year.
Duration	Medium-term	Sensory disturbances altering Caribou movement will extend throughout the operations phase.
Frequency	Continuous	Sensory disturbances that alter Caribou movement are expected to be continuous due to road operations, as they are very sensitive to human disturbances, which may also be perceived as a risk of predation.
Context	High	In the context of movement alteration due to sensory disturbances, Caribou have weak resilience and are very sensitive with little capacity to assimilate change.
Reversibility	Reversible	Sensory disturbances are reversible when noise, movement and light cease to be generated in the Project Footprint.
Likelihood of Occurrence	Probable	Sensory disturbances altering Caribou movement due to road operations are likely as Caribou move quickly when in proximity to roads and generally take efforts to avoid them.

Loss of Connectivity

Construction

Caribou movement is likely to be altered by construction of the road due to fragmentation of forest habitat, resulting in a loss of connectivity. There are few effective mitigation measures that can be applied to minimize the effects of habitat fragmentation on Caribou. Wildlife overpasses are well established in North America as successful solutions for maintaining habitat connectivity across transportation corridors but is unlikely feasible in the context of the proposed road construction and landscape. Additionally, Caribou (Boreal population) are not well documented in the literature successfully using wildlife crossings (i.e., overpasses, underpasses), particularly given their strong avoidance behaviour towards roads and surrounding areas are unlikely suitable mitigation measures. Therefore, after mitigation measures are applied, there will be a net negative effect due to loss of connectivity. A summary of the net effect assessment relating to alteration in movement due to loss of connectivity from the construction phase based on the Characterization Criteria is presented in **Table 13-60**.



Table 13-60: Criteria Results for Alteration in Caribou Movement Due to Loss of Connectivity – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as loss of connectivity is undesirable and considered to be adverse relating to alteration of Caribou movement.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as loss of connectivity will cause a measurable change in Caribou movement. The width of the corridor will be 35 m and it will extend approximately 70 km from the western edge of the Missisa range boundary.
Geographic Extent	RSA	Loss of connectivity altering Caribou movement will affect Caribou moving across the RSA, potentially posing a barrier for the entire length of the feature.
Timing	All Time Periods	Alteration in Caribou movement due to loss of connectivity is expected to happen year-round.
Duration	Long-term	The effect is expected to extend beyond the operations phase.
Frequency	Continuous	Vegetation permanently removed as a result of road construction will generate continuous effects to habitat connectivity.
Context	Moderate	In the context of alteration in movement due to habitat fragmentation, some Caribou may be resilient to change and have capacity to adapt.
Reversibility	Reversible	Effects to Caribou movement due to loss of connectivity is reversible if vegetation is restored in the ROW.
Likelihood of Occurrence	Probable	Alteration in movement due to loss of connectivity is well understood for Caribou and is likely to occur.

Operations

No further fragmentation of forest habitat resulting in loss of connectivity is anticipated to occur as a result of the operations phase. Maintenance activities such as vegetation management may temporarily widen portions of the ROW that have overgrown, having a short-term effect on connectivity. Vehicle use of the road is expected to create a barrier for Caribou use. Overall, the effect will be negative. A summary of the net effect assessment relating to loss of connectivity from the operations phase based on the Characterization Criteria is presented in **Table 13-61**.

Table 13-61: Criteria Results for Alteration in Caribou Movement Due to Loss of Connectivity – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as road use by vehicles during operations will create a barrier to Caribou.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect will cause a measurable change in Caribou movement but is unlikely to affect overall Caribou populations.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	All Time Periods	The effect can occur year-round.



Characterization Criteria	Result	Rationale
Duration	Medium-term	Loss of connectivity due to vehicles from road operations altering Caribou movement will extend through the operations phase.
Frequency	Frequent	Loss of connectivity due to vehicles from road operations is expected to occur intermittently.
Context	Low	Caribou are expected to be resilient to alterations in movement that may result from road use by vehicles during operations.
Reversibility	Reversible	The effect is reversible once vehicles stop using the road.
Likelihood of Occurrence	Probable	A loss of connectivity due to road operations is likely to occur.

13.5.2.1.4 Injury or Death

Collisions With Vehicles

Construction

Strictly enforcing mitigation measures during the construction phase is expected to eliminate collisions with and fatalities of Caribou by construction vehicles and equipment. Construction is expected to take place largely between 7am and 7pm, which is the same period when Caribou are typically active as a primarily diurnal species with some crepuscular tendencies. It is expected there will be a net neutral effect on Caribou injury and death from collisions as a result of the construction phase. A summary of the net effect assessment relating to injury and death resulting from collisions from the construction phase based on the Characterization Criteria is presented in **Table 13-62**.

Table 13-62: Criteria Results for Caribou Injury or Death Due to Collisions with Vehicles – Construction

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as mitigation measures will effectively prevent collisions with caribou during the construction phase.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as there will be no measurable injury or death to Caribou during the construction phase.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	All Time Periods	The effect may occur at any time throughout the year.
Duration	Short-term	Collisions with construction vehicles and equipment would only occur during the construction phase.
Frequency	Infrequent	Strict enforcement of mitigation measures will limit the number of collisions between construction vehicles and Caribou.
Context	Moderate	Caribou are expected to be moderately resilient to a small number of injuries or mortalities that could result from collisions with construction vehicles.
Reversibility	Reversible	Collisions with construction vehicles and equipment will cease once construction activities conclude.
Likelihood of Occurrence	Unlikely	Collisions between construction vehicles and Caribou are not likely.



Operations

Mortality from road operations is not expected to be eliminated by mitigations but may be expected to occur in locations where Caribou cross the road, especially during crepuscular periods when changing light conditions pose hazards to drivers. The predicted maximum vehicles travelling on the road is 500 per day, with the majority of travel anticipated to take place during daylight hours when Caribou are most active. Overall, a net negative effect is expected due to vehicle traffic. A summary of the net effect assessment relating to injury and death resulting from collisions from the operations phase based on the Characterization Criteria is presented in **Table 13-63**.

Table 13-63: Criteria Results for Caribou Injury or Death Due to Collisions with Vehicles – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as collisions between Caribou and vehicles are undesirable and considered to be adverse relating to Caribou survival.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible as Caribou generally avoid active roads, and mitigation measures such as slower speeds and driver vigilance are expected to prevent collision mortalities.
Geographic Extent	Project Footprint	Collisions between Caribou and vehicles will be limited to the Project Footprint.
Timing	All Time Periods	Collisions with Caribou can occur year-round.
Duration	Medium-term	Collisions between Caribou and vehicles are expected to occur through road operations.
Frequency	Infrequent	As Caribou are known to avoid roads, collisions are expected to be rare.
Context	Moderate	Caribou are expected to be moderately resilient to a small number of injuries or mortalities that could result from collisions with vehicles.
Reversibility	Reversible	Collisions will cease once road operation concludes.
Likelihood of Occurrence	Possible	While it is expected to be rare, collisions between Caribou and vehicles may occur.

Increased Access

Construction

Strict site controls and workplace policies are expected to effectively eliminate the risk of hunting and poaching of Caribou during construction. Overall, it is expected there will be a net neutral effect. A summary of the net effect assessment relating to injury and death resulting from increased access during the construction phase based on the Characterization Criteria is presented in **Table 13-64**.



Table 13-64: Criteria Results for Caribou Injury or Death Due to Increased Access – Construction

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as mitigation measures are expected to effectively manage hunting or poaching access by controlling site access and through workplace policies on behaviour and conduct.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, no measurable change in Caribou injury and mortality is expected.
Geographic Extent	LSA	The Project Footprint may provide increased access to the LSA.
Timing	All Time Periods	Increased access resulting in hunting or poaching may occur year-round.
Duration	Short-term	Increased access resulting from construction would stop after the construction phase.
Frequency	Infrequent	Strict enforcement of mitigation measures will limit hunting or poaching of Caribou.
Context	Low	Caribou are expected to be resilient to a small number of mortalities that may result from increased access that may occur from road construction.
Reversibility	Reversible	The effects are reversible if access to the road is restricted.
Likelihood of Occurrence	Unlikely	Increased access from road construction is expected to be effectively mitigated and is unlikely to occur.

Operations

Increased access to Caribou habitat as a result of the operations phase may result in increased legal harvest and illegal poaching of Caribou. While the remote nature of the project location may pose a challenge to monitoring for poaching, it is expected that the federal and provincial authorities will continue to enforce laws and regulations relating to Caribou in the RSA; however, the effect cannot be entirely eliminated. Overall, a net negative effect is expected due to increased access. A summary of the net effect assessment relating to injury and death resulting from increased access during the operations phase based on the Characterization Criteria is presented in **Table 13-65**.

Table 13-65: Criteria Results for Caribou Injury or Death Due to Increased Access – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as poaching of Caribou is undesirable and considered to be adverse relating to Caribou survival.
Magnitude	Low	The magnitude of the effect is predicted to be low, as any mortality from poaching would result in a measurable change but would unlikely affect the overall population.
Geographic Extent	LSA	The Project Footprint may provide increased access to the LSA.
Timing	All Time Periods	Increased access resulting in poaching may occur year-round.



Characterization Criteria	Result	Rationale
Duration	Long-term	Increased access will persist long-term if the corridor continues to provide access after the operations phase, such as by all-terrain vehicle or snowmobile.
Frequency	Infrequent	Poaching due to increased access is expected to be rare.
Context	Low	Caribou are expected to be resilient to a small number of mortalities that may result from increased access that may occur as a result of road operations.
Reversibility	Reversible	The effects are reversible if access to the road is restricted.
Likelihood of Occurrence	Unlikely	Laws are in place to prevent poaching and Caribou occur in low densities across the landscape. Poaching due to increased access is unlikely to occur.

Changes to Predator-Prey Dynamics

Construction

Effects on Caribou survival from improved predator access and movement rates is possible. Wolf predation of collared caribou was estimated to be 12.5% annually in the existing conditions. Mitigation involving reclamation/blockage of any temporarily disturbed areas and access roads after construction will minimize the effect as these actions will reduce open areas and linear features. While reclamation and restoration has been shown to reduce predator and prey use of anthropogenic features (Dickie et al., 2021; Dickie et al., 2022; Keim et al. 2021; Tattersall et al., 2019), the effects of increased predation cannot be completely eliminated. It is probable there will be a net negative effect on Caribou survival in the RSA due to increased predation as a result of road construction. A summary of the net effect assessment relating to injury and death due to changes to predator-prey dynamics from the construction phase based on the Characterization Criteria is presented in **Table 13-66**.

Table 13-66: Criteria Results for Caribou Injury or Death from Changes to Predator-Prey Dynamics – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as injury or death of Caribou due to improved predator access due to road construction is undesirable.
Magnitude	High	The magnitude of the effect is predicted to be high, as the primary threat to Caribou in Ontario is increased predation rates related to habitat disturbance.
Geographic Extent	RSA	Predators are not expected to remain in the Project Footprint and will travel into the RSA.
Timing	All Time Periods	Predation may occur at any time throughout the year.
Duration	Long-term	Improved predator access is expected to remain beyond the construction and operations phases.
Frequency	Frequent	Caribou mortality by increased predation is expected to occur intermittently.
Context	High	Predation by wolves is a major factor limiting Caribou populations, contributing to low recruitment and survival rates.



Characterization Criteria	Result	Rationale
Reversibility	Irreversible	Improved predator access is mitigatable with revegetation efforts in the ROW, however it can likely not be fully reversed in the foreseeable future.
Likelihood of Occurrence	Probable	Increased predation of Caribou due to improved predator access and changes to predator-prey dynamics is likely.

Operations

It is possible there will be a net negative effect on Caribou survival in the RSA as a result of road operation due to increased predation. A summary of the net effect assessment relating to Caribou injury and death due to changes to predator-prey dynamics from the operations phase based on the Characterization Criteria is presented in **Table 13-67**.

Table 13-67: Criteria Results for Caribou Injury or Death Due to Changes to Predator-Prey Dynamics – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as injury or death of Caribou due to improved predator access due to road operation is undesirable.
Magnitude	High	The magnitude of the effect is predicted to be high, as the primary threat to Caribou in Ontario is increased predation rates related to habitat disturbance.
Geographic Extent	RSA	Predators are not expected to remain in the Project Footprint and will travel into the RSA.
Timing	All Time Periods	Predation may occur at any time throughout the year.
Duration	Medium-term	Improved predator access changing predator-prey dynamics will extend through the operations phase.
Frequency	Frequent	Caribou mortality by increased predation is expected to occur intermittently.
Context	High	Predation by wolves is a major factor limiting Caribou populations, contributing to low recruitment and survival rates.
Reversibility	Reversible	Improved predator access is mitigatable with revegetation efforts in the ROW it can likely not be fully reversed.
Likelihood of Occurrence	Possible	Attraction of predators to the road and predators using the maintained ROW to travel may cause Caribou injury and mortality.

Increased Energy Expenditures

Construction

The effects of habitat loss, alteration and degradation, alteration of movements, and changes to predator-prey dynamics on Caribou from the construction phase will likely lead to increased efforts to forage for food and access Category 1 High Use Areas and Category 2 Seasonal Ranges in the RSA. Mitigation measures applied during the construction phase to the individual effects will minimize increased energy expenditure to some degree but cannot eliminate it. It is possible there will be a net negative effect on



Caribou survival in the RSA from increased energy expenditures as a result of the construction phase. A summary of the net effect assessment relating to Caribou injury and death due to increased energy expenditures from the construction phase based on the Characterization Criteria is presented in **Table 13-68**.

Table 13-68: Criteria Results for Caribou or Death Due to Increased Energy Expenditures – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as injury or death of Caribou due to increased energy expenditure from construction is adverse and undesirable.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect may cause a slight measurable change in Caribou survival and reproduction but is unlikely to affect the overall population.
Geographic Extent	RSA	The effect will likely extend beyond the LSA into the RSA.
Timing	All Time Periods	Increased energy expenditure may occur year-round.
Duration	Long-term	Increased energy expenditure from road construction is expected to continue beyond the operations phase.
Frequency	Frequent	Increased energy expenditure in the RSA is expected to be intermittent from the construction phase.
Context	Moderate	Caribou are expected to be moderately resilient to a slight increase in energy expenditures related to road construction.
Reversibility	Reversible	Increased energy expenditure is reversible if construction activities cease and vegetation has re-established in the linear features.
Likelihood of Occurrence	Possible	While it is not likely to occur, increased energy expenditures may impact Caribou survival and reproduction.

Operations

Caribou may experience increased energy expenditures from road operations as a result of other effects such as alteration in movement due to road avoidance, attraction of predators from road operations, and sensory disturbances generated by road operations. A net negative effect is possible. A summary of the net effect assessment relating to injury and death due to increased energy expenditures from the operations phase based on the Characterization Criteria is presented in **Table 13-69**.

Table 13-69: Criteria Results for Caribou Injury or Death Due to Increased Energy Expenditures – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as injury or death of Caribou due to increased energy expenditures from road operations is adverse and undesirable.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect may cause a slight measurable change in Caribou survival and reproduction but is unlikely to affect the overall population.
Geographic Extent	LSA	The effect will likely extend beyond the Project Footprint into the LSA, as Caribou exhibit higher movement rates within 5 km of roads.



Characterization Criteria	Result	Rationale
Timing	All Time Periods	Increased energy expenditures may occur year-round.
Duration	Medium-term	Increased energy expenditures from road operations is expected to stop after the operations phase.
Frequency	Frequent	Increased energy expenditures in the RSA is expected to be intermittent from road operations.
Context	Moderate	Caribou are expected to be moderately resilient to a slight increase in energy expenditures related to road operations.
Reversibility	Reversible	Increased energy expenditure is reversible once operations cease and vegetation has re-established in the linear features.
Likelihood of Occurrence	Possible	While it is not likely to occur, increased energy expenditure may impact Caribou survival and reproduction.

Table 13-70 and **Table 13-71** provide summaries of the characterized predicted net effects for caribou during the construction and operations phases.



Table 13-70: Summary Table of the Predicted Net Effects for Caribou During the Construction Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Negative	Negligible	LSA	All Time Periods	Permanent	Continuous	Moderate	Irreversible	Certain
Habitat Alteration/Degradation – Habitat Structural Change	Negative	Low	LSA	All Time Periods	Long-term	Continuous	Moderate	Reversible	Certain
Habitat Alteration/Degradation – Sensory Disturbance	Negative	High	LSA	All Time Periods	Short-term	Continuous	High	Reversible	Certain
Habitat Alteration/Degradation – Hydrological Changes	Negative	Moderate	LSA	All Time Periods	Permanent	Continuous	Moderate	Irreversible	Certain
Alterations in Movement – Loss of Connectivity	Negative	Moderate	RSA	All Time Periods	Long-term	Continuous	Moderate	Reversible	Probable
Alterations in Movement – Sensory Disturbance	Negative	High	LSA	All Time Periods	Short-term	Continuous	High	Reversible	Probable
Injury/Death – Collisions with Vehicles	Neutral	Negligible	Project Footprint	All Time Periods	Short-term	Infrequent	Moderate	Reversible	Unlikely
Injury/Death – Increased Access	Neutral	Negligible	LSA	All Time Periods	Short-term	Infrequent	Low	Reversible	Unlikely
Injury/Death – Changes to Predator-Prey Dynamics	Negative	High	RSA	All Time Periods	Long-term	Frequent	High	Irreversible	Probable
Injury/Death – Increased Energy Expenditure	Negative	Low	RSA	All Time Periods	Long-term	Frequent	Moderate	Reversible	Possible



Table 13-71: Summary Table of the Predicted Net Effects for Caribou During the Operations Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Neutral	Negligible	Project Footprint	All Time Periods	Short-term	Infrequent	Low	Reversible	Unlikely
Habitat Alteration/Degradation – Habitat Structural Change	Neutral	Negligible	LSA	All Time Periods	Short-term	Infrequent	Low	Reversible	Unlikely
Habitat Alteration/Degradation – Sensory Disturbance	Negative	Moderate	LSA	All Time Periods	Medium-term	Continuous	High	Reversible	Certain
Habitat Alteration/Degradation – Hydrological Changes	Negative	Low	LSA	All Time Periods	Short-term	Infrequent	Low	Reversible	Possible
Alterations in Movement – Loss of Connectivity	Negative	Low	Project Footprint	All Time Periods	Medium-term	Frequent	Low	Reversible	Probable
Alterations in Movement – Sensory Disturbance	Negative	High	LSA	All Time Periods	Medium-term	Continuous	High	Reversible	Probable
Injury/Death – Collisions with Vehicles	Negative	Negligible	Project Footprint	All Time Periods	Medium-term	Infrequent	Moderate	Reversible	Possible
Injury/Death – Increased Access	Negative	Low	LSA	All Time Periods	Long-term	Infrequent	Low	Reversible	Unlikely
Injury/Death – Changes to Predator-Prey Dynamics	Negative	High	RSA	All Time Periods	Medium-term	Frequent	High	Irreversible	Possible
Injury/Death – Increased Energy Expenditure	Negative	Low	LSA	All Time Periods	Medium-term	Frequent	Moderate	Reversible	Possible



13.5.2.2 Wolverine

13.5.2.2.1 Habitat Loss

Wolverine habitat loss is expected due to site preparation and construction activities as well as terrestrial vegetation changes because of road construction and operations. There is a predicted net effect of habitat loss after the implementation of mitigation measures.

Clearance Activities

Construction

Road construction will require the removal of 546.57 ha (3%) of wolverine habitat in the LSA, comprised of all ecotypes as wolverine are wide-ranging and may use even low-quality habitat for movement purposes. Overall, the net effect to wolverine is negative due to the loss of suitable denning, movement, and foraging habitats. A summary of the net effect assessment relating to habitat loss because of the construction phase based on the Characterization Criteria is presented in **Table 13-72**.

Table 13-72: Criteria Results for Loss of Wolverine Habitat – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as loss of suitable denning, movement and foraging habitat is undesirable and considered to be adverse.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as the effect will cause a measurable destruction of wolverine habitat, but the habitat loss experienced is likely within the adaptive capability of this species.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All Time Periods	Wolverines are active year-round when construction activities may take place.
Duration	Permanent	Recovery to baseline habitat conditions following construction is unlikely.
Frequency	Continuous	Once wolverine habitat is removed, the effect will occur continuously.
Context	Moderate	In the context of habitat loss, wolverine are moderately resilient to change and have capacity to adapt as habitat is not limiting in the LSA.
Reversibility	Irreversible	Habitat loss from the road construction will persist beyond project operations and the net effect is unlikely to be reversed.
Likelihood of Occurrence	Certain	Habitat loss will occur as a result of road construction.

Operations

Maintenance of the road, including vegetation trimming and repairs to road infrastructure, may be required over time, which may result in the short-term creation of disturbed habitat in the Project Footprint. Overall, it is probable there will be a neutral effect on wolverine. A summary of the net effect assessment relating to habitat loss as a result of the operations phase based on the Characterization Criteria is presented in **Table 13-73**.



Table 13-73: Criteria Results for Loss of Wolverine Habitat – Operations

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as no destruction of additional habitat is expected due to road operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as there will be no additional measurable loss of habitat as a result of road operations.
Geographic Extent	Project Footprint	Vegetation management and road maintenance will be limited to the Project Footprint.
Timing	All Time Periods	Additional destruction of wolverine habitat is not expected as a result of operations, but road maintenance may occur at any time during the year.
Duration	Short-term	Any additional destruction of wolverine habitat will be short-term, until vegetation management activities are completed.
Frequency	Infrequent	Additional destruction of wolverine habitat as a result of operations is not expected.
Context	Low	Habitat loss as a result of vegetation management along the road is expected to be minimal and selective. Wolverines are expected to be resilient to small, temporary habitat losses that may result vegetation management as a result of road operations.
Reversibility	Reversible	The net effect is reversible as vegetation is expected to regrow once vegetation management is completed.
Likelihood of Occurrence	Unlikely	An additional negative effect is unlikely to occur as removal of habitat is not required for the operation of the road.

13.5.2.2.2 Habitat Alteration or Degradation

Habitat Structural Change

Construction

Vegetation removals, creation of the ROW and construction of the paved and gravel road surfaces may alter or degrade wolverine denning, foraging, and movement habitat near the Project Footprint, extending into the LSA by changing vegetation height, density, and community composition. The ROW will be 35 m wide with a road surface spanning 12 m composed of gravel (eastern half) and asphalt or chip seal treatment (western half) (refer to Section 4.3.1). After the implementation of mitigation measures, construction of the road may lead to edge effects, including abiotic, direct biotic, and indirect biotic effects on the habitat, along with the physical habitat structural changes. Overall, the net effect is expected to be negative. A summary of the net effect assessment relating to habitat alteration and degradation due to habitat structural change as a result of the construction phase based on the Characterization Criteria is presented in **Table 13-74**.

Table 13-74: Criteria Results for Wolverine Habitat Alteration or Degradation from Habitat Structural Change – Construction

Characterization Criteria	Result	Rationale
Direction	Positive	Wolverines can use disturbed vegetation sites, such as those recently logged, for foraging opportunities, and slash or debris piles may provide denning habitat.
Magnitude	Low	The amount of habitat structural change is expected to have a minimal effect on the population as other factors such as sensory disturbance will influence wolverine use of these areas.
Geographic Extent	LSA	The effects will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	The effects are expected to occur throughout the year.
Duration	Medium-term	The effects are expected to extend through road operations.
Frequency	Continuous	Vegetation permanently removed from road construction will generate continuous habitat structural changes.
Context	Moderate	Wolverines take advantage of certain habitat structural changes such as disturbed sites and have capacity to assimilate change.
Reversibility	Reversible	The effects are reversible if the cleared vegetation is restored.
Likelihood of Occurrence	Certain	Habitat structural changes will occur because of construction.

Operations

Habitat structural changes will occur in the LSA due to vegetation clearing and changes to vegetation community structure initiated during road construction. These vegetation changes will be maintained during road operations, but no new changes are expected to be generated as a result. Overall, the net effect is expected to be neutral. A summary of the net effect assessment relating to habitat structural changes as a result of the operations phase based on the Characterization Criteria is presented in **Table 13-75**.

Table 13-75: Criteria Results for Wolverine Habitat Alteration or Degradation from Habitat Structural Change – Operations

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as no new effects are expected as a result of road operation, resulting in no change compared with baseline conditions.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as there will be no additional measurable habitat structural changes as a result of road operation.
Geographic Extent	LSA	The effects will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	The effects are expected to occur throughout the year.
Duration	Short-term	Any additional habitat structural changes will be short-term, until vegetation management activities are completed.
Frequency	Infrequent	Vegetation management that may lead to temporary habitat structural changes will be infrequent.



Characterization Criteria	Result	Rationale
Context	Low	Habitat structural changes as a result of vegetation management along the road are expected to be minimal and temporary. Wolverines are expected to be resilient to small changes that may result from vegetation management during road operations.
Reversibility	Reversible	The effects are reversible if the cleared vegetation is restored.
Likelihood of Occurrence	Unlikely	An additional effect as a result of road operation is unlikely to occur.

Hydrological Changes

Construction

Wolverine habitat, particularly foraging and movement habitat, may be altered hydrologically, with construction activities such as grading for road installation resulting in changes to both surface and groundwater water causing flooding or drying of vegetation communities. Based on the Groundwater assessment of alteration to groundwater level and flow direction (Section 8.5) these changes are certain to result in a net negative effect in the LSA. A summary of the net effect assessment relating to hydrological changes as a result of the construction phase based on the Characterization Criteria is presented in **Table 13-76**.

Table 13-76: Criteria Results for Wolverine Habitat Alteration or Degradation Due from Hydrological Changes – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as it is undesirable and considered the be adverse relating to alteration of wolverine habitat.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as hydrological changes will cause a measurable change in Wolverine habitat but is likely within the adaptive capability of this species.
Geographic Extent	LSA	The effect will extend into the LSA.
Timing	All Time Periods	Hydrological changes are expected to occur through the year as a result of the construction phase.
Duration	Permanent	Recovery to baseline hydrological conditions following construction is unlikely.
Frequency	Continuous	The effect of hydrological changes resulting from construction will occur continually.
Context	Moderate	In the context of alteration and degradation of habitat due to hydrological changes, Wolverine are moderately resilient to change and have capacity to adapt.
Reversibility	Irreversible	Hydrological changes will persist beyond project operations and the net effect is unlikely to be reversed.
Likelihood of Occurrence	Certain	Hydrological changes will occur as a result of construction.



Operations

Operation of the road is not anticipated to result in further changes to hydrology. It is possible that changes to hydrology may occur as a result of the operations phase due to culvert and drainage blockages requiring maintenance. Overall, the net effect is expected to be negative. A summary of the net effect assessment relating to hydrological changes as a result of the operations phase based on the Characterization Criteria is presented in **Table 13-77**.

Table 13-77: Criteria Results for Wolverine Habitat Alteration or Degradation from Hydrological Changes – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as changes to hydrology are undesirable and considered to be adverse relating to alteration of wolverine habitat.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect will cause a measurable change in Wolverine foraging and movement habitat but is unlikely to affect overall wolverine populations.
Geographic Extent	LSA	Hydrological changes will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	Hydrological changes due to blockages can occur throughout the year.
Duration	Short-term	Hydrological changes resulting from road operations are expected to be temporary until maintenance and repair activities are completed.
Frequency	Infrequent	Hydrological changes resulting from road operations are expected to be rare.
Context	Low	Wolverines are expected to be resilient to small habitat alterations that may result from hydrological changes that may occur because of road operations.
Reversibility	Reversible	Hydrological changes should be restored once maintenance activities are concluded.
Likelihood of Occurrence	Possible	Blockages to culverts and drainage features resulting from operations are possible.

Sensory Disturbance

Construction

During construction, activities such as blasting at quarries/pits, earth hauling and vegetation clearing, and the use of lighting around facilities, may reduce the ability of wolverines to use habitat along the ROW and supportive infrastructure due to sensory disturbances. Mitigation measures around timing (hours of work, seasonality) for construction activities are expected to mitigate some of the potential effects but there is a predicted net effect on habitat from noise due to construction activities as well as movement of construction vehicles and equipment. Sensory disturbances have the potential to impact movement, foraging and denning habitats. Overall, there will be a net negative effect due to sensory disturbance. A summary of the net effect assessment relating to habitat alteration and degradation caused by sensory disturbance as a result of the construction phase based on the Characterization Criteria is presented in **Table 13-78**.



Table 13-78: Criteria Results for Wolverine Habitat Alteration or Degradation from Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is undesirable and considered to be adverse relating to alteration of wolverine habitat.
Magnitude	High	The magnitude of the effect is predicted to be high, as the effect will cause a measurable alteration of wolverine habitat and likely exceeds the ability for the species to continue sustained existence within the area.
Geographic Extent	LSA	Sensory disturbances altering wolverine habitat will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	Sensory disturbances altering wolverine habitat are expected to occur through the year as a result of the construction phase.
Duration	Short-term	Sensory disturbances altering wolverine habitat due to construction activities are expected to end after the construction phase.
Frequency	Continuous	Sensory disturbances that alter wolverine habitat are expected to be continuous during construction as they are very sensitive to human disturbances.
Context	High	In the context of habitat alteration due to sensory disturbances, Wolverine are not resilient and have little capacity to assimilate change. Wolverines do not use habitats (e.g., for denning) adjacent to human disturbances.
Reversibility	Reversible	Sensory disturbances are reversible when noise, movement and light cease to be generated in the Project Footprint.
Likelihood of Occurrence	Certain	Sensory disturbances altering wolverine habitat because of construction are certain as mitigation measures cannot entirely minimize light, movement and noise generated to baseline levels.

Operations

Noise and light from vehicles travelling on the road because of operations will impact wolverine habitat along the ROW and supportive infrastructure. Additionally, the quarries are expected to be used beyond the construction phase, which will continue to generate sensory disturbances such as noise and movement of vehicles and equipment. It is expected that the road will mainly be used during daylight hours, minimizing effects on wolverine habitat between dusk and dawn; however, road noise and other sensory disturbances generated during daylight hours has the potential to affect movement, foraging, and denning habitats. Overall, the effect is expected to be negative. A summary of the net effect assessment relating to habitat alteration and degradation caused by sensory disturbance because of the operations phase based on the Characterization Criteria is presented in **Table 13-79**.



Table 13-79: Criteria Results for Wolverine Habitat Alteration or Degradation from Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is undesirable and considered to be adverse relating to alteration of wolverine habitat.
Magnitude	High	The magnitude of the effect is predicted to be high, as the effect will cause a measurable alteration of wolverine habitat and likely exceeds the ability for the species to continue sustained existence within the area.
Geographic Extent	LSA	Sensory disturbances altering wolverine habitat will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	Sensory disturbances altering wolverine habitat are expected to occur through the year because of the operations phase.
Duration	Medium-term	Sensory disturbances altering wolverine habitat will extend through the operations phase.
Frequency	Continuous	Sensory disturbances that alter wolverine habitat are expected to be continuous because of operations as they are very sensitive to human disturbances and road use can occur at any time of day.
Context	High	In the context of habitat alteration due to sensory disturbances, Wolverine are not resilient and have little capacity to assimilate change. Wolverines do not use habitats (e.g., for denning) adjacent to human disturbances.
Reversibility	Reversible	Sensory disturbances are reversible when noise, movement and light cease to be generated in the Project Footprint.
Likelihood of Occurrence	Certain	Sensory disturbances altering Wolverine habitat as a result of operations are certain.

13.5.2.2.3 Alteration in Movement

Loss of Connectivity

Construction

Wolverine movement is likely to be altered by construction of the road due to fragmentation of forest habitat, resulting in a loss of connectivity. There are few effective mitigation measures that can be applied to minimize the effects of habitat fragmentation on Wolverine. Wildlife overpasses are well established in North America as successful solutions for maintaining habitat connectivity across transportation corridors but is unlikely feasible in the context of the proposed road construction and landscape. Additionally, Wolverines are not well documented in the literature successfully using wildlife crossings (i.e., overpasses, underpasses) and in the case of Banff National Park, it took 15 years after the installation of the wildlife overpass before a wolverine was documented using it to cross the Trans-Canada Highway (Rocky Mountain Outlook, 2012). Therefore, after mitigation measures are applied, there will be a net negative effect due to loss of connectivity. A summary of the net effect assessment relating to alteration in movement due to loss of connectivity from the construction phase based on the Characterization Criteria is presented in **Table 13-80**.



Table 13-80: Criteria Results for Alteration in Wolverine Movement Due to Loss of Connectivity – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as loss of connectivity is undesirable and considered to be adverse relating to alteration of wolverine movement.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as loss of connectivity will cause a measurable change in Wolverine movement. The width of the corridor will be 35 m and Wolverines have been known to make crossings at widths of 68 m.
Geographic Extent	LSA	Loss of connectivity altering Wolverine movement will affect wolverines moving through the LSA.
Timing	All Time Periods	Alteration in wolverine movement due to loss of connectivity is expected to happen year-round.
Duration	Medium-term	The effect is expected to extend through the operations phase.
Frequency	Continuous	Vegetation permanently removed due to road construction will generate continuous effects to habitat connectivity.
Context	Moderate	In the context of alteration in movement due to habitat fragmentation, some Wolverines may be resilient to change and have capacity to adapt.
Reversibility	Reversible	Effects to wolverine movement due to loss of connectivity is reversible if the gap in vegetation is narrowed or eliminated.
Likelihood of Occurrence	Certain	Alteration in movement due to loss of connectivity is well understood for wolverines and is certain to occur.

Operations

No further fragmentation of forest habitat resulting in loss of connectivity is anticipated to occur due to the operations phase. Maintenance activities such as vegetation management may temporarily widen portions of the ROW that have overgrown, having a short-term effect on connectivity. Overall, the effect will be neutral. A summary of the net effect assessment relating to loss of connectivity from the operations phase based on the Characterization Criteria is presented in **Table 13-81**.

Table 13-81: Criteria Results for Alteration in Wolverine Movement Due to Loss of Connectivity – Operations

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as no additional loss of connectivity is expected from road operation, resulting in no change compared with baseline conditions.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as there will be no additional measurable change in connectivity from the operations phase.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	All Time Periods	The effect can occur year-round.



Characterization Criteria	Result	Rationale
Duration	Short-term	The effect is expected to be short-term, until vegetation management activities are completed.
Frequency	Infrequent	Additional loss of connectivity is expected to be rare as road operations will not result in the fragmentation of habitat.
Context	Low	Wolverine is expected to be resilient to small alterations in movement that may result from habitat fragmentation that may occur from road operations.
Reversibility	Reversible	The effect is reversible if the cleared vegetation is restored.
Likelihood of Occurrence	Unlikely	A negative effect is unlikely to occur as there will be no additional loss of connectivity from road operations.

Sensory Disturbance

Construction

Wolverine movement will be altered by sensory disturbances generated from the construction phase. Noise, lighting and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of Wolverines as they avoid the road the ROW and supportive infrastructure areas. Mitigation measures focused on sensory disturbance including timing windows, noise and light abatement are expected to mitigate some of the potential effects but there is a predicted net negative effect from construction activities on Wolverine movement. A summary of the net effect assessment relating to alteration in Wolverine movement due to sensory disturbance from the construction phase based on the Characterization Criteria is presented in **Table 13-82**.

Table 13-82: Criteria Results for Alteration in Wolverine Movement from Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is undesirable and considered to be adverse relating to alteration of wolverine movement.
Magnitude	High	The magnitude of the effect is predicted to be high, as the effect will cause a measurable alteration of wolverine movement and likely exceeds the ability for the species to continue sustained existence within the area.
Geographic Extent	LSA	Sensory disturbances altering wolverine movement will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	Sensory disturbances altering wolverine movement are expected to occur through the year from the construction phase.
Duration	Short-term	Sensory disturbances altering wolverine movement due to construction activities are expected to end after the construction phase.
Frequency	Continuous	Sensory disturbances that alter wolverine movement are expected to be continuous during construction as they are very sensitive to human disturbances.



Characterization Criteria	Result	Rationale
Context	Moderate	In the context of movement alteration due to sensory disturbances, wolverine are moderately resilient as they will avoid the disturbances and traverse large landscapes as part of their life movements.
Reversibility	Reversible	Sensory disturbances are reversible when noise, movement and light cease to be generated in the Project Footprint.
Likelihood of Occurrence	Certain	Sensory disturbances altering wolverine movement due to construction are certain as mitigation measures cannot entirely minimize light, movement and noise generated to baseline levels and wolverines are known to avoid areas with mechanized human disturbance.

Operations

After the implementation of mitigation measures, road operations are also expected to result in alterations in wolverine movement. While traffic levels are expected to be low, wolverines are likely to experience a net negative effect due to sensory disturbance from road operation. A summary of the net effect assessment relating to alteration in wolverine movement due to sensory disturbance from the operations phase based on the Characterization Criteria is presented in **Table 13-83**.

Table 13-83: Criteria Results for Alteration in Wolverine Movement from Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is undesirable and considered to be adverse relating to alteration of wolverine movement.
Magnitude	High	The magnitude of the effect is predicted to be high, as the effect will cause a measurable alteration of wolverine movement and likely exceeds the ability for the species to continue sustained existence within the area.
Geographic Extent	LSA	Sensory disturbances altering wolverine movement will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	Sensory disturbances altering wolverine movement are expected to occur through the year due to the operations phase.
Duration	Medium-term	Sensory disturbances altering wolverine movement will extend throughout the operations phase.
Frequency	Continuous	Sensory disturbances that alter wolverine movement are expected to be continuous due to road operations as they are very sensitive to human disturbances, which may also be perceived as a risk of predation.
Context	Moderate	In the context of movement alteration due to sensory disturbances, wolverine are moderately resilient as they will avoid the disturbances and traverse large landscapes as part of their life movements.
Reversibility	Reversible	Sensory disturbances are reversible when noise, movement and light cease to be generated in the Project Footprint.



Characterization Criteria	Result	Rationale
Likelihood of Occurrence	Certain	Sensory disturbances altering wolverine movement from road operations are certain as wolverines move quickly when in proximity to roads and spend less time near them.

13.5.2.2.4 Injury or Death

Collisions With Vehicles

Construction

Strictly enforcing mitigation measures during the construction phase is expected to eliminate collisions with and fatalities of wolverines by construction vehicles and equipment. Construction is expected to take place largely between 7am and 7pm, avoiding the crepuscular and nocturnal periods when wolverines are most active. It is expected there will be a net neutral effect on wolverine injury and death from collisions because of the construction phase. A summary of the net effect assessment relating to wolverine injury and death resulting from collisions during the construction phase based on the Characterization Criteria is presented in **Table 13-84**.

Table 13-84: Criteria Results for Wolverine Injury or Death Due to Collisions with Vehicles – Construction

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as no collisions with wolverines are expected to occur as a result of the construction phase.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as there will be no measurable injury or death to wolverines during the construction phase.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	All Time Periods	Collisions may occur at any time throughout the year due to the construction phase.
Duration	Short-term	Collisions with construction vehicles and equipment would end after construction is complete.
Frequency	Infrequent	Strict enforcement of mitigation measures will limit the number of collisions between construction vehicles and wolverines.
Context	Moderate	Wolverine are expected to be moderately resilient to a small number of injuries or mortalities that could result from collisions with construction vehicles.
Reversibility	Reversible	Collisions with construction vehicles and equipment will cease once construction activities conclude.
Likelihood of Occurrence	Possible	Collisions between construction vehicles and wolverines may occur, despite mitigation measures, but are not likely.



Operations

Mortality due to the operational phase is not expected to be eliminated by mitigations. Injury or death is expected to occur in locations where wolverines may cross the road, especially between dusk and dawn when Wolverine are more active. The predicted maximum vehicles travelling on the road is 500 per day, with most of the travel anticipated to take place during daylight hours when wolverine are less active. Overall, a net negative effect is expected due to vehicle traffic. A summary of the net effect assessment relating to Wolverine injury and death resulting from collisions during the operations phase based on the Characterization Criteria is presented in **Table 13-85**.

Table 13-85: Criteria Results for Wolverine Injury or Death Due to Collisions with Vehicles – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as collisions between wolverines and vehicles are undesirable and considered the be adverse relating to Wolverine survival.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as wolverine and have low population numbers and low reproductive rates. Any mortality would result in a measurable change but would not necessarily exceed the ability for this species to continue sustained existence within the area.
Geographic Extent	Project Footprint	Collisions between wolverines and vehicles will be limited to the Project Footprint.
Timing	All Time Periods	Collisions with wolverines can occur year-round.
Duration	Medium-term	Collisions between wolverines and vehicles are expected to occur through road operations.
Frequency	Infrequent	As road use will mainly occur during daylight hours, and wolverines are known to avoid roads, collisions between wolverines and vehicles are expected to be rare.
Context	Moderate	Wolverines are expected to be moderately resilient to a low number of mortalities that may result from collisions with vehicles due to road operations.
Reversibility	Reversible	Collisions will cease once road operation concludes.
Likelihood of Occurrence	Possible	While it expected to be rare, collisions between wolverines and vehicles may occur.

Changes to Predator-Prey Dynamics

Construction

Effects on wolverine survival from improved predator access and movement rates is possible. Mitigation involving reclamation/blockage of any temporarily disturbed areas and access roads after construction will minimize the effect as these actions will reduce open areas and linear features; however, the effects of increased predation cannot be completely eliminated. It is possible there will be a net negative effect on Wolverine survival in the LSA because of construction causing increased predation. A summary of the net effect assessment relating to Wolverine injury and death due to changes to predator-prey dynamics resulting from the construction phase based on the Characterization Criteria is presented in **Table 13-86**.



Table 13-86: Criteria Results for Wolverine Injury or Death from Changes to Predator-Prey Dynamics – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as injury or death of wolverine due to improved predator access due to road construction is undesirable.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as Wolverine and have low population numbers and low reproductive rates. Any mortality would result in a measurable change but would not necessarily exceed the ability for this species to continue sustained existence within the area.
Geographic Extent	LSA	Predators are not expected to remain in the Project Footprint and will travel into the LSA.
Timing	All Time Periods	Predation may occur at any time throughout the year.
Duration	Long-term	Improved predator access is expected to remain beyond the construction and operations phases.
Frequency	Infrequent	Wolverine mortality by predation occurs infrequently as reported in the literature.
Context	Moderate	Wolverines are expected to be moderately resilient to a low number of mortalities that may result from increased predation due to the construction phase.
Reversibility	Irreversible	Improved predator access is mitigatable with revegetation efforts in the ROW, however it can likely not be fully reversed in the foreseeable future.
Likelihood of Occurrence	Possible	While it is expected to be rare, improved predator access may result in increased predation of wolverine.

Operations

It is possible there will be a net negative effect on wolverine survival in the LSA from road operation due to increased predation. A summary of the net effect assessment relating to wolverine injury and death due to changes to predator-prey dynamics from the operations phase based on the Characterization Criteria is presented in **Table 13-87**.

Table 13-87: Criteria Results for Wolverine Injury or Death Due to Changes to Predator-Prey Dynamics – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as injury or death of wolverine due to attraction of predators to the road from road operations is undesirable.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as wolverine and have low population numbers and low reproductive rates. Any mortality would result in a measurable change but would not necessarily exceed the ability for this species to continue sustained existence within the area.
Geographic Extent	LSA	Predators are not expected to remain in the Project Footprint and will travel into the LSA.



Characterization Criteria	Result	Rationale
Timing	All Time Periods	Predation may occur at any time throughout the year.
Duration	Medium-term	Increased predation due predators attracted to the road from operations is expected to stop after the operations phase.
Frequency	Infrequent	Wolverine mortality by predation occurs infrequently as reported in the literature.
Context	Moderate	Wolverines are expected to be moderately resilient to a low number of mortalities that may result from increased predation due to the operations phase.
Reversibility	Irreversible	Improved predator access is mitigatable with revegetation efforts in the ROW, however it can likely not be fully reversed in the foreseeable future.
Likelihood of Occurrence	Possible	While it is expected to be rare, predators attracted to the road may cause wolverine injury and mortality.

Increased Energy Expenditures

Construction

The cumulative effects of habitat loss, alteration and degradation, and alteration of movements on wolverine due to construction will likely lead to increased efforts to travel throughout their home ranges, forage for food, and access denning habitat in the RSA. Mitigation measures applied during construction to the individual effects will cumulatively minimize increased energy expenditure to some degree but cannot eliminate it. It is possible there will be a net negative effect on wolverine survival in the RSA from construction due to increased energy expenditures. A summary of the net effect assessment relating to wolverine injury and death due to increased energy expenditure caused by construction phase based on the Characterization Criteria is presented in **Table 13-88**.

Table 13-88: Criteria Results for Wolverine or Death Due to Increased Energy Expenditure – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as injury or death of wolverine due to increased energy expenditure from construction is adverse and undesirable.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect may cause a slight measurable change in wolverine survival and reproduction but is unlikely to affect the overall population.
Geographic Extent	RSA	The effect will likely extend beyond the LSA into the RSA as wolverines have very large home ranges.
Timing	All Time Periods	Increased energy expenditure may occur year-round.
Duration	Long-term	Increased energy expenditure from road construction is expected to continue beyond the operations phase.
Frequency	Frequent	Increased energy expenditure in the RSA is expected to be intermittent due to construction activities.
Context	Moderate	Wolverines are expected to be moderately resilient to a slight increase in energy expenditures related to road construction.



Characterization Criteria	Result	Rationale
Reversibility	Reversible	Increased energy expenditure is reversible if construction activities cease, and vegetation has re-established in the linear features.
Likelihood of Occurrence	Possible	While it is not likely to occur, increased energy expenditure may result in increased mortality of wolverine.

Operations

Wolverines may experience increased energy expenditures from road operations because of other effects combined such as alteration in movement due to road avoidance, attraction of predators from road operations, and sensory disturbances generated by road operations. A net negative effect is possible. A summary of the net effect assessment relating to wolverine injury and death due to increased energy expenditure from the operations phase based on the Characterization Criteria is presented in **Table 13-89**.

Table 13-89: Criteria Results for Wolverine Injury or Death Due to Increased Energy Expenditure – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as injury or death of wolverine due to increased energy expenditure from road operations is adverse and undesirable.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect may cause a slight measurable change in wolverine survival and reproduction but is unlikely to affect the overall population.
Geographic Extent	RSA	The effect will likely extend beyond the LSA into the RSA as wolverines have very large home ranges.
Timing	All Time Periods	Increased energy expenditure may occur year-round.
Duration	Medium-term	Increased energy expenditure from road operations is expected to stop after the operations phase.
Frequency	Frequent	Increased energy expenditure in the RSA is expected to be intermittent due to road operations.
Context	Moderate	Wolverines are expected to be moderately resilient to a slight increase in energy expenditures related to road operations.
Reversibility	Reversible	Increased energy expenditure is reversible once operations cease, and vegetation has re-established in the linear features.
Likelihood of Occurrence	Possible	While it is not likely to occur, increased energy expenditure may result in increased mortality of wolverine.



Increased Access

Construction

Strict site controls and workplace policies are expected to effectively eliminate the risk of hunting and poaching of wolverine during the construction phase. Overall, it is expected there will be a net neutral effect. A summary of the net effect assessment relating to injury and death resulting from increased access due to the construction phase based on the Characterization Criteria is presented in **Table 13-90**.

Table 13-90: Criteria Results for Wolverine Injury or Death Due to Increased Access – Construction

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as mitigation measures are expected to effectively manage hunting or poaching access by controlling site access and through workplace policies on behaviour and conduct.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, no measurable change in wolverine injury and mortality is expected due to increased access as a result of construction activities.
Geographic Extent	LSA	The Project Footprint may provide increased access to the LSA.
Timing	All Time Periods	Increased access resulting in hunting or poaching may occur year-round.
Duration	Short-term	Increased access resulting from construction would stop after the construction phase.
Frequency	Infrequent	Strict enforcement of mitigation measures will limit hunting or poaching of wolverine.
Context	Moderate	Wolverines are expected to be moderately resilient to a slight increase in injury or death related to increased access because of road construction.
Reversibility	Reversible	The effects are reversible if access to the road is restricted.
Likelihood of Occurrence	Unlikely	Increased access because of construction is expected to be effectively mitigated and is unlikely to occur.

Operations

Increased access to wolverine habitat from the operations phase may result in increased legal harvest and illegal poaching of wolverine. While the remote nature of the project location may pose a challenge to monitoring for poaching, it is expected that the federal and provincial authorities will continue to enforce laws and regulations relating to wolverines in the RSA; however, the effect cannot be eliminated. Overall, a net negative effect is expected due to increased access. A summary of the net effect assessment relating to wolverine injury and death resulting from increased access due to the operations phase based on the Characterization Criteria is presented in **Table 13-91**.



Table 13-91: Criteria Results for Wolverine Injury or Death Due to Increased Access – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as poaching of wolverines and incidental harvest are undesirable and considered to be adverse relating to wolverine survival.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as wolverine and have low population numbers and low reproductive rates. Any mortality from poaching or incidental harvest would result in a measurable change but would not necessarily exceed the ability for this species to continue sustained existence within the area.
Geographic Extent	LSA	The Project Footprint may provide increased access to the LSA.
Timing	All Time Periods	Increased access resulting in harvest or poaching may occur year-round.
Duration	Long-term	Increased access will persist long-term if the corridor continues to provide access after the operations phase, such as by all-terrain vehicle or snowmobile.
Frequency	Infrequent	Poaching and incidental harvest of wolverine due to increased access are expected to be rare.
Context	Moderate	Wolverines are expected to be moderately resilient to a slight increase in injury or death related to increased access resulting from road operations.
Reversibility	Reversible	The effects are reversible if access to the road is restricted.
Likelihood of Occurrence	Probable	While laws are in place to prevent poaching, incidental trapping of wolverine is known to occur in northern Ontario. The effect is likely to occur due to the operations phase.

Table 13-92 and **Table 13-93** provide summaries of the characterized predicted net effects for wolverine during the construction and operations phases.

Table 13-92: Summary Table of the Predicted Net Effects for Wolverine During the Construction Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Negative	Moderate	Project Footprint	All Time Periods	Permanent	Continuous	Moderate	Irreversible	Certain
Habitat Alteration or Degradation – Changes in Vegetation Structure	Positive	Low	LSA	All Time Periods	Medium-term	Continuous	Moderate	Reversible	Certain
Habitat Alteration or Degradation – Hydrological Change	Negative	Moderate	LSA	All Time Periods	Permanent	Continuous	Moderate	Irreversible	Certain
Habitat Alteration or Degradation – Sensory Disturbance	Negative	High	LSA	All Time Periods	Short-term	Continuous	High	Reversible	Certain
Alteration in Movement – Loss of Connectivity	Negative	Moderate	LSA	All Time Periods	Medium-term	Continuous	Moderate	Reversible	Certain
Alteration in Movement – Sensory Disturbance	Negative	High	LSA	All Time Periods	Short-term	Continuous	Moderate	Reversible	Certain
Injury or Death – Collisions with Vehicles	Neutral	Negligible	Project Footprint	All Time Periods	Short-term	Infrequent	Moderate	Reversible	Possible
Injury or Death – Changes to Predator-Prey Dynamics	Negative	Moderate	LSA	All Time Periods	Long-term	Infrequent	Moderate	Reversible	Possible
Injury or Death – Increased Energy Expenditures	Negative	Low	RSA	All Time Periods	Long-term	Frequent	Moderate	Reversible	Possible
Injury or Death – Increased Access	Neutral	Negligible	LSA	All Time Periods	Short-term	Infrequent	Moderate	Reversible	Unlikely



Table 13-93: Summary Table of the Predicted Net Effects for Wolverine During the Operations Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Neutral	Negligible	Project Footprint	All Time Periods	Short-term	Infrequent	Low	Reversible	Unlikely
Habitat Alteration or Degradation – Changes in Vegetation Structure	Neutral	Negligible	LSA	All Time Periods	Short-term	Infrequent	Low	Reversible	Unlikely
Habitat Alteration or Degradation – Hydrological Change	Negative	Low	LSA	All Time Periods	Short-term	Infrequent	Low	Reversible	Possible
Habitat Alteration or Degradation – Sensory Disturbance	Negative	High	LSA	All Time Periods	Medium-term	Continuous	High	Reversible	Certain
Alterations in Movement – Loss of Connectivity	Neutral	Negligible	Project Footprint	All Time Periods	Short-term	Infrequent	Low	Reversible	Unlikely
Alteration in Movement – Sensory Disturbance	Negative	High	LSA	All Time Periods	Medium-term	Continuous	Moderate	Reversible	Certain
Injury or Death – Collisions with Vehicles	Negative	Moderate	Project Footprint	All Time Periods	Medium-term	Infrequent	Moderate	Reversible	Possible
Injury or Death – Changes to Predator-Prey Dynamics	Negative	Moderate	LSA	All Time Periods	Medium-term	Infrequent	Moderate	Reversible	Possible
Injury or Death – Increased Energy Expenditure	Negative	Low	RSA	All Time Periods	Medium-term	Frequent	Moderate	Reversible	Possible
Injury of Death – Increased Access	Negative	Moderate	LSA	All Time Periods	Long-term	Infrequent	Moderate	Reversible	Probable



13.5.2.3 Little Brown Myotis and Northern Myotis

13.5.2.3.1 Habitat Loss

Myotis bat habitat loss is expected due to site preparation and construction activities as well as terrestrial vegetation changes resulting from road construction and operations. There is a predicted net effect of habitat loss after implementation of mitigation measures.

Construction

Road construction will require the removal of 9.22 ha of high use bat habitat in the LSA, comprised of Mixedwood Swamps (2.45 ha), Open Shore Fen/Thicket Swamp (0.02 ha), Open Shore Shrub Fen (0.83 ha) and River/Open Water (0.92 ha). Mixedwood Swamp is rare in the study areas, typically occurring in very small pockets within a Conifer Swamp mosaic. Approximately 312.2 ha of potentially suitable maternity roosting habitat will be removed, comprised of Conifer Swamp (155.6 ha), Conifer Forest (150.8 ha), Mixedwood Forest (4.2 ha) and Hardwood Forest (1.6 ha), representing approximately 4.6% of potential maternity roosting habitat in the LSA and 1 % in the RSA. Overall, the net effect to little brown myotis and northern myotis is negative due to the loss of suitable maternity roosting habitat and foraging habitat. A summary of the net effect assessment relating to habitat loss due to the construction phase based on the Characterization Criteria is presented in **Table 13-94**.

Table 13-94: Criteria Results for Loss of Little Brown Myotis and Northern Myotis Habitat – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as loss of maternity roosting habitat and foraging habitat is undesirable and considered the be adverse.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as the effect will cause a measurable destruction of little brown myotis and northern myotis habitat, but the habitat loss experienced is likely within the adaptive capability of these species.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All Time Periods	The effect of habitat loss will occur throughout the little brown myotis and northern myotis active season.
Duration	Permanent	Recovery to baseline habitat conditions following construction is unlikely.
Frequency	Continuous	Once little brown myotis and northern myotis habitat is removed, the effect will occur continuously.
Context	Moderate	While little brown myotis and northern myotis are sensitive to habitat loss, they are moderately resilient to change and have capacity to adapt.
Reversibility	Irreversible	Habitat loss from the road construction will persist beyond project operations and the net effect is unlikely to be reversed.
Likelihood of Occurrence	Certain	Habitat loss will occur as a result of road construction.

Operations

Maintenance of the road, including vegetation trimming and repairs to road infrastructure, may be required over time, which may result in the removal of suitable roosting habitat that has temporarily re-grown in the Project Footprint. Overall, it is probable there will be a neutral effect on little brown myotis and northern myotis. A summary of the net effect assessment relating to habitat loss due to the operations phase based on the Characterization Criteria is presented in **Table 13-95**.

Table 13-95: Criteria Results for Loss of Little Brown Myotis and Northern Myotis Habitat – Operations

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as no destruction of additional habitat is expected due to road operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as there will be no additional measurable loss of habitat resulting from road operations.
Geographic Extent	Project Footprint	Vegetation management and road maintenance will be limited to the Project Footprint.
Timing	All Time Periods	Additional destruction of little brown myotis and northern myotis habitat is not expected as a result of operations, but road maintenance may occur at any time during the year.
Duration	Short-term	Any additional destruction of little brown myotis and northern myotis habitat will be short-term, until vegetation management activities are completed.
Frequency	Infrequent	Additional destruction of little brown myotis and northern myotis habitat as a result of operations is not expected.
Context	Low	Habitat loss as a result of vegetation management along the road is expected to be minimal and selective. Bats are expected to be resilient to small habitat losses that may result vegetation management due to road operations.
Reversibility	Reversible	The net effect is reversible as vegetation is expected to regrow once vegetation management is completed.
Likelihood of Occurrence	Unlikely	An additional negative effect is unlikely to occur as removal of habitat is not required for the operation of the road.

13.5.2.3.2 Habitat Alteration or Degradation

Habitat Structural Change

Construction

Vegetation removals, creation of the ROW and construction of the paved and gravel road surfaces may alter or degrade little brown myotis and northern myotis habitat near the Project Footprint, extending into the LSA by changing vegetation height, density, and community composition. The ROW will be 35 m wide with a road surface spanning 12 m composed of gravel (eastern half) and asphalt or chip seal treatment (western half) (refer to Section 4.3.1). After the implementation of mitigation measures, construction of the road may lead to edge effects, including abiotic, direct biotic, and indirect biotic effects on the habitat, along with the physical habitat structural changes. Overall, the net effect is expected to be negative. A



summary of the net effect assessment relating to habitat alteration and degradation due to habitat structural change from the construction phase based on the Characterization Criteria is presented in **Table 13-96**.

Table 13-96: Criteria Results for Little Brown Myotis and Northern Myotis Habitat Alteration or Degradation from Habitat Structural Change – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as it is undesirable and considered to be adverse relating to alteration of little brown myotis and northern myotis habitat.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as the effect will cause a measurable change in little brown myotis and northern myotis habitat, and low levels of high use habitat are available in the area.
Geographic Extent	LSA	The effects will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	The effects are expected to occur throughout the little brown myotis and northern myotis active season.
Duration	Medium-term	The effects are expected to extend through road operations.
Frequency	Continuous	Vegetation permanently removed from road construction will generate continuous habitat structural changes.
Context	Moderate	In the context of habitat alteration due to habitat structural changes, little brown myotis and northern myotis are moderately resilient to change and have capacity to adapt.
Reversibility	Reversible	The effects are reversible if the cleared vegetation is restored.
Likelihood of Occurrence	Certain	Habitat structural changes will occur as a result of construction.

Operations

Habitat structural changes will occur in the LSA due to vegetation clearing and changes to vegetation community structure initiated during road construction. These vegetation changes will be maintained during road operations, but no new habitat structural changes are expected to be generated as a result. Overall, the net effect is expected to be neutral. A summary of the net effect assessment relating to habitat structural changes during the operations phase based on the Characterization Criteria is presented in **Table 13-97**.

Table 13-97: Criteria Results for Little Brown Myotis and Northern Myotis Habitat Alteration or Degradation from Habitat Structural Change – Operations

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as no new habitat structural changes are expected during road operation, resulting in no change compared with baseline conditions.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as there will be no additional measurable change in habitat structure during road operation.
Geographic Extent	LSA	The effects will occur beyond the Project Footprint into the LSA.



Characterization Criteria	Result	Rationale
Timing	All Time Periods	The effects are expected to occur throughout the little brown myotis and northern myotis active season.
Duration	Short-term	Any additional habitat structural changes in Myotis habitat will be short-term, until vegetation management activities are completed.
Frequency	Infrequent	Vegetation management that may lead to temporary effects will be infrequent.
Context	Low	Habitat structural changes as a result of vegetation management along the road are expected to be minimal and temporary. Little brown myotis and northern myotis are expected to be resilient to small changes that may result from vegetation management during road operations.
Reversibility	Reversible	The effects are reversible if the cleared vegetation is restored.
Likelihood of Occurrence	Unlikely	An additional negative effect as a result of road operation is unlikely to occur.

Sensory Disturbance

Construction

During construction, activities such as blasting at quarries/pits, earth hauling and vegetation clearing, and the use of lighting around facilities, may reduce the ability of Little Brown Myotis and Northern Myotis to use habitat along the ROW and supportive infrastructure due to sensory disturbances. Mitigation measures around timing (hours of work) for construction activities are expected to mitigate most of the potential effects but there is a predicted net effect from noise due to construction activities. Daytime noise has the potential to impact suitable roosting habitat. Overall, there will be a net negative effect due to sensory disturbance. A summary of the net effect assessment relating to habitat alteration and degradation caused by sensory disturbance during the construction phase based on the Characterization Criteria is presented in **Table 13-98**.

Table 13-98: Criteria Results for Little Brown Myotis and Northern Myotis Habitat Alteration or Degradation from Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is undesirable and considered to be adverse relating to alteration of little brown myotis and northern myotis habitat.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect will cause a measurable alteration of little brown myotis and northern myotis habitat but is unlikely to affect overall little brown myotis and northern myotis populations.
Geographic Extent	LSA	Sensory disturbances altering little brown myotis and northern myotis habitat will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	Sensory disturbances altering little brown myotis and northern myotis habitat are expected to occur through the year during the construction phase.



Characterization Criteria	Result	Rationale
Duration	Short-term	Sensory disturbances altering little brown myotis and northern myotis habitat due to construction activities are expected to end after the construction phase.
Frequency	Frequent	Sensory disturbances that alter little brown myotis and northern myotis habitat are expected to occur intermittently during construction.
Context	Moderate	In the context of habitat alteration due to sensory disturbances, little brown myotis and northern myotis are moderately resilient to change and have capacity to adapt.
Reversibility	Reversible	Sensory disturbances are reversible when noise and light cease to be generated in the Project Footprint.
Likelihood of Occurrence	Certain	Sensory disturbances altering little brown myotis and northern myotis habitat during construction are certain as mitigation measures cannot entirely minimize light and noise generated to baseline levels.

Operations

Noise and light from vehicles travelling on the road during operations will impact habitat along the ROW and supportive infrastructure. It is expected that the road will mainly be used during daylight hours, minimizing effects on little brown myotis and northern myotis activity between dusk and dawn; however, road noise generated during daylight hours has the potential to affect day roosts and maternity roosting habitat and any road noise generated at night may mask echolocation calls in nearby foraging habitats. Overall, the effect is expected to be negative. A summary of the net effect assessment relating to habitat alteration and degradation caused by sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-99**.

Table 13-99: Criteria Results for Little Brown Myotis and Northern Myotis Habitat Alteration or Degradation from Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is undesirable and considered to be adverse relating to alteration of little brown myotis and northern myotis habitat.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect will cause a measurable alteration of little brown myotis and northern myotis habitat but is unlikely to affect overall bat species populations.
Geographic Extent	LSA	Sensory disturbances altering little brown myotis and northern myotis habitat will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	Sensory disturbances altering little brown myotis and northern myotis habitat are expected to occur throughout the bat active season.
Duration	Medium-term	Sensory disturbances altering little brown myotis and northern myotis habitat are expected to extend through road operations.
Frequency	Frequent	While sensory disturbances altering little brown myotis and northern myotis habitat between dusk and dawn during the bat active season are expected to be rare, road use when bats are roosting during the daytime will occur regularly during the bat active season.



Characterization Criteria	Result	Rationale
Context	Low	Little brown myotis and northern myotis are expected to be resilient to sensory disturbances that alter habitat resulting from road operations as the same species are common in urban areas with higher densities of roads and road usage.
Reversibility	Reversible	Sensory disturbances are reversible when noise and light cease to be generated in the ROW.
Likelihood of Occurrence	Certain	Sensory disturbances altering little brown myotis and northern myotis habitat during road operations are certain as mitigation measures cannot entirely minimize light and noise generated to baseline levels.

Hydrological Changes

Construction

Little brown myotis and northern myotis habitat, particularly foraging habitat, may be altered hydrologically, with construction activities such as grading for road installation resulting in changes to both surface and groundwater water causing flooding or drying of vegetation communities. Based on the groundwater assessment of alteration to groundwater level and flow direction (Section 8.5 – Assessment of Effects on Groundwater Resources) these changes are certain to result in a net negative effect in the LSA. A summary of the net effect assessment relating to hydrological changes during the construction phase based on the Characterization Criteria is presented in **Table 13-100**.

Table 13-100: Criteria Results for Little Brown Myotis and Northern Myotis Habitat Alteration or Degradation Due from Hydrological Changes – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as it is undesirable and considered the be adverse relating to alteration of little brown myotis and northern myotis habitat.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as hydrological changes will cause a measurable change in little brown myotis and northern myotis habitat but is likely within the adaptive capability of these species.
Geographic Extent	LSA	The effect will extend into the LSA.
Timing	All Time Periods	Hydrological changes are expected to occur through the year during the construction phase.
Duration	Permanent	Recovery to baseline hydrological conditions following construction is unlikely.
Frequency	Continuous	The effect of hydrological changes resulting from construction will occur continually.
Context	Moderate	In the context of alteration and degradation of habitat due to hydrological changes, little brown myotis and northern myotis are moderately resilient to change and have capacity to adapt.
Reversibility	Irreversible	Hydrological changes will persist beyond project operations and the net effect is unlikely to be reversed.



Characterization Criteria	Result	Rationale
Likelihood of Occurrence	Certain	Hydrological changes will occur during construction.

Operations

Operation of the road is not anticipated to result in further changes to hydrology. It is possible that changes to hydrology may occur during the operations phase due to culvert and drainage blockages requiring maintenance. Overall, the net effect is expected to be negative. A summary of the net effect assessment relating to hydrological changes during the operations phase based on the Characterization Criteria is presented in **Table 13-101**.

Table 13-101: Criteria Results for Little Brown Myotis and Northern Myotis Habitat Alteration or Degradation from Hydrological Changes – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as changes to hydrology are undesirable and considered to be adverse relating to alteration of little brown myotis and northern myotis habitat.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect will cause a measurable change in little brown myotis and northern myotis habitat but is unlikely to affect overall little brown myotis and northern myotis species populations.
Geographic Extent	LSA	Hydrological changes will occur beyond the Project Footprint into the LSA.
Timing	All Time Periods	Hydrological changes are expected to occur throughout the bat active season.
Duration	Short-term	Hydrological changes during road operations will be temporary until maintenance and repair activities are completed.
Frequency	Infrequent	Hydrological changes during road operations are expected to be rare.
Context	Low	Little brown myotis and northern myotis are expected to be resilient to small habitat alterations that may result from hydrological changes that may occur during road operations.
Reversibility	Reversible	Hydrological changes should be restored once maintenance activities are concluded.
Likelihood of Occurrence	Possible	Blockages to culverts and drainage features during operations are possible.

13.5.2.3.3 Alteration in Movement

Loss of Connectivity

Construction

Little brown myotis and northern myotis movement may be altered by construction of the road due to the fragmentation of forest habitat, resulting in a loss of connectivity. There are few effective mitigation measures that can be applied to minimize the effects of habitat fragmentation on little brown myotis and northern myotis. Wildlife overpasses are well established in North America as successful solutions for



maintaining habitat connectivity across transportation corridors but is unlikely feasible in the context of the proposed road construction and landscape. Specific bat overpass designs have been employed in European countries to varying degrees of success (Berthinussen and Altringham, 2012; Claireau et al., 2018), with poor success potentially attributed to sampling design and not the overpass itself (Claireau et al., 2019). While a gantry overpass with a diamond mesh metal grate has been found as a successful bat crossing solution in France (Claireau et al., 2019), it is unknown whether that is suitable for *Myotis* bats in Ontario. Therefore, after mitigation measures are applied, it is possible that there will be a net negative effect due to movement barriers created by habitat fragmentation. A summary of the net effect assessment relating to alteration in movement due to loss of connectivity during the construction phase based on the Characterization Criteria is presented in **Table 13-102**.

Table 13-102: Criteria Results for Alteration in Little Brown Myotis and Northern Myotis Movement Due to Loss of Connectivity – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as loss of connectivity is undesirable and considered to be adverse relating to alteration of little brown myotis and northern myotis movement.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as loss of connectivity will cause a measurable change in little brown myotis and northern myotis movement but is likely within the adaptive capability of these species.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	All Time Periods	Alteration in little brown myotis and northern myotis movement due to loss of connectivity is expected to happen throughout the bat active season.
Duration	Medium-term	Effects from habitat fragmentation are expected to extend through the operations phase.
Frequency	Continuous	Vegetation permanently removed during road construction will generate continuous effects to habitat connectivity.
Context	Moderate	In the context of alteration in movement due to loss of connectivity, little brown myotis and northern myotis are moderately resilient to change and have capacity to adapt.
Reversibility	Reversible	Effects to little brown myotis and northern myotis movement due to loss of connectivity are reversible if the cleared vegetation is restored.
Likelihood of Occurrence	Possible	Alteration in movement due to loss of connectivity may occur but is unlikely as forest fragmentation has been found to potentially positively impact little brown myotis and northern myotis in eastern Ontario but has not been studied in the context of roads.

Operations

No further fragmentation of forest habitat resulting in loss of connectivity is anticipated to occur during the operations phase. Overall, the effect will be neutral. A summary of the net effect assessment relating to loss of connectivity during the operations phase based on the Characterization Criteria is presented in **Table 13-103**.

Table 13-103: Criteria Results for Alteration in Little Brown Myotis and Northern Myotis Movement Due to Loss of Connectivity – Operations

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as no additional loss of connectivity is expected during road operation, resulting in no change compared with baseline conditions.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as there will be no additional measurable loss of connectivity during the operations phase.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	All Time Periods	Alteration in little brown myotis and northern myotis movement due to loss of connectivity may happen throughout the bat active season.
Duration	Medium-term	Alteration in little brown myotis and northern myotis movement due to loss of connectivity is expected to extend through the operations phase.
Frequency	Infrequent	Additional loss of connectivity is expected to be rare as road operations will not result in the fragmentation of habitat.
Context	Low	Little brown myotis and northern myotis are expected to be resilient to small alterations in movement that may result from loss of connectivity that may occur during road operations.
Reversibility	Reversible	Effects to little brown myotis and northern myotis movement due to loss of connectivity are reversible if the cleared vegetation is restored.
Likelihood of Occurrence	Unlikely	A negative effect is unlikely to occur as there will be no additional loss of connectivity from road operations.

Sensory Disturbance

Construction

Little brown myotis and northern myotis movement is also likely to be altered by sensory disturbances. Noise, lighting and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of little brown myotis and northern myotis as they avoid the road the ROW and supportive infrastructure areas. Mitigation measures focused on sensory disturbance including timing, noise and light abatement are expected to mitigate most of the potential effects but there is a predicted net negative effect from construction activities on bat movement. A summary of the net effect assessment relating to alteration in bat movement due to sensory disturbance during the construction phase based on the Characterization Criteria is presented in **Table 13-104**.



Table 13-104: Criteria Results for Alteration in Little Brown Myotis and Northern Myotis Movement from Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbances are undesirable and considered to be adverse relating to alteration of little brown myotis and northern myotis movement.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as sensory disturbances will cause a measurable change in little brown myotis and northern myotis movement but is likely within the adaptive capability of these species.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All Time Periods	The effect of sensory disturbance on bat movement will occur throughout the little brown myotis and northern myotis active season.
Duration	Short-term	Construction-related sensory disturbances altering little brown myotis and northern myotis movement will conclude after the completion of the construction phase.
Frequency	Continuous	Sensory disturbances altering bat movement are expected to occur continually.
Context	Moderate	In the context of alteration in movement due to sensory disturbances, little brown myotis and northern myotis are moderately resilient to change and have capacity to adapt.
Reversibility	Reversible	Alteration in movement due to sensory disturbances is reversible when noise and light cease to be generated in the ROW.
Likelihood of Occurrence	Certain	Alteration in movement due to sensory disturbances during construction is certain as mitigation measures cannot entirely minimize light and noise generated to baseline levels.

Operations

After the implementation of mitigation measures, road operations are also expected to result in alterations in little brown myotis and northern myotis movement. While traffic levels are expected to be low, little brown myotis and northern myotis may experience a net negative effect due to sensory disturbance from road operation. A summary of the net effect assessment relating to alteration in little brown myotis and northern myotis movement due to sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-105**.

Table 13-105: Criteria Results for Alteration in Little Brown Myotis and Northern Myotis Movement from Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbances are undesirable and considered to be adverse relating to alteration of little brown myotis and northern myotis movement.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect will cause a measurable change in little brown myotis and northern myotis movement but is unlikely to affect overall little brown myotis and northern myotis species populations.



Characterization Criteria	Result	Rationale
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All Time Periods	The effect of sensory disturbance on little brown myotis and northern myotis movement will occur throughout their active season.
Duration	Medium-term	Alteration in little brown myotis and northern myotis movement due to sensory disturbances is expected to extend through the operations phase.
Frequency	Frequent	Sensory disturbances that alter little brown myotis and northern myotis movement are expected to occur intermittently during the operations phase.
Context	Moderate	In the context of alteration in movement due to sensory disturbances, little brown myotis and northern myotis are moderately resilient to change and have capacity to adapt.
Reversibility	Reversible	Alteration in movement due to sensory disturbances is reversible when noise and light cease to be generated in the ROW.
Likelihood of Occurrence	Possible	Alteration in movement due to sensory disturbances during the operations phase may occur but is unlikely as traffic levels are expected to be low and will mainly travel during daylight hours.

13.5.2.3.4 Injury or Death

Collisions with Vehicles

Construction

Strictly enforcing mitigation measures during the construction phase is expected to keep the number of collisions and fatalities between little brown myotis and northern myotis with vehicles and equipment to a negligible level. Construction is expected to take place largely between 7am and 7pm, avoiding the period between dusk and dawn when bats are most active during their active season. Risk of collisions between construction vehicles and little brown myotis and northern myotis cannot completely be eliminated, therefore it is expected there will be a net negative effect on bat injury and death from collisions during the construction phase. A summary of the net effect assessment relating to bat injury and death resulting from collisions during the construction phase based on the Characterization Criteria is presented in **Table 13-106**.

Table 13-106: Criteria Results for Little Brown Myotis and Northern Myotis Injury or Death Due to Collisions with Vehicles – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, collisions with construction vehicles are undesirable and considered to be adverse relating to little brown myotis and northern myotis survival.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as little brown myotis or northern myotis are rare in the RSA and have low population numbers due to White Nose Syndrome. Any mortality would result in a measurable change but would not necessarily exceed the ability for these species to continue sustained existence within the area.



Characterization Criteria	Result	Rationale
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	All Time Periods	Collisions may occur at any time during the little brown myotis and northern myotis active season.
Duration	Short-term	Collisions with construction vehicles and equipment would only occur during the construction phase.
Frequency	Infrequent	Strict enforcement of mitigation measures will limit the number of collisions between construction vehicles and little brown myotis and northern myotis.
Context	Moderate	Little brown myotis and northern myotis are expected to be moderately resilient to a small number of mortalities that may result from collisions with construction vehicles.
Reversibility	Reversible	Collisions with construction vehicles and equipment will cease once construction activities conclude.
Likelihood of Occurrence	Possible	Collisions between construction vehicles and little brown myotis and northern myotis may occur, despite mitigation measures.

Operations

Mortality during the operational phase is not expected to be eliminated by mitigations but is expected to occur throughout the little brown myotis and northern myotis active season where flyways cross the road, such as near watercourses and upland forest habitat. The predicted maximum vehicles travelling on the road is 500 per day, with the majority of travel anticipated to take place during daylight hours. Overall, a net negative effect is expected due to vehicle traffic. A summary of the net effect assessment relating to little brown myotis and northern myotis injury and death resulting from collisions during the operations phase based on the Characterization Criteria is presented in

Table 13-107.

Table 13-107: Criteria Results for Little Brown Myotis and Northern Myotis Injury or Death Due to Collisions with Vehicles – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as collisions between little brown myotis and northern myotis and vehicles are undesirable and considered to be adverse relating to little brown myotis and northern myotis survival.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as little brown myotis or northern myotis are rare in the RSA and have low population numbers due to White Nose Syndrome. Any mortality would result in a measurable change but would not necessarily exceed the ability for these species to continue sustained existence within the area.
Geographic Extent	Project Footprint	Collisions between little brown myotis and northern myotis and vehicles will be limited to the Project Footprint.
Timing	All Time Periods	Collisions between little brown myotis and northern myotis and vehicles are expected to occur throughout the little brown myotis and northern myotis active season.



Characterization Criteria	Result	Rationale
Duration	Medium-term	Collisions between little brown myotis and northern myotis and vehicles are expected to occur throughout road operations.
Frequency	Infrequent	As road use will mainly occur during daylight hours, collisions between little brown myotis and northern myotis and vehicles are expected to be rare.
Context	Moderate	Little brown myotis and northern myotis are expected to be moderately resilient to a low number of mortalities that may result from collisions with vehicles during road operations.
Reversibility	Reversible	Collisions will cease once road operation concludes.
Likelihood of Occurrence	Possible	While it expected to be rare, vehicles travelling between dusk and dawn during the little brown myotis and northern myotis active season may collide with little brown myotis and northern myotis.

Incidental Take

Construction

After mitigation measures have been applied, including timing windows avoiding vegetation clearing in little brown myotis and northern myotis habitat during the maternity roosting season (May 1 – August 31), it is less likely that little brown myotis and northern myotis injury or death will occur. Overall, a net neutral effect is likely. A summary of the net effect assessment relating to little brown myotis and northern myotis injury and death resulting from incidental take during the construction phase based on the Characterization Criteria is presented in **Table 13-108**.

Table 13-108: Criteria Results for Little Brown Myotis and Northern Myotis Injury or Death from Incidental Take – Construction

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as mitigation measures are expected to effectively manage incidental take by limiting vegetation removal in little brown myotis and northern myotis habitat to outside of the maternity roosting season.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as little brown myotis or northern myotis are rare in the RSA and have low population numbers due to White Nose Syndrome. Any mortality would result in a measurable change but would not necessarily exceed the ability for these species to continue sustained existence within the area.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	All Time Periods	Incidental take may occur at any time during the little brown myotis and northern myotis active season.
Duration	Short-term	Incidental take from construction activities will cease at the end of the construction phase.
Frequency	Infrequent	Incidental take is expected to be rare with the implementation of mitigation measures such as timing windows.
Context	Moderate	Little brown myotis and northern myotis are expected to be moderately resilient to a low number of mortalities that may result from incidental take during construction.
Reversibility	Reversible	The net effect is reversible once construction concludes.



Characterization Criteria	Result	Rationale
Likelihood of Occurrence	Unlikely	A negative effect is unlikely to occur.

Operations

Vegetation trimming in little brown myotis and northern myotis habitat during road operation may result in injury or death to these species if conducted during the active season, even after mitigation measures have been applied. Little brown myotis and northern myotis have very small body sizes, ranging from just a few centimetres to 10 cm in length, and can roost individually in knot holes, loose bark, and cracks and crevices of trees, making them difficult to detect if a visual inspection is conducted prior to vegetation clearing. Overall, a net negative effect is possible if vegetation clearing occurs during the active season. A summary of the net effect assessment relating to little brown myotis and northern myotis injury and death resulting from incidental take during the operations phase based on the Characterization Criteria is presented in **Table 13-109**.

Table 13-109: Criteria Results for Little Brown Myotis and Northern Myotis Injury or Death from Incidental Take – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as injury or death of little brown myotis and northern myotis due to incidental take during vegetation management conducted as a result of road operations is undesirable.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as little brown myotis or northern myotis are rare in the RSA and have low population numbers due to White Nose Syndrome. Any mortality would result in a measurable change but would not necessarily exceed the ability for these species to continue sustained existence within the area.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	All Time Periods	Incidental take may occur at any time during the little brown myotis and northern myotis active season.
Duration	Medium-term	The potential for incidental take would occur over the operating lifetime of the road.
Frequency	Infrequent	Incidental take is expected to be rare with the implementation of mitigation measures such as timing windows.
Context	Moderate	Little brown myotis and northern myotis are expected to be moderately resilient to a low number of mortalities that may result from incidental take during road operation.
Reversibility	Reversible	The net effect is reversible once road operation concludes.
Likelihood of Occurrence	Possible	While it expected to be rare, vegetation management activities during the little brown myotis and northern myotis active season may result in incidental take, causing little brown myotis and northern myotis injury or death.



Changes to Predator-Prey Dynamics

Construction

Effects on little brown myotis and northern myotis survival from improved predator access and movement rates is possible. Mitigation involving reclamation/blockage of any temporarily disturbed areas and access roads after construction will minimize the effect as these actions will reduce open areas and linear features; however, the effects of changes to predator-prey dynamics via increased predation cannot be completely eliminated. It is possible there will be a net negative effect on little brown myotis and northern myotis survival in the LSA during construction due to changes to predator-prey dynamics. A summary of the net effect assessment relating to bat injury and death due to changes to predator-prey dynamics during the construction phase based on the Characterization Criteria is presented in **Table 13-110**.

Table 13-110: Criteria Results for Little Brown Myotis and Northern Myotis Injury or Death from Changes to Predator-Prey Dynamics – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as injury or death of little brown myotis and northern myotis may occur due to improved predator access during construction.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as little brown myotis or northern myotis are rare in the RSA and have low population numbers due to White Nose Syndrome. Any mortality would result in a measurable change but would not necessarily exceed the ability for these species to continue sustained existence within the area.
Geographic Extent	LSA	Predators are not expected to remain in the Project Footprint and will travel into the LSA.
Timing	All Time Periods	Predation may occur at any time during the little brown myotis and northern myotis active season.
Duration	Long-term	Improved predator access is expected to remain beyond the operations phase.
Frequency	Infrequent	Predation events are expected to be rare as there are no predators that specialize on little brown myotis and northern myotis in the region.
Context	Moderate	Little brown myotis and northern myotis are expected to be moderately resilient to a low number of mortalities that may result from predation during the construction phase.
Reversibility	Reversible	Improved predator access is expected to end once vegetation has re-established in the linear features following operations.
Likelihood of Occurrence	Possible	While it is expected to be rare, improved predator access may result in increased predation of little brown myotis and northern myotis.



Operations

It is possible there will be a net negative effect on little brown myotis and northern myotis survival in the LSA during road operation due to increased predation. A summary of the net effect assessment relating to little brown myotis and northern myotis injury and death due to changes to predator-prey dynamics during the operations phase based on the Characterization Criteria is presented in **Table 13-111**.

Table 13-111: Criteria Results for Little Brown Myotis and Northern Myotis Injury or Death Due to Changes to Predator-Prey Dynamics- Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as predation of little brown myotis and northern myotis is undesirable and considered to be adverse relating to little brown myotis and northern myotis injury and death.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as little brown myotis or northern myotis are rare in the RSA and have low population numbers due to White Nose Syndrome. Any mortality would result in a measurable change but would not necessarily exceed the ability for these species to continue sustained existence within the area.
Geographic Extent	LSA	Predators are not expected to remain in the Project Footprint and will travel into the LSA.
Timing	All Time Periods	Predation may occur at any time during the little brown myotis and northern myotis active season.
Duration	Medium-term	Increased predation due predators attracted to the road during operations is expected to stop after the operations phase.
Frequency	Infrequent	Predation events are expected to be rare as there are no predators that specialize on little brown myotis and northern myotis in the region.
Context	Moderate	Little brown myotis and northern myotis are expected to be moderately resilient to a low number of mortalities that may result from predation during the operations phase.
Reversibility	Reversible	Increased predation is expected to end once vegetation has re-established in the linear features following operations.
Likelihood of Occurrence	Possible	Predators attracted to the ROW during road operations will possibly predate little brown myotis and northern myotis but are not known to specialize on these species.

Increased Energy Expenditure

Construction

The cumulative effects of habitat loss, alteration and degradation, and alteration of movements on Little Brown Myotis and Northern Myotis during construction will likely lead to increased efforts to travel between roosting and foraging habitats and also to successfully forage for food in habitats near the Project Footprint. Mitigation measures applied during construction to the individual effects will cumulatively minimize increased energy expenditure to some degree but cannot eliminate it. It is possible there will be a net negative effect on Little Brown Myotis and Northern Myotis survival in the LSA during construction due to increased energy expenditures for Little Brown Myotis and Northern Myotis. A



summary of the net effect assessment relating to bat injury and death due to increased energy expenditure during the construction phase based on the Characterization Criteria is presented in **Table 13-112**.

Table 13-112: Criteria Results for Little Brown Myotis and Northern Myotis Injury or Death Due to Increased Energy Expenditure – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as injury or death of little brown myotis and northern myotis may occur due to increased energy expenditure during construction.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as little brown myotis or northern myotis are rare in the RSA and have low population numbers due to White Nose Syndrome. Any mortality would result in a measurable change but would not necessarily exceed the ability for these species to continue sustained existence within the area.
Geographic Extent	LSA	The effect will extend to the LSA as little brown myotis and northern myotis will be travelling away from the Project Footprint to avoid sensory impacts and seek suitable habitat.
Timing	All Time Periods	Increased energy expenditure may occur at any time during the little brown myotis and northern myotis active season.
Duration	Medium-term	Increased energy expenditure from road construction is expected to continue through the operations phase.
Frequency	Frequent	Increased energy expenditure in the LSA is expected to be frequent during construction.
Context	Moderate	Little brown myotis and northern myotis are expected to be moderately resilient to a low number of mortalities that may result from increased energy expenditure during the construction phase.
Reversibility	Reversible	Increased energy expenditure is expected to end once vegetation has re-established in the linear features following operations.
Likelihood of Occurrence	Possible	While it is expected to be rare, increased energy expenditure may result in increased mortality of little brown myotis and northern myotis.

Operations

Little brown myotis and northern myotis may experience increased energy expenditures during road operations as a result of other effects such as alteration in movement due to road avoidance, attraction of predators from road operations, and sensory disturbances generated by road operations. A net negative effect is possible. A summary of the net effect assessment relating to little brown myotis and northern myotis injury and death due to increased energy expenditure during the construction phase based on the Characterization Criteria is presented in **Table 13-113**.



Table 13-113: Criteria Results for Little Brown Myotis and Northern Myotis Injury or Death Due to Increased Energy Expenditure – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as injury or death of little brown myotis and northern myotis may occur due to increased energy expenditure during operations.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as little brown myotis or northern myotis are rare in the RSA and have low population numbers due to White Nose Syndrome. Any mortality would result in a measurable change but would not necessarily exceed the ability for these species to continue sustained existence within the area.
Geographic Extent	LSA	The effect will extend to the LSA as little brown myotis and northern myotis will be travelling away from the Project Footprint to avoid sensory impacts and seek suitable habitat.
Timing	All Time Periods	Increased energy expenditure may occur at any time during the little brown myotis and northern myotis active season.
Duration	Medium-term	Increased energy expenditure from road construction is expected to continue through the operations phase.
Frequency	Frequent	Increased energy expenditure in the LSA is expected to be frequent during operations.
Context	Moderate	Little brown myotis and northern myotis are expected to be moderately resilient to a low number of mortalities that may result from increased energy expenditure during the operations phase.
Reversibility	Reversible	Increased energy expenditure is expected to end once vegetation has re-established in the linear features following operations.
Likelihood of Occurrence	Possible	While it is expected to be rare, increased energy expenditure may result in increased mortality of little brown myotis and northern myotis.

Table 13-114 and **Table 13-115** provide summaries of the characterized predicted net effects for Little Brown Myotis and Northern Myotis during the construction and operations phases.



Table 13-114: Summary Table of the Predicted Net Effects for Little Brown Myotis and Northern Myotis During the Construction Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Negative	Moderate	Project Footprint	All Time Periods	Permanent	Continuous	Moderate	Irreversible	Certain
Habitat Alteration/Degradation – Habitat Structural Change	Negative	Moderate	LSA	All Time Periods	Medium-term	Continuous	Moderate	Reversible	Certain
Habitat Alteration/Degradation – Sensory Disturbance	Negative	Low	LSA	All Time Periods	Short-term	Frequent	Moderate	Reversible	Certain
Habitat Alteration/Degradation – Hydrological Changes	Negative	Moderate	LSA	All Time Periods	Permanent	Continuous	Moderate	Irreversible	Certain
Alterations in Movement – Loss of Connectivity	Negative	Moderate	Project Footprint	All Time Periods	Medium-term	Continuous	Moderate	Reversible	Possible
Alterations in Movement – Sensory Disturbance	Negative	Moderate	Project Footprint	All Time Periods	Short-term	Continuous	Moderate	Reversible	Certain
Injury/Death – Collisions with Vehicles	Negative	Moderate	Project Footprint	All Time Periods	Short-term	Infrequent	Moderate	Reversible	Possible
Injury/Death – Incidental Take	Neutral	Moderate	Project Footprint	All Time Periods	Short-term	Infrequent	Moderate	Reversible	Unlikely
Injury/Death – Changes to Predator-Prey Dynamics	Negative	Moderate	LSA	All Time Periods	Long-term	Infrequent	Moderate	Reversible	Possible
Injury/Death – Increased Energy Expenditure	Negative	Moderate	LSA	All Time Periods	Medium-term	Frequent	Moderate	Reversible	Possible



Table 13-115: Summary Table of the Predicted Net Effects for Little Brown Myotis and Northern Myotis During the Operations Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Neutral	Negligible	Project Footprint	All Time Periods	Short-term	Infrequent	Low	Reversible	Unlikely
Habitat Alteration/ Degradation – Habitat Structural Change	Neutral	Negligible	LSA	All Time Periods	Short-term	Infrequent	Low	Reversible	Unlikely
Habitat Alteration/ Degradation – Sensory Disturbance	Negative	Low	LSA	All Time Periods	Medium-term	Frequent	Low	Reversible	Certain
Habitat Alteration/ Degradation – Hydrological Changes	Negative	Low	LSA	All Time Periods	Short-term	Infrequent	Low	Reversible	Possible
Alterations in Movement – Loss of Connectivity	Neutral	Negligible	Project Footprint	All Time Periods	Medium-term	Infrequent	Low	Reversible	Unlikely
Alterations in Movement – Sensory Disturbance	Negative	Low	Project Footprint	All Time Periods	Medium-term	Frequent	Moderate	Reversible	Possible
Injury/Death – Collisions with Vehicles	Negative	Moderate	Project Footprint	All Time Periods	Medium-term	Infrequent	Moderate	Reversible	Possible
Injury/Death – Incidental Take	Negative	Moderate	Project Footprint	All Time Periods	Medium-term	Infrequent	Moderate	Reversible	Possible
Injury/Death – Changes to Predator-Prey Dynamics	Negative	Moderate	LSA	All Time Periods	Medium-term	Infrequent	Moderate	Reversible	Possible
Injury/Death – Increased Energy Expenditure	Negative	Moderate	LSA	All Time Periods	Medium-term	Frequent	Moderate	Reversible	Possible



13.5.2.4 Evening Grosbeak

13.5.2.4.1 Habitat Loss

Clearance Activities

Construction

Destruction of Evening Grosbeak habitat by clearance activities is certain as a result of construction activities. Evening Grosbeak habitat loss and destruction are expected due to site preparation and construction activities as well as terrestrial vegetation changes during road construction and operations. There is a predicted net effect of habitat loss after implementation of mitigation measures. Based on the results of habitat modelling via Ecological Land Classification (refer to Section 11), construction activities will remove 85.36 ha, representing approximately 4.23 % of the most suitable Evening Grosbeak habitat in the LSA. At the RSA level 155.01 ha of habitat will be removed, or 1.77% of suitable habitat. Overall, suitable Evening Grosbeak nesting habitat is somewhat uncommon throughout the study areas with 7.29% of the LSA and 7.5% of the Full Study Area consisting of these vegetation communities.

Overall, it is expected that there will be a small negative net effect in the Project Footprint from habitat loss and the likelihood is certain. This loss of habitat is considered permanent. A summary of the net effects relating to the habitat loss during the construction phase based on the Characterization Criteria is presented in **Table 13-116**.

Table 13-116: Criteria Results for Destruction of Evening Grosbeak Habitat Due to Clearance Activities – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as destruction of Evening Grosbeak habitat is expected as a result of project construction.
Magnitude	Moderate	The magnitude of the effect is predicted to be Moderate, as the effect will cause a measurable destruction of Evening Grosbeak habitat, and low levels of prime habitat are available in the area.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All Time Periods	Construction activities, including habitat removal are expected to occur through the year.
Duration	Permanent	Any destruction of Evening Grosbeak habitat is expected to permanent as the roadbed will remain on the landscape for the foreseeable future.
Frequency	Continuous	Evening Grosbeak habitat once removed from the Project footprint will remain removed for the forceable future.
Context	Moderate	Effects are likely to affect Deciduous and Mixedwoods that are uncommon throughout the study area and throughout the larger region.
Reversibility	Irreversible	The roadbed is unlikely to be removed hence the effect should be thought of as irreversible.
Likelihood of Occurrence	Certain	The loss of habitat during construction is certain.

Operations

Destruction of Evening Grosbeak habitat by clearance activities is not expected as a result of roadway operations. Repairs to the roadway and crossing structures may be required over time, but these are not expected to result in additional destruction of Evening Grosbeak habitat. Overall, the effect on Evening Grosbeak would be negligible. The effect is negligible and the likelihood unlikely. A summary of the net effects relating to the habitat loss during the operations phase based on the Characterization Criteria is presented in **Table 13-117**.

Table 13-117: Criteria Results for Destruction of Evening Grosbeak Habitat Due to Clearance Activities – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as while no destruction of additional habitat is expected if it occurs it would be a net negative for Evening Grosbeak.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect is not expected to occur during the operations phase.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All time periods	Additional destruction of Evening Grosbeak habitat is not expected during operations.
Duration	Medium-term	Any destruction of Evening Grosbeak habitat will be medium-term, during repairs or maintenance and undergo restoration.
Frequency	Infrequent	Additional destruction of Evening Grosbeak habitat during operations is not expected.
Context	Resilient	Given that the Project Footprint is not expected to expand no new mature upland Evening Grosbeak habitats are expected to be removed.
Reversibility	Reversible	The net effect is reversible if the roadway was removed.
Likelihood of Occurrence	Unlikely	Additional net effects of the Project during operations are unlikely.

13.5.2.4.2 Habitat Alteration or Degradation

Sensory Disturbances

Construction

Effects of sensory disturbance on degradation or alteration of Evening Grosbeak habitat is probable during the construction phase. Sensory disturbances resulting from road construction, including movement of equipment and vehicles, noise, lighting, and other human activities may degrade habitat for Evening Grosbeak adjacent to the Project Footprint. Disturbance may be considerable during impulsive activities such as blasting or quarrying, or during activities such as hauling which may occur during all hours causing Evening Grosbeak to avoid the ROW and supportive infrastructure. Artificial lighting could alter Evening Grosbeak behavior including foraging and reproduction. Mitigations will aim to confine disturbance both spatially and temporally using noise and light mitigation plans. Overall, it is possible there will be a net negative effect during the construction phase. A summary of the net effects relating to



habitat alteration through sensory disturbance during the construction phase based on the Characterization Criteria is presented in **Table 13-118**.

Table 13-118: Criteria Results for Habitat Alteration or Degradation of Evening Grosbeak Habitat Due to Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project construction activities.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could cause a measurable alteration of Evening Grosbeak habitat, but the change is likely small.
Geographic Extent	LSA	The effect will be extended past the Project Footprint into the local study area approximately 125 m.
Timing	All time periods	Impacts on Evening Grosbeak would occur during any point of the active season.
Duration	Short-term	Any alteration of Evening Grosbeak habitat due to sensory impacts will be short-term, during the construction phase of the project.
Frequency	Frequent	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Evening Grosbeak during construction.

Operations

Effects of sensory disturbance on degradation or alteration of Evening Grosbeak habitat is possible during the operations phase. For operations most sensory impacts will be related to traffic noise which may degrade Evening Grosbeak habitat causing avoidance of areas near roads or decreased habitat value. Light pollution impacts from the road during operations are considered non-existent as the road will not be lit except for existing lights around the community. While documented sensory impacts of roads on Evening Grosbeak limited, low traffic levels are likely to result in minimal impacts on Evening Grosbeak as most studies documenting an impact usually have volumes in the tens of thousands (Smith et al. 2005). Overall, it is possible there will be a small net negative effect due to sensory disturbances during operations. The effect is expected to occur while the road is in use and can be considered reversible as it would stop following the operations phase of the project. A summary of the net effects relating to habitat alteration through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-119**.



Table 13-119: Criteria Results for Habitat Alteration or Degradation of Evening Grosbeak Habitat Due to Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project construction activities.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could cause a measurable alteration of Evening Grosbeak habitat, but the change is likely small.
Geographic Extent	LSA	The effect will be extended past the Project Footprint into the local study area approximately 125 m.
Timing	All time periods	Impacts on Evening Grosbeak would occur during any point of the active season.
Duration	Medium-term	Any alteration of Evening Grosbeak habitat due to sensory impacts will be medium-term, lasting the length of the operations phase.
Frequency	Frequent	Sensory disturbances will occur primarily during daytime when traffic occurs.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Sensory disturbance changes should be restored once use of the road concludes.
Likelihood of Occurrence	Possible	Sensory disturbances may affect some Evening Grosbeak but responses to low levels of traffic are not conclusive, and some habituation may occur.

Changes in Vegetation Structure

Construction

Effects of changes in vegetation structure on degradation or alteration of Evening Grosbeak habitat is possible during the operations phase. Vegetation removals during road construction may alter or degrade Evening Grosbeak habitat near the Project Footprint including conversion to early seral habitats and creation of habitat edges. Mitigations including retention of upland areas may mitigate impacts on Evening Grosbeaks as they prefer to use mature coniferous and mixedwoods. While road corridors in forested landscapes reduce abundance of some species, Evening Grosbeak are known to use roadsides. However, early seral habitats have little value for Evening Grosbeak at least during the breeding season. Overall, it is possible there will be a small net negative effect. A summary of the net effects relating to habitat alteration by changes in vegetation structure during the construction phase based on the Characterization Criteria is presented in **Table 13-120**.



Table 13-120: Criteria Results for Habitat Alteration or Degradation of Evening Grosbeak Habitat Due to Changes in Vegetation Structure – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as the low habitat value for early seral habitat outweighs positive edge effects.
Magnitude	Negligible	The magnitude of the effect is predicted to be Low, as changes to habitat structure will potentially affect a small number of individuals.
Geographic Extent	LSA	The edge effect will extend into the LSA adjacent to the Project Footprint.
Timing	All time periods	The changes in vegetation structure will occur during all time periods.
Duration	Long-term	The changes in vegetation structure will be present as long as the road remains active and won't be of value to Evening Grosbeak as breeding habitat long past the operational phase ends.
Frequency	Continuous	The changes in vegetation structure will be present continuously once vegetation removal occurs.
Context	Resilient	Impact will be low as the vegetation changes will be minimal and Evening Grosbeak have some use for early seral habitats.
Reversibility	Reversible	The effect is reversible one the roadway is removed.
Likelihood of Occurrence	Possible	Even with mitigations its possible the changes in vegetation structure may affect some individual Evening Grosbeak during construction activities.

Operations

Effects of changes in vegetation structure on degradation or alteration of Evening Grosbeak habitat is possible during the operations phase. While it is anticipated that restoration of laydown areas and access roads will reverse some of the habitat alteration or degradation caused by road construction, these areas would not be used by Evening Grosbeaks for the foreseeable future. Maintenance activities, including removal of roadside vegetation during road operations, will create periodic disturbances and sustain edge effects along the ROW. Overall, the same impact of habitat alteration due to structural changes to Evening Grosbeak habitat would be expected during the operations phase as described for the construction phase. A summary of the net effects relating to habitat alteration by changes in vegetation structure during the operations phase based on the Characterization Criteria is presented in **Table 13-121**.

Table 13-121: Criteria Results for Habitat Alteration or Degradation of Evening Grosbeak Habitat Due to Changes in Vegetation Structure – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as the low habitat value for early seral habitat outweighs positive edge effects.
Magnitude	Low	The magnitude of the effect is predicted to be low, as changes to habitat structure will potentially affect a small number of individuals.
Geographic Extent	LSA	The edge effect will extend into the LSA adjacent to the Project Footprint.



Characterization Criteria	Result	Rationale
Timing	All time periods	The changes in vegetation structure will occur during all time periods.
Duration	Long-term	The changes in vegetation structure will be present as long as the road remains active and won't be of value to Evening Grosbeak as breeding habitat long past the operational phase ends.
Frequency	Continuous	The changes in vegetation structure will be present continuously once vegetation removal occurs.
Context	Resilient	Impact will be low as the vegetation changes will be minimal and Evening Grosbeak have some use for early seral habitats.
Reversibility	Reversible	The effect is reversible once the roadway is removed.
Likelihood of Occurrence	Possible	Even with mitigations its possible the changes in vegetation structure may affect some individual Evening Grosbeak during construction activities.

13.5.2.4.3 Alteration in Movement

Loss of Connectivity

Construction

Effects of changes to habitat connectivity on alteration in movement of Evening Grosbeak is possible during the construction phase. Forest specialist species that have shown reluctance to cross gaps like those created by roads where the road creates a distinctive edge between the road and preferred habitats. However, Evening Grosbeak has not been found to be area sensitive at the local level where gaps along forest edges may affect movement. Furthermore, at 35 m wide, the project ROW is smaller than the smallest gap size (50 m) found to limit crossings for some boreal birds. After implementation of mitigation methods, a negligible negative effect on Evening Grosbeak movement will likely remain. A summary of the net effects relating to alteration of movement through loss of connectivity during the construction phase based on the Characterization Criteria is presented in **Table 13-122**.

Table 13-122: Criteria Results for Alteration in Movement of Evening Grosbeak Due to Loss of Connectivity – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as decreased connectivity may occur as a result of construction activities.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the barrier effect would be minimal for Evening Grosbeak.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area.
Timing	All time periods	Changes in habitat connectivity that cause movement alterations would happen at any period during the Evening Grosbeak active season.
Duration	Medium-term	Any alteration of Evening Grosbeak movement will be medium-term, as the effect will continue into the operations phase of the project.



Characterization Criteria	Result	Rationale
Frequency	Continuous	Changes in habitat connectivity are continuous.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and edge habitats have little effect on Evening Grosbeak movement.
Reversibility	Reversible	Changes in connectivity should be end once the operation phase ends.
Likelihood of Occurrence	Possible	Changes in connectivity may affect some Evening Grosbeak during construction.

Operations

Effects of changes to habitat connectivity on alteration in movement of Evening Grosbeak is possible during the operations phase. Like the construction phase, decreased connectivity due to the road connectivity is not expected to result in meaningful changes to Evening Grosbeak movement. Maintenance activities will maintain vegetation along the Row in an early seral state which are not considered a deterrence. While some forest species have show to avoid gaps, including road gaps this has generally been found along much wider gaps than the 35 m project ROW and Evening Grosbeaks often use roads for grit and salt consumption. After implementation of mitigation methods, a negligible negative effect on Evening Grosbeak movement will likely remain. A summary of the net effects relating to alteration of movement through loss of connectivity during the construction phase based on the Characterization Criteria is presented in **Table 13-123**.

Table 13-123: Criteria Results for Alteration in Movement of Evening Grosbeak Due to Loss of Connectivity – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as decreased connectivity may occur as a result of operation activities.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the barrier effect would be minimal for Evening Grosbeak.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the edge of local study area.
Timing	All time periods	Changes in habitat connectivity that cause movement alterations would happen at any period during the Evening Grosbeak active season.
Duration	Medium-term	Any alteration of Evening Grosbeak movement will be medium-term, lasting the operational phase of the project.
Frequency	Continuous	Changes in habitat connectivity are continuous.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and edge habitats have little effect on Evening Grosbeak movement.
Reversibility	Reversible	Changes in connectivity should be end once the operation phase ends.
Likelihood of Occurrence	Possible	Changes in connectivity may affect some Evening Grosbeak movement during operations.



Sensory Disturbances

Construction

Effects of sensory disturbance on Evening Grosbeak movement is probable during the construction phase. Evening Grosbeak could alter their movement around the Project Footprint as they avoid disturbances like blasting, clearing, hauling and grading and other human actions during construction activities. Many of these disturbances will be abrupt and occur randomly and at different locations which could cause individual Evening Grosbeaks to abandon the area near the disturbance. Construction lighting could attract Evening Grosbeak for foraging or due to disorientation during migration movements. Mitigation measures focused on sensory disturbance including timing, noise and light abatement are expected to mitigate most of the potential effects but there is a predicted net effect from road construction on Evening Grosbeak movement. A summary of the net effects relating to alteration of movement through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-124**.

Table 13-124: Criteria Results for Alteration in Movement of Evening Grosbeak Due to Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project operation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could potentially affect a few breeding pairs.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area.
Timing	All time periods	Sensory disturbances that cause movement alterations would happen at any period during the Evening Grosbeak active season.
Duration	Short-term	Any alteration of Evening Grosbeak movement will be short-term, during the construction phase of the project.
Frequency	Infrequently	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Evening Grosbeak during construction.

Operations

Effects of sensory disturbance on Evening Grosbeak movement is probable during the operations phase. During operations traffic noise will be the primary sensory impact on Evening Grosbeak as the road will not have lighting except near the community. Noise disturbance by roads has not been directly measured for Evening Grosbeak. However, traffic noise has been found to lower abundance and promote avoidance in many in many bird species. Sensory disturbance been shown to affect bird distribution when noise exceeded 56 dB but the WSR noise study indicates only a small area may exceed these decibel limits (Appendix J – Noise and Vibration Impact Assessment Report). Given the small area affected and few



individuals affected, a negligible negative effect on Evening Grosbeak movement will likely occur. A summary of the net effects relating to alteration of movement through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-125**.

Table 13-125: Criteria Results for Alteration in Movement of Evening Grosbeak Due to Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be low, as the effect could potentially affect a few breeding pairs.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area.
Timing	All time periods	Sensory disturbances that cause movement alterations would happen at any period during the Evening Grosbeak active season.
Duration	Medium-term	Any alteration of Evening Grosbeak movement will be medium-term, during the operations phase of the project.
Frequency	Infrequent	Sensory disturbances will occur during periods of traffic and maintenance activities, location and intensity will vary temporally.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Possible	Sensory disturbances may affect some Evening Grosbeak during operations during periods of higher volume traffic.

13.5.2.4.4 Injury or Death

Collisions with Vehicles

Construction

Injury and/or death from collisions is probable during the construction phase for Evening Grosbeak. Evening Grosbeaks are attracted to roads, particularly outside of the breeding season, for the ingestion of grit and road salt and suffer mortality as a result of collisions with vehicles. Strictly enforcing mitigation measures during the construction phase is expected to keep the number of collisions between Evening Grosbeak and vehicles and equipment low and the magnitude low. Low numbers of vehicles will travel between camps and construction locations, collision risk will be minimized by effect enforcement of speed limits and wildlife training for personal. Within construction sites vehicles will be traveling at low speeds and environmental monitors will watch for any roosting or nesting birds and initiate mitigations if appropriate. After mitigations, a low magnitude net negative effect is probable due to vehicle traffic. A summary of the net effects relating to injury and death through collisions during the construction phase based on the Characterization Criteria is presented in **Table 13-126**.



Table 13-126: Criteria Results for Injury or Death of Evening Grosbeak Due to Collisions – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths due to collisions with construction vehicles may occur during the construction phase.
Magnitude	Low	The magnitude of the effect is predicted to be Low, as only a few individuals may be affected.
Geographic Extent	LSA	The effect will extend to birds moving between the LSA on each side of the Project Footprint.
Timing	All time periods	Collisions could happen during any period during the Evening Grosbeak active season.
Duration	Short-term	Collisions with construction vehicles will occur during the construction phase of the project.
Frequency	Infrequent	Strict enforcements will limit the number of collisions between construction vehicles and Evening Grosbeak.
Context	Moderate	Evening Grosbeak due to their flight pattern and behavior near roads are known to be susceptible to collisions.
Reversibility	Reversible	Collisions will stop once construction activities are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its possible some collisions with Evening Grosbeak may occur during construction.

Operations

Injury and/or death from collisions is possible during the operations phase for Evening Grosbeak. Mortality during the operational phase is not expected to be eliminated by mitigations but is expected to occur throughout the Evening Grosbeak active season where the road crosses breeding and foraging habitats. The roadside behavior of Evening Grosbeak, foraging for grit and salt along the road, make them more susceptible to vehicle collisions. While the low traffic levels will generally keep the number of collisions at low levels, collisions are still expected along low-volume forest roads like the WSR. Additionally, mitigations are likely not as effective during operations as the construction phase as enforcement will be more difficult. Overall, a net negative effect is probable due to vehicle traffic. A summary of the net effects relating to Injury and death through collisions during the operations phase based on the Characterization Criteria is presented in **Table 13-127**.



Table 13-127: Criteria Results for Injury or Death of Evening Grosbeak Due to Collisions – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, deaths due to collisions may occur as a result of road operation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as a Spruce Budworm outbreak which coincide with high numbers of Evening Grosbeaks is unlikely under current climate conditions.
Geographic Extent	LSA	The effect will extend to birds moving between the LSA on each side of the Project Footprint.
Timing	All time periods	Collisions could happen during any period during the Evening Grosbeak active season but more likely outside of breeding.
Duration	Medium-term	These collisions will occur through the lifetime of the operations phase of the project.
Frequency	Infrequent	Low traffic volume will limit the number of collisions between vehicles and Evening Grosbeak.
Context	Moderate	Evening Grosbeak due to their flight pattern and behavior near roads are known to be susceptible to collisions.
Reversibility	Reversible	Collisions will stop once operation activities are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its probable some collisions with Evening Grosbeak will occur during operations phase as road users may ignore mitigations and operational duration.

Incidental Take

Construction

Injury and/or death from incidental take is possible during the construction phase for Evening Grosbeak. Vegetation clearing in Evening Grosbeak habitat during road construction, and/or movement of equipment/vehicles through vegetated areas, may result in injury or death to birds, hatchlings, and/or eggs if management of vegetation is carried out during the breeding season. Mitigation measures including timing windows will preclude the removal of vegetation within the breeding season in most situations, however when removal occurs within the breeding season mitigation measures such as nest sweeps will not eliminate incidental take. Evening Grosbeak nests are high in trees, in dense foliage and difficult to spot. Overall, a net negative effect is probable if vegetation clearing occurs during the breeding season. A summary of the net effects relating to injury and death through incidental take during the construction phase based on the Characterization Criteria is presented in **Table 13-128**.



Table 13-128: Criteria Results for Injury or Death of Evening Grosbeak Due to Incidental Take – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Evening Grosbeak may occur as a result of incidental take.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	Sensitive periods	Incidental take would primarily occur during the Evening Grosbeak breeding season.
Duration	Short-term	Incidental take from construction activities will stop at the end of the construction phase of the project.
Frequency	Infrequent	Timing mitigation will limit the number deaths due to clearance activities.
Context	Resilient	Mitigations will limit any impacts on Evening Grosbeak populations.
Reversibility	Reversible	Incidental take would stop once construction activities are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its probable some incidental take may occur during construction.

Operations

Injury and/or death from incidental take is probable during the operations phase for Evening Grosbeak. The position of Evening Grosbeak nests in mature trees at least 5 m off the ground limits the likelihood of incidental take as removal of large trees would not occur during most maintenance activities. The potential for incidental take would occur over the operating lifetime of the road as periodic clearing of the ROW may occur during operations as part of line-of-sight maintenance or infrastructure repairs. These activities would be confined to the Project Footprint. Though smaller in scale, if maintenance occurs during the breeding season mitigative measures could not completely avoid incidental take. A summary of the net effects relating to injury and death through incidental take during the operations phase based on the Characterization Criteria is presented in **Table 13-129**.

Table 13-129: Criteria Results for Injury or Death of Evening Grosbeak Due to Incidental Take – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Evening Grosbeak may occur as a result of incidental take.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible as Evening Grosbeak nest locations will limit the number of affected individuals.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	Sensitive periods	Incidental take would primarily occur during the Evening Grosbeak breeding season.
Duration	Medium-term	The potential for incidental take would occur over the operating lifetime of the road.
Frequency	Infrequent	Timing mitigations will limit the number deaths due to clearance activities.



Characterization Criteria	Result	Rationale
Context	Resilient	While some individuals may be impacted mitigations will limit any impacts on Evening Grosbeak populations.
Reversibility	Reversible	Incidental take would stop once road operations are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its possible some incidental take may occur during operations given the extended lifetime of the road.

Changes to Predator-Prey Dynamics

Construction

Injury and/or death from predation is possible during the construction phase for Evening Grosbeak. Use of linear features and edge habitats by predators of Evening Grosbeak will increase predation as these species have been document to use forest edges like a road ROW to increase their predation success. It is expected predation will extend somewhat into the LSA, as predators may use the roads to access new areas. Mitigations involving reclamation/blockage of any temporarily disturbed areas and access roads will reduce open areas and linear features; however, the effects of increased predation will not be completely eliminated. Parasitism is not expected due to the non-presence of Brown-headed Cowbird. With mitigations is probable there will be a low magnitude, negative effect on Evening Grosbeak from increased predation. A summary of the net effects relating to injury and death through increased predation during the construction phase based on the Characterization Criteria is presented in **Table 13-130**.

Table 13-130: Criteria Results for Injury or Death of Evening Grosbeak Due to Changes to Predator-Prey Dynamics – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Evening Grosbeak may occur because of increased predation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	LSA	The effect will extend into the Local Study Area.
Timing	All time periods	Predation would occur throughout the Evening Grosbeak active season.
Duration	Long-term	The effect that originated as part of construction would last past the operational lifetime of road.
Frequency	Infrequent	Predation events are likely to be low in frequency due to the cryptic nature of the Evening Grosbeak and few individuals will be using areas near the road.
Context	Resilient	Mitigations will limit any impacts on Evening Grosbeak populations.
Reversibility	Reversible	The effect of increased predation would end once the linear features have regenerated sufficiently.
Likelihood of Occurrence	Probable	Even with mitigations its probable that increased predation could occur given known use of linear edges by predators.



Injury and/or death from predation is probable during the operations phase for Evening Grosbeak. Effects on Evening Grosbeak from changes to predator-prey dynamics during operations are a continuation of the same impacts. Maintenance clearing during operations will maintain openness along the ROW which will allow predators increased access to upland habitat associated with Evening Grosbeak. Songbird predators are known to have increased success along edges. Mitigations are also limited during the operations phase. Vegetation removal will occur only when essential, however the open nature of the ROW is required for safe operations of the road. It is probable there will be a moderate magnitude, negative effect on Evening Grosbeak survival in the LSA due to increased predation. A summary of the net effects relating to injury and death through increased predation during the operations phase based on the Characterization Criteria is presented in **Table 13-131**.

Table 13-131: Criteria Results for Injury or Death of Evening Grosbeak Due to Changes to Predator-Prey Dynamics – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Evening Grosbeak may occur as a result of increased predation.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as songbird predators are known to have increased success along edges.
Geographic Extent	LSA	The effect will extend into the Local Study Area.
Timing	All time periods	Predation would occur throughout the Evening Grosbeak active season.
Duration	Long-term	Effects from operational activities would last past the operational lifetime of road.
Frequency	Infrequent	Predation events due to increased access are likely to be low in frequency due to the cryptic nature of the Evening Grosbeak nests.
Context	Resilient	Mitigations including restoration will limit any impacts on Evening Grosbeak populations.
Reversibility	Reversible	The effect of increased predation would end once the linear features have regenerated sufficiently.
Likelihood of Occurrence	Probable	Even with mitigations its probable that increased predation could occur given known use of linear edges by predators.

Table 13-132 and **Table 13-133** provide summaries of the characterized predicted net effects for evening Grosbeak during the construction and operations phases.



Table 13-132: Summary Table of the Predicted Net Effects for Evening Grosbeak During the Construction Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Negative	Moderate	Project Footprint	All Time Periods	Permanent	Continuous	Moderate	Irreversible	Certain
Habitat Alteration/Degradation – Changes in Vegetation Structure	Negative	Negligible	LSA	All time periods	Long-term	Continuous	Resilient	Reversible	Possible
Habitat Alteration/Degradation – Sensory Disturbance	Negative	Low	LSA	All time periods	Short-term	Frequent	Resilient	Reversible	Probable
Alterations in Movement – Sensory Disturbance	Negative	Low	LSA	All time periods	Short-term	Infrequent	Resilient	Reversible	Probable
Alterations in Movement – Loss of Connectivity	Negative	Negligible	LSA	All time periods	Medium-term	Continuous	Resilient	Reversible	Possible
Injury/Death – Collisions with Vehicles	Negative	Low	LSA	All time periods	Short-term	Infrequent	Moderate	Reversible	Probable
Injury/Death – Incidental Take	Negative	Low	Project Footprint	Sensitive periods	Short-term	Infrequent	Resilient	Reversible	Probable
Injury/Death – Changes to Predator-Prey Dynamics	Negative	Low	LSA	All time periods	Long-term	Infrequent	Resilient	Reversible	Probable



Table 13-133: Summary Table of the Predicted Net Effects for Evening Grosbeak During the Operations Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Neutral	Negligible	Project Footprint	All time periods	Medium-term	Infrequent	Resilient	Reversible	Unlikely
Habitat Alteration/Degradation – Changes in Vegetation Structure	Negative	Low	LSA	All time periods	Long-term	Continuous	Resilient	Reversible	Possible
Habitat Alteration/Degradation – Sensory Disturbance	Negative	Low	LSA	All time periods	Medium-term	Frequent	Resilient	Reversible	Possible
Alterations in Movement – Sensory Disturbance	Negative	Negligible	LSA	All time periods	Medium-term	Infrequent	Resilient	Reversible	Possible
Alterations in Movement – Loss of Connectivity	Negative	Negligible	LSA	All time periods	Medium-term	Continuous	Resilient	Reversible	Possible
Injury/Death – Collisions with Vehicles	Negative	Low	LSA	All time periods	Medium-term	Infrequent	Moderate	Reversible	Probable
Injury/Death – Incidental Take	Negative	Negligible	Project Footprint	Sensitive periods	Medium-term	Infrequent	Resilient	Reversible	Probable
Injury/Death – Changes to Predator-Prey Dynamics	Negative	Moderate	LSA	All time periods	Long-term	Infrequent	Resilient	Reversible	Probable



13.5.2.5 Olive Sided Flycatcher

13.5.2.5.1 Habitat Loss

Olive-sided Flycatcher habitat loss and destruction is expected due to site preparation and construction activities as well as terrestrial vegetation changes during road construction and operations. There is a predicted net effect of habitat loss after implementation of mitigation measures.

Clearance Activities

Construction

In the eastern and Northern boreal Olive-sided Flycatcher is heavily associated with open wetland habitats including bogs and swamps with a high ratio of forest edges and wetlands (COSEWIC 2020). In general, the Olive-sided Flycatcher is strongly associated with openings and edges in coniferous forest habitats (BSI, 2024) and less common in Deciduous areas (COSEWIC, 2020).

Based on the of habitat modelling via Ecological Land Classification construction activities will result in the removal of 331.95 ha, representing approximately 2.07% of the most suitable Olive-sided Flycatcher habitat in the LSA. Overall, suitable Olive-sided Flycatcher habitat is extremely common throughout the study area with 64.58% of the LSA and 60.77% of the Full Study Area consisting of these vegetation communities.

Using the results of habitat modelling via Ecological Land Classification (refer to Section 11), and an understanding of the Project Footprint, estimate construction activities will result in the removal of 201.02 ha (2.02%) of Conifer Swamp communities, 44.85 ha (1.33%) of Fen Communities, 90.36 ha (1.07%) of Bog Communities, 6.88 ha (0.84%) of Riparian/Shore Communities, and 81.15 ha (4.29%) of Conifer Forest in the LSA, representing approximately 1.73% of the most suitable Olive-sided Flycatcher habitat in the LSA. Overall, suitable Olive-sided Flycatcher habitat is common throughout the study area with 64.58% of the LSA and 60.77% of the Full Study Area consisting of these vegetation communities. Given the wide availability of suitable habitat for Olive-Sided Flycatcher the effect of this loss is likely minimal.

Gradient boosted regression tree (BRT) modelling was done to estimate density for the Olive-sided Flycatcher. **Figure 13.13** shows the estimated density of Olive-sided Flycatcher within the RSA under current conditions for the Olive-sided Flycatcher. When the Project Footprint is overlaid it shows a loss of approximately 1.11% of high-use habitat in the LSA and a loss of 0.27% of high-use habitat in the RSA for Olive-sided Flycatcher due to road construction (**Table 13-134**).

Table 13-134: Olive-sided Flycatcher High-Density Habitat by Study Area

Species	LSA		RSA	
	Pre-construction (ha)	% Removed	Pre-construction (ha)	% Removed
Olive-sided Flycatcher	6285.66 ha	1.11%	26406.83 ha	0.27%

Overall, given the small amount of forested habitat removed, and the availability of wetland habitat the net effect on wetland bird's marginal. A summary of the net effects relating to the habitat loss during the operations phase based on the Characterization Criteria is presented in **Table 13-135**.



Table 13-135: Criteria Results for Destruction of Olive-Sided Flycatcher Habitat from Clearance Activities – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as destruction of Olive-Sided Flycatcher habitat is expected as a result of project construction.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as the effect will cause a measurable destruction of Olive-sided Flycatcher habitat, but small in relation to the available habitat in the area.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All Time Periods	Construction activities, including habitat removal, are expected to occur through the year.
Duration	Permanent	Any destruction of Olive-Sided Flycatcher habitat during construction is expected to be permanent as the roadbed will remain on the landscape for the foreseeable future.
Frequency	Continuous	Olive-Sided Flycatcher habitat once removed from the Project footprint will remain removed for the foreseeable future.
Context	Resilient	Effects are likely to habitat types that are common throughout the study area and throughout the larger region.
Reversibility	Irreversible	The roadbed is unlikely to be removed hence the effect should be thought of as irreversible.
Likelihood of Occurrence	Certain	The loss of habitat during construction is certain.

Operations

Destruction of Olive-Sided Flycatcher habitat is not expected as a result of roadway operations. Repairs to the roadway and crossing structures may be required over time, but these are not expected to result in destruction of Olive-Sided Flycatcher habitat as repairs should be contained within the existing footprint. A small chance exists that reclaimed temporary laydowns and clearings may be reused during operations. Continued use of the quarries is expected but the footprint of the quarry is not expected to be expanded with the potential removals of Olive-sided Flycatcher Habitat accounted for in the construction phase. Overall, the effect on Olive-Sided Flycatcher would be negligible. A summary of the net effects relating to the habitat loss during the operations phase based on the Characterization Criteria is presented in **Table 13-136**.

Table 13-136: Criteria Results for Destruction of Olive-Sided Flycatcher from Clearance Activities – Operations

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as no destruction of additional habitat is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect is not expected to occur during the operations phase.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.



Characterization Criteria	Result	Rationale
Timing	All time periods	Additional destruction of Olive-Sided Flycatcher habitat is not expected during operations.
Duration	Short-term	Any destruction of Olive-Sided Flycatcher habitat will be short-term, during repairs or maintenance.
Frequency	Infrequent	Additional destruction of Olive-Sided Flycatcher habitat during operations is not expected.
Context	Resilient	Effects are likely to affect habitats that are common throughout the study area and throughout the larger region. As such, these habitats should be resilient to disturbance.
Reversibility	Reversible	The net effect is reversible if the roadway was removed.
Likelihood of Occurrence	Unlikely	Additional net effects of the Project during operations are unlikely.

13.5.2.5.2 Habitat Alteration or Degradation

Hydrological Changes

Construction

It is probable hydrological changes may result in the alteration or degradation of Olive-Sided Flycatcher habitat during the construction phase. Peatlands, which make up the majority of vegetative communities within the project footprint are susceptible to changes in the flow of surface and subsurface water resulting from the bisection of these features by road construction. While road design will aim to maintain both surface and sub-surface hydrologic flows and will minimize but not eliminate the effects. Based on the Groundwater assessment (Section 8.5) these changes are expected to be low in magnitude but permanent. Also given the flexibility of Olive-Sided Flycatcher in its habitat selection, the effect of hydrology changes is likely only slight. After implementation of mitigation methods, a minor negative effect on Olive-Sided Flycatcher habitat will likely remain. A summary of the net effects relating to the changes in hydrology during the construction phase based on the Characterization Criteria is presented in **Table 13-137**.

Table 13-137: Criteria Results for Habitat Alteration or Degradation of Olive-sided Flycatcher Habitat Due to Hydrological Changes – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as some alteration of hydrology is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect could cause a measurable alteration of Olive-sided Flycatcher habitat, but the change is likely minimal.
Geographic Extent	LSA	The effect extends into the Local study area up to 250m.
Timing	All Time Periods	Alteration of hydrology could occur during any time period.
Duration	Permanent	Hydrological changes originating in the construction phase are likely to be permanent as the roadbed will remain even after the operations phase ends.



Characterization Criteria	Result	Rationale
Frequency	Continuous	Hydrological changes will be continuous.
Context	Resilient	Only a small fraction of Olive-sided Flycatcher breeding habitat is likely to be affected.
Reversibility	Irreversible	The roadbed is unlikely to be removed hence the effect should be thought of as irreversible.
Likelihood of Occurrence	Probable	The alteration of wetland habitat during construction is likely to occur but mitigations should limit any changes.

Operations

It is probable hydrological changes may result in the alteration or degradation of Olive-Sided Flycatcher habitat during the construction phase. Changes could occur due to culvert and drainage maintenance. These changes are likely to be more localized and temporary as culvert clearing and repairs would restore the existing hydrology and a responsive maintenance program, including reporting mechanisms would limit the area affected. After implementation of mitigation methods, it is not expected that hydrological alterations would impact on Olive-sided Flycatcher habitat to a measurable extent. A summary of the net effects relating to the changes in hydrology during the operations phase based on the Characterization Criteria is presented in **Table 13-138**.

Table 13-138: Criteria Results for Habitat Alteration or Degradation of Olive-sided Flycatcher Habitat Due to Hydrological Changes – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as some alteration of hydrology is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect is not expected to increase to an appreciable degree during the operations phase.
Geographic Extent	LSA	The effect will be limited primarily to the Project Footprint but may extend into the Local Study Area.
Timing	All time periods	Impacts on Olive-sided Flycatcher would occur during any point of the active season.
Duration	Short-term	Any destruction of Olive-sided Flycatcher habitat will be short-term, during repairs or maintenance where in-water work is required.
Frequency	Infrequent	Additional destruction of Olive-sided Flycatcher habitat during operations is not expected.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Hydrological changes should be restored once maintenance activities are concluded.
Likelihood of Occurrence	Possible	Additional hydrological impacts during operations are unlikely but have a small chance to occur if mitigations are ignored.



Sensory Disturbances

Construction

Effects of sensory disturbance on degradation or alteration of Olive-sided Flycatcher habitat is probable during the construction phase. Sensory disturbances resulting from road construction, including movement of equipment and vehicles, noise, lighting, and other human activities may degrade habitat for Olive-sided Flycatcher adjacent to the Project Footprint. Disturbance may be considerable during impulsive activities such as blasting or quarrying, or during activities such as hauling which may occur during all hours causing Olive-sided Flycatcher to avoid the ROW and supportive infrastructure. Mitigations will aim to confine disturbance both spatially and temporally using noise and light mitigation plans. Overall, it is possible there will be a net negative effect during the construction phase. A summary of the net effects relating to habitat alteration through sensory disturbance during the construction phase based on the Characterization Criteria is presented in **Table 13-139**.

Table 13-139: Criteria Results for Habitat Alteration or Degradation of Olive-sided Flycatcher Habitat Due to Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project construction activities.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could cause a measurable alteration of Olive-sided Flycatcher habitat, but the change is likely small.
Geographic Extent	LSA	The effect will be extended past the Project Footprint into the local study area approximately 125 m.
Timing	All time periods	Impacts on Olive-sided Flycatcher would occur during any point of the active season.
Duration	Short-term	Any alteration of Olive-sided Flycatcher habitat due to sensory impacts will be short-term, during the construction phase of the project.
Frequency	Frequent	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Olive-sided Flycatcher during construction.

Operations

Effects of sensory disturbance on degradation or alteration of Olive-sided Flycatcher habitat is possible during the operations phase. For operations most sensory impacts will be related to traffic noise which may degrade Olive-sided Flycatcher habitat causing avoidance of areas near roads or decreased habitat value. Light pollution impacts from the road during operations are considered non-existent as the road will not be lit except for existing lights around the community. While documented noise impacts of roads on Olive-sided Flycatcher are mixed, with some studies showing positive and others negative associations,



low traffic levels are likely to result in minimal impacts on Olive-sided Flycatcher as most studies documenting an impact usually have volumes in the tens of thousands (Smith et al. 2005). Overall, it is possible there will be a small net negative effect due to sensory disturbances during operations. The effect is expected to occur while the road is in use and can be considered reversible as it would stop following the operations phase of the project. A summary of the net effects relating to habitat alteration through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-140**.

Table 13-140: Criteria Results for Habitat Alteration or Degradation of Olive-sided Flycatcher Habitat Due to Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project construction activities.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as both positive and negative changes to habitat quality may occur.
Geographic Extent	LSA	The effect will be extended past the Project Footprint into the local study area approximately 125 m.
Timing	All time periods	Impacts on Olive-sided Flycatcher would occur during any point of the active season.
Duration	Medium-term	Any alteration of Olive-sided Flycatcher habitat due to sensory impacts will be medium-term, lasting the length of the operations phase.
Frequency	Frequent	Sensory disturbances will occur primarily during daytime when traffic occurs.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Sensory disturbance changes should be restored once use of the road concludes.
Likelihood of Occurrence	Possible	Sensory disturbances may affect some Olive-sided Flycatcher but responses to low levels of traffic are not conclusive, and some habituation may occur.

13.5.2.5.3 Alteration in Movement

Loss of Connectivity

Construction

Effects of changes to habitat connectivity on alteration in movement of Olive-sided Flycatcher is possible during the construction phase. However, vegetation removal and construction activities that could create gaps that affect habitat connectivity are not expected to result in significant changes to Olive-sided Flycatcher movement. Fragmentation likely has a low impact on Olive-sided Flycatcher as it commonly uses fragmented areas and gaps, including abrupt edges. Furthermore, at 35 m wide, the project ROW is smaller than the smallest gap size (50 m) found to limit crossings for some boreal birds. Additionally, the vegetation alterations within the ROW will contain early seral vegetation that Olive-sided Flycatcher will make use of. After implementation of mitigation methods, a negligible negative effect on Olive-sided Flycatcher movement will likely remain. A summary of the net effects relating to alteration of movement



through loss of connectivity during the construction phase based on the Characterization Criteria is presented in **Table 13-141**.

Table 13-141: Criteria Results for Alteration in Movement of Olive-sided Flycatcher Due to Loss of Connectivity – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as decreased connectivity may occur as a result of construction activities.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the barrier effect would be minimal for Olive-sided Flycatcher.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area.
Timing	All time periods	Changes in habitat connectivity that cause movement alterations would happen at any period during the Olive-sided Flycatcher active season.
Duration	Medium-term	Any alteration of Olive-sided Flycatcher movement will be medium-term, as the effect will continue into the operations phase of the project.
Frequency	Continuous	Changes in habitat connectivity are continuous.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and edge habitats have little effect on Olive-sided Flycatcher.
Reversibility	Reversible	Changes in connectivity should be end once the operation phase ends.
Likelihood of Occurrence	Possible	Changes in connectivity may affect some Olive-sided Flycatcher during construction.

Operations

Effects of changes to habitat connectivity on alteration in movement of Olive-sided Flycatcher is possible during the operations phase. Like the construction phase, decreased connectivity due to the road connectivity is not expected to result in meaningful changes to Olive-sided Flycatcher movement. Maintenance activities will maintain vegetation along the Row in an early seral state which are not considered a deterrence. A small reduction in crossings may occur due to intraspecific competition between Olive-sided Flycatcher along the edge however this is not expected to be of significant magnitude. After implementation of mitigation methods, a negligible negative effect on Olive-sided Flycatcher movement will likely remain. A summary of the net effects relating to alteration of movement through loss of connectivity during the construction phase based on the Characterization Criteria is presented in **Table 13-142**.

Table 13-142: Criteria Results for Alteration in Movement of Olive-sided Flycatcher Due to Loss of Connectivity – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as decreased connectivity may occur as a result of operation activities.



Characterization Criteria	Result	Rationale
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the barrier effect would be minimal for Olive-sided Flycatcher.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the edge of local study area.
Timing	All time periods	Changes in habitat connectivity that cause movement alterations would happen at any period during the Olive-sided Flycatcher active season.
Duration	Medium-term	Any alteration of Olive-sided Flycatcher movement will be medium-term, lasting the operational phase of the project.
Frequency	Continuous	Changes in habitat connectivity are continuous.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and edge habitats have little effect on Olive-sided Flycatcher.
Reversibility	Reversible	Changes in connectivity should be end once the operation phase ends.
Likelihood of Occurrence	Possible	Changes in connectivity may affect some Olive-sided Flycatcher during construction.

Sensory Disturbances

Construction

Effects of sensory disturbance on Olive-sided Flycatcher movement is probable during the construction phase. Olive-sided Flycatcher could alter their movement around the Project Footprint as they avoid disturbances like blasting, clearing, hauling and grading and other human actions during construction activities. Many of these disturbances will be abrupt and occur randomly and at different locations which could cause individual Olive-sided Flycatchers to abandon the area near the disturbance. Construction lighting could attract Olive-sided Flycatcher for foraging. Mitigation measures focused on sensory disturbance including timing, noise and light abatement are expected to mitigate most of the potential effects but there is a predicted net effect from road construction on Olive-sided Flycatcher movement. A summary of the net effects relating to alteration of movement through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-143**.

Table 13-143: Criteria Results for Alteration in Movement of Olive-sided Flycatcher Due to Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project operation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could potentially affect a few breeding pairs.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area.



Characterization Criteria	Result	Rationale
Timing	All time periods	Sensory disturbances that cause movement alterations would happen at any period during the Olive-sided Flycatcher active season.
Duration	Short-term	Any alteration of Olive-sided Flycatcher movement will be short-term, during the construction phase of the project.
Frequency	Infrequently	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Olive-sided Flycatcher during construction.

Operations

Effects of sensory disturbance on Olive-sided Flycatcher movement is probable during the operations phase. During operations traffic noise will be the primary sensory impact on Olive-sided Flycatcher. While not specific to Olive-sided Flycatcher, traffic noise has been found to lower abundance and promote avoidance in many in many bird species. Sensory disturbance been shown to affect bird distribution when noise exceeded 56 dB but the WSR noise study indicates only a small area may exceed these decibel limits (Appendix J – Noise and Vibration Impact Assessment Report). Olive-sided Flycatcher activity at road sites has also generally not been found to be negatively affected at low disturbance levels. It is possible that a few individual Olive-sided Flycatcher will experience a negative alteration in movement in the LSA. However, given the small area affected and few individuals affected, a negligible negative effect on Olive-sided Flycatcher movement will likely occur. A summary of the net effects relating to alteration of movement through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-144**.

Table 13-144: Criteria Results for Alteration in Movement of Olive-sided Flycatcher Due to Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be low, as the effect could potentially affect a few breeding pairs.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area.
Timing	All time periods	Sensory disturbances that cause movement alterations would happen at any period during the Olive-sided Flycatcher active season.
Duration	Medium-term	Any alteration of Olive-sided Flycatcher movement will be medium-term, during the operations phase of the project.
Frequency	Infrequent	Sensory disturbances will occur during periods of traffic and maintenance activities, location and intensity will vary temporally.



Characterization Criteria	Result	Rationale
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Possible	Sensory disturbances may affect some Olive-sided Flycatcher during operations during periods of higher volume traffic.

13.5.2.5.4 Injury or Death

Collisions with Vehicles

Construction

Injury and/or death from collisions with vehicles is possible during the construction phase for Olive-sided Flycatcher. Strictly enforcing mitigation measures during the construction phase is expected to keep the number of collisions between Lesser Yellowlegs and vehicles and equipment low and the magnitude low. Low numbers of vehicles will travel between camps and construction locations, collision risk will be minimized by effect enforcement of speed limits and wildlife training for personal. Within construction sites vehicles will be traveling at low speeds and environmental monitors will watch for any roosting or nesting birds and initiate mitigations if appropriate. Olive-sided Flycatcher generally makes short foraging flights from high perches that will make collisions with vehicles infrequent. After mitigations, a small net negative effect is possible due to vehicle traffic. A summary of the net effects relating to injury and death through collisions with vehicles during the construction phase based on the Characterization Criteria is presented in **Table 13-145**.

Table 13-145: Criteria Results for Injury or Death of Olive-sided Flycatcher Due to Collisions with Vehicles – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths due to collisions with construction vehicles may occur during the construction phase.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as only a few individuals may be affected.
Geographic Extent	LSA	The effect will extend to birds moving between the LSA on each side of the Project Footprint.
Timing	All time periods	Collisions could happen during any period during the Olive-sided Flycatcher active season.
Duration	Short-term	Collisions with construction vehicles will occur during the construction phase of the project.
Frequency	Infrequent	Strict enforcements will limit the number of collisions between construction vehicles and Olive-sided Flycatcher.
Context	Resilient	Olive-sided Flycatcher due to their flight pattern are not known to be particularly susceptible to collisions.
Reversibility	Reversible	Collisions will stop once construction activities are concluded.



Characterization Criteria	Result	Rationale
Likelihood of Occurrence	Possible	Even with mitigations its possible some collisions with Olive-sided Flycatcher may occur during construction.

Operations

Injury and/or death from collisions with vehicles is possible during the operations phase for Olive-sided Flycatcher. Mortality during the operational phase is not expected to be eliminated by mitigations but is expected to occur throughout the Olive-sided Flycatcher active season where the road crosses breeding and foraging habitats. While the low traffic levels will generally keep the number of collisions at low levels, collisions are still expected along low-volume forest roads like the WSR. Additionally, mitigations are likely not as effective during operations as the construction phase as enforcement will be more difficult. Overall, a net negative effect is probable due to vehicle traffic. A summary of the net effects relating to Injury and death through collisions during the operations phase based on the Characterization Criteria is presented in **Table 13-146**.

Table 13-146: Criteria Results for Injury or Death of Olive-sided Flycatcher Due to Collisions with Vehicles – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, deaths due to collisions may occur as a result of road operation.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as songbird collisions occur along low volume roads.
Geographic Extent	LSA	The effect will extend to birds moving between the LSA on each side of the Project Footprint.
Timing	All time periods	Collisions could happen during any period during the Olive-sided Flycatcher active season.
Duration	Medium-term	These collisions will occur through the lifetime of the operations phase of the project.
Frequency	Infrequent	Low volume and Olive-sided Flycatcher behavior will limit the number of collisions between vehicles and Olive-sided Flycatcher.
Context	Resilient	Olive-sided Flycatcher are not known to be particularly susceptible to collision due to flight behavior.
Reversibility	Reversible	Collisions will stop once operation activities are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its probable some collisions with Olive-sided Flycatcher will occur during operations phase as road users may ignore mitigations and operational duration.



Incidental Take

Construction

Injury and/or death from incidental take is possible during the construction phase for Olive-sided Flycatcher. Vegetation clearing in Olive-sided Flycatcher and Rusty Blackbird habitat during road construction, and/or movement of equipment/vehicles through vegetated areas, may result in injury or death to birds, hatchlings, and/or eggs if management of vegetation is carried out during the breeding season. Olive-sided Flycatcher nests are cryptic, high in trees and difficult to spot. Mitigation measures including timing windows will preclude the removal of vegetation within the breeding season in most situations, however when removal occurs within the breeding season mitigation measures such as nest sweeps will not eliminate incidental take. Overall, a net negative effect is probable if vegetation clearing occurs during the breeding season. A summary of the net effects relating to injury and death through incidental take during the construction phase based on the Characterization Criteria is presented in **Table 13-147**.

Table 13-147: Criteria Results for Injury or Death of Olive-sided Flycatcher Due to Incidental Take – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Olive-sided Flycatcher may occur as a result of incidental take.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	Sensitive periods	Incidental take would primarily occur during the Olive-sided Flycatcher breeding season.
Duration	Short-term	Incidental take from construction activities will stop at the end of the construction phase of the project.
Frequency	Infrequent	Timing mitigation will limit the number deaths due to clearance activities.
Context	Resilient	Mitigations will limit any impacts on Olive-sided Flycatcher populations.
Reversibility	Reversible	Incidental take would stop once construction activities are concluded.
Likelihood of Occurrence	Possible	Even with mitigations its possible some incidental take may occur during construction.

Operations

Injury and/or death from incidental take is possible during the operations phase for Olive-sided Flycatcher. The potential for incidental take would occur over the operating lifetime of the road as periodic clearing of the ROW may occur during operations as part of line-of-sight maintenance or infrastructure repairs. These activities would be confined to the Project Footprint. Though smaller in scale, if maintenance occurs during the breeding season mitigative measures could not completely avoid incidental take. The position of Olive-sided Flycatcher nests in mature trees limits the likelihood of incidental take as removal of large trees would not occur during most maintenance activities. A summary of the net effects relating to injury and death through incidental take during the operations phase based on the Characterization Criteria is presented in **Table 13-148**.



Table 13-148: Criteria Results for Injury or Death of Olive-sided Flycatcher Due to Incidental Take – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Olive-sided Flycatcher may occur as a result of incidental take.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible as Olive-sided Flycatcher nest locations will limit the number of affected individuals.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	Sensitive periods	Incidental take would primarily occur during the Olive-sided Flycatcher breeding season.
Duration	Medium-term	The potential for incidental take would occur over the operating lifetime of the road.
Frequency	Infrequent	Timing mitigations will limit the number deaths due to clearance activities.
Context	Resilient	While some individuals may be impacted mitigations will limit any impacts on Olive-sided Flycatcher populations.
Reversibility	Reversible	Incidental take would stop once road operations are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its possible some incidental take may occur during operations given the extended lifetime of the road.

Changes to Predator-Prey Dynamics

Construction

Injury and/or death from changes to predator-prey dynamics is possible during the construction phase for Olive-sided Flycatcher. Use of linear features and edge habitats by predators of Olive-sided Flycatcher will increase predation as these species have been document to use forest edges like a road ROW to increase their predation success. Mitigations involving reclamation/blockage of any temporarily disturbed areas and access roads will reduce open areas and linear features; however, the effects of increased predation will not be completely eliminated. It is expected predation will extend somewhat into the LSA, as predators may use the roads to access new areas. Parasitism is not expected due to the non-presence of Brown-headed Cowbird. With mitigations is probable there will be a low magnitude, negative effect on Olive-sided Flycatcher from increased predation. A summary of the net effects relating to injury and death through changes to predator-prey dynamics during the construction phase based on the Characterization Criteria is presented in **Table 13-149**.

Table 13-149: Criteria Results for Injury or Death of Olive-sided Flycatcher Due to Changes to Predator-Prey Dynamics – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Olive-sided Flycatcher may occur because of increased predation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.



Characterization Criteria	Result	Rationale
Geographic Extent	LSA	The effect will extend into the Local Study Area.
Timing	All time periods	Predation would occur throughout the Olive-sided Flycatcher active season.
Duration	Long-term	The effect that originated as part of construction would last past the operational lifetime of road.
Frequency	Infrequent	Predation events are likely to be low in frequency due to the cryptic nature of the Olive-sided Flycatcher and few individuals will be using areas near the road.
Context	Resilient	Predation events due to increased access are likely to be low in frequency due to the cryptic nature of the Olive-sided Flycatcher nests.
Reversibility	Reversible	The effect of increased predation would end once the linear features have regenerated sufficiently.
Likelihood of Occurrence	Probable	Even with mitigations its probable that increased predation could occur given known use of linear edges by predators.

Operations

Injury and/or death from changes to predator-prey dynamics is probable during the operations phase for Olive-sided Flycatcher. Maintenance clearing during operations will maintain openness along the ROW which will allow predators increased access to wetland habitat associated with Olive-sided Flycatcher. Songbird predators are known to have increased success along edges. Mitigations during the operations phase will consist of only removing when essential, however the open nature of the ROW is required for safe operations of the road. It is probable there will be a moderate magnitude, negative effect on Olive-sided Flycatcher survival in the LSA due to increased predation. A summary of the net effects relating to injury and death through changes to predator-prey dynamics during the operations phase based on the Characterization Criteria is presented in **Table 13-150**.

Table 13-150: Criteria Results for Injury or Death of Olive-sided Flycatcher Due to Changes to Predator-Prey Dynamics – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Olive-sided Flycatcher may occur as a result of increased predation.
Magnitude	Low	The magnitude of the effect is predicted to be moderate, as songbird predators are known to have increased success along edges.
Geographic Extent	LSA	The effect will extend into the Local Study Area.
Timing	All time periods	Predation would occur throughout the Olive-sided Flycatcher active season.
Duration	Long-term	Effects from operational activities would last past the operational lifetime of road.
Frequency	Infrequent	Predation events are likely to be low in frequency due to the cryptic nature of the Olive-sided Flycatcher and few individuals will be using areas near the road.



Characterization Criteria	Result	Rationale
Context	Resilient	Mitigations including restoration will limit any impacts on Olive-sided Flycatcher populations.
Reversibility	Reversible	The effect of increased predation would end once the linear features have regenerated sufficiently.
Likelihood of Occurrence	Probable	Even with mitigations its probable that increased predation could occur given known use of linear edges by predators.

Table 13-151 and **Table 13-152** provide summaries of the characterized predicted net effects for Olive-sided Flycatcher during the construction and operations phases.



Table 13-151: Summary Table of the Predicted Net Effects for Olive-Sided Flycatcher During the Construction Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Negative	Low	Project Footprint	All Time Periods	Permanent	Continuous	Resilient	Irreversible	Certain
Habitat Alteration or Degradation – Hydrological Changes	Negative	Negligible	LSA	All Time Periods	Permanent	Continuous	Resilient	Irreversible	Probable
Habitat Alteration or Degradation – Sensory Disturbance	Negative	Low	LSA	All time periods	Short-term	Frequent	Resilient	Reversible	Probable
Alterations in Movement – Sensory Disturbance	Negative	Low	LSA	All time periods	Short-term	Infrequent	Resilient	Reversible	Probable
Alterations in Movement – Loss Connectivity	Negative	Negligible	Project Footprint	All time periods	Medium-term	Frequently	Resilient	Reversible	Possible
Injury or Death – Collisions with Vehicles	Negative	Negligible	LSA	All time periods	Short-term	Infrequent	Resilient	Reversible	Possible
Injury or Death – Incidental Take	Negative	Low	Project Footprint	Sensitive periods	Short-term	Infrequent	Resilient	Reversible	Possible
Injury or Death – Changes to Predator-Prey Dynamics	Negative	Low	LSA	All time periods	Long-term	Infrequent	Resilient	Reversible	Probable



Table 13-152: Summary Table of the Predicted Net Effects for Olive-sided Flycatcher During the Operations Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Neutral	Negligible	Project Footprint	All time periods	Short-term	Infrequent	Resilient	Reversible	Unlikely
Habitat Alteration or Degradation – Hydrological Changes	Negative	Negligible	LSA	All time periods	Short-term	Infrequent	Resilient	Reversible	Possible
Habitat Alteration or Degradation – Sensory Disturbance	Negative	Negligible	LSA	All time periods	Medium-term	Frequent	Resilient	Reversible	Possible
Alterations in Movement – Sensory Disturbance	Negative	Negligible	LSA	All time periods	Medium-term	Infrequent	Resilient	Reversible	Possible
Alterations in Movement – Loss Connectivity	Negative	Negligible	Project Footprint	All time periods	Medium-term	Frequent	Resilient	Reversible	Possible
Injury or Death – Collisions with Vehicles	Negative	Moderate	LSA	All time periods	Medium-term	Infrequent	Resilient	Reversible	Probable
Injury or Death – Incidental Take	Negative	Negligible	Project Footprint	Sensitive periods	Medium-term	Infrequent	Resilient	Reversible	Probable
Injury or Death – Changes to Predator-Prey Dynamics	Negative	Moderate	LSA	All time periods	Long-term	Infrequent	Resilient	Reversible	Probable



13.5.2.6 Rusty Blackbird

13.5.2.6.1 Habitat Loss

Clearance Activities

Construction

Destruction of Rusty Blackbird habitat by clearance activities is certain as a result of construction activities. Rusty Blackbird habitat loss and destruction is expected due to site preparation and construction activities as well as terrestrial vegetation changes during road construction and operations. There is a predicted net effect of habitat loss after implementation of mitigation measures. In the boreal Rusty Blackbird is associated with open wetlands like sedge meadows, beaver ponds, muskegs, swamps, and riparian habitats near the edges of islands, lakes, rivers and streams, (COSEWIC 2017). For foraging habitat Rusty Blackbird requires shallow water habitats less than 6 cm deep (COSEWIC, 2017).

Based on the results of habitat modelling via Ecological Land Classification (refer to Section 11), construction activities will remove 342.72 ha, representing approximately 1.54 % of the most suitable Rusty Blackbird habitat in the LSA. At the RSA level 379.96 ha of habitat will be removed, or 0.37% of suitable habitat. Overall, suitable Rusty Blackbird habitat is extremely common throughout the study area with 89.97% of the LSA and 86.8 % of the Full Study Area consisting of these vegetation communities. Overall shallow wetlands habitats are extremely common across the RSA. Given the small amount of wetland habitat removed, and the high availability of wetland habitat, the net effect of clearance activities on Rusty Blackbird is predicted to be minimal. A summary of the net effects relating to the habitat loss during the construction phase based on the Characterization Criteria is presented in **Table 13-153**.

Table 13-153: Criteria Results for Destruction of Rusty Blackbird Habitat from Clearance Activities – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as destruction of Rusty Blackbird habitat is expected as a result of project construction.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect will cause a measurable destruction of Rusty Blackbird habitat, but very small in relation to the available habitat in the area.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All Time Periods	Construction activities, including habitat removal, are expected to occur through the year.
Duration	Permanent	Any destruction of Rusty Blackbird habitat during construction is expected to permanent as the roadbed will remain on the landscape for the foreseeable future.
Frequency	Continuous	Rusty Blackbird habitat once removed from the Project footprint will remain removed for the forceable future.
Context	Resilient	Effects are likely to habitat types that are common throughout the study area and throughout the larger region.
Reversibility	Irreversible	The roadbed is unlikely to be removed hence the effect should be thought of as irreversible.
Likelihood of Occurrence	Certain	The loss of habitat during construction is certain.

Operations

Destruction of Rusty Blackbird habitat is not expected as a result of roadway operations. During the operations phase work including repairs to the roadway and crossing structures should be contained within the existing footprint avoiding any new destruction of Rusty Blackbird habitat. A small chance exist that reclaimed temporary laydowns and clearings may be reused during operations but restoration of these areas would occur after any usage. Continued use of the quarries is expected but the footprint of the quarry is not expected to be expanded with the potential removals of Rusty Blackbird Habitat accounted for in the construction phase. Overall, the effect on Rusty Blackbird would be negligible. A summary of the net effects relating to the habitat loss during the operations phase based on the Characterization Criteria is presented in **Table 13-154**.

Table 13-154: Criteria Results for Destruction of Rusty Blackbird from Clearance Activities – Operations

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as no destruction of additional habitat is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect is not expected to occur during the operations phase.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All time periods	Additional destruction of Rusty Blackbird habitat is not expected during operations.
Duration	Short-term	Any destruction of Rusty Blackbird habitat will be short-term, during repairs or maintenance with restoration occurring.
Frequency	Infrequent	Additional destruction of Rusty Blackbird habitat during operations is not expected.
Context	Resilient	Effects are likely to affect habitats that are common throughout the study area and throughout the larger region. As such, these habitats should be resilient to disturbance.
Reversibility	Reversible	The net effect is reversible if the roadway was removed.
Likelihood of Occurrence	Unlikely	Additional net effects of the Project during operations are unlikely.

13.5.2.6.2 Habitat Alteration or Degradation

Hydrological Changes

Construction

It is probable hydrological changes may result in the alteration or degradation of Rusty Blackbird habitat during the construction phase. Peatlands, which make up the majority of vegetative communities within the project footprint are susceptible to changes in the flow of surface and subsurface water resulting from the bisection of these features by road construction. For Rusty Blackbird small changes in water levels due to changes in wetland drainage patterns could alter feeding habitats and habitat use. While road design will aim to maintain both surface and sub-surface hydrologic flows and will minimize but not eliminate the effects. Based on the Groundwater assessment (Section 8.5) these changes are expected to be low in magnitude but permanent. After implementation of mitigation methods, a minor negative



effect on Rusty Blackbird habitat will likely remain. A summary of the net effects relating to the changes in hydrology during the construction phase based on the Characterization Criteria is presented in **Table 13-155**.

Table 13-155: Criteria Results for Habitat Alteration or Degradation of Rusty Blackbird Habitat Due to Hydrological Changes – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as some alteration of hydrology is expected as a result of project operation.
Magnitude	Low	The magnitude of the effect is predicted to be Low, as the effect could cause a measurable alteration of Rusty Blackbird habitat, but the change is likely small.
Geographic Extent	LSA	The effect extends into the Local Study Area up to 250m.
Timing	All Time Periods	Alteration of hydrology could occur during any time period.
Duration	Permanent	Hydrological changes originating in the construction phase are likely to be permanent as the roadbed will remain even after the operations phase ends.
Frequency	Continuous	Hydrological changes will be continuous.
Context	Resilient	Only a small fraction of Rusty Blackbird breeding habitat is likely to be affected.
Reversibility	Irreversible	The roadbed is unlikely to be removed hence the effect should be thought of as irreversible.
Likelihood of Occurrence	Probable	The alteration of wetland habitat during construction is likely to occur but mitigations should limit any changes.

Operations

It is possible hydrological changes may result in the alteration or degradation of Rusty Blackbird habitat during the operations phase. Short-term changes could occur due to culvert blockages and other drainage issues. These changes are likely to be more localized and reversible as culvert clearing and repairs would restore the existing hydrology. A responsive maintenance program, including reporting mechanism for road users would limit the area affected and frequency of occurrences. After implementation of mitigation methods, it is not expected that hydrological alterations would impact on Rusty Blackbird habitat to a measurable extent. A summary of the net effects relating to the changes in hydrology during the operations phase based on the Characterization Criteria is presented in **Table 13-156**.



Table 13-156: Criteria Results for Habitat Alteration or Degradation of Rusty Blackbird Habitat Due to Hydrological Changes – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as some alteration of hydrology is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect is not expected to increase to an appreciable degree during the operations phase.
Geographic Extent	LSA	The effect will be limited primarily to the Project Footprint but may extend into the Local Study Area.
Timing	All time periods	Impacts on Rusty Blackbird would occur during any point of the active season.
Duration	Short-term	Any destruction of Rusty Blackbird habitat will be short-term, during repairs or maintenance where in-water work is required.
Frequency	Infrequent	Additional destruction of Rusty Blackbird habitat during operations is not expected.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Hydrological changes should be restored once maintenance activities are concluded.
Likelihood of Occurrence	Possible	Additional hydrological impacts during operations are unlikely but have a small chance to occur if mitigations are ignored.

Sensory Disturbances

Construction

Effects of sensory disturbance on degradation or alteration of Rusty Blackbird habitat is probable during the construction phase. Sensory disturbances resulting from road construction, including movement of equipment and vehicles, noise, lighting, and other human activities may degrade habitat for Rusty Blackbird adjacent to the Project Footprint as they are known to avoid changes in their environment. Noise disturbance may be considerable during impulsive activities such as blasting or quarrying. Impulsive noise has shown to be effective at reducing blackbird use of areas such as airports and agricultural fields, similar responses around active construction sites may be expected, however these activities will only occur in a few places. Mitigations will aim to confine disturbance both spatially and temporally using noise and light mitigation plans. Overall, it is possible there will be a net low magnitude negative effect during the construction phase. A summary of the net effects relating to habitat alteration through sensory disturbance during the construction phase based on the Characterization Criteria is presented in **Table 13-157**.



Table 13-157: Criteria Results for Habitat Alteration or Degradation of Rusty Blackbird Habitat Due to Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project construction activities.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could cause a measurable alteration of Rusty Blackbird habitat, but the change is likely small.
Geographic Extent	LSA	The effect will be extended past the Project Footprint into the local study area approximately 125 m.
Timing	All time periods	Impacts on Rusty Blackbird would occur during any point of the active season.
Duration	Short-term	Any alteration of Rusty Blackbird habitat due to sensory impacts will be short-term, during the construction phase of the project.
Frequency	Frequent	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Moderate	Rusty Blackbird shows some avoidance of roads and any changes in its environment.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Rusty Blackbird during construction.

Operations

Effects of sensory disturbance on degradation or alteration of Rusty Blackbird habitat is possible during the operations phase. For operations most sensory impacts will be related to traffic noise which may degrade Rusty Blackbird habitat causing avoidance of areas near roads or decreased habitat value. Light pollution impacts from the road during operations are considered non-existent as the road will not be lit except for existing lights around the community. While documented noise impacts of roads on Rusty Blackbird are mixed, with some studies showing positive and others negative associations, low traffic levels are likely to result in minimal impacts on Rusty Blackbird as most studies documenting an impact usually have volumes in the tens of thousands (Smith et al. 2005) although the Keeyask study in Northern Manitoba found reduced abundance along minor roads (WRCS, 2024). Overall, it is possible there will be a moderate magnitude negative effect due to sensory disturbances during operations. The effect is expected to occur while the road is in use and can be considered reversible as it would stop following the operations phase of the project. A summary of the net effects relating to habitat alteration through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-158**.



Table 13-158: Criteria Results for Habitat Alteration or Degradation of Rusty Blackbird Habitat Due to Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project construction activities.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as the effect could cause a measurable alteration of Rusty Blackbird habitat, due to evidence of road avoidance.
Geographic Extent	LSA	The effect will be extended past the Project Footprint into the local study area approximately 125 m.
Timing	All time periods	Impacts on Rusty Blackbird would occur during any point of the active season.
Duration	Medium-term	Any alteration of Rusty Blackbird habitat due to sensory impacts will be medium-term, lasting the length of the operations phase.
Frequency	Frequent	Sensory disturbances will occur primarily during daytime when traffic occurs.
Context	Moderate	Rusty Blackbird shows some avoidance of roads and any changes in its environment.
Reversibility	Reversible	Sensory disturbance changes should be restored once use of the road concludes.
Likelihood of Occurrence	Possible	Sensory disturbances may affect some Rusty Blackbird but responses to low levels of traffic are not conclusive, and some habituation may occur.

13.5.2.6.3 Alteration in Movement

Loss of Connectivity

Construction

Effects of changes to habitat connectivity on alteration in movement of Rusty Blackbird is possible during the construction phase. However, vegetation removal and construction activities that could create gaps that affect habitat connectivity are not expected to result in significant changes to Rusty Blackbird movement. At 35 m wide, the project ROW is smaller than the smallest gap size (50 m) found to limit crossings for some boreal birds. Additionally, fragmentation likely has a low impact on Rusty Blackbird as it commonly edges around beaver ponds riparian edges and other wetlands. Furthermore, the vegetation alterations within the ROW will contain early seral vegetation that Rusty Blackbird may make use of for nesting like regenerating conifers. After implementation of mitigation methods, a negligible negative effect on Rusty Blackbird movement will likely remain. A summary of the net effects relating to alteration of movement through loss of connectivity during the construction phase based on the Characterization Criteria is presented in **Table 13-159**.



Table 13-159: Criteria Results for Alteration in Movement of Rusty Blackbird Due to Loss of Connectivity – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as decreased connectivity may occur as a result of construction activities.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the barrier effect would be small for Rusty Blackbird.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area.
Timing	All time periods	Changes in habitat connectivity that cause movement alterations would happen at any period during the Rusty Blackbird active season.
Duration	Medium-term	Any alteration of Rusty Blackbird movement will be medium-term, as the effect will continue into the operations phase of the project.
Frequency	Continuous	Changes in habitat connectivity are continuous.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and edge habitats have little effect on Rusty Blackbird.
Reversibility	Reversible	Changes in connectivity should be end once the operation phase ends.
Likelihood of Occurrence	Possible	Changes in connectivity may affect some Rusty Blackbird during construction.

Operations

Effects of changes to habitat connectivity on alteration in movement of Rusty Blackbird is possible during the operations phase. Like the construction phase, decreased connectivity due to the road connectivity is not expected to result in meaningful changes to Rusty Blackbird movement. While some bird species treat high traffic roads as a barrier, given the predicted maximum vehicles travelling on the proposed road is 500 per day, with the majority of travel anticipated to take place during daylight hours, any barrier effect is likely to be minimal as there will be long periods of time with little to no traffic. Maintenance activities will maintain vegetation along the Row in an early seral state which are not considered a deterrence as Rusty Blackbird use small conifers as nesting sites and the gap width is relatively small at ~35 m. After implementation of mitigation methods, a negligible negative effect on Rusty Blackbird movement will likely remain. A summary of the net effects relating to alteration of movement through loss of connectivity during the construction phase based on the Characterization Criteria is presented in **Table 13-160**.

Table 13-160: Criteria Results for Alteration in Movement of Rusty Blackbird Due to Loss of Connectivity – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as decreased connectivity may occur as a result of operation activities.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the barrier effect would be minimal for Rusty Blackbird.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the edge of local study area.



Characterization Criteria	Result	Rationale
Timing	All time periods	Changes in habitat connectivity that cause movement alterations would happen at any period during the Rusty Blackbird active season.
Duration	Medium-term	Any alteration of Rusty Blackbird movement will be medium-term, lasting the operational phase of the project.
Frequency	Continuous	Changes in habitat connectivity are continuous.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and edge habitats have little effect on Rusty Blackbird.
Reversibility	Reversible	Changes in connectivity should be end once the operation phase ends.
Likelihood of Occurrence	Possible	Changes in connectivity may affect some Rusty Blackbird during construction.

Sensory Disturbances

Construction

Effects of sensory disturbance on Rusty Blackbird movement is probable during the construction phase. Rusty Blackbird could alter their movement around the Project Footprint as they avoid disturbances like blasting, clearing, hauling and grading and other human actions during construction activities. Many of these disturbances will be abrupt and occur randomly and at different locations which could cause individual Rusty Blackbirds to abandon the area near the disturbance. Rusty Blackbirds are neophobic and may move out of areas when construction starts. Mitigation measures focused on sensory disturbance including timing, noise and light abatement are expected to mitigate most of the potential effects but there is a predicted net effect from road construction on Rusty Blackbird movement. A summary of the net effects relating to alteration of movement through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-161**.

Table 13-161: Criteria Results for Alteration in Movement of Rusty Blackbird Due to Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project operation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could potentially affect a few breeding pairs.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area.
Timing	All time periods	Sensory disturbances that cause movement alterations would happen at any period during the Rusty Blackbird active season.
Duration	Short-term	Any alteration of Rusty Blackbird movement will be short-term, during the construction phase of the project.
Frequency	Infrequently	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Moderate	Rusty Blackbird shows some avoidance of roads and any changes in its environment.



Characterization Criteria	Result	Rationale
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Rusty Blackbird during construction.

Operations

Effects of sensory disturbance on Rusty Blackbird movement is probable during the operations phase. During operations traffic noise will be the primary sensory impact on Rusty Blackbird. While not specific to Rusty Blackbird, traffic noise has been found to lower abundance and promote avoidance in many in many bird species. Sensory disturbance been shown to affect bird distribution when noise exceeded 56 dB, but the WSR noise study indicates only a small area may exceed these decibel limits (Appendix J – Noise and Vibration Impact Assessment Report). However, Rusty Blackbird were found to be less common along low use access roads in Northern Manitoba that would have a similar level of use. Overall, it is possible there will be a small net negative effect due to sensory disturbances during operations. A summary of the net effects relating to alteration of movement through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-162**.

Table 13-162: Criteria Results for Alteration in Movement of Rusty Blackbird Due to Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project operation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could potentially affect a few breeding pairs.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area.
Timing	All time periods	Sensory disturbances that cause movement alterations would happen at any period during the Rusty Blackbird active season.
Duration	Medium-term	Any alteration of Rusty Blackbird movement will be medium-term, during the operations phase of the project.
Frequency	Infrequent	Sensory disturbances will occur during periods of traffic and maintenance activities; location and intensity will vary temporally.
Context	Moderate	Rusty Blackbird shows some avoidance of roads and any changes in its environment.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Possible	Sensory disturbances may affect some Rusty Blackbird during operations during periods of higher volume traffic.



13.5.2.6.4 Injury or Death

Collisions with Vehicles

Construction

Injury and/or death from collisions is possible during the construction phase for Rusty Blackbird. Low numbers of vehicles will travel between camps and construction locations; collision risk will be minimized by effect enforcement of speed limits and wildlife training for personal. Strictly enforcing mitigation measures during the construction phase is expected to keep the number of collisions between Rusty Blackbird and vehicles and equipment low and the magnitude low. Within construction sites vehicles will be traveling at low speeds and environmental monitors will watch for any roosting or nesting birds and initiate mitigations if appropriate. Rusty Blackbird due to their perching in low vegetation a ground foraging may be vulnerable to some collisions occurring where suitable habitat is crossed by the Project Footprint. After mitigations, a small net negative effect is possible due to vehicle traffic. A summary of the net effects relating to injury and death through collisions during the construction phase based on the Characterization Criteria is presented in **Table 13-163**.

Table 13-163: Criteria Results for Injury or Death of Rusty Blackbird Due to Collisions with Vehicles – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths due to collisions with construction vehicles may occur during the construction phase.
Magnitude	Low	The magnitude of the effect is predicted to be moderate, as only a few individuals may be affected.
Geographic Extent	LSA	The effect will extend to birds moving between the LSA on each side of the Project Footprint.
Timing	All time periods	Collisions could happen during any period during the Rusty Blackbird active season.
Duration	Short-term	Collisions with construction vehicles will occur during the construction phase of the project.
Frequency	Infrequent	Strict enforcements will limit the number of collisions between construction vehicles and Rusty Blackbird.
Context	Resilient	Collisions are not known to be a major threat for Rusty Blackbirds.
Reversibility	Reversible	Collisions will stop once construction activities are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its probable some collisions with Rusty Blackbird may occur during construction.

Operations

Injury and/or death from collisions is possible during the operations phase for Rusty Blackbird. Mortality during the operational phase is not expected to be eliminated by mitigations but is expected to occur throughout the Rusty Blackbird active season where the road crosses breeding and foraging habitats. The low elevation perching and ground foraging habits of Rusty Blackbirds may make them more susceptible to vehicle collisions. While the low traffic levels will generally keep the number of collisions at low levels, collisions are still expected along low-volume forest roads like the WSR. Additionally, mitigations are likely not as effective during operations as the construction phase as enforcement will be



more difficult. Overall, a net negative effect is probable due to vehicle traffic. A summary of the net effects relating to Injury and death through collisions during the operations phase based on the Characterization Criteria is presented in **Table 13-164**.

Table 13-164: Criteria Results for Injury or Death of Rusty Blackbird Due to Collisions with Vehicles – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, deaths due to collisions may occur as a result of road operation.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as songbird collisions occur along low volume roads.
Geographic Extent	LSA	The effect will extend to birds moving between the LSA on each side of the Project Footprint.
Timing	All time periods	Collisions could happen during any period during the Rusty Blackbird active season.
Duration	Medium-term	These collisions will occur through the lifetime of the operations phase of the project.
Frequency	Infrequent	Low volume and Rusty Blackbird behavior will limit the number of collisions between vehicles and Rusty Blackbird.
Context	Resilient	Rusty Blackbird forage and perch near ground which may make them susceptible, but road avoidance may limit collisions.
Reversibility	Reversible	Collisions will stop once operation activities are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its probable some collisions with Rusty Blackbird will occur during operations phase as road users may ignore mitigations and the operational duration.

Incidental Take

Construction

Injury and/or death from incidental take is possible during the construction phase for Rusty Blackbird. Vegetation clearing in Rusty Blackbird and Rusty Blackbird habitat during road construction, and/or movement of equipment/vehicles through vegetated areas, may result in injury or death to birds, hatchlings, and/or eggs if management of vegetation is carried out during the breeding season. Rusty Blackbird nests are in dense small conifers and well hidden. Mitigation measures including timing windows will preclude the removal of vegetation within the breeding season in most situations, however when removal occurs within the breeding season mitigation measures such as nest sweeps will not eliminate incidental take. Overall, a net negative effect is probable if vegetation clearing occurs during the breeding season. A summary of the net effects relating to injury and death through incidental take during the construction phase based on the Characterization Criteria is presented in **Table 13-165**.



Table 13-165: Criteria Results for Injury or Death of Rusty Blackbird Due to Incidental Take – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Rusty Blackbird may occur as a result of incidental take.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	Sensitive periods	Incidental take would primarily occur during the Rusty Blackbird breeding season.
Duration	Short-term	Incidental take from construction activities will stop at the end of the construction phase of the project.
Frequency	Infrequent	Timing mitigation will limit the number deaths due to clearance activities.
Context	Resilient	While some individuals may be impacted mitigations will limit any impacts on Rusty Blackbird populations.
Reversibility	Reversible	Incidental take would stop once construction activities are concluded.
Likelihood of Occurrence	Possible	Even with mitigations its possible some incidental take may occur during construction.

Operations

Injury and/or death from incidental take is possible during the operations phase for Rusty Blackbird. The potential for incidental take would occur over the operating lifetime of the road as periodic clearing of the ROW may occur during operations as part of line-of-sight maintenance or infrastructure repairs. Though smaller in scale, if maintenance occurs during the breeding season mitigative measures could not completely avoid incidental take. These activities would be confined to the Project Footprint. Rusty Blackbird prefers to nest in small dense clumps of conifers which would likely be present within the ROW or if any temporary areas or laydowns are reopened during operations. Overall, for Rusty Blackbird a net negative effect is probable if vegetation clearing during the operations phase occurs during the breeding season. A summary of the net effects relating to injury and death through incidental take during the operations phase based on the Characterization Criteria is presented in **Table 13-166**.

Table 13-166: Criteria Results for Injury or Death of Rusty Blackbird Due to Incidental Take – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Rusty Blackbird may occur as a result of incidental take.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals. And avoidance of the road by Rusty Blackbird may limit the number of individuals affected.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	Sensitive periods	Incidental take would primarily occur during the Rusty Blackbird breeding season.

Characterization Criteria	Result	Rationale
Duration	Medium-term	The potential for incidental take would occur over the operating lifetime of the road.
Frequency	Infrequent	Timing mitigations will limit the number deaths due to clearance activities.
Context	Moderate	Rusty Blackbird may use young conifers along ROW which could be targeted for maintenance.
Reversibility	Reversible	Incidental take would stop once road operations are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its possible some incidental take may occur during operations given the extended lifetime of the road.

Changes to Predator-Prey Dynamics

Construction

Injury and/or death from predation is possible during the construction phase for Rusty Blackbird. Use of linear features and edge habitats by predators of Rusty Blackbird will increase predation as these species have been document to use forest edges like a road ROW to increase their predation success. Mitigations involving reclamation/blockage of any temporarily disturbed areas and access roads will reduce open areas and linear features; however, the effects of increased predation will not be eliminated. Decreased nest success has been found in Rusty Blackbirds in the boreal in areas of high fragmentation and predation is the main cause of nest loss. It is expected predation will extend somewhat into the LSA, as predators may use the roads to access new areas. Parasitism is not expected due to the non-presence of Brown-headed Cowbird. With mitigations is probable there will be a low magnitude, negative effect on Rusty Blackbird from increased predation. A summary of the net effects relating to injury and death through increased predation during the construction phase based on the Characterization Criteria is presented in **Table 13-167**.

Table 13-167: Criteria Results for Injury or Death of Rusty Blackbird Due to Changes to Predator-Prey Dynamics – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Rusty Blackbird may occur because of increased predation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	LSA	The effect will extend into the Local Study Area.
Timing	All time periods	Predation would occur throughout the Rusty Blackbird active season.
Duration	Long-term	The effect that originated as part of construction would last past the operational lifetime of road.
Frequency	Infrequent	Predation events are likely to be low in frequency due to the cryptic nature of the Rusty Blackbird and few individuals will be using areas near the road.
Context	Resilient	Mitigations will limit any impacts on Rusty Blackbird populations.



Characterization Criteria	Result	Rationale
Reversibility	Reversible	The effect of increased predation would end once the linear features have regenerated sufficiently.
Likelihood of Occurrence	Probable	Even with mitigations its probable that increased predation could occur given known use of linear edges by predators.

Operations

Injury and/or death from predation is probable during the operations phase for Rusty Blackbird. Mortality during the operational phase is not expected to be eliminated by mitigations but is expected to occur throughout the Rusty Blackbird active season where the road crosses breeding and foraging habitats. Maintenance clearing will consist of only removing vegetation when essential, however the open nature of the ROW is required for safe operations of the road which will allow predators increased access to wetland and forested habitat associated with Rusty Blackbird. It is probable there will be a low magnitude, negative effect on Rusty Blackbird survival in the LSA due to increased predation. A summary of the net effects relating to injury and death through increased predation during the operations phase based on the Characterization Criteria is presented in **Table 13-168**.

Table 13-168: Criteria Results for Injury or Death of Rusty Blackbird Due to Changes to Predator-Prey Dynamics – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Rusty Blackbird may occur as a result of increased predation.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as songbird predators are known to have increased success along edges.
Geographic Extent	LSA	The effect will extend into the Local Study Area.
Timing	All time periods	Predation would occur throughout the Rusty Blackbird active season.
Duration	Long-term	Effects from operational activities would last past the operational lifetime of road.
Frequency	Infrequent	Predation events are likely to be low in frequency due to the hidden nature of Rusty Blackbird nests and few individuals will be using areas near the road.
Context	Resilient	Mitigations including restoration will limit any impacts on Rusty Blackbird populations.
Reversibility	Reversible	The effect of increased predation would end once the linear features have regenerated sufficiently.
Likelihood of Occurrence	Probable	Even with mitigations its probable that increased predation could occur given known use of linear edges by predators.

Table 13-169 and **Table 13-170** provide summaries of the characterized predicted net effects for Rusty Blackbird during the construction and operations phases.



Table 13-169: Summary Table of the Predicted Net Effects for Rusty Blackbird During the Construction Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Negative	Low	Project Footprint	All Time Periods	Permanent	Continuous	Resilient	Irreversible	Certain
Habitat Alteration/ Degradation – Hydrological Changes	Negative	Low	LSA	All Time Periods	Permanent	Continuous	Resilient	Irreversible	Probable
Habitat Alteration/ Degradation – Sensory Disturbance	Negative	Low	LSA	All time periods	Short-term	Frequent	Moderate	Reversible	Probable
Alterations in Movement – Sensory Disturbance	Negative	Low	LSA	All time periods	Short-term	Infrequent	Moderate	Reversible	Probable
Alterations in Movement – Loss of Connectivity	Negative	Negligible	Project Footprint	All time periods	Medium-term	Frequently	Resilient	Reversible	Possible
Injury/Death – Collisions with Vehicles	Negative	Low	LSA	All time periods	Short-term	Infrequent	Resilient	Reversible	Possible
Injury/Death – Incidental Take	Negative	Low	Project Footprint	Sensitive periods	Short-term	Infrequent	Resilient	Reversible	Possible
Injury/Death – Changes to Predator-Prey Dynamics	Negative	Low	LSA	All time periods	Long-term	Infrequent	Resilient	Reversible	Probable



Table 13-170: Summary Table of the Predicted Net Effects for Rusty Blackbird During the Operations Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Neutral	Negligible	Project Footprint	All time periods	Short-term	Infrequent	Resilient	Reversible	Unlikely
Habitat Alteration/ Degradation – Hydrological Changes	Negative	Negligible	LSA	All time periods	Short-term	Infrequent	Resilient	Reversible	Possible
Habitat Alteration/ Degradation – Sensory Disturbance	Negative	Low	LSA	All time periods	Medium-term	Frequent	Moderate	Reversible	Possible
Alterations in Movement – Sensory Disturbance	Negative	Low	LSA	All time periods	Medium-term	Infrequent	Moderate	Reversible	Possible
Alterations in Movement – Loss of Connectivity	Negative	Negligible	LSA	All time periods	Medium-term	Frequent	Resilient	Reversible	Possible
Injury/Death – Collisions with Vehicles	Negative	Moderate	LSA	All time periods	Medium-term	Infrequent	Resilient	Reversible	Probable
Injury/Death – Incidental Take	Negative	Low	Project Footprint	Sensitive periods	Medium-term	Infrequent	Moderate	Reversible	Probable
Injury/Death – Changes to Predator-Prey Dynamics	Negative	Moderate	LSA	All time periods	Long-term	Infrequent	Resilient	Reversible	Probable



13.5.2.7 Lesser Yellowlegs

13.5.2.7.1 Habitat Loss

Clearance Activities

Construction

Lesser Yellowlegs habitat loss and destruction are expected due to site preparation and construction activities as well as terrestrial vegetation maintenance during road operations. There is a predicted net effect of habitat loss after implementation of mitigation measures. During the construction phase, vegetation will be removed from the project footprint which will result in the permanent loss of Lesser Yellowlegs habitat. Progressive reclamation will restore vegetation in some areas including temporary camps, laydowns and access roads reducing the net effect of vegetation removal.

Based on the of habitat modelling via Ecological Land Classification construction activities will result in the removal of 85.49 ha, representing approximately 1.71% of the most suitable Lesser Yellowlegs habitat in the LSA. At the RSA level this represents 0.29% of suitable habitat. Overall, suitable Lesser Yellowlegs habitat is somewhat common throughout the study area with 18% of the LSA and 22.2% of the Full Study Area consisting of these vegetation communities. Based on COSEWIC assessment Report (2020) at 0.113 territories per ha we could However, the number of affected breeding pairs is likely much lower based on field results and density modeling done by the Boreal Avian Modeling Project (BAM, 2024) which estimates density at 0.0016 adult males per hectare within the LSA and RSA.

Overall, it is expected that there will be a small negative net effect in the Project Footprint from habitat loss and the likelihood is certain. A summary of the net effects relating to the habitat loss during the construction phase based on the Characterization Criteria is presented in **Table 13-171**.

Table 13-171: Criteria Results for Destruction of Lesser Yellowlegs Habitat Due to Clearance Activities – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as destruction of Lesser Yellowlegs habitat is expected as a result of project construction.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect will cause a measurable destruction of Lesser Yellowlegs habitat, but very small in relation to the available habitat in the area.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All Time Periods	Construction activities, including habitat removal, are expected to occur through the year.
Duration	Permanent	Any destruction of Lesser Yellowlegs habitat during construction is expected to permanent as the roadbed will remain on the landscape for the foreseeable future.
Frequency	Continuous	Lesser Yellowlegs habitat once removed from the Project footprint will remain removed for the forceable future.
Context	Resilient	Effects are likely to habitat types that are common throughout the study area and throughout the larger region.



Characterization Criteria	Result	Rationale
Reversibility	Irreversible	The roadbed is unlikely to be removed hence the effect should be thought of as irreversible.
Likelihood of Occurrence	Certain	The loss of habitat during construction is certain.

Operations

Destruction of Lesser Yellowlegs habitat is not expected as a result of roadway operations. Repairs to the roadway and crossing structures may be required over time, but these are not expected to result in destruction of Lesser Yellowlegs habitat as repairs should be contained within the existing footprint. A small chance exist that reclaimed temporary laydowns and clearings may be reused during operations, but these should undergo restoration. Continued use of the quarries is expected but the footprint of the quarry is not expected to be expanded, and the footprint area of the quarries do not contain preferred Lesser Yellowlegs habitats. Overall, the effect on Lesser Yellowlegs would be negligible. A summary of the net effects relating to the habitat loss during the operations phase based on the Characterization Criteria is presented in **Table 13-172**.

Table 13-172: Criteria Results for Destruction of Lesser Yellowlegs Habitat Due to Clearance Activities – Operations

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as no destruction of additional habitat is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect is not expected to occur during the operations phase.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All time periods	Additional destruction of Lesser Yellowlegs habitat is not expected during operations.
Duration	Short-term	Any destruction of Lesser Yellowlegs habitat will be short-term, during repairs or maintenance.
Frequency	Infrequent	Additional destruction of Lesser Yellowlegs habitat during operations is not expected.
Context	Resilient	Effects are likely to affect habitats that are common throughout the study area and throughout the larger region. As such, these habitats should be resilient to disturbance.
Reversibility	Irreversible	The roadbed is unlikely to be removed hence the effect should be thought of as irreversible.
Likelihood of Occurrence	Unlikely	Additional net effects of the Project during operations are unlikely.



13.5.2.7.2 Habitat Alteration or Degradation

Changes in Vegetation Structure

Construction

It is anticipated that restoration of laydown areas and access roads will reverse some of the habitat alteration or degradation caused by road construction, but most areas will remain free of tall vegetation. Microhabitat features may experience edge effects if they occur adjacent to the ROW which could affect Lesser Yellowlegs. However, the edge effect on Lesser Yellowlegs is expected to be relatively low due to the more open and lower vegetation structure of its preferred wetland communities compared to forested habitats which experience large changes due to edge effects and its ability to use disturbed habitats. Overall, it is possible there will be a small net negative effect. A summary of the net effects relating to habitat alteration by changes in vegetation structure during the construction phase based on the Characterization Criteria is presented in **Table 13-173**.

Table 13-173: Criteria Results for Habitat Alteration or Degradation of Lesser Yellowlegs Habitat Due To Changes in Vegetation Structure – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, increased edge effects are expected as a result of vegetation clearing.
Magnitude	Low	The magnitude of the effect is predicted to be low, as Lesser Yellowlegs habitat structure will be minimally affected.
Geographic Extent	LSA	The edge effect will extend into the LSA adjacent to the Project Footprint.
Timing	All time periods	The changes in vegetation structure will occur during all time periods.
Duration	Medium-term	The changes in vegetation structure will be present as long as the road remains active.
Frequency	Continuous	The changes in vegetation structure will be present continuously once vegetation removal occurs.
Context	Resilient	Impact will be low as the vegetation changes will be minimal and Lesser Yellowlegs can use disturbed habitats.
Reversibility	Reversible	The effect is reversible once the roadway is removed.
Likelihood of Occurrence	Possible	Even with mitigations its possible the changes in vegetation structure may affect some individual Lesser Yellowlegs during construction activities.

Operations

As stated in the previous section, it is anticipated that restoration of laydown areas and access roads will reverse some of the habitat alteration or degradation caused by road construction; however, maintenance of vegetation during road operations will create periodic disturbances and sustain edge effects along the ROW. While mitigations will keep vegetation removals to a minimum, removals for line-of-sight and other safety concerns will maintain the edge in many locations. Overall, it is possible there will be a net-negative effect during the operations phase. A summary of the net effects relating to habitat alteration



by changes in vegetation structure during the construction phase based on the Characterization Criteria is presented in **Table 13-174**.

Table 13-174: Criteria Results for Habitat Alteration or Degradation of Lesser Yellowlegs Habitat Due To Changes in Vegetation Structure – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, increased edge effects are expected as a result of vegetation clearing.
Magnitude	Low	The magnitude of the effect is predicted to be low, as Lesser Yellowlegs habitat structure will be minimally affected.
Geographic Extent	LSA	The edge effect will extend into the LSA adjacent to the Project Footprint.
Timing	All time periods	The changes in vegetation structure will occur during all time periods.
Duration	Medium-term	The changes in vegetation structure will be present as long as the road remains active.
Frequency	Continuous	The changes in vegetation structure will be present continuously as long as maintenance activities occur.
Context	Resilient	Impact will be low as the vegetation changes will be minimal and Lesser Yellowlegs can use disturbed habitats.
Reversibility	Reversible	The effect is reversible one the roadway is removed.
Likelihood of Occurrence	Possible	Even with mitigations its possible the edge effect may affect some individual Lesser Yellowlegs during operational activities.

Hydrological Changes

Construction

It is expected that changes in hydrology will alter Lesser Yellowlegs habitat as it is widely accepted that roads can alter the hydrologic function and characteristics of the landscapes they traverse. Overall, it is probable there will be a net negative effect in the LSA. Based on the Groundwater assessment (Section 8.5) these changes are expected to be low in magnitude but permanent. Road design will aim to maintain both surface and sub-surface hydrologic flows Also, given the flexibility of Lesser Yellowlegs in its habitat selection, the effect of hydrology changes is likely only slight (COSEWIC, 2020). After implementation of mitigation methods, a minor negative effect on Lesser Yellowlegs habitat will likely remain. A summary of the net effects relating to the changes in hydrology during the construction phase based on the Characterization Criteria is presented in **Table 13-175**.



Table 13-175: Criteria Results for Habitat Alteration or Degradation of Lesser Yellowlegs Habitat Due to Hydrological Changes – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as some alteration of hydrology is expected as a result of project operation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could cause a measurable alteration of Lesser Yellowlegs habitat, but the change is likely small.
Geographic Extent	LSA	The effect extends into the Local study area up to 250m.
Timing	All Time Periods	Alteration of hydrology could occur during any time period
Duration	Permanent	Hydrological changes originating in the construction phase are likely to be permanent as the roadbed will remain even after the operations phase ends.
Frequency	Continuous	Hydrological changes will be continuous.
Context	Resilient	Only a small fraction of Lesser Yellowlegs breeding and foraging habitat is likely to be affected.
Reversibility	Irreversible	The roadbed is unlikely to be removed hence the effect should be thought of as irreversible.
Likelihood of Occurrence	Probable	The alteration of wetland habitat during construction is likely to occur but mitigations should limit any changes.

Operations

Changes to hydrology could also occur during the operations phase due to culvert and drainage maintenance. Hydrological changes are likely to be more localized and temporary as culvert clearing and repairs would restore the existing hydrology and a responsive maintenance program, including reporting mechanisms would limit the area affected. While some Lesser Yellowlegs habitat may be altered the effect is expected to be negligible. A summary of the net effects relating to the changes in hydrology during the operations phase based on the Characterization Criteria is presented in **Table 13-176**.

Table 13-176: Criteria Results for Habitat Alteration or Degradation of Lesser Yellowlegs Habitat Due to Hydrological Changes – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as some alteration of hydrology is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect is not expected to increase during the operations phase.
Geographic Extent	LSA	The effect will be limited primarily to the Project Footprint but may extend into the Local Study Area.
Timing	All time periods	Impacts on Common Nighthawk would occur during any point of the active season.
Duration	Short-term	Any destruction of Common Nighthawk habitat will be short-term, during repairs or maintenance where in-water work is required.



Characterization Criteria	Result	Rationale
Frequency	Infrequent	Additional destruction of Common Nighthawk habitat during operations is not expected.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Hydrological changes should be restored once maintenance activities are concluded.
Likelihood of Occurrence	Possible	Additional hydrological impacts during operations are unlikely but have a small chance to occur if mitigations are ignored.

Sensory Disturbances

Construction

The net effect of increased sensory disturbance during construction is expected to be minor. Sensory disturbances resulting from road construction, including movement of equipment and vehicles, noise, lighting, and other human activities may degrade habitat for Lesser Yellowlegs adjacent to the Project Footprint. Disturbance may be considerable during impulsive activities such as blasting or quarrying, or during activities such as hauling which may occur during all hours causing wetland birds to avoid the ROW and supportive infrastructure. Mitigations will aim to confine disturbance both spatially and temporally using noise and light mitigation plans. The effect is expected to be short-term and reversible within the LSA as it would stop following the construction phase of the project. A summary of the net effects relating to habitat alteration through sensory disturbance during the construction phase based on the Characterization Criteria is presented in **Table 13-177**.

Table 13-177: Criteria Results for Habitat Alteration or Degradation of Lesser Yellowlegs Habitat Due to Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project construction activities.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could cause a measurable alteration of Lesser Yellowlegs habitat, but the change is likely small.
Geographic Extent	LSA	The effect will be extended past the Project Footprint into the local study area approximately 125 m.
Timing	All time periods	Impacts on Lesser Yellowlegs would occur during any point of the active season.
Duration	Short-term	Any alteration of Lesser Yellowlegs habitat due to sensory impacts will be short-term, during the construction phase of the project.
Frequency	Frequent	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.



Characterization Criteria	Result	Rationale
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Lesser Yellowlegs during construction.

Operations

The net effect of increased sensory disturbance during operations is expected to be minimal. For operations most sensory impacts will be related to traffic noise which may degrade Lesser Yellowlegs habitat causing avoidance of areas near roads or decreased habitat value. However, low traffic levels are likely to result in minimal impacts on Lesser Yellowlegs, for example no avoidance of the road by birds was found at the Ekati mine road with ~200 vehicles a day, whereas studies detailing an impact usually have volumes in the tens of thousands (Smith et al. 2005). Overall, it is possible there will be a small net negative effect due to sensory disturbances during operations. The effect is expected to occur while the road is in use and can be considered reversible as it would stop following the operations phase of the project. A summary of the net effects relating to habitat alteration through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-178**.

Table 13-178: Criteria Results for Habitat Alteration or Degradation of Lesser Yellowlegs Habitat Due to Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project construction activities.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as both positive and negative changes to habitat quality may occur.
Geographic Extent	LSA	The effect will be extended past the Project Footprint into the local study area approximately 125 m
Timing	All time periods	Impacts on Lesser Yellowlegs would occur during any point of the active season.
Duration	Medium-term	Any alteration of Lesser Yellowlegs habitat due to sensory impacts will be medium-term, lasting the length of the operations phase.
Frequency	Frequent	Sensory disturbances will occur primarily during daytime when traffic occurs.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Sensory disturbance changes should be restored once use of the road concludes.
Likelihood of Occurrence	Possible	Sensory disturbances may affect some Lesser Yellowlegs but responses to low levels of traffic are not conclusive and some habituation may occur.



13.5.2.7.3 Alteration in Movement

Sensory Disturbances

Construction

Lesser Yellowlegs movement may be altered by sensory disturbances associated with Project construction and operations. Lesser Yellowlegs may shift away from active construction areas during construction activities such as blasting, clearing, hauling and grading altering patterns of movement within and around the project footprint. Loud sudden noises could also cause Lesser Yellowlegs to abandon an area temporarily. Mitigation measures focused on sensory disturbance including timing, noise and light abatement are expected to mitigate most of the potential effects but there is a predicted net effect from road construction on Lesser Yellowlegs movement. A summary of the net effects relating to alteration of movement through sensory disturbance during the construction phase based on the Characterization Criteria is presented in **Table 13-179**.

Table 13-179: Criteria Results for Alteration in Movement of Lesser Yellowlegs Due to Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project operation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could potentially affect a few breeding pairs.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area.
Timing	All time periods	Sensory disturbances that cause movement alterations would happen at any period during the Lesser Yellowlegs active season.
Duration	Short-term	Any alteration of Lesser Yellowlegs movement will be short-term, during the construction phase of the project.
Frequency	Infrequently	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Lesser Yellowlegs during construction.

Operations

During operations noise will be the primary sensory impact on Lesser Yellowlegs. While not specific to Lesser Yellowlegs, traffic noise has been found to lower abundance and promote avoidance in many in many bird species. The direct effect of sensory disturbance on Lesser Yellowlegs during operations is likely to be low as changes in shorebird distribution are related to high traffic when noise exceeded 56 dB. The WSR road is predicted to have only 500 vehicles a day, and the noise study indicates only a small area may exceed these decibel limits (Appendix J – Noise and Vibration Impact Assessment Report). While traffic levels are expected to be low, it is possible that a few individual Lesser Yellowlegs will experience a negative alteration in movement in the LSA. However, given the small area affected and few individuals affected, a negligible negative effect on Lesser Yellowlegs movement will likely occur. A summary of the net effects relating to alteration of movement through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-180**.

Table 13-180: Criteria Results for Alteration in Movement of Lesser Yellowlegs Due to Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be low, as the effect could potentially affect a few breeding pairs.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area.
Timing	All time periods	Sensory disturbances that cause movement alterations would happen at any period during the Lesser Yellowlegs active season.
Duration	Medium-term	Any alteration of Lesser Yellowlegs movement will be medium-term, during the operations phase of the project.
Frequency	Infrequent	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Possible	Sensory disturbances may affect some Lesser Yellowlegs during operations during periods of higher volume traffic.



Connectivity

Construction

Vegetation removal and construction activities that could create gaps that affect habitat connectivity are not expected to result in significant changes to Lesser Yellowlegs movement. Bird species that have shown reluctance to cross gaps like those created by roads are generally forest species where the road creates a distinctive edge between the road and preferred habitats, with larger gaps acting as a greater barrier. Lesser Yellowlegs prefer more open habitats where the road would present as less of a barrier. Furthermore, at 35 m wide, the project ROW is smaller than the smallest gap size (50 m) found to limit crossings for some boreal birds.

Additionally, Lesser Yellowlegs are known to use disturbed areas, including anthropogenic disturbances. Given their habitat plasticity, most vegetation alterations around the road ROW are not likely to result in loss of connectivity as these areas will continue to be used. After implementation of mitigation methods, a negligible negative effect on Lesser Yellowlegs movement will likely remain. A summary of the net effects relating to alteration of movement through loss of connectivity during the construction phase based on the Characterization Criteria is presented in **Table 13-181**.

Table 13-181: Criteria Results for Alteration in Movement of Lesser Yellowlegs Due to Changes in Connectivity – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as decreased connectivity may occur as a result of construction activities.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the barrier effect would be minimal for Lesser Yellowlegs.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area.
Timing	All time periods	Changes in habitat connectivity that cause movement alterations would happen at any period during the Lesser Yellowlegs active season.
Duration	Medium-term	Any alteration of Lesser Yellowlegs movement will be medium-term, as the effect will continue into the operations phase of the project.
Frequency	Continuous	Changes in habitat connectivity are continuous.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Changes in connectivity should end once the operation phase ends.
Likelihood of Occurrence	Possible	Changes in connectivity may affect some Lesser Yellowlegs during construction.



Operations

Connectivity is not expected to be affected for Lesser Yellowlegs during road operations. The structural similarity between the ROW and preferred Lesser Yellowlegs habitat will be unlikely to be treated as a barrier and no studies have shown that shorebirds are reluctant to cross gaps. While some bird species treat high traffic roads as a barrier, given the predicted maximum vehicles travelling on the proposed road is 500 per day, with the majority of travel anticipated to take place during daylight hours, any barrier effect is likely to be minimal as there will be long periods of time with little to no traffic. After implementation of mitigation methods, a negligible negative effect on Lesser Yellowlegs movement will likely remain. A summary of the net effects relating to alteration of movement through loss of connectivity during the construction phase based on the Characterization Criteria is presented in **Table 13-182**.

Table 13-182: Criteria Results for Alteration in Movement of Lesser Yellowlegs Due to Changes in Connectivity – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as decreased connectivity may occur as a result of operation activities.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the barrier effect would be minimal for Lesser Yellowlegs.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the edge of local study area.
Timing	All time periods	Changes in habitat connectivity that cause movement alterations would happen at any period during the Lesser Yellowlegs active season.
Duration	Medium-term	Any alteration of Lesser Yellowlegs movement will be medium-term, lasting the operational phase of the project.
Frequency	Continuous	Changes in habitat connectivity are continuous.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Changes in connectivity should be end once the operation phase ends.
Likelihood of Occurrence	Possible	Changes in connectivity may affect some Lesser Yellowlegs during construction.

13.5.2.7.4 Injury or Death

Collisions

Construction

Strictly enforcing mitigation measures during the construction phase is expected to keep the number of collisions between Lesser Yellowlegs and vehicles and equipment low and the magnitude low. Within construction sites vehicles will be traveling at low speeds and environmental monitors will watch for any roosting or nesting birds and initiate mitigations if appropriate. Low numbers of vehicles will travel between camps and construction locations, collision risk will be minimized by effect enforcement of speed limits and wildlife training for personal. Even after mitigations, a net negative effect is possible due to



vehicle traffic. A summary of the net effects relating to Injury and death through collisions during the construction phase based on the Characterization Criteria is presented in **Table 13-183**.

Table 13-183: Criteria Results for Injury or Death of Lesser Yellowlegs Due to Collisions – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths due to collisions with construction vehicles may occur during the construction phase.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as only a few individuals may be affected.
Geographic Extent	LSA	The effect will extend to birds moving between the LSA on each side of the Project Footprint.
Timing	All time periods	Collisions could happen during any period during the Lesser Yellowlegs active season.
Duration	Short-term	Collisions with construction vehicles will occur during the construction phase of the project.
Frequency	Infrequent	Strict enforcements will limit the number of collisions between construction vehicles and Lesser Yellowlegs.
Context	Resilient	Lesser Yellowlegs are not known to be particularly susceptible to collisions.
Reversibility	Reversible	Collisions will stop once construction activities are concluded.
Likelihood of Occurrence	Possible	Even with mitigations its possible some collisions with Lesser Yellowlegs may occur during construction.

Operations

Mortality during the operational phase is not expected to be eliminated by mitigations but is expected to occur throughout the shorebird active season where the road crosses breeding and foraging habitats. As stated earlier shorebirds comprise a relatively small number of avian casualties attributed to collisions with vehicles in Canada, but are likely under reported and the effect on Lesser Yellowlegs populations is unknown. Given the predicted maximum vehicles travelling on the proposed road is 500 per day, with the majority of travel anticipated to take place during daylight hours, the number of collisions is likely to be low, but not zero. Additionally, mitigations are likely not as effective during operations as the construction phase as enforcement will be more difficult. Overall, a net negative effect is probable due to vehicle traffic. A summary of the net effects relating to Injury and death through collisions during the operations phase based on the Characterization Criteria is presented in **Table 13-184**.

Table 13-184: Criteria Results for Injury or Death of Lesser Yellowlegs Due to Collisions – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, deaths due to collisions may occur as a result of road operation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could potentially affect only a few individuals.



Characterization Criteria	Result	Rationale
Geographic Extent	LSA	The effect will extend to birds moving between the LSA on each side of the Project Footprint.
Timing	All time periods	Collisions could happen during any period during the Lesser Yellowlegs active season.
Duration	Medium-term	These collisions will occur through the lifetime of the operations phase of the project.
Frequency	Infrequent	Low volume and minimal night travel will limit the number of collisions between vehicles and Lesser Yellowlegs.
Context	Resilient	Lesser Yellowlegs are not known to be particularly susceptible to collision.
Reversibility	Reversible	Collisions will stop once operation activities are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its probable some collisions with Lesser Yellowlegs will occur during operations phase as road users may ignore mitigations.

Incidental Take

Construction

Vegetation clearing in Lesser Yellowlegs habitat during road construction may result in injury or death to birds, hatchlings, and/or eggs if management of vegetation is carried out during the breeding season. The characteristics of Lesser Yellowlegs nests can make them difficult to detect. Additionally, behavior of adults and young including staying on their nest when approached by humans and remain still increase the potential for incidental take. Mitigation measures including timing windows will preclude the removal of vegetation within the breeding season in most situations. In situations where removal of vegetation is required within the breeding season, mitigation measures will reduce but not eliminate incidental take. Overall, a net negative effect is possible if vegetation clearing occurs during the breeding season. A summary of the net effects relating to injury and death through incidental take during the construction phase based on the Characterization Criteria is presented in **Table 13-185**.

Table 13-185: Criteria Results for Injury or Death of Lesser Yellowlegs Due to Incidental Take – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Lesser Yellowlegs may occur as a result of incidental take.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	Sensitive periods	Incidental take would primarily occur during the Lesser Yellowlegs breeding season.
Duration	Short-term	Incidental take from construction activities will stop at the end of the construction phase of the project.



Characterization Criteria	Result	Rationale
Frequency	Infrequent	Timing mitigation will limit the number deaths due to clearance activities.
Context	Resilient	Mitigations will limit any impacts on Lesser Yellowlegs populations.
Reversibility	Reversible	Incidental take would stop once construction activities are concluded.
Likelihood of Occurrence	Possible	Even with mitigations its possible some incidental take may occur during construction.

Operations

Injury or death of Lesser Yellowlegs is possible during operations if maintenance is scheduled to occur work in Lesser Yellowlegs habitat during the breeding season. Though smaller in scale compared to construction activities, periodic clearing of the ROW and other repairs may occur during operations as part of required road maintenance. These activities would be confined to the project footprint. While timing windows will be followed for most maintenance activities, some work may be required inside of the breeding season. While mitigations will reduce the effect, incidental take is probable if maintenance work during the breeding season. A summary of the net effects relating to injury and death through incidental take during the operations phase based on the Characterization Criteria is presented in **Table 13-186**.

Table 13-186: Criteria Results for Injury or Death of Lesser Yellowlegs Due to Incidental Take – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Lesser Yellowlegs may occur as a result of incidental take.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	Sensitive periods	Incidental take would primarily occur during the Lesser Yellowlegs breeding season.
Duration	Medium-term	The potential for incidental take would occur over the operating lifetime of the road.
Frequency	Infrequent	Timing mitigations will limit the number deaths due to clearance activities.
Context	Resilient	While some individuals may be impacted mitigations will limit any impacts on Lesser Yellowlegs populations.
Reversibility	Reversible	Incidental take would stop once road operations are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its probable some incidental take may occur during operations given the extended lifetime of the road.



Predation

Construction

Effects on Lesser Yellowlegs survival from improved predator access and success rates is possible during the construction phase. Ground nesting shorebirds, like Lesser Yellowlegs are particularly vulnerable to mammal predators like red fox and coyote which are known to spread via human infrastructure like roads. Increased openness could also increase avian predator success. Parasitism is not expected due to the non-presence of Brown-headed Cowbird. Mitigation involving reclamation/blockage of any temporarily disturbed areas and access roads will reduce the effect as these actions will reduce open areas and linear features; however, the effects of increased predation cannot be completely eliminated. With mitigations is probable there will be a low magnitude, negative effect on Lesser Yellowlegs from increased predation. A summary of the net effects relating to injury and death through increased predation during the construction phase based on the Characterization Criteria is presented in **Table 13-187**.

Table 13-187: Criteria Results for Injury or Death of Lesser Yellowlegs Due to Predation – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Lesser Yellowlegs may occur because of increased predation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	LSA	The effect will extend into the Local Study Area.
Timing	All time periods	Predation would occur throughout the Lesser Yellowlegs active season.
Duration	Long-term	The effect that originated as part of construction would last past the operational lifetime of road.
Frequency	Infrequent	Predation events are likely to be low in frequency due to the cryptic nature of the Lesser Yellowlegs and few individuals will be using areas near the road.
Context	Resilient	Mitigations will limit any impacts on Lesser Yellowlegs populations.
Reversibility	Reversible	The effect of increased predation would end once the linear features have regenerated sufficiently.
Likelihood of Occurrence	Probable	Even with mitigations its probable that increased predation could occur given known use of linear edges by predators.

Operations

Effects on Lesser Yellowlegs survival from improved predator access and success rates is also probable during the operations phase. Maintenance clearing during operations will maintain openness along the ROW which will allow predators increased access to wetland areas near the road exposing ground nesters, like Lesser Yellowlegs, to increased predation. Little mitigation is possible during the operations phase as the open nature of the ROW is required for safe operations. It is probable there will be a low magnitude, negative effect on Lesser Yellowlegs survival in the LSA due to increased predation. A



summary of the net effects relating to injury and death through increased predation during the operations phase based on the Characterization Criteria is presented in **Table 13-188**.

Table 13-188: Criteria Results for Injury or Death of Lesser Yellowlegs Due to Predation – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Lesser Yellowlegs may occur as a result of increased predation.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as shorebird predators are known to have increased success along edges.
Geographic Extent	LSA	The effect will extend into the Local Study Area.
Timing	All time periods	Predation would occur throughout the Lesser Yellowlegs active season.
Duration	Long-term	Effects from operational activities would last past the operational lifetime of road.
Frequency	Infrequent	Predation events are likely to be low in frequency due to the cryptic nature of the Lesser Yellowlegs and few individuals will be using areas near the road.
Context	Resilient	Mitigations including restoration will limit any impacts on Lesser Yellowlegs populations.
Reversibility	Reversible	The effect of increased predation would end once the linear features have regenerated sufficiently.
Likelihood of Occurrence	Probable	Even with mitigations its probable that increased predation could occur given known use of linear edges by predators.

Table 13-189 and **Table 13-190** provide summaries of the characterized predicted net effects for Lesser Yellowlegs during the construction and operations phases.



Table 13-189: Summary Table of the Predicted Net Effects for Lesser Yellowlegs During the Construction Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Destruction from construction activities	Negative	Low	Project Footprint	All Time Periods	Permanent	Continuous	Resilient	Irreversible	Certain
Habitat Alteration/ Degradation – Changes in Vegetation Structure	Negative	Low	LSA	All time periods	Medium-term	Continuous	Resilient	Reversible	Possible
Habitat Alteration/ Degradation – Hydrological Changes	Negative	Low	LSA	All Time Periods	Permanent	Continuous	Resilient	Irreversible	Probable
Habitat Alteration/ Degradation – Sensory Disturbance	Negative	Low	LSA	All time periods	Short-term	Frequent	Resilient	Reversible	Probable
Alterations in Movement – Sensory Disturbance	Negative	Low	LSA	All time periods	Short-term	Infrequently	Resilient	Reversible	Probable
Alterations in Movement – Loss of Connectivity	Negative	Negligible	Project Footprint	All time periods	Medium-term	Frequently	Resilient	Reversible	Possible
Injury/Death – Collisions with Vehicles	Negative	Negligible	Project Footprint	All time periods	Short-term	Infrequent	Resilient	Reversible	Possible
Injury/Death – Incidental Take	Negative	Low	Project Footprint	Sensitive periods	Short-term	Infrequent	Resilient	Reversible	Possible
Injury/Death – Changes to Predator-Prey Dynamics	Negative	Low	LSA	All time periods	Long-term	Infrequent	Resilient	Reversible	Probable



Table 13-190: Summary Table of the Predicted Net Effects for Lesser Yellowlegs During the Operations Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Destruction during construction activities	Neutral	Negligible	Project Footprint	All time periods	Short-term	Infrequent	Resilient	Reversible	Unlikely
Habitat Alteration/ Degradation – Changes in Vegetation Structure	Negative	Low	LSA	All time periods	Medium-term	Continuous	Resilient	Reversible	Possible
Habitat Alteration/ Degradation – Hydrological Changes	Negative	Negligible	LSA	All time periods	Short-term	Infrequent	Resilient	Reversible	Possible
Habitat Alteration/ Degradation – Sensory Disturbance	Negative	Negligible	LSA	All time periods	Medium-term	Frequent	Resilient	Reversible	Possible
Alterations in Movement – Sensory Disturbance	Negative	Low	LSA	All time periods	Medium-term	Infrequent	Resilient	Reversible	Possible
Alterations in Movement – Loss of Connectivity	Negative	Negligible	Project Footprint	All time periods	Medium-term	Frequent	Resilient	Reversible	Possible
Injury/Death – Collisions with Vehicles	Negative	Low	Project Footprint	All time periods	Medium-term	Infrequent	Resilient	Reversible	Probable
Injury/Death – Incidental Take	Negative	Low	Project Footprint	Sensitive periods	Medium-term	Infrequent	Resilient	Reversible	Probable
Injury/Death – Changes to Predator-Prey Dynamics	Negative	Moderate	LSA	All time periods	Long-term	Infrequent	Resilient	Reversible	Probable



13.5.2.8 Common Nighthawk

13.5.2.8.1 Habitat Loss

Common Nighthawk habitat loss and destruction are expected due to site preparation and construction activities as well as terrestrial vegetation changes during road construction and operations. There is a predicted net effect of habitat loss after implementation of mitigation measures.

Clearance Activities

Construction

Destruction of Common Nighthawk habitat by clearance activities is certain as a result of construction activities. Based on the results of habitat modelling via Ecological Land Classification (refer to Section 11), construction activities will remove of 9.63 ha of habitat, representing approximately 6.1% of the most suitable Common Nighthawk breeding habitat in the LSA. Preferred Common Nighthawk habitat is relatively rare in the RSA only making up only 270 ha or 0.23% of the total study area. Gradient boosted regression tree (BRT) modelling was done to estimate density for the Common Nighthawk. Modeled densities ranged from 0.07536 to 0.8987 birds/ha. The limited predicted density range likely reflects the generalist nature of Common Nighthawk during foraging and not the more limited breeding habitat. Common Nighthawk will congregate in areas where large numbers of aerial insects are available such as riparian areas and large wetlands which are common throughout the RSA.

Overall, given the amount of breeding habitat removed based on Ecological Land Classification, and the low general availability of preferred habitat the net effect on Common Nighthawk is moderately negative. While some use of drier open bog habitats is likely, these micro-habitat features are not well defined in the Ecological Land Classification and Common Nighthawk breeding habitats within the lowland boreal has not been studied extensively making for a more conservative approach to the evaluation. A summary of the net effects relating to the habitat loss during the construction phase based on the Characterization Criteria is presented in **Table 13-191**.

Table 13-191: Criteria Results for Destruction of Common Nighthawk Habitat Due to Clearance Activities – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as destruction of Common Nighthawk habitat is expected as a result of project construction.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as the effect will cause a measurable destruction of Common Nighthawk habitat, and low levels of prime habitat are available in the area.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All Time Periods	Construction activities, including habitat removal are expected to occur through the year.
Duration	Permanent	Any destruction of Common Nighthawk habitat is expected to permanent as the roadbed will remain on the landscape for the foreseeable future.
Frequency	Continuous	Common Nighthawk habitat once removed from the Project footprint will remain removed for the forceable future.



Characterization Criteria	Result	Rationale
Context	Moderate	Effects are likely to affect rock outcrops that are uncommon throughout the study area and throughout the larger region.
Reversibility	Irreversible	The roadbed is unlikely to be removed hence the effect should be thought of as irreversible.
Likelihood of Occurrence	Certain	The loss of habitat during construction is certain.

Operations

Destruction of Common Nighthawk habitat by clearance activities is not expected as a result of roadway operations. Repairs to the roadway and crossing structures may be required over time, but these are not expected to result in destruction of Common Nighthawk habitat. Overall, the effect on Common Nighthawk would be negligible. The effect is neutral and the likelihood unlikely. A summary of the net effects relating to the habitat loss during the operations phase based on the Characterization Criteria is presented in **Table 13-192**.

Table 13-192: Criteria Results for Destruction of Common Nighthawk Habitat Due to Clearance Activities – Operations

Characterization Criteria	Result	Rationale
Direction	Neutral	The direction of this effect will be neutral, as no destruction of additional habitat is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect is not expected to occur during the operations phase.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All time periods	Additional destruction of Common Nighthawk habitat is not expected during operations.
Duration	Short-term	Any destruction of Common Nighthawk habitat will be short-term, during repairs or maintenance.
Frequency	Infrequent	Additional destruction of Common Nighthawk habitat during operations is not expected.
Context	Resilient	Effects are likely to affect habitats that are common throughout the study area and throughout the larger region. As such, these habitats should be resilient to disturbance.
Reversibility	Reversible	The net effect is reversible if the roadway was removed.
Likelihood of Occurrence	Unlikely	Additional net effects of the Project during operations are unlikely.



13.5.2.8.2 Habitat Alteration or Degradation

Hydrological Changes

Construction

It is probable hydrological changes may result in the alteration or degradation of Common Nighthawk habitat during the construction phase. Peatlands, which make up the majority of vegetative communities within the project footprint are susceptible to changes in the flow of surface and subsurface water resulting from the bisection of these features by road construction. Road construction design which considers peat consolidation and compression processes and installation of culverts will minimize but not eliminate the effects. Based on the Groundwater assessment (Section 8.5) these changes are expected to be low in magnitude but permanent. While nest loss due to flooding has been documented given that breeding sites for Common Nighthawk tend to be in drier areas the effect of hydrology changes is likely only slight. After implementation of mitigation methods, a minor negative effect on Common Nighthawk habitat will likely remain. A summary of the net effects relating to the changes in hydrology during the construction phase based on the Characterization Criteria is presented in **Table 13-193**.

Table 13-193: Criteria Results for Habitat Alteration or Degradation of Common Nighthawk Habitat Due to Hydrological Changes – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as some alteration of hydrology is expected as a result of project operation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could cause a measurable alteration of Common Nighthawk habitat, but the change is likely small.
Geographic Extent	LSA	The effect extends into the Local study area up to 250m.
Timing	All Time Periods	Alteration of hydrology could occur during any time period
Duration	Permanent	Hydrological changes originating in the construction phase are likely to be permanent as the roadbed will remain even after the operations phase ends.
Frequency	Continuous	Hydrological changes will be continuous.
Context	Low	Only a small fraction of nighthawk breeding habitat is likely to be affected.
Reversibility	Irreversible	The roadbed is unlikely to be removed hence the effect should be thought of as irreversible.
Likelihood of Occurrence	Probable	The alteration of wetland habitat during construction is likely to occur but mitigations should limit any changes.

Operations

Changes to hydrology during the operations phase are possible due to culvert and drainage maintenance. Hydrological changes are likely to be more localized and temporary as culvert clearing and repairs would restore the existing hydrology and a responsive maintenance program, including reporting mechanisms would limit the area affected. A summary of the net effects relating to the changes in hydrology during the operations phase based on the Characterization Criteria is presented in **Table 13-194**.



Table 13-194: Criteria Results for Habitat Alteration or Degradation of Common Nighthawk Habitat Due to Hydrological Changes – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as some alteration of hydrology is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect is not expected to increase during the operations phase.
Geographic Extent	LSA	The effect will be limited primarily to the Project Footprint but may extend into the Local Study Area.
Timing	All time periods	Impacts on Common Nighthawk would occur during any point of the active season.
Duration	Short-term	Any destruction of Common Nighthawk habitat will be short-term, during repairs or maintenance where in-water work is required.
Frequency	Infrequent	Additional destruction of Common Nighthawk habitat during operations is not expected.
Context	Low	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Hydrological changes should be restored once maintenance activities are concluded.
Likelihood of Occurrence	Possible	Additional net effects of the Project during operations are unlikely.

Sensory Disturbances

Construction

Effects of sensory disturbance on degradation or alteration of Common Nighthawk habitat is probable during the construction phase. Sensory disturbances resulting from road construction, including movement of equipment and vehicles, noise, vibration, and other human activities may degrade habitat for Common Nighthawk adjacent to the Project Footprint, reducing utilization of the area or altering habitat use. Noise disturbance will be especially true during construction when activities such as blasting, quarrying, hauling and clearing occur. However, with mitigation measures in place, including timing of activities, noise disturbance for common nighthawk is expected to be small due to its ability to adapt to anthropogenic disturbances. Light management mitigations will reduce unneeded lighting, however the effects of lighting on Common Nighthawk can be both positive foraging nightjars have been shown to fly long distances to forage under lights. Given the potential for both positive and negative effects of sensory disturbance, the effect is expected to be a minor negative impact as breeding habitats where negative responses to noise occur are more limited and valuable than foraging habitats which may experience positive effects related to light. A summary of the net effects relating to habitat alteration through sensory disturbance during the construction phase based on the Characterization Criteria is presented in **Table 13-195**.



Table 13-195: Criteria Results for Habitat Alteration or Degradation of Common Nighthawk Habitat Due to Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project construction activities.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as both positive and negative changes to habitat quality may occur.
Geographic Extent	LSA	The effect will be extended past the Project Footprint into the local study area approximately 125 m.
Timing	All time periods	Impacts on Common Nighthawk would occur during any point of the active season.
Duration	Short-term	Any alteration of Common Nighthawk habitat due to sensory impacts will be short-term, during the construction phase of the project.
Frequency	Frequent	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary with Common Nighthawk adaptable to anthropogenic noise.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Common Nighthawk during construction.

13.5.2.8.3 Alteration in Movement

Sensory Disturbances

Construction

Effects of sensory disturbance on Common Nighthawk movement is probable during the construction phase. Noise, vibration and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that are likely to alter movement of Common Nighthawks, including shifts in territories, as they avoid the project ROW and supportive infrastructure. Mitigation measures focused on sensory disturbance including timing, noise and light abatement are expected to mitigate most of the potential effects but there is a predicted net negative effect during construction on Common Nighthawks movement as breeding habitats are more limited and valuable than foraging habitats. Overall, after implementation of mitigation methods, a low magnitude negative effect on Common Nighthawk movement will likely remain. A summary of the net effects relating to alteration of movement through sensory disturbance during the construction phase based on the Characterization Criteria is presented in **Table 13-196**.



Table 13-196: Criteria Results for Alteration of Common Nighthawk Movement Due to Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project operation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could potentially affect a few breeding pairs.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area, approximately 125 m.
Timing	All time periods	Sensory disturbances that cause movement alterations would happen at any period during the Common Nighthawk active season.
Duration	Short-term	Any alteration of Common Nighthawk movement will be short-term, during the construction phase of the project.
Frequency	Frequent	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary with Common Nighthawk adaptable to anthropogenic noise.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Common Nighthawks during construction.

13.5.2.8.4 Injury or Death

Collisions

Construction

Effects of injury and/or death from collisions on Common Nighthawk is possible during the construction phase. Mortality from collisions during the construction phase is possible and is not expected to be completely eliminated by mitigations and occurring throughout Common Nighthawk active season where construction activities intersect breeding, roosting and foraging habitats. Common Nighthawks, particularly males, collisions can be of particular importance as they often rest on gravel roads at night. Strictly enforcing mitigation measures during the construction phase around equipment, use of off-highway vehicles and travel speed are expected to keep the number of collisions between Common Nighthawks and vehicles and equipment low. Overall, after implementation of mitigation methods, a negative effect on Common Nighthawk will likely remain. A summary of the net effects relating to Injury and death through collisions during the construction phase based on the Characterization Criteria is presented in **Table 13-197**.



Table 13-197: Criteria Results for Injury or Death of Common Nighthawk Due to Collisions – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths due to collisions with construction vehicles may occur during the construction phase.
Magnitude	Low	The magnitude of the effect is predicted to be Low, as only a few individuals may be affected.
Geographic Extent	LSA	The effect will extend to birds moving between the LSA on each side of the Project Footprint.
Timing	All time periods	Collisions could happen during any period during the Common Nighthawk active season.
Duration	Short-term	Collisions with construction vehicles will occur during the construction phase of the project.
Frequency	Infrequent	Strict enforcements will limit the number of collisions between construction vehicles and Common Nighthawks.
Context	Moderate	Impacts on Common Nighthawk may occur due to roosting on road.
Reversibility	Reversible	Collisions will stop once construction activities are concluded.
Likelihood of Occurrence	Possible	Even with mitigations its possible some collisions with Common Nighthawks may occur during construction.

Operations

Mortality from collisions during the operational phase is probable and is not expected to be completely eliminated by mitigations and occurring throughout Common Nighthawk active season where the road intersects breeding, roosting and foraging habitats. While Common Nighthawk can roost on gravel roads, the gravel surface is expected to become paved during the 3rd season of operations further reducing the possibility of injury or death from collisions. Given the predicted maximum vehicles travelling on the proposed road is 500 per day, with the majority of travel anticipated to take place during daylight hours, the number of collisions is likely to be low. Overall, a net negative effect is probable due to vehicle collisions. A summary of the net effects relating to Injury and death through collisions during the operations phase based on the Characterization Criteria is presented in **Table 13-198**.

Table 13-198: Criteria Results for Injury or Death of Common Nighthawk Due to Collisions – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, deaths due to collisions may occur as a result of road operation.
Magnitude	Moderate	The magnitude of the effect is predicted to be moderate, as vehicle collisions are a known concern for Common Nighthawk.
Geographic Extent	LSA	The effect will extend to birds moving between the LSA on each side of the Project Footprint.
Timing	All time periods	Collisions could happen during any period during the Common Nighthawk active season.



Characterization Criteria	Result	Rationale
Duration	Medium-term	These collisions will occur through the lifetime of the operations phase of the project.
Frequency	Infrequent	Low volume and minimal night travel will limit the number of collisions between vehicles and Common Nighthawks.
Context	Moderate	Impacts on Common Nighthawk may occur due to roosting on road.
Reversibility	Reversible	Collisions will stop once operation activities are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its probable some collisions with Common Nighthawks will occur during operations phase as road users may not be aware of Common Nighthawk behavior.

Incidental Take

Construction

Mitigations related to avoiding vegetation removal during the migratory bird nesting period are expected to minimize the potential effect of incidental take on Common Nighthawk. However, if construction activities take place in Common Nighthawk habitat during the breeding season, injury or death of birds, hatchlings, and/or eggs may occur, even after mitigation measures have been applied. The cryptic characteristics of Common Nighthawks can make them difficult to detect while on nests. Additionally, as their camouflage is their primary defense Common Nighthawks stay on their nest when approached by humans and their young either remain still (Sandilands, 2008). While less likely to be impacted outside of nesting season, Common Nighthawks can roost on the ground and remain still as camouflage is their primary defense. Overall, a net negative effect is possible when vegetation clearing occurs, especially if it occurs during the breeding season. The effect is expected to be short-term as its confined to the construction phase and reversible as it would stop following the construction activities. A summary of the net effects relating to Injury and death through Incidental Take during the construction phase based on the Characterization Criteria is presented in **Table 13-199**.

Table 13-199: Criteria Results for Injury or Death of Common Nighthawk Due to Incidental Take – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Common Nighthawk may occur as a result of incidental take.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	Sensitive periods	Incidental take would primarily occur during the Common Nighthawk breeding season.
Duration	Short-term	Incidental take from construction activities will stop at the end of the construction phase of the project.
Frequency	Infrequent	Timing mitigation will limit the number deaths due to clearance activities.
Context	Low	Mitigations will limit any impacts on Common Nighthawk populations.



Characterization Criteria	Result	Rationale
Reversibility	Reversible	Incidental take would stop once construction activities are concluded.
Likelihood of Occurrence	Possible	Even with mitigations its possible some incidental take may occur during construction.

Operations

Vegetation clearing in Common Nighthawk habitat is also scheduled to occur during operations. Though smaller in scale, periodic clearing of the ROW may occur during operations as part of line-of-sight maintenance, while timing windows will be enforced this maintenance may be required inside of the breeding season. A net negative effect is possible from maintenance clearing of vegetation during operations. The effect is expected to potentially occur throughout the lifetime of the project but be reversible as it would stop following the operations phase of the project. A summary of the net effects relating to injury and death through incidental take during the operations phase based on the Characterization Criteria is presented in **Table 13-200**.

Table 13-200: Criteria Results for Injury or Death of Common Nighthawk Due to Incidental Take – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Common Nighthawk may occur as a result of incidental take.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	Sensitive periods	Incidental take would primarily occur during the Common Nighthawk breeding season.
Duration	Medium-term	The potential for incidental take would occur over the operating lifetime of the road.
Frequency	Infrequent	Timing mitigations will limit the number deaths due to clearance activities.
Context	Low	Mitigations will limit any impacts on Common Nighthawk populations.
Reversibility	Reversible	Incidental take would stop once road operations are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its probable some incidental take may occur during operations given Common Nighthawk are ground nesters and the extended lifetime of the road.



Predation

Construction

Effects on Common Nighthawk survival from improved predator access and movement rates is probable. As ground nesting birds Common Nighthawks are particularly susceptible to predators. Their eggs and young are susceptible to several boreal species including foxes, coyotes, crows, ravens, gulls, owls and raptors (Brigham et al. 2011). Mitigation involving reclamation/blockage of any temporarily disturbed areas and access roads will reduce the effect as these actions will reduce open areas and linear features; however, the effects of increased predation cannot be completely eliminated as the road will cross naturally open areas and potentially expose Common Nighthawks to increased predation. It is probable there will be a low magnitude, negative effect on Common Nighthawk survival in the LSA during the active season due to increased predation. A summary of the net effects relating to injury and death through increased predation during the construction phase based on the Characterization Criteria is presented in **Table 13-201**.

Table 13-201: Criteria Results for Injury or Death of Common Nighthawk Due to Predation – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Common Nighthawk may occur because of increased predation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	LSA	The effect will extend into the Local Study Area.
Timing	All time periods	Predation would occur throughout the Common Nighthawk active season.
Duration	Long-term	The effect that originated as part of construction would last past the operational lifetime of road.
Frequency	Infrequent	Predation events are likely to be low in frequency due to the cryptic nature of the Common Nighthawk and few individuals will be using areas near the road.
Context	Low	Mitigations will limit any impacts on Common Nighthawk populations.
Reversibility	Reversible	The effect of increased predation would end once the linear features have regenerated sufficiently.
Likelihood of Occurrence	Probable	Even with mitigations its probable that increased predation could occur given known use of linear edges by predators.

Operations

Effects on Common Nighthawk survival from improved predator access and movement rates during the operations phase is probable. Effects on Common Nighthawks from predator encounters are predicted to be long term in duration as predators are known to use linear features well beyond their operational lifetime. Maintenance clearing during operations will maintain openness along the ROW which may encourage Common Nighthawks to use areas near the road exposing them to increased predation. It is probable there will be a low magnitude, negative effect on Common Nighthawk survival in the LSA during the active season due to increased predation. A summary of the net effects relating to injury and death through increased predation during the operations phase based on the Characterization Criteria is presented in **Table 13-202**.



Table 13-202: Criteria Results for Injury or Death of Common Nighthawk Due to Predation – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Common Nighthawk may occur as a result of increased predation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	LSA	The effect will extend into the Local Study Area.
Timing	All time periods	Predation would occur throughout the Common Nighthawk active season.
Duration	Long-term	Effects from operational activities would last past the operational lifetime of road.
Frequency	Infrequent	Predation events are likely to be low in frequency due to the cryptic nature of the Common Nighthawk and few individuals will be using areas near the road.
Context	Low	Mitigations will limit any impacts on Common Nighthawk populations.
Reversibility	Reversible	The effect of increased predation would end once the linear features have regenerated sufficiently.
Likelihood of Occurrence	Probable	Even with mitigations its probable that increased predation could occur given known use of linear edges by predators.

Table 13-203 and **Table 13-204** provide summaries of the characterized predicted net effects for Lesser Yellowlegs during the construction and operations phases.



Table 13-203: Summary Table of the Predicted Net Effects for Common Nighthawk During the Construction Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Negative	Moderate	Project Footprint	All Time Periods	Permanent	Continuous	Moderate	Irreversible	Certain
Habitat Alteration/ Degradation – Sensory Disturbance	Negative	Negligible	LSA	All time periods	Short-term	Frequent	Resilient	Reversible	Probable
Habitat Alteration/ Degradation – Hydrological Changes	Negative	Low	LSA	All Time Periods	Permanent	Continuous	Resilient	Irreversible	Probable
Alterations in Movement – Sensory Disturbance	Negative	Low	LSA	All time periods	Short-term	Frequent	Resilient	Reversible	Probable
Injury/Death – Incidental Take	Negative	Low	Project Footprint	Sensitive periods	Short-term	Infrequent	Resilient	Reversible	Possible
Injury/Death – Collisions with Vehicles	Negative	Negligible	Project Footprint	All time periods	Short-term	Infrequent	Resilient	Reversible	Possible
Injury/Death – Changes to Predator-Prey Dynamics	Negative	Low	LSA	All time periods	Long-term	Infrequent	Resilient	Reversible	Probable



Table 13-204: Summary Table of the Predicted Net Effects for Common Nighthawk During the Operations Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Neutral	Negligible	Project Footprint	All time periods	Short-term	Infrequent	Resilient	Reversible	Unlikely
Habitat Alteration/ Degradation – Hydrological Changes	Negative	Negligible	LSA	All time periods	Short-term	Infrequent	Resilient	Reversible	Possible
Injury/Death – Incidental Take	Negative	Low	Project Footprint	Sensitive periods	Medium-term	Infrequent	Resilient	Reversible	Probable
Injury/Death – Collisions with Vehicles	Negative	Low	Project Footprint	All time periods	Medium-term	Infrequent	Moderate	Reversible	Probable
Injury/Death – Changes to Predator-Prey Dynamics	Negative	Low	LSA	All time periods	Long-term	Infrequent	Resilient	Reversible	Probable



13.5.2.9 Bald Eagle

13.5.2.9.1 Habitat Loss

Bald Eagle habitat loss and destruction is expected due to site preparation and construction activities as well as terrestrial vegetation changes during road construction and operation. There is a predicted net effect of habitat loss after implementation of mitigation measures.

Clearance Activities

Construction

Destruction of Bald Eagles habitat by clearance activities is certain as a result of construction activities. Based on the results of habitat modelling via Ecological Land Classification (refer to Section 11), construction activities will remove of 86.96 ha of habitat, representing approximately 4.2% of the most suitable Bald Eagles breeding habitat in the LSA. At the RSA level 213.52 ha of habitat will be removed, or 2.39% of suitable habitat. Overall, suitable Bald Eagle nesting habitat is somewhat uncommon throughout the study area with 8.33% of the LSA and 7.66% of the Full Study Area consisting of these vegetation communities.

In terms of foraging habitat, removal of some open water habitat is required. Construction activities will result in the removal of 0.97 ha of Lake/Open Water and 0.96 ha of River/Open Water in the LSA. The RSA intersects four (4) tertiary watersheds, including 14 major lakes/rivers (refer to Section 11).

Raptor Nests (i.e., stick nests) were recorded during aerial surveys near but not within the project footprint. A total of 23 Bald Eagle nests were recorded; however, none were within 1 km of the WSR route alternatives. Nests are often reused year after year, therefore there is a low likelihood that any nests will be removed as a result of construction. Overall, little impact is expected on foraging and nesting habitats of Bald Eagle.

Overall, it is expected that there will be a small negative net effect in the Project Footprint from habitat loss and the likelihood is certain. A summary of the net effects relating to the habitat loss during the construction phase based on the Characterization Criteria is presented in **Table 13-205**.

Table 13-205: Criteria Results for Destruction of Bald Eagle Habitat Due to Clearance Activities – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as destruction of Bald Eagle habitat is expected as a result of project construction.
Magnitude	Moderate	The magnitude of the effect is predicted to be Moderate, as the effect will cause a measurable destruction of Bald Eagle habitat, and moderately low levels of prime habitat are available in the area.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All Time Periods	Construction activities, including habitat removal are expected to occur through the year.
Duration	Permanent	Any destruction of Bald Eagle habitat is expected to permanent as the roadbed will remain on the landscape for the foreseeable future.



Characterization Criteria	Result	Rationale
Frequency	Continuous	Bald Eagle habitat once removed from the Project footprint will remain removed for the foreseeable future.
Context	Moderate	Effects are likely to affect Deciduous and Mixedwoods that are uncommon throughout the study area and throughout the larger region.
Reversibility	Irreversible	The roadbed is unlikely to be removed hence the effect should be thought of as irreversible.
Likelihood of Occurrence	Certain	The loss of habitat during construction is certain.

Operations

Destruction of Bald Eagle habitat by clearance activities is not expected as a result of roadway operations. Repairs to the roadway and crossing structures may be required over time, but these are not expected to result in additional destruction of Bald Eagle habitat. Overall, the effect on Bald Eagle would be negligible. The effect is negligible and the likelihood unlikely. A summary of the net effects relating to the habitat loss during the operations phase based on the Characterization Criteria is presented in **Table 13-206**.

Table 13-206: Criteria Results for Destruction of Bald Eagle Habitat Due to Clearance Activities – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as while no destruction of additional habitat is expected if it occurs it would be a net negative for Bald Eagle.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect is not expected to occur during the operations phase.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All time periods	Additional destruction of Bald Eagle habitat is not expected during operations.
Duration	Medium-term	Any destruction of Bald Eagle habitat will be short-term, during repairs or maintenance and undergo restoration.
Frequency	Infrequent	Additional destruction of Bald Eagle habitat during operations is not expected.
Context	Resilient	Effects are likely to affect habitats that are common throughout the study area and throughout the larger region. As such, these habitats should be resilient to disturbance.
Reversibility	Reversible	The net effect is reversible if the roadway was removed.
Likelihood of Occurrence	Unlikely	Additional net effects of the Project during operations are unlikely.



13.5.2.9.2 Habitat Alteration or Degradation

Hydrological Changes

Construction

It is probable hydrological changes may result in the alteration or degradation of Bald Eagle habitat during the construction phase. Bald Eagle aquatic habitat used for foraging may be altered hydrologically, with construction activities such as grading for road installation resulting in changes to both surface and groundwater water causing flooding or drying of aquatic communities. Bald eagle nesting habitat may also be affected through the death of trees, and Bald Eagles may not breed for a year following loss of a nest tree. The effects of roads on hydrology and wetland habitat may occur up to 250 m from the ROW. Mitigation measures implemented will ensure sufficient flow of both surface and groundwater through existing streams. Flow rates or water depths should not be significantly affected, and Bald Eagles should be able to utilize the same locations as habitat once construction is completed. After implementation of mitigation methods, a minor negative effect on Bald Eagle habitat will likely remain. A summary of the net effects relating to the changes in hydrology during the construction phase based on the Characterization Criteria is presented in **Table 13-207**.

Table 13-207: Criteria Results for Habitat Alteration or Degradation of Bald Eagle Habitat Due to Hydrological Changes – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as some alteration of hydrology is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect could cause a measurable alteration of Bald Eagle habitat, but the change is likely minimal.
Geographic Extent	LSA	The effect extends into the Local study area up to 250m.
Timing	All Time Periods	Alteration of hydrology could occur during any time period.
Duration	Permanent	Hydrological changes originating in the construction phase are likely to be permanent as the roadbed will remain even after the operations phase ends.
Frequency	Continuous	Hydrological changes will be continuous.
Context	Low	Only a small fraction of Bald Eagle breeding habitat is likely to be affected.
Reversibility	Irreversible	The roadbed is unlikely to be removed hence the effect should be thought of as irreversible.
Likelihood of Occurrence	Probable	The alteration of wetland habitat during construction is likely to occur but mitigations should limit any changes.



Operations

It is possible hydrological changes may result in the alteration or degradation of Bald Eagle habitat during the operations phase. Changes could occur due to culvert and drainage maintenance. These changes are likely to be more localized and temporary as culvert clearing and repairs would restore the existing hydrology and a responsive maintenance program, including reporting mechanisms would limit the area affected. After implementation of mitigation methods, it is not expected that hydrological alterations would impact on Bald Eagle habitat to a measurable extent. A summary of the net effects relating to the changes in hydrology during the operations phase based on the Characterization Criteria is presented in **Table 13-208**.

Table 13-208: Criteria Results for Habitat Alteration or Degradation of Bald Eagle Habitat Due to Hydrological Changes – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as some alteration of hydrology is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect is not expected to increase during the operations phase.
Geographic Extent	LSA	The effect will be limited primarily to the Project Footprint but may extend into the Local Study Area.
Timing	All time periods	Impacts on Bald Eagle would occur during any point of the active season.
Duration	Short-term	Any destruction of Bald Eagle habitat will be short-term, during repairs or maintenance where in-water work is required.
Frequency	Infrequent	Additional destruction of Bald Eagle habitat during operations is not expected.
Context	Low	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Hydrological changes should be restored once maintenance activities are concluded.
Likelihood of Occurrence	Possible	Additional hydrological impacts during operations are unlikely but have a small chance to occur if mitigations are ignored.

Sensory Disturbances

Construction

Effects of sensory disturbance on degradation or alteration of Bald Eagle habitat is probable during the construction phase. Sensory disturbances during construction, such as those associated with blasting, quarrying, hauling, and clearing, may occur at all hours. Bald Eagles may be sensitive to human activity during the breeding season and may alter their behavior if activities are close to the nest. During the field programs, no Bald Eagle nests were noted within 1 km of the WSR route alternatives; however undetected and/or new nest may be located during construction activities. If discovered, mitigations will be implemented including protective nest buffer zones during the critical breeding period. While it's been demonstrated that eagles in areas of high human activity levels can habituate to human presence the impact of sensory disturbance cannot be completely removed. Overall, it is possible there will be a net negative effect during the construction phase. A summary of the net effects relating to habitat alteration



through sensory disturbance during the construction phase based on the Characterization Criteria is presented in **Table 13-209**.

Table 13-209: Criteria Results for Habitat Alteration or Degradation of Bald Eagle Habitat Due to Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project construction activities.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could cause a measurable alteration of Bald Eagle habitat, but the change is likely small.
Geographic Extent	LSA	The effect will be extended past the Project Footprint into the local study area approximately 125 m.
Timing	All time periods	Impacts on Bald Eagle would occur during any point of the active season.
Duration	Short-term	Any alteration of Bald Eagle habitat due to sensory impacts will be short-term, during the construction phase of the project.
Frequency	Frequent	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Moderate	Bald Eagles can be sensitive to human activity. But some habituation is possible.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Bald Eagle during construction.

Operations

Effects of sensory disturbance on degradation or alteration of Bald Eagle habitat is possible during the operations phase. While sensory disturbance has been found to lower abundance of Bald Eagles near roads, the impact is primarily associated with high traffic volumes. During the operations phase, it is expected that only 500 vehicles per day are anticipated to use the road, primarily during daylight hours. However, while traffic levels are expected to be low, it is possible that a few individual Bald Eagles will experience sensory impacts. Waterbodies and watercourses along the route may serve as foraging habitat for Bald Eagles, these areas may also attract fishers and hunters once the road is open. Bald Eagles may alter their use of foraging areas while humans are present, however the remote nature of the WSR area is likely to limit the number people willing to travel for access to fish or hunting opportunities. Overall, it is possible there will be a net negative effect during the operations phase. A summary of the net effects relating to habitat alteration through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-210**.



Table 13-210: Criteria Results for Habitat Alteration or Degradation of Bald Eagle Habitat Due to Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project construction activities.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could cause a measurable alteration of Bald Eagle habitat, but the change is likely small.
Geographic Extent	LSA	The effect will be extended past the Project Footprint into the local study area approximately 125 m.
Timing	All time periods	Impacts on Bald Eagle would occur during any point of the active season.
Duration	Medium-term	Any alteration of Bald Eagle habitat due to sensory impacts will be medium-term, lasting the length of the operations phase.
Frequency	Frequent	Sensory disturbances will occur primarily during daytime when traffic occurs.
Context	Moderate	Bald Eagles can be sensitive to human activity. But some habituation is possible.
Reversibility	Reversible	Sensory disturbance changes should be restored once use of the road concludes.
Likelihood of Occurrence	Possible	Sensory disturbances may affect some Bald Eagle but responses to low levels of traffic are generally minimal, and some habituation may occur. Likelihood of disturbance of foraging areas is also low due to the isolated nature of the road.

Changes in Vegetation Structure

Construction

Effects of changes in vegetation structure on degradation or alteration of Bald Eagle habitat is possible during the operations phase. Vegetation removals during road construction may alter or degrade Bald Eagle habitat near the Project Footprint including conversion to early seral habitats and creation of habitat edges. Mitigations including retention of riparian areas may mitigate impacts on Bald Eagles as they prefer to use habitats close to large bodies of water which are their primary foraging habitats. Bald Eagles are unlikely to be impacted by the edge creation as edges are natural features in their habitat and may perch or nest on large canopy trees near edges which can be more productive. Overall, it is possible there will be a small net negative effect. A summary of the net effects relating to habitat alteration by changes in vegetation structure during the construction phase based on the Characterization Criteria is presented in **Table 13-211**.



Table 13-211: Criteria Results for Habitat Alteration or Degradation of Bald Eagle Habitat Due to Changes in Vegetation Structure – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as the low habitat value for early seral habitat outweighs positive edge effects.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as Bald Eagle habitat structure will be minimally affected.
Geographic Extent	LSA	The edge effect will extend into the LSA adjacent to the Project Footprint.
Timing	All time periods	The changes in vegetation structure will occur during all time periods.
Duration	Long-term	The changes in vegetation structure will be present as long as the road remains active and won't be of value to Bald Eagle as breeding habitat long past the operational phase ends.
Frequency	Continuous	The changes in vegetation structure will be present continuously once vegetation removal occurs.
Context	Resilient	Impact will be low as the vegetation changes will be minimal, and Bald Eagle can use disturbed habitats.
Reversibility	Reversible	The effect is reversible one the roadway is removed.
Likelihood of Occurrence	Possible	Even with mitigations its possible the changes in vegetation structure may affect some individual Bald Eagle during construction activities.

Operations

Effects of changes in vegetation structure on degradation or alteration of Bald Eagle habitat is possible during the operations phase. While it is anticipated that restoration of laydown areas and access roads will reverse some of the habitat alteration or degradation caused by road construction, these areas would not be used by Bald Eagles for the foreseeable future. Maintenance activities, including removal of roadside vegetation during road operations, will create periodic disturbances and sustain edge effects along the ROW. For Bald Eagles creation of the edge is likely a positive change as Bald Eagles would be expected to use trees along any created edge if suitable perching trees are available. Given the narrow nature of the ROW increased windthrow is considered unlikely. A summary of the net effects relating to habitat alteration by changes in vegetation structure during the operations phase based on the Characterization Criteria is presented in **Table 13-212**.

Table 13-212: Criteria Results for Habitat Alteration or Degradation of Bald Eagle Habitat Due To Changes in Vegetation Structure – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as the low habitat value for early seral habitat outweighs positive edge effects.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as Bald Eagle habitat structure will be minimally affected.
Geographic Extent	LSA	The edge effect will extend into the LSA adjacent to the Project Footprint.
Timing	All time periods	The changes in vegetation structure will occur during all time periods.



Characterization Criteria	Result	Rationale
Duration	Long-term	The changes in vegetation structure will be present as long as the road remains active and won't be of value to Bald Eagle as breeding habitat long past the operational phase ends.
Frequency	Continuous	The changes in vegetation structure will be present continuously as long as maintenance activities occur.
Context	Resilient	Impact will be low as the vegetation changes will be minimal, and Lesser Yellowlegs can use disturbed habitats.
Reversibility	Reversible	The effect is reversible one the roadway is removed.
Likelihood of Occurrence	Possible	Even with mitigations it's possible the changes in vegetation structure may affect some individual Bald Eagles during operations.

13.5.2.9.3 Alteration in Movement

Sensory Disturbances

Construction

Effects of sensory disturbance on Bald Eagle movement is probable during the construction phase. Noise, lighting and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of Bald Eagles as they avoid the project ROW and supportive infrastructure. Prolonged disturbances may result in displacement from preferred habitats. Mitigation measures focused on sensory disturbance including timing, noise and light abatement are expected to mitigate most of the potential effects, but there is a predicted net effect from road construction activities on Bald Eagle movement. A summary of the net effects relating to alteration of movement through sensory disturbance during the construction phase based on the Characterization Criteria is presented in **Table 13-213**.

Table 13-213: Criteria Results for Alteration in Movement of Bald Eagle Due to Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project operation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could potentially affect a few breeding pairs.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area, approximately 125 m.
Timing	All time periods	Sensory disturbances that cause movement alterations would happen at any period during the Bald Eagle active season.
Duration	Short-term	Any alteration of Bald Eagle movement will be short-term, during the construction phase of the project.
Frequency	Frequent	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Moderate	Bald Eagles can be sensitive to human activity. But some habituation is possible.



Characterization Criteria	Result	Rationale
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Bald Eagles during construction.

Operations

Effects of sensory disturbance on Bald Eagle movement is probable during the operations phase. Vehicle noise is anticipated be the primary sensory impact on Bald Eagles during operations. Bald Eagles have shown to avoid busy roads when alternative habitat is available but Bald eagles that nest in proximity to human disturbance have shown the ability to habituate. The WSR road is predicted to have only 500 vehicles a day and the noise study indicates only a small area may exceed these decibel limits (Appendix J – Noise and Vibration Impact Assessment Report). this should reference the While traffic levels are expected to be low, it is possible that a few individual Bald Eagles will experience sensory impacts. Bald Eagles may flush or temporarily leave areas while humans are present and use of waterways by people fishing or hunting may also disturb Bald Eagles. The remote nature of the WSR area is likely to limit the number people willing to travel for access to fish or hunting opportunities. A summary of the net effects relating to alteration of movement through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-214**.

Table 13-214: Criteria Results for Alteration in Movement of Bald Eagle Due to Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project operation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could potentially affect a few breeding pairs.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area, approximately 125 m.
Timing	All time periods	Sensory disturbances that cause movement alterations would happen at any period during the Bald Eagle active season.
Duration	Medium-term	Any alteration of Bald Eagle movement will be short-term, during the construction phase of the project.
Frequency	Frequent	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Moderate	Bald Eagles can be sensitive to human activity. But some habituation is possible.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Bald Eagles during construction.



13.5.2.9.4 Injury or Death

Collisions with Vehicles

Construction

Injury and/or death from collisions is possible during the construction phase for Bald Eagle. Strictly enforcing mitigation measures during the construction phase around equipment, and vehicle travel speed are expected to keep the number of collisions between Bald Eagles and vehicles and equipment low. Bald Eagles can often be seen on roadsides attracted to carrion and are susceptible to collisions while feeding. Removal of any roadkill will be included in the wildlife mitigation plan. The potential for collisions is not expected to be completely eliminated by mitigations where construction activities intersect Bald Eagle breeding, roosting and foraging habitats. Overall, after implementation of mitigation methods, a negative effect on Bald Eagle will likely remain. A summary of the net effects relating to Injury and death through collisions during the construction phase based on the Characterization Criteria is presented in **Table 13-215**.

Table 13-215: Criteria Results for Injury or Death of Bald Eagle Movement Due to Collisions – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths due to collisions with construction vehicles may occur during the construction phase.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as only a couple individuals may be affected.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	All time periods	Collisions could happen during any period during the Bald Eagle active season.
Duration	Short-term	Collisions with construction vehicles will only occur during the construction phase of the project.
Frequency	Infrequent	Strict enforcements will limit the number of collisions between construction vehicles and Bald Eagles.
Context	Resilient	Low number of collisions will limit any impacts on Bald Eagle populations.
Reversibility	Reversible	Collisions will stop once construction activities are concluded.
Likelihood of Occurrence	Possible	Even with mitigations its possible some collisions with Bald Eagles may occur during construction.



Operations

Injury and/or death from collisions is possible during the operations phase for Bald Eagle. Mortality during the operational phase is not expected to be eliminated by mitigations and potentially occurring all year except for winter but peak in summer as juvenile raptors are more susceptible to road-based mortality (Hanmer and Robinson, 2021). Low traffic levels (maximum 500 a day) traveling mostly during the day and speed controls should mitigate but not eliminate the effect. Mitigations are expected to be less effective during operations than the construction phase. Controls over vehicle speed, which is of particular importance for mitigating wildlife collisions, will be less enforceable when the road is operating. Additionally, roadkill is likely to remain on the road longer. Overall, a small net negative effect is possible due to vehicle traffic during operations. A summary of the net effects relating to Injury and death through collisions during the operations phase based on the Characterization Criteria is presented in

Table 13-216.

Table 13-216: Criteria Results for Injury or Death of Bald Eagle Due to Collisions – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, deaths due to collisions may occur as a result of road operation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could potentially affect only a few individuals.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	All time periods	Collisions could happen during any period during the Bald Eagle active season.
Duration	Medium-term	These collisions will occur through the lifetime of the operations phase of the project.
Frequency	Infrequent	Low volume and minimal night travel will limit the number of collisions between vehicles and Bald Eagles.
Context	Resilient	Low number of collisions will limit any impacts on Bald Eagle populations.
Reversibility	Reversible	Collisions will stop once operation activities are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its probable some collisions with Bald Eagles will occur during operations phase as road users may not be aware of Bald Eagle behavior.

Incidental Take

Construction

Injury and/or death from incidental take is possible during the construction phase for Bald Eagle. Mitigations related to avoiding vegetation removal during the critical breeding period of Bald Eagles are expected to minimize the potential effect of incidental take. However, vegetation clearing in Bald Eagle habitat during road construction may result in injury or death to birds, hatchlings, and/or eggs if management of vegetation is carried out during the breeding season, even after mitigation measures have been applied. Incidental nest removal is unlikely as Bald Eagles use large stick nests that are relatively conspicuous on the landscape, in the tallest trees. Indirect mortality could occur if construction activities take place within close proximity to active nest but is unlikely as know nest are not within a 1km radius of the Project Footprint. After implementation of mitigation methods, including timing windows,



pre-clearance surveys and buffer establishment, any remaining effects will be negligible. A summary of the net effects relating to Injury and death through incidental take during the construction phase based on the Characterization Criteria is presented in **Table 13-217**.

Table 13-217: Criteria Results for Injury or Death of Bald Eagle Due to Incidental Take – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Bald Eagle may occur as a result of incidental take.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as Bald Eagle nests are conspicuous and well known in the project vicinity.
Geographic Extent	LSA	The effect will extend out into the LSA.
Timing	Sensitive periods	If it occurs, incidental take would primarily occur during the Bald Eagle breeding season as nestlings or eggs may be affected
Duration	Short-term	Incidental take from construction activities will stop at the end of the construction phase of the project.
Frequency	Infrequent	Timing mitigation will limit the number deaths due to clearance activities.
Context	Low	Mitigations will limit any impacts on Bald Eagle populations.
Reversibility	Reversible	Incidental take would stop once construction activities are concluded.
Likelihood of Occurrence	Unlikely	With mitigations it's unlikely incidental take may occur during construction.

Operations

Injury and/or death from incidental take is unlikely during the operations phase for Bald Eagle. Though smaller in scale, periodic clearing of the ROW may occur during operations as part of line-of-sight maintenance, while timing windows will be enforced this maintenance may be required inside of the breeding season. Given that work would solely occur in previously cut areas Bald Eagle habitat is unlikely to be affected directly although indirect effects may be experienced by a few Bald Eagles. While no existing nests occur near the road, during the lifetime of the road new nests could be built that may be impacted by maintenance activities. After implementation of mitigation methods, including timing windows, pre-clearance surveys and buffer establishment, any remaining effects will be negligible. A summary of the net effects relating to Injury and death through incidental take during the operations phase based on the Characterization Criteria is presented in **Table 13-218**.

Table 13-218: Criteria Results for Injury or Death of Bald Eagle Due to Incidental Take – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Bald Eagle may occur as a result of incidental take.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as Bald Eagle nests are conspicuous and well known in the project vicinity.



Characterization Criteria	Result	Rationale
Geographic Extent	LSA	The effect will extend out into the LSA.
Timing	Sensitive periods	If it occurs, incidental take would primarily occur during the Bald Eagle breeding season as nestlings or eggs may be affected.
Duration	Medium-term	The potential for incidental take would occur over the operating lifetime of the road.
Frequency	Infrequent	Timing mitigation will limit the number deaths due to clearance activities.
Context	Low	Mitigations will limit any impacts on Bald Eagle populations.
Reversibility	Reversible	Incidental take would stop once road operations are concluded.
Likelihood of Occurrence	Unlikely	With mitigations it's unlikely incidental take will occur during operations even given the extended lifetime of the road.

Changes to Predator-Prey Dynamics

Construction

Injury and/or death from predation is unlikely during the construction phase for Bald Eagle. However, effects on Bald Eagle survival from improved predator access and movement rates is unlikely as current known nesting territories occur more than 1 km from the preferred route. Mitigation involving reclamation/ blockage of any temporarily disturbed areas and access roads will reduce the effect as these actions will reduce open areas and linear features; however, the effects of increased predation cannot be eliminated. While some predation by terrestrial predators may occur, this is considered unlikely and only occur when nestlings leave the nest. Avian predation may also occur on eggs and nestlings but given the conspicuous nature of Bald Eagle nests, creation of the road is unlikely to increase avian predation. After implementation of mitigation methods, any remaining effects will be negligible. A summary of the net effects relating to Injury and death through predation during the construction phase based on the Characterization Criteria is presented in **Table 13-219**.

Table 13-219: Criteria Results for Injury or Death of Bald Eagle Due to Predation – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Bald Eagle may occur because of increased predation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as few predation attempts will occur as a result of increased access.
Geographic Extent	LSA	The effect will extend into the Local Study Area.
Timing	All time periods	Predation would occur throughout the Bald Eagle active season.
Duration	Long-term	The effect that originated as part of construction would last past the operational lifetime of road.
Frequency	Infrequent	Predation events are likely to be low in frequency due to the location of Bald Eagle nests and their position as an apex predator.
Context	Low	Bald Eagles, especially adults are rarely targets of predation.



Characterization Criteria	Result	Rationale
Reversibility	Reversible	The effect of increased predation would end once the linear features have regenerated sufficiently.
Likelihood of Occurrence	Unlikely	With mitigations it's unlikely predation rates will increase due to construction of the road.

Operations

Injury and/or death for Bald Eagle due to predation increases are likely to be minimal during operations. Maintenance clearing during operations will maintain openness along the ROW which will maintain predator access to areas near the road and facilitate movement. While no existing nests occur near the road, during the lifetime of the road new nests could be built that may be impacted by predation. Like during the construction phase, predation events may occur, but most would not be attributable to increases access provided by the road. A summary of the net effects relating to Injury and death through predation during the construction phase based on the Characterization Criteria is presented in **Table 13-220**.

Table 13-220: Criteria Results for Injury or Death of Bald Eagle Due to Predation – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Bald Eagle may occur because of increased predation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as few predation attempts will occur because of increased predator access.
Geographic Extent	LSA	The effect will extend into the Local Study Area.
Timing	All time periods	Predation would occur throughout the Bald Eagle active season.
Duration	Long-term	Effects from operational activities would last past the operational lifetime of road.
Frequency	Infrequent	Predation events are likely to be low in frequency due to the location of Bald Eagle nests and their position as an apex predator.
Context	Low	Bald Eagles, especially adults are rarely targets of predation.
Reversibility	Reversible	The effect of increased predation would end once the linear features have regenerated sufficiently.
Likelihood of Occurrence	Unlikely	With mitigations it's unlikely predation rates will increase due to construction of the road.

Table 13-221 and **Table 13-222** provide summaries of the characterized predicted net effects for Bald Eagle during the construction and operations phases.



Table 13-221: Summary Table of the Predicted Net Effects for Bald Eagle During the Construction Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Negative	Moderate	Project Footprint	All Time Periods	Permanent	Continuous	Moderate	Irreversible	Certain
Habitat Alteration/ Degradation – Hydrological Changes	Negative	Negligible	LSA	All Time Periods	Permanent	Continuous	Low	Irreversible	Probable
Habitat Alteration/ Degradation – Sensory Disturbance	Negative	Low	LSA	All time periods	Short-term	Frequent	Moderate	Reversible	Probable
Habitat Alteration/ Degradation – Changes in Vegetation Structure	Negative	Negligible	LSA	All time periods	Long-term	Continuous	Resilient	Reversible	Possible
Alterations in Movement – Sensory Disturbance	Negative	Low	LSA	All time periods	Short-term	Frequent	Moderate	Reversible	Probable
Injury/Death – Collisions with Vehicles	Negative	Negligible	Project Footprint	All time periods	Short-term	Infrequent	Resilient	Reversible	Possible
Injury/Death – Incidental Take	Negative	Negligible	LSA	Sensitive periods	Short-term	Infrequent	Low	Reversible	Unlikely
Injury/Death – Changes to Predator-Prey Dynamics	Negative	Negligible	LSA	All time periods	Long-term	Infrequent	Low	Reversible	Unlikely



Table 13-222: Summary Table of the Predicted Net Effects for Bald Eagle During the Operations Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Negative	Negligible	Project Footprint	All time periods	Medium-term	Infrequent	Resilient	Reversible	Unlikely
Habitat Alteration or Degradation – Hydrological Changes	Negative	Negligible	LSA	All time periods	Short-term	Infrequent	Low	Reversible	Possible
Habitat Alteration or Degradation – Sensory Disturbance	Negative	Low	LSA	All time periods	Medium-term	Frequent	Moderate	Reversible	Possible
Habitat Alteration/ Degradation – Changes in Vegetation Structure	Negative	Negligible	LSA	All time periods	Long-term	Continuous	Resilient	Reversible	Possible
Alterations in Movement – Sensory Disturbance	Negative	Low	LSA	All time periods	Medium-term	Frequent	Moderate	Reversible	Probable
Injury/Death – Collisions with Vehicles	Negative	Low	Project Footprint	All time periods	Medium-term	Infrequent	Resilient	Reversible	Probable
Injury/Death – Incidental Take	Negative	Negligible	LSA	Sensitive periods	Medium-term	Infrequent	Low	Reversible	Unlikely
Injury/Death – Changes to Predator-Prey Dynamics	Negative	Negligible	LSA	All time periods	Long-term	Infrequent	Low	Reversible	Unlikely



13.5.2.10 Short-eared Owl

13.5.2.10.1 Habitat Loss

Short Eared Owl habitat loss and destruction is expected due to site preparation and construction activities as well as terrestrial vegetation changes during road construction and operation. There is a predicted net effect of habitat loss after implementation of mitigation measures.

Clearance Activities

Construction

Destruction of Short-eared Owl habitat by clearance activities is certain as a result of construction activities. Short-eared Owl habitat loss and destruction is expected due to site preparation and construction activities as well as terrestrial vegetation changes during road construction and operation. There is a predicted net effect of habitat loss after implementation of mitigation measures. Short-eared Owls favour open habitats throughout the year, and as such the limiting habitat feature would be nesting locations on dry ground near taller vegetation. Additionally, conifers adjacent to open areas are used during the winter for roosting adjacent to open areas (COSEWIC, 2021).

Based on the results of habitat modelling via Ecological Land Classification (refer to Section 11), construction activities will remove 80.22 ha of breeding habitat, or based on mean territory size, approximately 1 available breeding habitat. The 80.22 ha of habitat represents approximately 1.64% of the suitable Short-eared Owl breeding habitat in the LSA. At the RSA level this represents 0.26% of suitable habitat. Overall, suitable Short-eared Owl nesting habitat is somewhat uncommon throughout the study area with 17.69% of the LSA and 22.03% of the RSA consisting of these vegetation communities. For roosting habitat, estimated construction activities will result in the removal of 81.15 ha of Conifer Forest in the LSA and 150.8 ha in the RSA or 4.30% in the LSA and 1.78% in the RSA. Overall, given the small amount of open habitat removed, and the availability of forested habitat the net effect on Short-eared Owl is moderately negative. A summary of the net effects relating to the habitat loss during the operations phase based on the Characterization Criteria is presented in **Table 13-223**.

Table 13-223: Criteria Results for Destruction of Short-eared Owl Habitat Due to Clearance Activities – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as destruction of Short-eared Owl habitat is expected as a result of project construction.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect will cause a measurable destruction of Short-eared Owl habitat, and moderately levels of prime breeding habitat are available in the area.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All Time Periods	Construction activities, including habitat removal are expected to occur through the year.
Duration	Permanent	Any destruction of Short-eared Owl habitat is expected to permanent as the roadbed will remain on the landscape for the foreseeable future.



Characterization Criteria	Result	Rationale
Frequency	Continuous	Short-eared Owl habitat once removed from the Project footprint will remain removed for the foreseeable future.
Context	Low	Effects are likely to habitat types that are common throughout the study area and throughout the larger region.
Reversibility	Irreversible	The roadbed is unlikely to be removed hence the effect should be thought of as irreversible.
Likelihood of Occurrence	Certain	The loss of habitat during construction is certain.

Operations

Destruction of Short-eared Owl habitat by clearance activities is not expected as a result of roadway operations. Repairs to the roadway and crossing structures may be required over time, but these are not expected to result in destruction of Short-eared Owl habitat. Overall, the effect on Short-eared Owl would be negligible. The effect is neutral and the likelihood unlikely. A summary of the net effects relating to habitat loss during the operations phase based on the Characterization Criteria is presented in **Table 13-224**.

Table 13-224: Criteria Results for Destruction of Short-eared Owl Habitat Due to Clearance Activities – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as while no destruction of additional habitat is expected if it occurs it would be a net negative for Short-eared Owl.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect is not expected to occur during the operations phase.
Geographic Extent	Project Footprint	The effect will be limited primarily to the Project Footprint.
Timing	All time periods	Additional destruction of Short-eared Owl habitat is not expected during operations.
Duration	Medium-term	Any destruction of Bald Eagle habitat will be short-term, during repairs or maintenance and undergo restoration.
Frequency	Infrequent	Additional destruction of Short-eared Owl habitat during operations is not expected.
Context	Resilient	Effects are likely to affect habitats that are common throughout the study area and throughout the larger region. As such, these habitats should be resilient to disturbance.
Reversibility	Reversible	The net effect is reversible if the roadway was removed.
Likelihood of Occurrence	Unlikely	Additional net effects of the Project during operations are unlikely.



13.5.2.10.2 Habitat Alteration or Degradation

Hydrological Changes

Construction

It is probable hydrological changes may result in the alteration or degradation of Short-eared Owl habitat during the construction phase. Short-eared Owl Open Shore Fen and Open Bog habitat may be altered hydrologically, with construction activities such as grading for road installation resulting in changes to both surface and groundwater water causing flooding or drying of vegetation communities. Short-eared Owl nesting habitat may also be affected through flooding and raising of the water table. If death of the tree canopy occurs the more open habitat could make some areas more suitable as Short-eared Owl foraging habitat. The effects of roads on hydrology and wetland habitat may occur up to 250 m from the ROW. Mitigation measures implemented will ensure sufficient flow of both surface and groundwater through existing streams. Flow rates or water depths should not be significantly affected, and Short-eared Owls should be able to utilize the same locations as habitat once construction is completed. After implementation of mitigation methods, a minor negative effect on Short-eared Owl habitat will likely remain. A summary of the net effects relating to the changes in hydrology during the construction phase based on the Characterization Criteria is presented in **Table 13-225**.

Table 13-225: Criteria Results for Habitat Alteration or Degradation of Short-eared Owl Habitat Due to Hydrological Changes – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as some alteration of hydrology is expected as a result of project operation.
Magnitude	Low	The magnitude of the effect is predicted to be Low as only a few owl nesting areas may be affected, and creation of open habitats may be a positive effect.
Geographic Extent	LSA	The effect will be limited primarily to the Project Footprint but may extend into the Local Study Area.
Timing	All time periods	Impacts on Short-eared Owl would occur during any point of the active season.
Duration	Permanent	Hydrological changes originating in the construction phase are likely to be permanent as the roadbed will remain for the foreseeable future.
Frequency	Continuous	Hydrological changes will be continuous.
Context	Low	Effects are likely to affect only a small amount of breeding habitat and foraging habitat.
Reversibility	Irreversible	The roadbed is unlikely to be removed hence the effect should be thought of as irreversible.
Likelihood of Occurrence	Probable	The alteration of wetland habitat during construction is likely to occur but mitigations should limit any changes.



Operations

It is possible hydrological changes may result in the alteration or degradation of Short-eared Owl habitat during the operations phase. Changes to hydrology during the operations phase are possible due to culvert and drainage blockages. Hydrological changes are likely to be more localized and temporary as culvert clearing and repairs would restore the existing hydrology and a responsive maintenance program, including reporting mechanisms would limit the area affected. Longer-term impacts would only occur if maintenance is ignored. After implementation of mitigation methods, a minor negative effect on Short-eared Owl habitat will likely remain. A summary of the net effects relating to the changes in hydrology during the operations phase based on the Characterization Criteria is presented in **Table 13-226**.

Table 13-226: Criteria Results for Habitat Alteration or Degradation of Short-eared Owl Habitat Due to Hydrological Changes – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as some alteration of hydrology is expected as a result of project operation.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as the effect is not expected to increase during the operations phase.
Geographic Extent	LSA	The effect will be limited primarily to the Project Footprint but may extend into the Local Study Area.
Timing	All time periods	Impacts on Short-eared Owl would occur during any point of the active season.
Duration	Short-term	Any destruction of Short-eared Owl habitat will be short-term, during repairs or maintenance where in-water work is required.
Frequency	Infrequent	Additional destruction of Short-eared Owl habitat during operations is not expected.
Context	Low	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Hydrological changes should be restored once maintenance activities are concluded.
Likelihood of Occurrence	Possible	Additional hydrological impacts during operations are unlikely but have a small chance to occur if mitigations are ignored.

Sensory Disturbances

Construction

Effects of sensory disturbance on degradation or alteration of Short-eared Owl habitat is probable during the construction phase. Sensory disturbances generated during construction activities such as blasting, quarrying, hauling and clearing may occur during all hours, degrading Short-eared Owl habitat. Construction noise is less continuous and more impulsive than traffic noise, so less habituation is expected. Noise during construction may mask prey movements and reduce foraging efficiency, thereby degrading Short-eared Owl habitat near construction areas. This degradation is expected to be short term as construction locations will move during the construction phase. Light pollution may provide some benefit to Short-eared Owls by improving hunting conditions. After implementation of mitigation methods, a minor negative effect on Short-eared Owl is probable for the construction phase. A summary of the net



effects relating to habitat alteration through sensory disturbance during the construction phase based on the Characterization Criteria is presented in **Table 13-227**.

Table 13-227: Criteria Results for Habitat Alteration or Degradation of Short-eared Owl Habitat Due to Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project construction activities.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could cause a measurable alteration of Short-eared Owl habitat, but the change is likely small.
Geographic Extent	LSA	The effect will be extended past the Project Footprint into the local study area approximately 125 m.
Timing	All time periods	Impacts on Short-eared Owl would occur during any point of the active season.
Duration	Short-term	Any alteration of Short-eared Owl habitat due to sensory impacts will be short-term, during the construction phase of the project.
Frequency	Frequent	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Short-eared Owl during construction.

Operations

Effects of sensory disturbance on degradation or alteration of Short-eared Owl habitat is possible during the operations phase. While sensory disturbance has been found to lower foraging efficiency of Short-eared Owls near roads, the impact is primarily associated with high traffic volumes. The predicted maximum vehicles travelling on the proposed road during the operations phase is 500 per day, largely taking place during daylight hours. While Short-eared Owls hunt during the day they are largely considered to be crepuscular and would therefore be less impacted by sensory disturbances. Short-eared Owls also can habituate to roads and will often make use of the road edge for perching. Overall, it is possible there will be a small net negative effect during the operations phase. A summary of the net effects relating to habitat alteration through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-228**.



Table 13-228: Criteria Results for Habitat Alteration or Degradation of Short-eared Owl Habitat Due to Sensory Disturbance – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project construction activities.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as Short-eared owls can often be seen roadside and negative effects are primarily seen along high volume roads.
Geographic Extent	LSA	The effect will be extended past the Project Footprint into the local study area approximately 125 m.
Timing	All time periods	Impacts on Short-eared Owl would occur during any point of the active season.
Duration	Medium-term	Any alteration of Short-eared Owl habitat due to sensory impacts will be medium-term, lasting the length of the operations phase.
Frequency	Frequent	Sensory disturbances will occur primarily during daytime when traffic occurs.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and foraging habitat, affecting few individuals who may habituate.
Reversibility	Reversible	Sensory disturbance changes should be restored once use of the road concludes.
Likelihood of Occurrence	Possible	Sensory disturbances may affect some Short-eared Owl but responses to low levels of traffic are generally minimal and some habituation may occur.

13.5.2.10.3 Alteration in Movement

Sensory Disturbances

Construction

Effects of sensory disturbance on Short-eared Owl movement is probable during the construction phase. Short-eared Owl movement may be altered by sensory disturbances. Noise, lighting and other human actions during construction activities such as blasting, clearing, hauling and grading will create disturbances that could alter movement of Short-eared Owls as they avoid the project ROW and supportive infrastructure. While specific studies on noise and Short-eared owls are limited other owl species have shown little response to anthropogenic noise. Lighting during construction may act as an attractant for Short-eared Owls for improved hunting. Mitigation measures focused on sensory disturbance including timing, noise and light abatement are expected to mitigate most of the potential effects, but there is a predicted net effect from road construction activities on Short-eared Owl movement. A summary of the net effects relating to habitat alteration through sensory disturbance during the operations phase based on the Characterization Criteria is presented in **Table 13-229**.



Table 13-229: Criteria Results for Alteration of Short-eared Owl Movement Due to Sensory Disturbance – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as sensory disturbance is expected as a result of project operation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as the effect could potentially affect a few breeding pairs.
Geographic Extent	LSA	The effect will extend past the Project Footprint into the local study area, approximately 125 m.
Timing	All time periods	Sensory disturbances that cause movement alterations would happen at any period during the Short-eared Owl active season.
Duration	Short-term	Any alteration of Short-eared Owl movement will be short-term, during the construction phase of the project.
Frequency	Frequent	Sensory disturbances will occur during periods of construction activities, location and intensity will vary temporally.
Context	Resilient	Effects are likely to affect only a small amount of breeding habitat and changes would only be temporary with Short-eared Owl adaptable to anthropogenic noise.
Reversibility	Reversible	Sensory disturbance changes should be restored once construction activities are concluded.
Likelihood of Occurrence	Probable	Sensory disturbances are likely to affect some Short-eared Owls during construction.

13.5.2.10.4 Injury or Death

Collisions

Construction

Injury and/or death from collisions is possible during the construction phase for Short-eared Owl. Vehicles will be travelling between camps and construction locations; these trips could occur at all hours and encounters with birds would not be unexpected. Short-eared Owls are vulnerable to collision as they often fly low across roads while hunting. Strictly enforcing mitigation measures during the construction phase is expected to keep the number of collisions between Short-eared Owls and vehicles and equipment at a low level. Enforcement of speed limits for construction and personal vehicles will limit deaths as higher speeds result in increased deaths for owls. Overall, after implementation of mitigation methods, a negative effect on Short-eared Owl will likely remain. A summary of the net effects relating to Injury and death through collisions during the construction phase based on the Characterization Criteria is presented in **Table 13-230**.



Table 13-230: Criteria Results for Injury or Death of Short-eared Owl Due to Collisions – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths due to collisions with construction vehicles may occur during the construction phase.
Magnitude	Low	The magnitude of the effect is predicted to be Low, as Short-eared Owls may occasionally be encountered along the road.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	All time periods	Collisions could happen during any period during the Short-eared Owl active season.
Duration	Short-term	Collisions with construction vehicles will only occur during the construction phase of the project.
Frequency	Infrequent	Strict enforcements will limit the number of collisions between construction vehicles and Short-eared Owls.
Context	Moderate	Low Flying behavior makes Short-eared Owls vulnerable to collisions.
Reversibility	Reversible	Collisions will stop once construction activities are concluded.
Likelihood of Occurrence	Possible	Even with mitigations its possible some collisions with Short-eared Owls may occur during construction.

Operations

Injury and/or death from collisions is possible during the operations phase for Short-eared Owl. Mortality during the operational phase is not expected to be eliminated by mitigations and will likely be highest during the spring and summer as recently fledged juvenile raptors and breeding adults are generally more susceptible to road-based mortality. Traffic speed is of particular importance with higher speeds resulting in increased deaths for owls, during operations this may be more of an issue as control over the road is expected to be less strictly enforced. Low traffic levels (maximum 500 a day) traveling mostly during the day and speed controls should mitigate but not eliminate the effect, especially given Short-eared Owl low flying behavior. Overall, a net negative effect is probable due to collisions during operations. A summary of the net effects relating to Injury and death through collisions during the construction phase based on the Characterization Criteria is presented in **Table 13-231**.

Table 13-231: Criteria Results for Injury or Death of Short-eared Owl Due to Collisions – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, deaths due to collisions may occur as a result of road operation.
Magnitude	Moderate	The magnitude of the effect is predicted to be low, as the effect could potentially affect only a few individuals.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	All time periods	Collisions could happen during any period during the Short-eared Owl active season.
Duration	Medium-term	These collisions will occur through the lifetime of the operations phase of the project.



Characterization Criteria	Result	Rationale
Frequency	Infrequent	Low volume and minimal night travel will limit the number of collisions between vehicles and Short-eared Owls.
Context	Moderate	Low Flying behavior makes Short-eared Owls vulnerable to collisions.
Reversibility	Reversible	Collisions will stop once operation activities are concluded.
Likelihood of Occurrence	Probable	Even with mitigations its probable some collisions with Short-eared Owls will occur during operations phase as road users may not be aware of Short-eared Owl behavior.

Incidental Take

Construction

Injury and/or death from incidental take is possible during the construction phase for Short-eared Owl. Vegetation clearing in Short-eared Owl habitat during road construction may result in injury or death to birds, hatchlings, and/or eggs if management of vegetation is carried out during the breeding season, even after mitigation measures have been applied. Short-eared Owls nest on the ground and their nests are well camouflaged. Detection of the nests would also be hindered by the female's reluctance to flush. Overall, a net negative effect is possible when vegetation clearing occurs, especially if it occurs during the breeding season. However given the mitigations related to avoiding vegetation removal during the migratory bird nesting period, the frequency of these occurrences is expected to be low. A summary of the net effects relating to Injury and death through Incidental Take during the construction phase based on the Characterization Criteria is presented in **Table 13-232**.

Table 13-232: Criteria Results for Injury or Death of Short-eared Owl Due to Incidental Take – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Short-eared Owl may occur as a result of incidental take.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	Project Footprint	The effect will be limited to the Project Footprint.
Timing	Sensitive periods	Incidental take would primarily occur during the Short-eared Owl breeding season.
Duration	Short-term	Incidental take from construction activities will stop at the end of the construction phase of the project.
Frequency	Infrequent	Timing mitigation will limit the number deaths due to clearance activities.
Context	Low	Mitigations will limit any impacts on Short-eared Owl populations.
Reversibility	Reversible	Incidental take would stop once construction activities are concluded.
Likelihood of Occurrence	Possible	Even with mitigations its possible some incidental take may occur during construction.



Operations

Injury and/or death from increased incidental take is possible during the construction phase for Short-eared Owl. Though smaller in scale than the construction phase, periodic clearing of the ROW may occur during operations as part of line-of-sight maintenance. These activities would be confined to the Project Footprint. The effect is expected to potentially occur throughout the lifetime of the project but be reversible as it would stop following the operations phase of the project. While timing windows will be enforced this maintenance may be required inside of the breeding season. After implementation of mitigation methods, including pre-clearance surveys and buffer establishment, a small negative impact on Short-eared Owl will remain. The effect will likely be negligible as Short-eared Owl typically nests more than 200 m from the road edge. A summary of the net effects relating to Injury and death through Incidental Take during the construction phase based on the Characterization Criteria is presented in **Table 13-233**.

Table 13-233: Criteria Results for Injury or Death of Short-eared Owl Due to Incidental Take – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Short-eared Owl may occur as a result of incidental take.
Magnitude	Negligible	The magnitude of the effect is predicted to be negligible, as Short-eared Owl nests locations are known to avoid areas near roads.
Geographic Extent	LSA	The effect will extend out into the LSA.
Timing	Sensitive periods	If it occurs, incidental take will primarily occur during the Short-eared Owl breeding season as nestlings or eggs may be affected.
Duration	Medium-term	The potential for incidental take would occur over the operating lifetime of the road.
Frequency	Infrequent	Timing mitigation will limit the number deaths due to clearance activities.
Context	Low	Mitigations will limit any impacts on Short-eared Owl populations.
Reversibility	Reversible	Incidental take would stop once road operations are concluded.
Likelihood of Occurrence	Possible	With mitigations it's possible increased incidental take will occur during operations given Short-eared Owls are ground nesters and the extended lifetime of the road.

Predation

Construction

Effects on Short-eared Owl survival from improved predator access and movement rates during the construction phase is probable. Roads that traverse Short-eared Owl breeding habitat may favour predators and increase predation risk. Ground nesting birds like Short-eared Owls particularly susceptible to terrestrial predators, with predation of nests the most significant source of reproductive failure. Mitigation involving reclamation/blockage of any temporarily disturbed areas and access roads will reduce the effect as these actions will reduce open areas and linear features; however, the effects of increased predation cannot be eliminated. Effects on Short-eared Owls from predator encounters are predicted to be long term in duration as predators are known to use linear features well beyond their operational lifetime. After



implementation of mitigation methods, a negative impact on Short-eared Owl will remain. A summary of the net effects relating to Injury and death through Incidental Take during the construction phase based on the Characterization Criteria is presented in **Table 13-234**.

Table 13-234: Criteria Results for Injury or Death of Short-eared Owl Due to Predation – Construction

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Short-eared Owl may occur because of increased predation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	LSA	The effect will extend into the Local Study Area.
Timing	All time periods	Predation would occur throughout the Short-eared Owl active season.
Duration	Long-term	The effect that originated as part of construction would last past the operational lifetime of road.
Frequency	Infrequent	Predation events are likely to be low in frequency due to the cryptic nature of the Short-eared Owl and few individuals will be using areas near the road.
Context	Low	Mitigations will limit any impacts on Short-eared Owl populations.
Reversibility	Reversible	The effect of increased predation would end once the linear features have regenerated sufficiently.
Likelihood of Occurrence	Probable	Even with mitigations its probable that increased predation could occur given known use of linear edges by predators.

Operations

Effects on Short-eared Owl survival from improved predator access and movement rates during the operations phase is probable. The effect during the operations phase will be a continuation of the same impacts as the construction phase. Maintenance clearing during operations will maintain openness along the ROW increasing predator access to areas adjacent to the road. Effects on Short-eared Owls from predator encounters are predicted to be long term in duration as predators are known to use linear features well beyond their operational lifetime. The low traffic levels along the road will likely prevent any mitigative effect from predator avoidance; however Short-eared Owl nest placement away from the ROW may decrease predator discovery of nest locations. After implementation of mitigation methods, a negative impact on Short-eared Owl will remain. A summary of the net effects relating to Injury and death through Incidental Take during the construction phase based on the Characterization Criteria is presented in **Table 13-235**.



Table 13-235: Criteria Results for Injury or Death of Short-eared Owl Due to Predation – Operations

Characterization Criteria	Result	Rationale
Direction	Negative	The direction of this effect will be negative, as deaths of Short-eared Owl may occur because of increased predation.
Magnitude	Low	The magnitude of the effect is predicted to be low, as mitigations will limit the number of affected individuals.
Geographic Extent	LSA	The effect will extend into the Local Study Area.
Timing	All time periods	Predation would occur throughout the Short-eared Owl active season.
Duration	Long-term	The effect that originated as part of construction would last past the operational lifetime of road.
Frequency	Infrequent	Predation events are likely to be low in frequency due to the cryptic nature of the Short-eared Owl and few individuals will be using areas near the road.
Context	Low	Mitigations will limit any impacts on Short-eared Owl populations.
Reversibility	Reversible	The effect of increased predation would end once the linear features have regenerated sufficiently.
Likelihood of Occurrence	Probable	Even with mitigations its probable that increased predation could occur given known use of linear edges by predators.

Table 13-236 and **Table 13-237** provide summaries of the characterized predicted net effects for Short-eared Owl during the construction and operations phases.



Table 13-236: Summary Table of the Predicted Net Effects for Short-eared Owl During the Construction Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Negative	Moderate	Project Footprint	All Time Periods	Permanent	Continuous	Low	Irreversible	Certain
Habitat Alteration/ Degradation – Hydrological Changes	Negative	Low	LSA	All time periods	Permanent	Continuous	Low	Irreversible	Probable
Habitat Alteration/ Degradation – Sensory Disturbance	Negative	Low	LSA	All time periods	Short-term	Frequent	Resilient	Reversible	Probable
Alterations in Movement – Sensory Disturbance	Negative	Low	LSA	All time periods	Short-term	Frequent	Resilient	Reversible	Probable
Injury/Death – Collisions with Vehicles	Negative	Low	Project Footprint	All time periods	Short-term	Infrequent	Moderate	Reversible	Possible
Injury/Death – Incidental Take	Negative	Low	Project Footprint	Sensitive periods	Short-term	Infrequent	Low	Reversible	Possible
Injury/Death – Changes to Predator-Prey Dynamics	Negative	Low	LSA	All time periods	Long-term	Infrequent	Low	Reversible	Probable



Table 13-237: Summary Table of the Predicted Net Effects for Short-eared Owl During the Operations Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Habitat Loss – Clearance Activities	Neutral	Negligible	Project Footprint	All time periods	Medium-term	Infrequent	Resilient	Reversible	Unlikely
Habitat Alteration or Degradation – Hydrological Changes	Negative	Negligible	LSA	All time periods	Short-term	Infrequent	Low	Reversible	Possible
Habitat Alteration or Degradation – Sensory Disturbance	Negative	Negligible	LSA	All time periods	Medium-term	Frequent	Resilient	Reversible	Possible
Injury/Death – Collisions with Vehicles	Negative	Moderate	Project Footprint	All time periods	Medium-term	Infrequent	Moderate	Reversible	Probable
Injury/Death – Incidental Take	Negative	Negligible	LSA	Sensitive periods	Medium-term	Infrequent	Low	Reversible	Possible
Injury/Death – Changes to Predator-Prey Dynamics	Negative	Low	LSA	All time periods	Long-term	Infrequent	Low	Reversible	Probable



13.5.2.11 Lake Sturgeon (Hudson Bay – James Bay population)

Although potential effects will be reduced with the implementation of the proposed mitigation measures outlined in **Section 13.4.7**, net effects on the Species At Risk VC (relating to Lake Sturgeon) may remain. Predicted net effects on the Fish and Fish Habitat VC are:

- Changes to Quantity and Quality of Fish Habitat:
 - Destruction/Loss of fish habitat;
 - Harmful alteration and disruption of fish habitat;
 - Changes to fish access to habitats;
- Changes to Fish Populations:
 - Injury or Death of fish; and
 - Changes to public access resulting in increased harvest of fish.

13.5.2.11.1 Destruction/Loss of Fish Habitat

The destruction of fish habitat for Lake Sturgeon refers to a reduction in the overall available fish habitat, making it unsuitable for fish to use during any stage of their life cycle. Despite mitigation efforts, destruction of fish habitat caused by construction activities is an expected net effect on fish and fish habitat. This section describes destruction of fish habitat across relevant project phases.

As a result, the only direct impact to the portion of streams within the bankfull width watercourses and waterbodies will be to the riparian areas and the locations where bridges have footings/piers in the water. All four of these crossings are expected to have bridges, which will significantly reduce the destruction of fish habitat. Bridge footings will have a small individual footprint approximately 12.5 m x 5 m in size (62.5m² / footing). With approximately 11 in-water footings/piers, there is an expected destruction of 562.5 m² of aquatic habitat. This will result in a small loss of fish habitat where bridge footings are placed. These crossing structures are summarized in **Table 13-238**. Additional fish habitat destruction will occur from clearing riparian vegetation in buffer areas that surround watercourses. This is anticipated to be destruction of approximately 1,285 m² of riparian habitat associated with waterbodies and watercourses where Lake Sturgeon may be present.

Table 13-238: Structure Types and Spans that may affect Lake Sturgeon

WC Number	Width (m)	Maximum Span (m)	Stream Width (m)	Number of Spans	Foundation Type	Number of Piers	Area of Aquatic Impact (m ²)	Area of Riparian Impact (m ²)
WC-1	253	253	250	7	Footing	7	437.5	115
WC-3	48	48	46	2	Footing	1	62.5	230
WC-26	35.0	35.0	30	1	Footing	0	0	322
WC-27	48	48	48	2	Footing	1	62.5	598

A spatial analysis indicated that, within a five-kilometer radius of the proposed road ROW, the total water coverage (primarily waterbodies) is approximately 16,000 hectares (1.6x10⁸ m²). This estimate only included waterbodies and does not include the footprint of small streams as they did not appear in the waterbody layer but are abundant. Based on this analysis, the estimated habitat loss of 687.5 m² of lake sturgeon aquatic habitat and 1,285 m² of riparian habitat a destruction of a very small portion of the available habitat in the area. A summary of the net effects of Destruction of Fish Habitat caused by construction based on the Characterization Criteria is presented in **Table 13-239**.

Table 13-239: Criteria Results for Destruction of Fish Habitat – Construction

Characterization Criteria	Result	Reason
Direction	Negative	The direction of this effect will be negative, as there will be destruction of Lake Sturgeon habitat as a result of the project.
Magnitude	Low	The magnitude of the effect is likely to be low, as the effect will cause a measurable destruction of Lake Sturgeon habitat, but very small in relation to the available Lake Sturgeon habitat in the area.
Geographic Extent	Project Footprint	The effect will be limited primarily to the project footprint.
Timing	Non-Spawning	Work within the watercourses and waterbodies will be restricted to outside of the restricted activity periods for fish that are present.
Duration	Long-term	The duration of the net effects is expected to be long-term, lasting the length of the project.
Frequency	Infrequent	The net effect is infrequent, likely only occurring at project construction.
Context	Resilient	Effects are likely to affect habitats that are common throughout the study area and throughout the larger region. As such, these habitats should be resilient to disturbance.
Reversibility	Reversible	The net effect is reversible if the roadway was removed.
Likelihood of Occurrence	Certain	The net effects for this project are certain. Avoidance of all Lake Sturgeon habitat is not possible should this project occur.

Operations

Destruction of lake sturgeon habitat is not expected as a result of roadway operations. Repairs to the roadway and crossing structures may be required over time, but these are not expected to result in destruction of fish habitat. In-water work may be required to complete repairs of culverts and bridges, but no new destruction of fish habitat will be expected at that time. Additional developments that may occur during the operations phase are outside the scope of this assessment.

13.5.2.11.2 Harmful Alteration and Disruption of Lake Sturgeon Habitat

The harmful alteration of fish habitat is defined as a change in the physical, chemical, or biological conditions in an aquatic system that could impair the ability for Lake Sturgeon to complete one of more of its life processes. The disruption of fish habitat is defined similarly but generally refers to short-term effects that might impair a Lake Sturgeon's ability to complete one or more of its life processes, whereas alteration is a more permanent/or long-term effect. Despite mitigation efforts, harmful alteration and/or disruption of fish habitat caused by construction activities is an expected net effect on Lake Sturgeon and Lake Sturgeon habitat.



This section describes harmful alteration and/or disruption of Lake Sturgeon habitat across relevant Project phases.

Construction

Habitat alteration/disruption due to material placement

Habitat alteration due to material placement is expected to be restricted to armoring of embankments and bridge footings. This armoring is itself a mitigation measures to reduce erosion and sedimentation (and maintain road integrity) but will still act as a modified habitat. However, natural shorelines generally tend to function as habitat better than armoured shorelines (Happel et al 2023). The armoring is expected at all bridge footings (11 footings) as well as along embankments and culverts that will be contacting the water.

Habitat alteration due to erosion or sedimentation

Is it expected that some increased in sediment accumulation may be expected as a result of construction. Wellman et al. (2000) found that sediment accumulation increased downstream and immediately at culvert entrances. This effect did not appear to have a significant effect on the fish presence. Wellman et al. also found that this accumulation was not detected at locations with bridge crossings. Project design has planned for bridge crossings at the locations (such as WC-3) where Lake Sturgeon spawning habitat as well as presence may be found, so the effect on rare species is expected to be negligible.

Habitat alteration due to changes in hydrology

Changes to hydrology or groundwater are not expected to significantly alter Lake Sturgeon habitat. Mitigation measures implemented will ensure sufficient flow of both surface and groundwater through existing streams. Flow rates or water depths should not be significantly affected, and Lake Sturgeon should be able to utilize the same locations as habitat once construction is completed.

Riparian Vegetation Clearing

The loss of riparian vegetation that may be utilized by Lake Sturgeon is expected to be minimal once mitigation measures (including vegetation clearing minimization) are implemented. Any temporarily cleared vegetation not on the road surface will be allowed to regrow so the loss of riparian vegetation will be limited to that permanently covered by the road surface.

Habitat Alteration Due to Introduction of Invasive Species

The introduction of invasive species, and the effect it will have on Lake Sturgeon habitat is expected to be negligible once mitigation measures are implemented. Vehicles will arrive on site clean and free from invasives, and those that do get introduced will be monitored and eradicated during construction and operations. A summary of the net effects of Harmful Alteration and Disruption of fish habitat caused by construction based on the Characterization Criteria is presented in **Table 13-240**.



Table 13-240: Criteria Results for Harmful Alteration and Disruption – Construction

Characterization Criteria	Result	Reason
Direction	Negative	The net effect relating to harmful alteration and disruption of fish habitat will be negative.
Magnitude	Low	The magnitude of the effect is likely to be low, as the effect will cause a measurable harmful alteration and disruption of fish habitat, but the amount disturbed relative to the available fish habitat in the area will be very low.
Geographic Extent	LSA	The extent of the harmful alteration and disruption is not expected to exceed past the local study area. Direct harmful alterations to habitat will be caused by construction (shading, substrate modification, loss of riparian vegetation), while increases in erosion and sedimentation may extend to the local study area.
Timing	Within Spawning	In-water work will be limited to outside fish spawning windows, but the net effects (such as sedimentation) will extend into the spawning windows for several years until it stabilizes.
Duration	Short-term to Long-term	The duration of the effect for modified substrates is expected to be long-term, lasting the length of the Project. Erosion and sedimentation, vegetation clearing, hydrology changes, and invasive species introduction is only expected to be short-term in duration.
Frequency	Infrequent	The frequency of these harmful alterations will be infrequent.
Context	Resilient	Effects are likely to impact habitats that are common throughout the study area and throughout the larger region. As such, these habitats should be resilient to disturbance.
Reversibility	Reversible	The net effect is reversible if the roadway was removed.
Likelihood of Occurrence	Certain	The net effects for this project are certain. Some harmful alteration is expected as part of the project construction.

Operations

Harmful Alteration and Disruption of fish habitat is not expected as a result of roadway operations. Repairs to the roadway and crossing structures may be required over time, but these are not expected to result in considerable net effects. There may be temporary effects due to erosion and/or sedimentation or clearing of riparian vegetation habitat during maintenance events. A summary of the net effects of Harmful Alteration and Disruption of fish habitat caused by operations based on the Characterization Criteria is presented in **Table 13-241**.

Table 13-241: Criteria Results for Harmful Alteration and Disruption – Operations

Characterization Criteria	Result	Reason
Direction	Negative	The net effect relating to harmful alteration and disruption of fish habitat will be negative.
Magnitude	Negligible	The magnitude of the effect is likely to be negligible as the effects are likely only to occur during roadway maintenance.



Characterization Criteria	Result	Reason
Geographic Extent	LSA	The extent of the harmful alteration and disruption during operations is not expected to be beyond the LSA. Direct harmful alterations to habitat will be caused by construction (Substrate modification, loss of riparian vegetation) in the project footprint, while increases in erosion and sedimentation during maintenance events may extend to the LSA.
Timing	Non-Spawning	Maintenance work, if required will be conducted during non-spawning seasons to avoid negative effects.
Duration	Short-term	The duration of the net effects is expected to be long-term, lasting the length of the project.
Frequency	Infrequent	The frequency of these harmful alterations will be infrequent.
Context	Resilient	Effects are likely to impact habitats that are common throughout the study area and throughout the larger region. As such, these habitats should be resilient to disturbance.
Reversibility	Reversible	The net effect is reversible if the roadway was removed.
Likelihood of Occurrence	Probable	The net effects for this project are probable, as some in-water work may need to occur as part of ongoing road maintenance and repair.

13.5.2.11.3 Changes in Lake Sturgeon Access to Habitats

Construction

During construction, there will be temporary restrictions to Lake Sturgeon passage while the embankment and bridge construction takes place, but this is expected to be relatively short in duration (2-3 years). In order to construct the road, the work-area will need to be isolated temporarily restricting fish access. However, the effects will also need to be monitored as previous studies suggest that even the best designed culverts program can still lead to fragmentation of fish populations.

Waterbodies and watercourses where sturgeon are present are all currently slated to have bridges which do not limit fish passage considerably. For Lake Sturgeon, these crossings include: Winisk Lake, Winiskesis Channel, and the Muketei River, and WC-27. It is there expected that there will be only temporary restrictions in Fish Access to Habitats during the construction phase only. A summary of the net effects relating to the creation of barriers to fish passage during the construction phase based on the Characterization Criteria is presented in **Table 13-242**.

Table 13-242: Criteria Results for Barriers to Fish Passage – Construction

Characterization Criteria	Result	Reason
Direction	Negative	The direction of this effect will be negative, as there will be barriers to Lake Sturgeon habitat created during the construction phase of the project.
Magnitude	Low	The magnitude of the effect is likely to be low.
Geographic Extent	Project Footprint and Local Study Area	The effect will be limited primarily to the project footprint and local study area.



Characterization Criteria	Result	Reason
Timing	Non-Spawning	Work within the watercourses and waterbodies will be restricted to outside of the restricted activity periods for Lake Sturgeon that are present.
Duration	Short-term	The duration of the effect is expected to be short-term, lasting only a short time while bridges are installed.
Frequency	Infrequent	Installations during the construction phase will only occur once per crossing.
Context	Resilient	Effects are likely to impact habitats and species that are common throughout the study area and throughout the larger region. As such, these habitats should be resilient to disturbance.
Reversibility	Reversible	The net effect is reversible if the roadway was removed.
Likelihood of Occurrence	Certain	The net effects for this project are certain. Isolation will be required to install the crossing structures.

Operations

It is expected that there will minimal effects during operation on Lake Sturgeon passage. It is anticipated that the bridges where these are present will not impact fish passage.

13.5.2.11.4 Injury or Death of Fish

Construction

Mitigation measures for Lake Sturgeon will limit the effects of direct injury or mortality during construction. This will include effects from equipment movement, material placement, blasting, and pump impingement and entrainment. Although the best efforts to remove fish via fish rescues will be completed, it is expected that some fish will be missed during these salvages, despite using multiple capture strategies. However, due to the relatively large size and rarity of Lake Sturgeon, it is expected that this number will be minimal. It is likely that small numbers of fish will also be killed even if successfully recovered, as not all fish captured through any method survive. Some estimates place mortality rates at approximately 7-10% for electrofishing (Habera et al 1996). It is difficult to estimate the number of fish lost or injured, but the number is expected to be low and not cause significant impacts to local populations. A summary of the net effects of Injury or Death of fish during the construction phase based on the Characterization Criteria is presented in **Table 13-243**.

Table 13-243: Criteria Results for Injury or Death of Fish – Construction

Characterization Criteria	Result	Reason
Direction	Negative	Injury or Death of Lake Sturgeon will be a negative effect during the construction phase.
Magnitude	Low	The number of Lake Sturgeon injured and killed is expected to be very low, as fish salvages will take place prior to in-water work. Some estimates place mortality rates at approximately 7-10% for electrofishing (Habera et al 1996).
Geographic Extent	Project Footprint	The effect will be limited primarily to the project footprint.



Characterization Criteria	Result	Reason
Timing	Non-Spawning	Work and fish salvages within the watercourses and waterbodies will be restricted to outside of the restricted activity periods for fish that are present.
Duration	Short-term	The duration of the effect is expected to be short-term.
Frequency	Infrequent	The net effect is infrequent, likely only occurring at project construction.
Context	Resilient	Effects are likely to impact species that are common throughout the study area and throughout the larger region. As such, the fish populations in the area are unlikely to be affected by the road.
Reversibility	Irreversible	Injuries/death caused by the project will be irreversible. However, if removal of the project and rehabilitation is completed fish populations should recover to pre-disturbance levels.
Likelihood of Occurrence	Possible	The net effects for this effect are possible.

Operations

Injury and fish death for Lake Sturgeon is expected to be minimal during operations. Road crossing maintenance which requires isolation may result in the occasional Injury or Death to fish but these will be very infrequent. Accidents and releases may occur but are not considered during the scope of this assessment. A summary of the net effects of Injury or Death of fish during the construction phase based on the Characterization Criteria is presented in **Table 13-244**.

Table 13-244: Criteria Results for Injury or Death of Fish – Operations

Characterization Criteria	Result	Reason
Direction	Negative	Injury or Death of fish will be a negative effect during the operations phase.
Magnitude	Low	The number of Lake Sturgeon injured and killed is expected to be very low, as fish salvages will take place prior to in-water work only when maintenance is required.
Geographic Extent	Project Footprint	The effect will be limited primarily to the project footprint.
Timing	Non-Spawning	Work and fish salvages within the watercourses and waterbodies will be restricted to outside of the restricted activity periods for fish that are present.
Duration	Short-term	The duration of the effect is expected to be short-term.
Frequency	Infrequent	The net effect is infrequent, likely only occurring at project construction.
Context	Resilient	Effects are likely to impact species that are common throughout the study area and throughout the larger region. As such, the fish populations in the area are unlikely to be affected by the road.
Reversibility	Irreversible	Injuries/death caused by the project will be irreversible. However, if removal of the project and rehabilitation is completed fish populations should recover to pre-disturbance levels.
Likelihood of Occurrence	Possible	The net effects for this effect are possible.



13.5.2.11.5 Changes in Public Access to Fish Habitats

Operations

The exact number of fish that will be harvested as a result of road operations will be difficult to quantify. Previous studies do exist that show how roadways can cause substantial effects on the fish populations due to increased harvest access. The effects will likely be concentrated on larger lakes and rivers with larger fish populations. As a result, it will be critical to monitor and enforce the mitigation and monitoring methods aimed at minimizing harvest to fish species utilized by First Nations. This would likely include watercourses such as Winisk Lake, Wineskesis Channel, and the Muketei River. The greatest fishing pressure is likely concentrated on Winisk Lake, where the local Webequie community already exploits the lake for recreation and as a food source (Hopper and Power 1991). The community (and many other First Nations in the area) will utilize Lake Sturgeon if captured, but they are not a regular source of food.

The remote nature of the WSR project is likely to limit the number anglers willing to travel for access to this fishery. Hunt and Dyck (2011) also noted increased road quality caused increases in fishing pressure, but that distance (and especially costs to travel) from a community reduced the overall fishing pressure. Lake sturgeon cannot be kept when fishing for non-Indigenous persons, so the pressure will be lower on these fish. The presence of more easily accessible productive fisheries much closer to the populations centers in the south also means that increased pressure would likely be small.

A summary of the net effects of Injury or Death of fish during the construction phase based on the Characterization Criteria is presented in **Table 13-245**.

Table 13-245: Criteria Results for Increased Harvest – Operations

Characterization Criteria	Result	Reason
Direction	Negative	Although mitigation measures are in place to reduce harvest, it is expected that increased access will cause an increased rate of fish harvest, which in turn will cause a negative impact to fish populations.
Magnitude	Low	Previous studies do exist that show how roadways can cause substantial effects on the fish populations due to increased harvest access. Although the harvest would not result in extirpation of the species in the streams, there may be local reductions in the fish populations. This effect may be limited to larger streams that are more likely to contain Lake Sturgeon.
Geographic Extent	Project Footprint and Local Study Area	The effect will be generally restricted to the project footprint and LSA and this is the area that will be made accessible by the presence of the road.
Timing	Spawning	The effects may extend into fish spawning windows, as anglers may capture fish year-round.
Duration	Long-term	The effect during the construction phase will be short-term, as the effect caused by construction workers will end shortly after the project is completed.
Frequency	Continuous	The effect during the construction phase will likely be continuous, likely concentrated in the ice-off seasons when fisheries are easier to exploit.



Characterization Criteria	Result	Reason
Context	Moderate	Lake Sturgeon are a slow reproducing species that can be impacted by overfishing however recreational and subsistence harvest of lake sturgeon is assumed to be minimal.
Reversibility	Irreversible	The net effect is reversible if the roadway was removed.
Likelihood of Occurrence	Probable	The net effects for phase are probable, as it is expected that even with all mitigations implemented, recreational fishing may take place.

Table 13-246 and **Table 13-247** provide summaries of the characterized predicted net effects for Lake Sturgeon during the construction and operations phases.



Table 13-246: Summary Table of the Predicted Net Effects for Lake Sturgeon During the Construction Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Destruction/Loss of Fish Habitat – Construction Activities	Negative	Low	Project Footprint	Non-Spawning	Long-term	Infrequent	Resilient	Reversible	Certain
Harmful Alteration and Disruption of Fish Habitat – Material placement.	Negative	Low	LSA	Within-Spawning	Long-term	Infrequent	Resilient	Reversible	Certain
Harmful Alteration and Disruption of Fish Habitat – Removal of riparian vegetation.	Negative	Low	LSA	Within-Spawning	Short-term	Infrequent	Resilient	Reversible	Certain
Harmful Alteration and Disruption of Fish Habitat – Change in Hydrology.	Negative	Low	LSA	Within-Spawning	Short-term	Infrequent	Resilient	Reversible	Possible
Harmful Alteration and Disruption of Fish Habitat – Reduced surface water quality from erosion, sedimentation, and depositions of contaminants.	Negative	Low	LSA	Within-Spawning	Short-term	Infrequent	Resilient	Reversible	Possible
Harmful Alteration and Disruption of Fish Habitat – Introduction of invasive species.	Negative	Low	LSA	Within-Spawning	Short-term	Infrequent	Resilient	Reversible	Possible
Changes in Fish Access to Habitats – Isolation structures for instream construction of bridges.	Negative	Low	LSA	Non-Spawning	Short-term	Infrequent	Resilient	Reversible	Certain
Injury or death of fish -Material placement, blasting, dewatering, and fish salvage.	Negative	Negligible	LSA	Non-Spawning	Short-term	Infrequent	Resilient	Irreversible	Probable



Table 13-247: Summary Table of the Predicted Net Effects for Lake Sturgeon During the Operations Phase

Predicted Net Effect	Net Effects Characterization								
	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Harmful Alteration and Disruption of Fish Habitat – Change in Hydrology.	Negative	Negligible	LSA	Within-Spawning	Short-term	Infrequent	Resilient	Reversible	Possible
Harmful Alteration and Disruption of Fish Habitat – Reduced surface water quality from erosion, sedimentation, and depositions of contaminants.	Negative	Negligible	LSA	Within-Spawning	Short-term	Infrequent	Resilient	Reversible	Possible
Harmful Alteration and Disruption of Fish Habitat – Introduction of invasive species.	Negative	Negligible	LSA	Within-Spawning	Short-term	Infrequent	Resilient	Reversible	Possible
Harmful Alteration and Disruption of Fish Habitat – Road maintenance activities.	Negative	Negligible	LSA	Non-Spawning	Short-term	Infrequent	Resilient	Reversible	Possible
Injury or death of fish – Maintenance activities that require in-water work.	Negative	Negligible	LSA	Non-Spawning	Short-term	Infrequent	Resilient	Irreversible	Probable
Changes in Public Access to Fish Habitats – Increased harvest	Negative	Low	LSA	Within-Spawning	Long-term	Continuous	Moderate	Reversible	Probable



13.6 Determination of Significance

Several methodologies can be used to determine whether an adverse environmental effect is significant or not significant, as outlined in the Interim Technical Guidance Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under the Canadian Environmental Assessment Act (CEA Agency, 2018). Adverse consequences on the Species at Risk VC would include:

- Wildlife Habitat Loss/Destruction
- Wildlife Habitat Alteration/Degradation;
- Alteration in Wildlife Movement; and
- Wildlife Injury or Death.

As presented in Section 5.2.6 (Environmental Assessment/Impact Assessment Approach: Determination of Significance), a qualitative aggregation method is used to determine significance based on the sequential interaction among the magnitude, geographic extent, duration, frequency, reversibility, and likelihood of occurrence criteria for effects. The net effects criteria are presented in **Table 13-42**. Consideration is also given to potential management concerns, and concerns expressed by Indigenous communities and groups, the public, government agencies and stakeholders raised during engagement and consultation activities conducted for the Project (**Table 13-4** and **Table 13-5**).

The following sequential interactions form the basis for determination of significance of adverse net effects on the Vegetation and Wetland VC:

- A predict net effects is considered not significant if the effect is:
 - Low to negligible in magnitude, Project Footprint in extent, short-term to medium in duration, infrequent to continuous occurrence, reversible to irreversible in nature, and unlikely to certain to occur.
- A predict net effects is considered significant if the effect is:
 - Moderate to high in magnitude, regional in extent, long-term to permanent in duration, continuous in occurrence, irreversible in nature, and probable (likely) or certain to occur.

13.6.1 Caribou (Boreal Population)

In Ontario, Caribou (Boreal population) have been designated as Threatened on the Species at Risk in Ontario List since 2004. The two main reasons for this species' decline are increased predation and habitat loss, the latter resulting from both natural disturbances like fires and anthropogenic activities such as natural resource extraction, which together fragment the landscape, benefit predator and alternate prey species, and ultimately increase predation risk for caribou (COSEWIC, 2014). As part of the existing conditions, the amount of disturbed habitat in the Missisa Range is estimated to be 14.4% of the total range area. Disturbed habitat for the Ozhiski Range is estimated to be 27.6% of the total range area (MNR, 2014d). These numbers remain below the 35% disturbance threshold identified in the federal recovery strategy (ECCC, 2020). The most recent population assessment (MNR, 2014a) for the Missisa Range indicated a declining population trend due to a combined low mean annual survival estimate (80%) and low calf recruitment, such that the range condition may be insufficient to sustain caribou (MNR, 2014d). While population trend data was lacking for the Ozhiski Range, the integrated range assessment determined the range condition is likely sufficient to sustain caribou.



13.6.1.1 Habitat Loss

The net effects of habitat loss is moderate in magnitude during the construction phase and negligible in magnitude during the operations phase. It is projected that 30.6% of caribou Category 1 Nursery Areas and 48.5% of Category 2 Seasonal Ranges in the Caribou LSA will be removed, which are 0.1% and 1.3% of the Caribou RSA, respectively. No other Category 1 High Use Areas will be affected. The resulting losses will effectively be converted into Category 3 Remaining Areas in the Range, increasing by 202.6% in the Caribou LSA and by 4.6% in the Caribou RSA. Overall, habitat loss is predicted to be predicted to be not significant.

13.6.1.2 Habitat Alteration or Degradation

Alteration and degradation of habitat resulting from the construction and operations phases are likely to extend beyond the Project Footprint to the LSA, including changes in habitat structure, hydrological changes and sensory disturbances.

The net effects of alteration of habitat due to changes in habitat structure is moderate in magnitude during the construction phase and negligible in magnitude during operations phase. Construction of the road will lead to edge effects and creation of early seral environments. These vegetation changes will be maintained during road operations, but no new habitat structural changes are expected to be generated as a result. Overall, habitat alteration or degradation due to changes in habitat structure is predicted to be not significant.

The net effects of alteration of habitat due to hydrological changes is moderate in magnitude during the construction phase and low in magnitude during the operations phase. Hydrological changes will occur as a result of road construction. Based on the groundwater assessment these changes will extend into the LSA and persist as long as the roadway remain in place. Overall, habitat alteration or degradation due to hydrological changes is predicted to be not significant.

The net effects of alteration of habitat due to sensory disturbance is moderate in magnitude during the construction and operations phases. Sensory disturbances generated from the construction and operations phases are likely to impact habitat in the LSA, including Nursery Areas and Seasonal Ranges. Overall, habitat alteration or degradation due to sensory disturbance is predicted to be not significant.

13.6.1.3 Alteration in Movement

Alterations in movement resulting from the construction and operations phases are likely to extend beyond the Project Footprint to the RSA, including sensory disturbances and impacts on connectivity.

The net effects of alteration of movement due to sensory disturbance is moderate in magnitude during the construction and operations phases. Caribou are likely to alter their movements as a result of sensory disturbances, which may be experienced 10 to 15 km from the source, can elicit anti-predator behaviours, and may result in home range sizes increasing or shifting. Overall, alteration in movement due to sensory disturbances from the construction and operations phases is predicted to be not significant.

The net effects of alteration of movement due to loss of connectivity is moderate in magnitude during the construction phase and low in magnitude during operations phase. The ROW in both width and length are expected to act as a barrier to caribou movement, with the addition of vehicles from the operations phase potentially creating an extra barrier. Overall, alteration in movement due to loss of connectivity from the construction and operations phases is predicted to be not significant.



13.6.1.4 Injury or Death

The net effects of injury or death due to collisions with vehicles is negligible in magnitude during the construction and operations phases. Collisions with vehicles are expected to be rare as caribou typically avoid roads, are active during daylight hours when visibility is better for vehicle operators, and with mitigation measures enforced. Net effects on caribou are predicted to be not significant.

The net effects of injury or death due to increased access is negligible in magnitude during the construction phase and low in magnitude during operations phase. Increased access may lead to more harvest by Indigenous Peoples or illegal poaching opportunities but are expected to be rare given the low density of the population and existing protections and enforcement for the species. Net effects on caribou are predicted to be not significant.

The net effects of injury or death due to changes to predator-prey dynamics is high in magnitude during the construction phase and moderate in magnitude during operations phase. The ROW is expected to provide predators such as wolves increased access to the caribou RSA, particularly where it traverses natural movement corridors. Overall, caribou injury or death due to changes to predator-prey dynamics during the construction phase is predicted to be significant.

The net effects of injury or death due to increased energy expenditure is 15 for the construction phase and 12 for the operations phase. These indicate a moderate impact resulting from each of the construction and operations phases. Energy expenditures are expected to increase as a result of both the construction and operations phases. Net effects on caribou are predicted to be not significant.

13.6.2 Wolverine

Over the past 200 years, the wolverine range in Ontario has contracted dramatically from being found mostly province-wide to being limited to Ontario's far north today (Ontario Wolverine Recovery Team, 2013). Habitat loss, degradation, and fragmentation are some of the most important threats to their survival and have contributed to the range contraction in Ontario and North America (Ruggerio et al., 1994; Aubry et al., 2007; COSEWIC, 2003). Roads and transmission lines may act as barriers to movement and dispersal and can be a source of mortality due to collisions with vehicles and predator encounters (COSEWIC, 2014; COSSARO, 2014). They are also particularly susceptible to trapping as they travel long distances and are attracted to bait (Ontario Wolverine Recovery Team, 2013). The northern recovery zone in Ontario, within which the Project is situated, is believed to have a stable or increasing population based on aerial survey results (Ontario Wolverine Recovery Team, 2013; ECCC, 2024b).

13.6.2.1 Habitat Loss

The net effects of habitat loss is high in magnitude during the construction phase and negligible in magnitude during operations phase. Wolverines are a far-ranging species that has been detected at survey sites across the Wolverine LSA. As such, the entire Wolverine LSA and project footprint is considered wolverine habitat, with the possible exception of deep lakes (although these are also utilized as travel paths during the winter). It is projected that 3% of wolverine habitat in the LSA will be removed, and 0.49% of habitat in the RSA.

The rarest and most sensitive habitat type for wolverine is denning sites, which are re-used between breeding years and are passed down from mothers to daughters. Dens are often well camouflaged and difficult to detect. One (1) den is known to occur within 400 m of the preferred route and will likely lose



function as denning habitat due to the indirect effects of clearance activities and the construction of the road, as studies have shown females are unlikely to den within several kilometres of roads. Just two (2) reproductively mature females were confirmed to have home ranges in the LSA during baseline studies. The loss of functional denning habitat in the LSA due to the construction of the road cannot be mitigated within the LSA, and as such the negative effect of habitat loss is high in magnitude and predicted to be significant for wolverine.

13.6.2.2 Habitat Alteration or Degradation

Alteration and degradation of habitat resulting from the construction and operations phases will extend to the LSA. Sensory disturbances during the operations phase will degrade several habitat types for wolverine, including movement, foraging, and denning habitats, and there are no mitigation measures that can be applied to reduce these effects. The net effect is predicted to be significant.

13.6.2.3 Alteration in Movement

Alterations in movement due to sensory disturbance and loss of connectivity caused by road construction and operation will extend into the LSA. The resulting impacts to wolverine were scored as low to moderate in magnitude and are expected to be not significant.

13.6.2.4 Injury or Death

With effective implementation of mitigation measures, mortalities due to collisions with vehicles, increased access, changes to predator-prey dynamics, and increased energy expenditure are likely to have a low magnitude negative impact in the LSA as there is a lower likelihood for these effects to occur. Collisions with vehicles will be rare as most travel is anticipated to occur during daylight periods when wolverines are not as active, and wolverines are also less likely to cross the road. Increased access during operations may lead to more trappers using the area and could result in intentional or incidental harvest of wolverine, which is a known threat to the species as they are attracted to bait used by trappers. Changes to predator-prey dynamics are possible as the road will provide a corridor for predators and competitors to travel along, and predators may be attracted to the road for foraging and scavenging opportunities during operations. Wolverines are also known to move more quickly in the presence of roads and avoid roads, which will lead to increased energy expenditures in their home ranges throughout the RSA; however, wolverines are already adapted to move long distances over the landscape through nearly all types of terrain. These effects on survival and reproduction of wolverine are predicted to be not significant.

13.6.3 Little Brown Myotis and Northern Myotis

Little Brown Myotis and Northern Myotis populations in Ontario have been severely decimated by White-nose Syndrome since it was first detected in the province in 2010, with declines believed to be greater than 90% for both species (COSSARO 2012a,b). Specifically, at a hibernaculum in northern Ontario (Cavern Lake, Dorion), hibernating Myotis bats decreased by 87% from 2014 to 2019 (Hooton et al., 2023). Additionally, Little Brown Myotis have been found to experience mortality at wind turbines in Ontario, accounting for 13% of all turbine-related bat mortalities (Davy et al. 2021; Zimmerling and Francis, 2016). There is some evidence that Little Brown Myotis numbers may be stabilizing and gradually increasing in eastern Ontario (Hooton et al., 2023).



13.6.3.1 Habitat Loss

The net effects of habitat loss is moderate in magnitude during the construction phase and negligible in magnitude during operations phase. Due to the dramatic population declines experienced by these *Myotis* species over the last 15-years, they are highly vulnerable to additional threats such as changes in habitat availability and distribution, as well as factors that impact survival and reproduction. Hardwood forest and mixed forest vegetation communities, which contain the most suitable maternity roosting habitat for *Myotis* bats, are rare in the RSA, comprising just 0.42% (189.61 ha and 343.99 ha, respectively) of the entire study area. It is projected that 0.84% (1.60 ha) of hardwood forest and 1.22% (4.21 ha) of mixed forest will be permanently removed in the RSA, representing 1.08% of the most suitable maternity roosting habitat. When removals of conifer swamp (155.6 ha) and conifer forest (150.8 ha) are included as potentially suitable maternity roosting habitat, loss of this habitat assemblage amounts to approximately 4.6% in the LSA and 1.0% in the RSA.

Foraging habitat in the RSA, which is typically over open wetlands, mixed swamps, open water and along riparian areas, comprises 10.6% (13,605.1 ha) of the entire study area. Approximately 0.7% (9.08 ha) of high-use habitat and 0.2% (27.3 ha) of the entire habitat assemblage is projected to be permanently removed in the RSA. With effective implementation of mitigation, the Project is likely to have a low negative impact on habitat availability and distribution. Overall, *Myotis* bat habitat use is projected to decline by 30.4% in the Project Footprint; decline by 11.8% in the LSA; and decline by 0.5% in the RSA as a result of habitat loss. Overall, the loss and destruction of habitat is predicted to be not significant.

13.6.3.2 Habitat Alteration or Degradation

Alteration and degradation of habitat resulting from the Construction and Operations Phases are likely to extend beyond the Project Footprint to the LSA, including changes in habitat structure, hydrological changes and sensory disturbances.

The net effects of alteration of habitat due to changes in habitat structure is moderate in magnitude during construction phase and negligible in magnitude during operations phase. Construction of the road will lead to edge effects and creation of early seral environments. These vegetation changes will be maintained during road operations, but no new habitat structural changes are expected to be generated as a result. Overall, habitat alteration or degradation due to changes in habitat structure is predicted to be not significant.

The net effects of alteration of habitat due to sensory disturbance are low in magnitude during the construction and operations phases. Sensory disturbance and degradation of habitat during the construction phase is expected to be mitigated by noise and light abatement policies. Low traffic levels are likely to limit impacts on foraging bats. Overall, habitat alteration or degradation due to sensory disturbance is predicted to be not significant.

The net effects of alteration of habitat due to hydrological changes are moderate in magnitude during construction phase and negligible in magnitude during operations phase. Hydrological changes will occur as a result of road construction. Based on the groundwater assessment these changes will extend into the LSA and persist as long as the roadway remain in place. While *Myotis* species foraging habitats are strongly associated with surface water features, foraging habitat is likely not limiting. Overall, habitat alteration or degradation due to changes in hydrology are predicted to be not significant.



13.6.3.3 Alteration in Movement

Alterations in movement resulting from the construction and operations phases are likely to extend beyond the Project Footprint to the LSA, including sensory disturbances and impacts on connectivity.

The net effects of alteration in movement due to changes in connectivity are low in magnitude during the construction phase and negligible in magnitude during operations phase. As Little Brown Myotis and Northern Myotis are highly mobile species and coexisted in human-altered environments including fragmented forested habitat, the impacts are predicted to be not significant.

The net effects of alteration in movement due to sensory disturbance are in magnitude during the construction and operations phases and are predicted to be not significant.

13.6.3.4 Injury or Death

With effective implementation of mitigation measures, mortalities due to collisions with vehicles, incidental take, and changes to predator-prey dynamics, are predicted to be not significant.

The net effect for collisions with vehicles is negligible in magnitude during construction phase and low in magnitude during operations phase. Collisions with vehicles will be rare as most travel is anticipated to occur during daylight periods when bats are not active. Net effects on little brown myotis and northern myotis is predicted to be not significant.

The net effect for incidental take is negligible in magnitude during construction phase and low in magnitude during operations phase. Vegetation clearing during the active season may be necessary but should be a rare occurrence and may not include suitable roosting habitat. Net effects on Little Brown Myotis and Northern Myotis is predicted to be not significant.

The net effect for changes to predator-prey dynamics is low in magnitude during the construction and operations phases. Construction of the road will allow some predators, in particular predators that prefer edge environments to increase their movement; however, predators, such as owls, are expected to maintain similar population sizes and rates of predation. Net effects on little brown myotis and northern myotis are predicted to be not significant.

The net effect for increased energy expenditure is low in magnitude during the construction and operations phases. Increased energy expenditures may decrease over time as Little Brown Myotis and Northern Myotis potentially acclimatize to the effects of the road. Net effects on Little Brown Myotis and Northern Myotis is predicted to be not significant.

13.6.4 Evening Grosbeak

In Canada, upland forest birds include Evening Grosbeak, which is both a year-round resident and short-distance migrant to the United States of America. Canada hosts a significant proportion of the Evening Grosbeak breeding population: approximately 52% of the global population (Birds Canada and ECCC, 2024). Since 1970, populations of Evening Grosbeak in Canada have experienced a large decrease, declining by 3.34% each year with the largest decline experienced between 1998 and 2016 (Birds Canada and ECCC, 2024). They are considered to be “Apparently Secure” nationally (N4B) and provincially (S4) (NatureServe, 2024). In the Boreal Softwood Shield (BCR 8), according to Ontario Breeding Bird Atlas data, the Evening Grosbeak population trend shows a decrease of 3% or more (Birds Canada, 2024).



13.6.4.1 Habitat Loss

The net effects of loss/destruction of habitat is moderate in magnitude during construction phase and negligible in magnitude during operations phase. These results are expected as the destruction of Evening Grosbeak habitat is primarily expected during the construction phase of the Project. Conifer forest and mixed forest vegetation communities, which contain Evening Grosbeak habitat, are rare in the RSA, comprising just 7.5% (8,405.38 ha and 343.99 ha, respectively) of the entire study area. It is projected that 7.7% of the available upland forest bird habitat will be permanently removed in the LSA. While habitat is rare, the Project is at the northern extreme of the Evening Grosbeak range. Overall, the loss and destruction of habitat is predicted to be not significant.

13.6.4.2 Habitat Alteration or Degradation

Alteration and degradation of habitat resulting from the construction and operations phases are likely to extend beyond the Project Footprint to the LSA, including changes in vegetation structure and sensory disturbances.

The net effects of alteration of habitat due to sensory disturbance are in magnitude during the construction and operations phases. Sensory disturbance and degradation of habitat during the construction phase is expected to be mitigated by noise and light abatement policies. Based on the short-term nature of the effect and the application of mitigation measures the effect during construction is predicted to be not significant. Sensory disturbance and degradation of habitat during the operations phase is related to traffic noise, given the low levels of traffic, the net effect on Evening Grosbeak is predicted to be not significant.

The net effects of alteration of habitat due to changes in vegetation structure are low in magnitude during the construction and operations phases. Conversion of mature forested areas to early seral habitats and maintenance of these areas during operations may result in degradation of Evening Grosbeak as these habitats may be more exposed to windfall and potential loss of nesting trees and early seral habitats are of little value as breeding habitat. Net effects on Evening Grosbeak is predicted to be not significant.

13.6.4.3 Alteration in Movement

Alterations in movement resulting from the construction and operations phases are likely to extend beyond the Project Footprint to the LSA, including sensory disturbances and impacts on connectivity.

The net effects of alteration in movement due to changes in connectivity are low in magnitude during the construction and operations phases. Linear features have been found to act as barriers to movement for forest specialists but in most cases the linear feature is much wider and the bird species that treated it as a barrier. Given that Evening Grosbeak has not been found to respond negatively to forest edges and can often be found on roads and ROWs, changes in movement due to connectivity are predicted to be not significant.

The net effects of alteration in movement due to sensory disturbance are low in magnitude during the construction and operations phases. Both noise and light may alter Evening Grosbeak movements; however, with mitigation measures, tolerance of humans in urban settings and in consideration of the use of roads with low traffic levels by Evening Grosbeak, sensory disturbance is predicted to cause a not significant effect on movement.



13.6.4.4 Injury or Death

With effective implementation of mitigation measures, mortalities due to collisions with vehicles, incidental take, and changes to predator-prey dynamics, are predicted to be not significant.

The net effect for collisions with vehicles is low impact in magnitude during the construction and operations phase. Effective enforcement is expected during the construction phase and predicted to be not significant. While mitigations may be less effective during operations, collisions with vehicles will be rare as traffic volume is expected to remain low at 500 vehicles per day and while Evening Grosbeak can suffer large numbers of deaths these are in areas of Spruce Budworm outbreak which occur outside the RSA.

The net effect for incidental take is negligible in magnitude during the construction and operations phases. Vegetation clearing during the active season may be necessary but should be a rare occurrence and may not include suitable nesting habitat. Maintenance activities will take place over a longer time but will likely be smaller in scale and few mature trees preferred by Evening Grosbeak will be cut. With appropriate mitigation measures such as timing windows, mortalities will remain rare and the effect is predicted to be not significant.

The net effect for changes to predator-prey dynamics is low in magnitude during the construction and operations phases. Construction of the road will allow some predators, in particular predators that prefer edge environments to increase their movement. For these Evening Grosbeak these include Sharp-shinned Hawk, and Common Raven; however, only a few individuals close to the ROW may be exposed to the increased predation. Additionally, mitigations around food storage, garbage removal and roadkill will limit predator attraction to the ROW. Increased predation is predicted to have a not significant impact on survival and reproduction of Evening Grosbeak.

13.6.5 Olive-sided Flycatcher

Olive-sided Flycatcher range throughout forested regions of Canada (COSEWIC, 2018). In the boreal ecozones, it is most common in open spruce and tamarack muskeg, bogs, and swamps (BSI, 2024). In terms of population in the boreal, 57% of the North American population is estimated to breed within the boreal (BSI, 2024).

Since the 1970's, populations of Olive-sided Flycatcher in Canada have experienced a large decrease, declining by 2.53% each year and staying well below the population goal range since the late 1970's (Birds Canada and ECCC, 2024). In Ontario's boreal the population has declined, less so in the Hudson Bay Lowland areas of the range but the degree is uncertain due to data deficiency. Threats to Olive-sided Flycatcher include changes to fires regimes, and reductions in insect populations. Resource development in its breeding range may provide a minor impact threat (EEEEC, 2018).

13.6.5.1 Habitat Loss

The net effect net effects of loss/destruction of habitat is in magnitude during construction phase and negligible in magnitude during operations phase. These results are expected as the destruction of Olive-sided Flycatcher habitat is primarily expected during the construction phase of the Project. In northern Ontario, Olive-sided Flycatcher nests in habitat mosaics, forested edges surrounded by open habitats of fens, bogs and swamps dominated by spruce and tamarack (COSEWIC, 2018). This type of habitat is relatively common in the study area, so foraging and breeding habitats not expected to be limited. Overall, the loss and destruction of habitat is predicted to be not significant.



13.6.5.2 Habitat Alteration or Degradation

Alteration and degradation of habitat resulting from the construction and operations phases are likely to extend beyond the Project Footprint to the LSA, including hydrological changes and sensory disturbances.

The net effect net effects of alteration of habitat due to hydrological changes are moderate in magnitude during Construction Phase and negligible in magnitude during operations phase. Hydrological changes will occur as a result of road construction. Based on the groundwater assessment these changes will extend into the LSA and persist as long as the roadway remain in place. While rated as moderate in magnitude, they are predicted to be not significant. During operations small changes in hydrology may occur due to plugged culverts or temporary diversions; however, with implementation of effective maintenance the effects should be short-term and reversible.

The net effect net effects of alteration of habitat due to sensory disturbance are low in magnitude during the construction and operations phases. Sensory disturbance and degradation of habitat during the construction phase is expected to be mitigated by noise and light abatement policies. Based on the short-term nature of the effect and the application of mitigation measures the effect during construction is predicted to be not significant. Sensory disturbance and degradation of habitat during the operations phase is related to traffic noise and given the low levels of traffic the net effect on Olive-sided Flycatcher is predicted to be not significant.

13.6.5.3 Alteration in Movement

Alterations in movement resulting from the construction and operations phases are likely to extend beyond the Project Footprint to the LSA, including sensory disturbances and impacts on connectivity.

The net effect net effects of alteration in movement due to sensory disturbance are low in magnitude during the construction phase and negligible in magnitude during operations phase. Both noise and light may alter Olive-sided Flycatcher movements; however, with mitigation measures, and in consideration of the resilient nature of Olive-sided Flycatcher to vehicle noise at low disturbance levels, sensory disturbance is predicted to cause a not significant effect on movement.

The net effect net effects of alteration in movement due to changes in connectivity are low in magnitude during the construction and operations phases. Linear features have been found to act as barriers to movement but in most cases the linear feature is much wider and the bird species that treated it as a barrier were generally forest specialists. Given that Olive-sided Flycatcher prefers habitat mosaics and uses edge habitats, changes in movement due to connectivity are predicted to be not significant.

13.6.5.4 Injury or Death

With effective implementation of mitigation measures, mortalities due to collisions with vehicles, incidental take, and changes to predator-prey dynamics, are predicted to be not significant.

The net effect for collisions with vehicles is negligible in magnitude during the construction phase and low in magnitude during the operations phase. Effective enforcement is expected during the construction phase and predicted to be not significant. While mitigations may be less effective during operations, collisions with vehicles will be rare as traffic volume is expected to remain low at 500 vehicles per day and Olive-sided Flycatcher perching and foraging flights are generally higher up in the canopy



The net effect for incidental take is negligible in magnitude during the construction and operations phases. Vegetation clearing during the active season may be necessary but should be a rare occurrence and may not include suitable nesting habitat. Maintenance activities will take place over a longer time but will likely be smaller in scale and few mature trees preferred by Olive-sided Flycatcher will be cut. With appropriate mitigation measures such as timing windows, mortalities will remain rare and the effect is predicted to be not significant.

The net effect for changes to predator-prey dynamics is low in magnitude during the construction and operations phases. Construction of the road will allow some predators, in particular predators that prefer edge environments to increase their movement. For Olive-sided Flycatcher these include Canada Jay, Sharp-shinned Hawk, Common Raven and Red Squirrel; however, only a few individuals close to the ROW may be exposed to the increased predation. Additionally, mitigations around food storage, garbage removal and roadkill will limit predator attraction to the ROW. The effect of increased predation is expected to have a not significant impact on survival and reproduction of Olive-sided Flycatcher.

13.6.6 Rusty Blackbird

Rusty Blackbird range throughout Canada in all provinces and territories (COSEWIC, 2017). In the boreal ecozones, its preferred breeding habitat includes meadows, beaver ponds, muskegs, swamps and riparian areas (COSEWIC, 2017). In terms of population in the boreal, 85% of the North American population is estimated to breed within the boreal (BSI, 2024).

Since the 1970's, populations of Rusty Blackbird in Canada have experienced a large decrease, declining by -1.91% each year and staying well below the population goal range since before the 1970's (Birds Canada and ECCC, 2024). In Ontario's boreal the population has declined in the Boreal Shield and the Hudson Bay Lowland areas of the range, decreasing over 3% per year. Threats to Rusty Blackbird in Canada include changes to forest clearing, and changes in wetland hydrology. Mercury contamination in its breeding range may provide a minor threat (ECCC, 2015).

13.6.6.1 Habitat Loss

The net effect net effects of loss/destruction of habitat is moderate in magnitude during construction phase and negligible in magnitude during operations phase. The destruction of Rusty Blackbird habitat is primarily expected to result from the construction phase of the Project. In northern Ontario, Rusty Blackbird nests in young coniferous trees, 1-3 m high, surrounded by open habitats of fens, bogs and riparian areas (COSEWIC, 2017). This type of habitat is relatively common in the study area, so foraging and breeding habitats are not expected to be limited. Overall, the loss and destruction of habitat is predicted to be not significant.

13.6.6.2 Habitat Alteration or Degradation

Alteration and degradation of habitat resulting from the construction and operations phases are likely to extend beyond the Project Footprint to the LSA, including edge effects, hydrological changes and sensory disturbances.

The net effect net effects of alteration of habitat due to hydrological changes are moderate in magnitude during Construction Phase and negligible in magnitude during operations phase. Hydrological changes will occur as a result of road construction. Rusty Blackbird requires shallow waterbodies for foraging so changes could alter feeding habitat. Based on the groundwater assessment these changes will extend



into the LSA and persist as long as the roadway remain in place. While rated as moderate in magnitude, they are predicted to be not significant. During operations small changes in hydrology may occur due to plugged culverts or temporary diversions; however, with implementation of effective maintenance the effects should be short-term and reversable.

The net effect net effects of alteration of habitat due to sensory disturbance are low in magnitude during the construction and operations phases. Rusty Blackbird show aversion to roads in some cases; however, other studies have not seen a disturbance impact. Sensory disturbance and degradation of habitat during the construction phase is expected to be mitigated by noise and light abatement policies. Based on the short-term nature of the effect and the application of mitigation measures, the net effect during construction is predicted to be not significant. Sensory disturbance and degradation of habitat during the operations phase is related to traffic noise, given the low levels of traffic, the net effect on Rusty Blackbird is predicted to be not significant.

13.6.6.3 Alteration in Movement

Alterations in movement resulting from the construction and operations phases are likely to extend beyond the Project Footprint to the LSA, including sensory disturbances and impacts on connectivity.

The net effect net effects of alteration in movement due to sensory disturbance are low in magnitude during the construction and operations phases. Rusty Blackbird has shown to be neophobic and displays some avoidance of roads; however, with mitigation measures during construction, and in consideration of the low levels of vehicle traffic during operations, sensory disturbance is not expected to cause a not significant effect on movement.

The net effect net effects of alteration in movement due to changes in connectivity are low in magnitude during the construction and operations phases. Linear features have been found to act as barriers to movement but in most cases the linear feature is much wider and the bird species that treated it as a barrier were generally forest specialists. Rusty Blackbird uses edge habitats and early seral vegetation and make use of open habitats, similar to other non-forest specialists, changes in movement due to connectivity are predicted to be not significant.

13.6.6.4 Injury or Death

With effective implementation of mitigation measures, mortalities due to collisions with vehicles, incidental take, and changes to predator-prey dynamics, are predicted to be not significant.

The net effect for collisions negligible in magnitude during the construction phase and low in magnitude during the operations phase. Effective enforcement is expected during the construction phase and predicted to be not significant. While mitigations may be less effective during operations, collisions with vehicles will be rare as traffic volume is expected to remain low at 500 vehicles per day

The net effect for incidental take is negligible in magnitude during the construction phase and low in magnitude during the operations phase. Vegetation clearing during the active season may be necessary but should be a rare occurrence and may not include suitable nesting habitat. Maintenance activities will take place over a longer time but will likely be smaller in scale. Rusty Blackbirds prefer young conifers 1-3 m tall so they may nest in areas which will undergo maintenance clearing during the operations phase. With appropriate mitigation measures such as timing windows, mortalities will remain rare and the net effect is predicted to be not significant.



The net effect for changes to predator-prey dynamics is low in magnitude during the construction and operations phases. Construction of the road will allow some predators, in particular predators that prefer edge environments to increase their movement. For Rusty Blackbird these include Canada Jay, Sharp-shinned Hawk, Common Raven and Red Squirrel. Given indications of road avoidance by Rusty Blackbird, only a few individuals close to the ROW may be exposed to the increased predation. Additionally, mitigations around food storage, garbage removal and roadkill will limit predator attraction to the ROW especially during construction. The effect of increased predation is expected to have a not significant effect on survival and reproduction of Rusty Blackbird.

13.6.7 Lesser Yellowlegs

Lesser Yellowlegs range throughout the boreal regions of Canada except for eastern parts Labrador and Newfoundland. In Ontario, the Hudson Bay Lowlands and areas of the boreal forest north of approximately 51° are considered in the breeding range of Lesser Yellowlegs (COSEWIC, 2020). In terms of population in the boreal, 94% of the North American population is estimated to breed within the boreal (BSI, 2024).

Since 1980, populations of Lesser Yellowlegs in Canada have experienced a large decrease, declining by 3.76% each year and staying well below the population goal range since the late 1990's (Birds Canada and ECCC, 2024). In Ontario's boreal the population has declined, less so in the southern areas of the range but this degree is uncertain due to data deficiency. Threats to Lesser Yellowlegs including habitat loss through shoreline development, agriculture and hunting, and are mainly found within its migration and wintering range. Resource development in its breeding range may provide a minor impact threat (EDEC, 2018).

13.6.7.1 Habitat Loss

The net effect of loss/destruction of habitat is moderate in magnitude during construction phase and negligible in magnitude during operations phase. The destruction of Lesser Yellowlegs habitat is primarily expected as a result of the construction phase of the Project. Lesser Yellowlegs nests in open habitats, primarily in drier areas surrounded by open wetlands, specifically large open fens with open waterbodies (COSEWIC, 2020) and raised open areas like regenerating burns that retain their wetland features (Cadman et al., 2007). This type of habitat is relatively common in the study area, so foraging and breeding habitats not expected to be limited. Overall, the loss and destruction of habitat is predicted to be not significant.

13.6.7.2 Habitat Alteration or Degradation

Alteration and degradation of habitat resulting from the construction and operations phases are likely to extend beyond the Project Footprint to the LSA, including changes in vegetation structure, hydrological changes and sensory disturbances.

The net effect of alteration of habitat due to changes in vegetation structure are low in magnitude during the construction and operations phases. Both the initial clearing and subsequent maintenance will create a distinctive edge between the ROW and the adjacent natural habitat. For Lesser Yellowlegs it is expected that this edge is predicted to have a not significant impact due to its use of existing open habitats, its ability to use disturbed areas and the low levels of traffic.



The net effect of alteration of habitat due to hydrological changes are moderate in magnitude during construction phase and negligible in magnitude during m operations phase. Hydrological changes will occur as a result of road construction. Based on the groundwater assessment these changes will extend into the LSA and persist as long as the roadway remain in place. While the net effects are rated as moderate in magnitude, they are predicted to be not significant. During operations small changes in hydrology may occur due to plugged culverts or temporary diversions; however, with implementation of effective maintenance the effects should be short-term and reversable. Overall, changes in habitat are predicted to be not significant.

The net effect of alteration of habitat due to sensory disturbance are low in magnitude during the construction and operation phases. Sensory disturbance and degradation of habitat during the construction phase is expected to be mitigated by noise and light abatement policies. Based on the short-term nature of the effect and the application of mitigation measures the effect during construction is predicted to be not significant. Sensory disturbance and degradation of habitat during the operations phase is related to traffic noise, given the low levels of traffic, the net effect on Lesser Yellowlegs is predicted to be not significant.

13.6.7.3 Alteration in Movement

Alterations in movement resulting from the construction and operations phases are likely to extend beyond the Project Footprint to the LSA, including sensory disturbances and impacts on connectivity.

The net effect of alteration in movement due to sensory disturbance are low in magnitude during the construction and operations phases. Both noise and light may alter Lesser Yellowlegs movements; however, with mitigation measures, and in consideration of the resilient nature of Lesser Yellowlegs to anthropogenic disturbance, sensory disturbance is predicted to cause a not significant effect on movement.

The net effect of alteration in movement due to changes in connectivity are in magnitude during the construction and operations phases. Linear features have been found to act as barriers to movement but in most cases the linear feature is much wider and the bird species that treated it as a barrier were generally forest specialists. Given that Lesser Yellowlegs prefers open habitats and uses disturbed habitats, changes in movement due to connectivity are predicted to be not significant.

13.6.7.4 Injury or Death

With effective implementation of mitigation measures, mortalities due to collisions with vehicles, incidental take, and changes to predator-prey dynamics, are predicted to be not significant.

The net effect for collisions is negligible in magnitude during the construction phase and low in magnitude during operations phase. Effective enforcement is expected during the construction phase. While mitigations may be less effective during operations, collisions with vehicles will be rare as traffic volume is expected to remain low at 500 vehicles per day.

The net effect for incidental take is negligible in magnitude during the construction and operations phases. Vegetation clearing during the active season may be necessary but should be a rare occurrence and may not include suitable nesting habitat. Maintenance activities will take place over a longer time but will likely be smaller in scale. With appropriate mitigation measures such as timing windows, mortalities will remain rare and the effect is predicted to be not significant.



The net effect for predation is low in magnitude during the construction and operations phases. Construction of the road will allow some predators, in particular land predators that predate on shorebirds like Lesser Yellowlegs to increase their movement. Foxes in particular are known to have impacts on shorebird populations; however, only a few individuals close to the ROW may be exposed to the increased predation. Additionally, mitigations around food storage, garbage removal and roadkill will limit predator attraction to the ROW. The effect of increased predation is predicted to have a not significant impact on survival and reproduction of Lesser Yellowlegs.

13.6.8 Common Nighthawk

Common Nighthawk range throughout Canada south of the treeline except for parts Labrador and Newfoundland. In Ontario, only the coastal regions of Hudson Bay are not considered within the Common Nighthawk range (COSEWIC, 2018). In terms of population in the boreal, 6% of the North American population is estimated to breed within the boreal (BSI, 2024). Since 1970, populations of Common Nighthawk in Canada have experienced a large decrease, declining by 2.21% each year and staying well below the population goal range since 1975 (Birds Canada and ECCO, 2024). In Ontario's boreal the population has declined but the degree is uncertain due to data deficiency. Threats to Common Nighthawk including pesticide use, agriculture and habitat loss and are mainly found in more southern areas of its range (EHEC, 2018).

13.6.8.1 Habitat Loss

The net effect of loss/destruction of habitat is moderate in magnitude during construction phase and negligible in magnitude during operations phase. These results are expected as the destruction of Common Nighthawk habitat is primarily expected during the construction phase of the Project. Common Nighthawk nests in open habitats, in the boreal Common Nighthawks are often disturbance specialist using post burn habitats as well as rocky outcrops, dry bogs and pine forests. This habitat is relatively rare in the study area, except for bogs where drier microhabitats are not quantified and therefore introduce some uncertainty. Foraging habitat is not expected to be limited.

13.6.8.2 Habitat Alteration or Degradation

Alteration and degradation of habitat resulting during the Construction and Operations Phases are likely to extend beyond the Project Footprint to the LSA, including hydrological effects and sensory disturbances. The net effect of alteration of habitat due to hydrological changes are moderate in magnitude during construction phase and negligible in magnitude during operations phase. Hydrological changes will occur as a result of road construction. Based on the groundwater assessment these changes will extend into the LSA and persist as long as the roadway remain in place. While rated as moderate, they are predicted to be not significant. During operations small changes in hydrology may occur due to plugged culverts or temporary diversions; however, with implementation of effective maintenance the effects should be short-term and reversible.

Alteration and degradation of habitat resulting from sensory disturbance is only expected in the construction phase, where rated as low in magnitude. Based on the short-term nature of the effect and the application of mitigation measures the net effect is predicted to be not significant.



13.6.8.3 Alteration in Movement

Alterations in movement due to sensory disturbance is expected in the Construction Phase only. The net effect during the construction phase is predicted to be low in magnitude. Both noise and light may alter Common Nighthawk movements; however, with mitigation measures, and in consideration of the resilient nature of Common Nighthawk to anthropogenic disturbance, construction of the road is predicted to cause a not significant effect on movement.

13.6.8.4 Injury or Death

With effective implementation of mitigation measures, mortalities due to collisions with vehicles, incidental take, and changes to predator-prey dynamics, are predicted to be not significant.

The net effect for collisions is low in magnitude during the construction and operations phases. Effective enforcement is expected during the construction phase. While mitigations may be less effective during operations, collisions with vehicles will be rare as traffic volume is expected to remain low at 500 vehicles per day; however, vehicle collision are a known concern for Common Nighthawk. Paving of the road will further lessen collisions during operations.

The net effect for incidental take is negligible in magnitude during the construction and operations phases. Vegetation clearing during the active season may be necessary but should be a rare occurrence and may not include suitable nesting habitat. With appropriate mitigation measures such as timing windows, mortalities will remain rare and the net effect is predicted to be not significant.

The net effect for predation is low in magnitude during the construction and operations phases. Construction of the road will allow some predators, in particular land predators that can predate on Common Nighthawk to increase their movement; however, only a few individuals may be exposed to the increased predation. The net effect of increased predation on survival and reproduction of Common Nighthawk is predicted to be not significant.

13.6.9 Bald Eagle

Bald Eagles range throughout North America, breeding throughout much of Canada and the U.S.A. In northern Canada it is considered to be a partial or short-distance migrant to southern portions of the country, coastal regions, and further south into the U.S.A. and Mexico (Buehler, 2022). Canada hosts a high proportion of the Bald Eagle breeding population: approximately 55% of the global population (Birds Canada and ECCC, 2024). Since 1970, populations of Bald Eagle in Canada have experienced a large increase, rising by 4.39% each year and recently (c. 2020) reaching the population goal range (Birds Canada and ECCC, 2024). In 2022, the Committee on the Status of Species at Risk in Ontario (COSSARO) assessed Bald Eagle as “Not at Risk”, attributed to the species recovery and presence throughout much of its former southern Ontario range, and it was removed from its listing as Special Concern under the *Endangered Species Act, 2007* in 2023. They are considered to be “Secure” in their breeding population nationally (N5B) and are “Apparently Secure” provincially (S4B) (NatureServe, 2024). In the Boreal Softwood Shield (BCR 8), according to Ontario Breeding Bird Atlas data, the Bald Eagle population trend shows an increase of greater than 3% (Birds Canada, 2024).



13.6.9.1 Habitat Loss

The net effect of loss/destruction of habitat is moderate in magnitude during construction phase and negligible in magnitude during operations phase. Upland forest communities are limited in the LSA, comprising just 7.5% (2,066.93 ha) of the Local study area. It is projected that 4.2% of the forested habitat will be permanently removed in the LSA; however, these areas are unlikely to provide nesting habitat for Bald Eagle as no nests have been observed within 1 km of the proposed route. A very minimal amount of open water habitat will be removed, representing 0.35% of all removals.

13.6.9.2 Habitat Alteration or Degradation

Alteration and degradation of habitat resulting from the construction and operations phases are likely to extend beyond the Project Footprint to the LSA, including changes in vegetation structure, hydrological changes and sensory disturbances.

The net effect of alteration of habitat due to vegetation structural changes are low in magnitude during the construction and operations phases. Conversion of mature forested areas to early seral habitats and maintenance of these areas during operations may result in degradation of Bald Eagle habitat as these habitats may be more exposed to windfall and potential loss of nesting trees and early seral habitats are of little value as breeding habitat.

The net effect of alteration of habitat due to hydrological changes are moderate in magnitude during construction phase and negligible in magnitude during operations phase. Hydrological changes will occur as a result of road construction. Based on the groundwater assessment these changes will extend into the LSA and persist as long as the roadway remain in place. While rated as moderate in magnitude, for the potential loss of nest trees they are predicted to be not significant. During operations, small changes in hydrology may occur due to plugged culverts or temporary diversions; however, with implementation of effective maintenance the effects should be short-term and reversable; however, some edge trees may become useful perching trees.

The net effect of alteration of habitat due to sensory disturbance are low in magnitude during the construction and operations phases. Sensory disturbance and degradation of habitat during the construction phase is expected to be mitigated by noise and light abatement policies. Based on the short-term nature of the effect and the application of mitigation measures the effect during construction the net effect is predicted to be not significant. Sensory disturbance and degradation of habitat during the operations phase is related to traffic noise, and human use along waterways. Given the low levels of traffic and use the net effect on Blad Eagles habitat is predicted to be not significant.

13.6.9.3 Alteration in Movement

Alterations in movement due to sensory disturbance caused by road construction and operation are expected to have low and negligible magnitude effects in the LSA, resulting in a net effect that s predicted to be not significant.

The net effect of alteration in movement due to sensory disturbance are moderate in magnitude during construction phase and low in magnitude during operations phase. Both noise and human presence may alter Bald Eagle movement. Enforcement of mitigation measures during the construction phase and the low levels of human use during the operations phase should minimize sensory disturbance impacts. Overall, as Bald Eagles are highly mobile and do not appear to avoid roads with low volumes when carrying out movements, the effects are predicted to be not significant.



13.6.9.4 Injury or Death

With effective implementation of mitigation measures, mortalities due to collisions with vehicles, incidental take, and changes to predator-prey dynamics, are predicted to be not significant.

The net effect for collisions is negligible in magnitude during the construction phase and low in magnitude during operations phase. Effective enforcement is expected during the construction phase. While mitigations may be less effective during operations, collisions with vehicles will be rare as traffic volume is expected to remain low in magnitude at 500 vehicles per day and Bald Eagles rarely suffers mortalities from collisions.

The net effect for incidental take is negligible in magnitude during the construction and operations phases. While vegetation clearing during the active season may be necessary, it should be a rare occurrence and will not likely include suitable nesting habitat. With appropriate mitigation measures such as timing windows, mortalities due to disturbance or destruction of Bald Eagle nesting habitat are less likely to occur, and given Bald Eagles select nest sites more than 100 m from roads, maintenance activities during operations are unlikely to result in incidental take.

The net effect for predation is negligible in magnitude during the construction and operations phases. While predators such as raptors, corvids, bears, and wolverine are expected to use the road corridor to travel and hunt, due to the distance to potential Bald Eagle nesting habitat (> 100 m), presence of the road is unlikely to provide any advantage to these species to access nests. These effects are predicted to have a not significant impact on survival and reproduction of Bald Eagle.

13.6.10 Short-eared Owl

Short-eared Owl is one of the world's most widely distributed birds, found on all continents apart from Australia and Antarctica. In northern Canada it is considered to be a partial or short-distance migrant to southern portions of the country (e.g., southern Ontario) and further south into the United States of America and Mexico (Wiggins et al., 2020). Canada hosts a low proportion of the Short-eared Owl breeding population: approximately 1.3% of the global population (Birds Canada and ECCC, 2024). Since 1970, populations of Short-eared Owl in Canada have experienced a large decrease, declining by 1.59% each year and staying well below the population goal range since 1975 (Birds Canada and ECCC, 2024). They are considered to be "Apparently Secure" in their breeding population nationally (N4B) and provincially (S4B) (NatureServe, 2024). In the Boreal Softwood Shield (BCR 8), according to Ontario Breeding Bird Atlas data, the Short-eared Owl population trend shows a decrease of 0.5% to 1.3 (Birds Canada, 2024).

13.6.10.1 Habitat Loss

The net effect of loss/destruction of habitat is moderate in magnitude during construction phase and negligible in magnitude during operations phase. Suitable vegetation communities, which contain Short-eared Owl habitat, are uncommon but rare in the LSA and RSA, comprising just 17.69 and 22.8% (4892.79 ha and 29523.31 ha, respectively) of the entire study area. It is projected that 1.64% of the available preferred roosting, breeding, and foraging habitat will be permanently removed in the LSA. The negative effect of habitat loss is moderate in low and therefore predicted to be not significant for Short-eared Owl.



13.6.10.2 Habitat Alteration or Degradation

Alteration and degradation of habitat resulting from the construction and operations phases are likely to extend beyond the Project Footprint to the LSA, including hydrological changes and sensory disturbances.

The net effect of alteration of habitat due to hydrological changes are moderate in magnitude during construction phase and negligible in magnitude during operations phase. Hydrological changes will occur as a result of road construction. Based on the groundwater assessment these changes will extend into the LSA and persist as long as the roadway remain in place. While rated as moderate in magnitude, net effects are predicted to be not significant. During operations small changes in hydrology may occur due to plugged culverts or temporary diversions; however, with implementation of effective maintenance the effects should be short-term and reversable.

The net effect of alteration of habitat due to sensory disturbance are low in magnitude during the construction and operations phases. Sensory disturbance and degradation of habitat during the construction phase is expected to be mitigated by noise and light abatement policies with impacts from lighting potentially acting as a positive impact. Based on the short-term nature of the effect and the application of mitigation measures the effect during construction is predicted to be not significant. Sensory disturbance and degradation of habitat during the operations phase is related to traffic noise, given the low levels of traffic, the net effects are predicted to be not significant on Short-eared Owl habitat.

13.6.10.3 Alterations in Movement

Alterations in movement due to sensory disturbance caused by road construction are expected to affect Short-eared Owls in the Project Footprint and LSA resulting in low magnitude effects. low in magnitude during the construction phase. Both noise and light may alter Short-eared Owl movements; however, with mitigation measures, and in consideration of the resilient nature of owls to anthropogenic disturbance, sensory disturbance is predicted to cause a not significant effect on movement.

13.6.10.4 Injury or Death

With effective implementation of mitigation measures, mortalities due to collisions with vehicles, incidental take, and changes to predator-prey dynamics, are predicted to be not significant.

Roads are recognized by the federal Short-eared Owl management plan (ECCC, 2018) as a high (continuing) immediate threat, but the impact and severity are unknown. The COSEWIC (2021) assessment identified roads as a “low” threat, primarily from a road mortality perspective.

The net effect for collision with vehicles is negligible in magnitude during the construction phase and low in magnitude during the operations phase. Effective enforcement is expected during the construction phase. While mitigations may be less effective during operations, collisions with vehicles will be rare as traffic volume is expected to remain low at 500 vehicles per day.

The net effect for incidental take is negligible in magnitude during the construction and operations phases. With appropriate mitigation measures such as timing windows, mortalities due to disturbance or destruction of Short-eared Owl nesting habitat are less likely to occur. Short-eared Owls are unlikely to nest in roadside environments or where vegetation clearing is necessary.



The net effect for changes to predator-prey dynamics is low in magnitude during the construction and operations phases. While predators such as Red-tailed Hawk and Great Horned Owl are expected to use the road corridor to travel and hunt, it is unlikely that predator species would exceed their carrying capacity without additional fitness drivers (e.g., human-subsidized food and shelter). Additionally, the potential predator species identified in **Section 13.3.10.4** are not known to rely on Short-eared Owls or their nests as a major source of prey (Wiggins et al., 2020; Preston and Beane, 2024; Artuso et al., 2022). These effects are predicted to have a not significant impact on survival and reproduction of Short-eared Owls.

13.6.11 Lake Sturgeon (Hudson Bay – James Bay population)

The quantitative aggregation assessment for the Lake Sturgeon and Lake Sturgeon Habitat VC are presented in . Although net effects on Lake Sturgeon and Lake Sturgeon habitat are expected to occur, due to the limited size of the roadway and the effectiveness of proposed mitigation measures, the Project's net effects are considered to be negligible to low in magnitude.

13.6.11.1 Destruction of Lake Sturgeon Habitat

Destruction of Lake Sturgeon Habitat due to instream activities for construction of bridges is expected in the construction phase only. The net effect for destruction of habitat is low in magnitude. There is an expected destruction of 687.5 m² of aquatic habitat, all caused by construction of bridge footings in locations where bridges are required to cross watercourses or waterbodies. In addition, fish habitat provided by the riparian areas surrounding watercourses is expected to be destroyed along the road ROW; however, Lake Sturgeon are rarely associated with aquatic vegetation. This habitat, while important, is abundant throughout the region and the effect of the road is predicted to cause a not significant effect on the available Lake Sturgeon habitat.

13.6.11.2 Harmful Alteration and Disruption of Lake Sturgeon Habitat

Harmful alteration and disruption of Lake Sturgeon habitat resulting from the construction and operations phases are likely to extend beyond the Project Footprint to the LSA, including materials placement, removal of riparian vegetation, hydrological changes, sedimentation and erosion and road maintenance activities.

Harmful alteration and disruption of fish habitat due to materials placement is expected in the construction phase only. The net effect for harmful alteration and disruption of fish habitat due to materials placement is expected to be low in magnitude. Modified habitat is expected to be limited to bridge footings and armouring around the six larger crossings. Given the limited footprint of the footings and armouring, the net effect is predicted to be not significant.

Harmful alteration and disruption of fish habitat due to removal of riparian vegetation is expected in the construction phase only. The net effect for harmful alteration and disruption of fish habitat due to removal of riparian vegetation is low in magnitude. Based on the short-term nature of the effect and the application of mitigation measures the effect is predicted to be not significant.

The net effect for changes to Hydrology is negligible in magnitude during the construction and operations phases. Based on the short-term nature of the effect and the application of mitigation measures the net effect is predicted to be not significant.



The net effect for reduced surface water quality from erosion, sedimentation, and depositions of contaminants is negligible in magnitude during the construction and operations phases. Increased sedimentation and erosion is also expected to occur downstream for a shorter (2-3 year) period of time post-construction, which may cause some temporary habitat avoidance (disruption), but this will resolve once the locations stabilize. This erosion and sedimentation may temporarily disrupt up to 25.4 hectares of downstream aquatic habitat. This effect is predicted to have a not significant impact on Lake Sturgeon habitat.

The net effect for introduction of invasive species is negligible in magnitude during the construction and operations phases. During the construction phase mitigation measures including vehicle inspections will minimize the potential of introduction of invasives. Monitoring for invasives will continue throughout construction and operations. With appropriate mitigation measures, introductions will remain rare and the net effect is predicted to be not significant.

Harmful alteration and disruption of fish habitat due to road maintenance activities is expected in the operations phase only. The net effect for harmful alteration and disruption of fish habitat due to road maintenance activities is negligible in magnitude. Effects during operations are expected to be short-lived and localized. Based on the short-term nature of the effect and the application of mitigation measures the effect is predicted to be not significant.

13.6.11.3 Barriers to Lake Sturgeon Passage

Barriers to Fish Passage due to isolation structures for instream construction of bridges is expected in the construction phase only. The net effect for barriers to Fish Passage due to isolation structures for instream construction of bridges is low in magnitude. Barriers to fish passage will be temporarily established during construction but will be very short in duration as bridges are installed. Bridges over larger watercourse and waterbody crossings will eliminate the potential for barriers at the six locations they are planned.

13.6.11.4 Injury or Death of Lake Sturgeon

With effective implementation of mitigation measures, mortalities due to material placement, dewatering and fish salvage during construction and maintenance activities, are predicted to be not significant for Lake Sturgeon.

The net effect for injury or death of fish by material placement, blasting, dewatering, and fish salvage during the construction phase is negligible in magnitude. It is expected that a small number of fish will be killed as a result of construction, as fish salvage efforts are never 100% effective; however, the mitigation measures selected will likely limit this to fish on an individual level and will not affect the local or regional populations of fish species. Additionally, due to the relatively large size and rarity of Lake Sturgeon, it is expected that this number will be minimal. With appropriate mitigation measures such as timing windows, mortalities will remain rare and the effect is predicted to be not significant.

Injury or death of fish due to maintenance activities is expected in the operations phase only. The net effect for injury or death of fish due to maintenance activities is negligible in magnitude. Road maintenance may require in-water works and isolation occasionally; however, these occurrences will be rare along the larger rivers where Lake Sturgeon may be present. The effect of in-water maintenance activities is predicted to have a not significant impact on survival of Lake Sturgeon.



13.6.11.5 Changes in Public Access

Increased harvest due to changes in public access is expected in the operations phase only. The net effect for increased harvest due to changes in public access is moderate in magnitude. Lake Sturgeon is found within major rivers of the James Bay Lowlands and Boreal Forest. It is vulnerable to harvest because of its slow reproductivity; however, most of the watercourses will remain generally inaccessible. Although there may be low to moderate changes to population abundance for Lake Sturgeon within some watercourses where access is improved, the long distance between the Project and major population centers will limit this impact. As a result, the operation of the road is predicted to cause a not significant effect on harvest of Lake Sturgeon.

13.7 Cumulative Effects

In addition to assessing the net environmental effects of the Project, the assessment for Species at Risk also evaluates and assesses the significance of net effects from the Project that overlap temporally and spatially with effects from other past, present and reasonably foreseeable developments (RFDs) and activities (i.e., cumulative effects).

For a valued component that has identified net effects where the magnitude was determined to be higher than low, it is necessary to determine if the effects from the Project interact both temporally and spatially with the effects from one or more past, present RFDs or activities, since the combined effects may differ in nature or extent from the effects of individual Project activities. Where information is available, the cumulative effects assessment estimates or predicts the contribution of effects from the Project and other human activities on the criteria, in the context of changes to the natural, health, social or economic environments.

For this Species at Risk VC assessment, the net effects in **Section 13.5.2** that are characterized as having a likelihood of occurrence of “Probable and “Certain” and a “Moderate” to “High” magnitude have been carried forward to the cumulative effects assessment. Net effects with this characterization are most likely to interact with other RFD and activities.

The predicted net effects of the Project on the Species at Risk VC that are carried forward for the assessment of cumulative effects within the Species at Risk RSAs include:

Caribou

- Habitat Alteration or Degradation – Sensory Disturbance;
- Habitat Alteration or Degradation – Hydrological Changes;
- Alterations in Movement – Sensory Disturbance;
- Alterations in Movement – Loss of Connectivity; and
- Injury or Death – Changes to Predator-Prey Dynamics.

Wolverine

- Habitat Loss – Clearance Activities;
- Habitat Alteration or Degradation – Sensory Disturbance;
- Habitat Alteration or Degradation – Hydrological Changes;
- Alterations in Movement – Sensory Disturbance; and



- Injury or Death – Increased Access.

Myotis Bats

- Habitat Loss – Clearance Activities;
- Habitat Alteration or Degradation – Changes in Vegetation Structure;
- Habitat Alteration or Degradation – Hydrological Changes; and
- Alterations in Movement – Sensory Disturbance.

Evening Grosbeak

- Habitat Loss – Clearance Activities; and
- Injury or Death – Changes to Predator-Prey Dynamics.

Olive-sided Flycatcher

- Habitat Loss – Clearance Activities; and
- Injury or Death – Changes to Predator-Prey Dynamics.

Rusty Blackbird

- Injury or Death – Changes to Predator-Prey Dynamics.

Lesser Yellowlegs

- Injury or Death – Changes to Predator-Prey Dynamics.

Bald Eagle

- Habitat Loss – Clearance Activities.

Short-eared Owl

- Habitat Loss – Clearance Activities.

Lake Sturgeon

- Changes in Fish Access to Habitats (during the operations phase); and
- Changes to Public Access to Fish Habitats (during operations phase).

Results of the cumulative effects assessment for the Species at Risk VC with consideration of RFDs and activities are presented in Section 21.



13.8 Prediction Confidence in the Assessment

13.8.1 Caribou

The level of confidence in the predictions for Project-related net effects on Caribou is moderate to high. The predictions are based on information collected as part of background information and data gathering; multi-year data collected from baseline studies; GIS analyses; an understanding of Project activities; the known effectiveness of mitigation measures; relevant peer-reviewed studies; experience of the assessment team; and an understanding of existing conditions. The level of confidence for the habitat (loss and alteration or degradation) net effects predictions is high because Caribou habitat amount and distribution in the LSA is understood as well as how the species is affected by habitat loss and disturbance. There is a moderate to high level of confidence in alterations in movement, as the scientific literature presents evidence and consensus on how roads and vehicle traffic create barriers to caribou (Boreal population) movement, but in Ontario studies investigating the impacts of sensory disturbances and their effects on Caribou behaviour are lacking, however studies have been completed in other regions and with other populations. Confidence in injury or death net effects is high for collisions with vehicles, increased access, and increased energy expenditures, but moderate for changes to predator-prey dynamics as predator distribution and abundance are lesser understood in the LSA and RSA and mortality of collared caribou during baseline studies was only assumed to have been due to wolf predation.

13.8.2 Wolverine

The level of confidence in the predictions for Project-related net effects on wolverine is moderate to high. The predictions are based on information collected as part of background information and data gathering; multi-year data collected from baseline studies; GIS analyses; an understanding of Project activities; the known effectiveness of mitigation measures; relevant peer-reviewed studies; experience of the assessment team; and an understanding of existing conditions. The level of confidence for the habitat (loss and alteration or degradation) net effects predictions is high because wolverine prevalence and distribution in the RSA is understood as well as how the species is affected by changes to its habitat such as the construction of roads. There is also a high level of confidence in alterations in movement as the scientific literature presents evidence and consensus on how the loss of connectivity and sensory disturbances affect wolverine movement in relation to their distribution through the LSA. Confidence in injury or death net effects is moderate as, while wolverine are understood to be affected by collisions with vehicles, increased access, and changes to predator-prey dynamics, effects of increased energy expenditure are not as clear. Apart from construction mitigations to avoid collisions, sensory disturbances during critical windows (i.e., denning), and laws surrounding harvest of the species, there are no known effective mitigation measures for wolverine regarding permanent loss of habitat, loss of connectivity, and sensory disturbances during operations.

13.8.3 Little Brown Myotis and Northern Myotis

The level of confidence in the predictions for Project-related net effects on Little Brown Myotis and Northern Myotis is moderate to high. The predictions are based on information collected as part of background information and data gathering, multi-year data collected from baseline studies, GIS data analyses, an understanding of Project activities, the known effectiveness of mitigation measures, relevant peer-reviewed studies, experience of the assessment team, and an understanding of existing conditions.



The level of confidence for the habitat (loss and alteration or degradation) net effects predictions is moderate because habitat requirements, locations, and use in the RSA are not fully understood for Little Brown Myotis and Northern Myotis. For example, it is not known if undetected Myotis hibernacula features exist within the Project Footprint. A quantitative analysis of bat activity was modelled with a Poisson regression to estimate probability of use at the Project Footprint, LSA, and RSA scales, which eliminates some uncertainty. There is a high level of confidence in the alterations in movement and injury or death net effects predictions as these are better understood/well documented in the context of roads with examples in scientific literature. Ultimately, the impacts on Little Brown Myotis and Northern Myotis may be difficult to assess post-construction due to the potential continuing effects of white-nose syndrome; as such, any changes in the presence of these species detected in the Project Footprint, LSA or RSA should be examined in that context and compared with other local regional data pools. Many of the mitigation measures outlined in **Section 13.4** are standard practice and have been implemented and demonstrated to be effective in road and highway construction.

13.8.4 Evening Grosbeak

The level of confidence in the predictions for Project-related net effects on upland forest birds is moderate. The predictions are based on information collected as part of background information and data gathering, multi-year data collected from baseline studies, GIS data analyses, an understanding of Project activities, the known effectiveness of mitigation measures, relevant peer-reviewed studies, experience of the assessment team, and an understanding of existing conditions. Upland forest birds were thoroughly surveyed temporally and spatially and as such there is a high level of understanding of their occurrence, distribution and habitat associations throughout the study areas. There is a moderate level of confidence in the habitat Alteration or Degradation, alteration in movement, and Injury or Death net effects predictions for upland forest birds such as Evening Grosbeak as these species are not well documented in scientific literature or other publications the context of the Boreal Forest and human disturbances, including roads. Many of the mitigation measures identified in **Section 13.4** are standard practice and have been implemented and demonstrated to be effective in road and highway construction.

13.8.5 Olive-sided Flycatcher

The level of confidence in the predictions for Project-related net effects on Olive-sided Flycatcher is moderate. The predictions are based on information collected as part of background information and data gathering, multi-year data collected from baseline studies, GIS data analyses, an understanding of Project activities, the known effectiveness of mitigation measures, relevant peer-reviewed studies, experience of the assessment team, and an understanding of existing conditions. Olive-sided Flycatcher were thoroughly surveyed temporally and spatially and as such there is a high level of understanding of their occurrence and distribution throughout the study areas. High numbers of Olive-sided Flycatcher detections allowed for density modeling to be developed for the RSA.

The level of confidence for the habitat net effects (loss/destruction and Alteration or Degradation) predictions is high because habitat requirements and use in the RSA are understood. There is a high level of confidence in the alteration in movement, and Injury or Death net effects predictions for Olive-sided Flycatcher, as Olive-sided Flycatcher is relatively well understood in the context of human disturbances and roads, with examples in scientific literature. Many of the mitigation measures identified in **Section 13.4** are standard practice and have been implemented and demonstrated to be effective in road and highway construction.



13.8.6 Rusty Blackbird

The level of confidence in the predictions for Project-related net effects on Rusty Blackbird is moderate. The predictions are based on information collected as part of background information and data gathering, multi-year data collected from baseline studies, GIS data analyses, an understanding of Project activities, the known effectiveness of mitigation measures, relevant peer-reviewed studies, experience of the assessment team, and an understanding of existing conditions. Rusty Blackbird were thoroughly surveyed temporally and spatially and as such there is a high level of understanding of their occurrence, distribution and habitat associations throughout the study areas.

There is a moderate level of confidence in the habitat Alteration or Degradation, alteration in movement, and Injury or Death net effects predictions for Rusty Blackbird as this species is not well documented in scientific literature or other publications the context of the boreal forest and human disturbances, including roads. Most of the literature around Rusty Blackbird is focused on its southern breeding range and wintering habitats. Many of the mitigation measures identified in **Section 13.4** are standard practice and have been implemented and demonstrated to be effective in road and highway construction

13.8.7 Lesser Yellowlegs

The level of confidence in the predictions for Project-related net effects on Lesser Yellowlegs is moderate. The predictions are based on information collected as part of background information and data gathering, multi-year data collected from baseline studies, GIS data analyses, an understanding of Project activities, the known effectiveness of mitigation measures, relevant peer-reviewed studies, experience of the assessment team, and an understanding of existing conditions. Lesser Yellowlegs were thoroughly surveyed temporally and spatially and as such there is a high level of understanding of their occurrence and distribution throughout the study areas.

There is a high level of confidence in the habitat Alteration or Degradation, alternation in movement and Injury or Death net effects predictions for shorebirds like Lesser Yellowlegs as they are relatively well understood in the context of human disturbances and roads, with examples in scientific literature. Many of the mitigation measures identified in **Section 13.4** are standard practice and have been implemented and demonstrated to be effective in road and highway construction.

13.8.8 Common Nighthawk

The level of confidence in the predictions for Project-related net effects on Common Nighthawk is moderate. The predictions are based on information collected as part of background information and data gathering, multi-year data collected from baseline studies, GIS data analyses, an understanding of Project activities, the known effectiveness of mitigation measures, relevant peer-reviewed studies, experience of the assessment team, and an understanding of existing conditions. Common Nighthawk were thoroughly surveyed temporally and spatially and as such there is a high level of understanding of their occurrence and distribution throughout the study areas.

The level of confidence for the habitat net effects (loss/destruction and Alteration or Degradation) predictions is moderate because habitat requirements and use in the RSA are not fully understood. Common Nighthawk nesting and foraging habitat use is well studied in more southern locations, their use of habitat in the Hudson Bay Lowlands, especially nesting habitat, is not well understood.



There is a high level of confidence in the alteration in movement, and Injury or Death net effects predictions for Common Nighthawk, as Common Nighthawk is relatively well understood in the context of human disturbances and roads, with examples in scientific literature. Many of the mitigation measures identified in **Section 13.4** are standard practice and have been implemented and demonstrated to be effective in road and highway construction.

13.8.9 Bald Eagle

The level of confidence in the predictions for Project-related net effects on Bald Eagles is moderate to high. The predictions are based on information collected as part of background information and data gathering, multi-year data collected from baseline studies, GIS data analyses, an understanding of Project activities, the known effectiveness of mitigation measures, relevant peer-reviewed studies, experience of the assessment team, and an understanding of existing conditions. Bald Eagle nests were thoroughly surveyed spatially; however, the current use of nests was not surveyed, nor foraging areas, and as such there is a moderate level of understanding of their occurrence, distribution and habitat associations throughout the study areas. There is a high level of confidence in the habitat alteration or degradation, alteration in movement, and injury or death net effects predictions for Bald Eagles as they are relatively well understood in the context of human disturbances and roads, with examples in scientific literature. Many of the mitigation measures identified in Section 12.4 are standard practice and have been implemented and demonstrated to be effective in road and highway construction.

13.8.10 Short-eared Owl

The level of confidence in the predictions for Project-related net effects on Short-eared Owls is moderate. The predictions are based on information collected as part of background information and data gathering, multi-year data collected from baseline studies, GIS data analyses, an understanding of Project activities, the known effectiveness of mitigation measures, relevant peer-reviewed studies, experience of the assessment team, and an understanding of existing conditions.

Short-eared Owls were not detected during field programs; 82 breeding bird point count stations and 55 ARU stations were located in breeding habitat for Short-eared Owls suggesting suitable coverage. However, as a relatively non-vocal species they can be difficult to detect during the breeding season and fall migratory period, although CWS has had success in near Hudson Bay (Wyshynski, 2024). Irruptive in nature and with low site fidelity there are few sites where they breed regularly. As such there is a low level of understanding of their occurrence and distribution, if they should occur.

There is a high level of confidence in the alternation in movement and injury or death net effects predictions for Short-eared Owls as they are relatively well understood in the context of human disturbances and roads, with examples in scientific literature. Many of the mitigation measures identified in Section 12.4 are standard practice and have been implemented and demonstrated to be effective in road and highway construction.



13.8.11 Lake Sturgeon (Hudson Bay – James Bay population)

The overall confidence in the assessment of net effects on Lake Sturgeon and Lake Sturgeon habitat is high as the destruction of Lake Sturgeon habitat is relatively well known (the area of the project components that completely cover surface water bodies). Although there may be future refinements in the project design (such as pier footings for bridges or specific orientations of culverts) as the Project proceeds to the Detail Design Phase, the effects are expected to be similar as assessed in this EAR/IS. The level of confidence for Lake Sturgeon habitat disruption/alteration is also considered high.

The confidence in the assessment of net effects of changes to Lake Sturgeon access to habitats as a result barriers to Lake Sturgeon passage and Injury or Death of Lake Sturgeon is also considered high, as the effects of roads are generally well documented understood and can be effectively mitigated with best management practices and proposed mitigation measures outlined in Section 10.4. The exact maintenance schedule for maintaining fish passage will need to be determined based on how quickly water crossings become blocked, but monitoring programs will determine this once the road is constructed.

The confidence in the assessment of net effects of change in public access that may lead to increased Lake Sturgeon harvest is moderate. There are some unknowns in how recreational fisheries from outside of the Indigenous communities in the area will exploit this new access. The location is still quite distance from significant population centers, so it is expected that the increase in harvest pressure will not be significant at this time. However, this assumption relies on what typical recreational fisherman are likely to do and may be subject to change over time if increasing access to the north brings additional residents/workers. The ongoing developments that may result from the Project are also not currently known and may affect the rates of harvest as well.

13.9 Predicted Future Condition of the Environment if the Project Does Not Proceed

The Project is located in an area that is currently part of the Ring of Fire development in Northern Ontario. Although no projects are currently operational, it is expected that this area will be developed as the government of Ontario (as well as many First Nations) has identified the area as a key priority for future economic development in Ontario. The roads are also a priority for First Nations in the area, as they connect First Nations communities to the rest of the province more easily.

If this specific project does not proceed, the future condition of wildlife and wildlife habitat in the area is likely to be relatively unchanged. The area remains difficult to access and challenging to develop projects. It is possible that additional roadways as an alternative may be constructed if this project does not proceed. Current alternatives may consider using the existing winter road route to Webequie for an all-season road, which would have similar environmental impacts in a different location. However, none of these have received any approvals that would allow them to proceed at this time.

Long-term impacts due to climate change may occur regardless of this project. It is anticipated that species shifts may occur, both floral and faunal. Forest fires are expected to become more frequent and intense due to climate change, which will impact all species. Disturbance by fire, in combination with



warming due to climate change, may eventually change the composition of the Boreal forest and create more suitable habitat for some species while reducing that of others.

According to the Ontario Provincial Climate Change Impact Assessment (PCCIA) Technical Report (Climate Risk Institute, 2023), caribou habitat quality may be degraded by warming temperatures associated with climate change, which can influence population dynamics. Under even conservative emission scenarios, the PCCIA Technical Report (Climate Risk Institute, 2023) identifies that boreal caribou are at a high risk of extirpation: with a mean minimum winter temperature increase of 0.9 to 5.5°C over pre-industrial temperatures, climactically suitable habitat could decrease between 57 and 99% (Massod et al., 2017). The Ozhiski and Missisa Caribou Ranges are abundant with freshwater lakes, which may experience reduced ice thickness in the winter due to increased winter temperatures, which may alter the ability for caribou to access areas to browse and increase the risk of drowning (Masood et al., 2017). Climate change resulting in regularly warmer summers and winters can also lead to a lack of high-quality forage availability, which presents risks for poor body condition and local extirpation of the Boreal population (Festa-Bianchet et al., 2011). Climate warming is also likely to influence host-parasite relationships potentially detrimental to caribou (Gunn et al., 2011) and reduce the current limitations of white-tailed deer expansion into Boreal caribou habitats (Kennedy-Slaney et al., 2018). Overall, Caribou (Boreal population) in the RSA are likely to decline regardless of Project construction due to the effects of increasing winter temperatures driven by climate change.

Wolverines in Ontario face a variety of threats, mainly climate change, forest fires, human development, industrial activities, overharvesting, increased road presence, and recreational activities (ECCC, 2024b). In the RSA, if the project does not proceed, the primary threats to wolverine include climate change are forest fires. Average annual temperatures in Canada are increasing in the north at a faster rate than in southern Canada, with winter temperatures increasing more than summer temperatures (Zhang et al., 2019). As a cold-adapted animal, wolverines may experience decreased survival and reproductive success from a reduced snowpack during the denning period and other changes to snow properties (Fisher et al., 2022; ECCC, 2024b). Ontario's Wolverine Recovery Strategy (Ontario Wolverine Recovery Team, 2013) identifies several climate change-related effects, including the reduction of spring snow cover and natal denning habitat; alteration of habitat from temperature extremes; and reduction and alteration of wolverine and prey habitat. The wolverine population in the northern recovery zone, within which the Project is situated, was believed to be stable or increasing when the Recovery Strategy was published in 2013 (Ontario Wolverine Recovery Team, 2013). In the long-term, if the Project does not proceed, climate change is likely to alter wolverine distribution and population in the RSA.

According to the Ontario PCCIA Technical Report (Climate Risk Institute, 2023), the environmental consequences from climate change impacts to mammals (including bats) is rated as "high" in Ontario's Far North Region by mid-century. little brown myotis and northern myotis are typically associated with deciduous or mixed forests and may benefit from the northward latitudinal shift and occupancy gains of white birch (*Betula papyrifera*) and trembling aspen (*Populus tremuloides*) as a result of climate change (Boisvert-Marsh and de Blois, 2021). However, drier, warmer conditions may also negatively affect many of the insect species these bats rely on as prey and also cause a mismatch in timing of prey emergence and Myotis bat emergence from hibernacula. Frick et al. (2009) identified cumulative precipitation during the little brown myotis active period (April – October) is strongly associated with annual survival, which may relate to insect prey availability. The effects of white-nose syndrome on little brown myotis and northern myotis prompted the Government of Ontario to develop a White-nose Syndrome Response Plan (MNR, 2015b) and a Recovery Strategy (Humphrey and Fotherby, 2019) that set goals, objectives, and recovery approaches for these species, with a long-term objective to have self-sustaining, resilient, redundant, and representative populations in areas affected by white-nose syndrome. It is expected that the entire Canadian range of little brown myotis and northern myotis is expected to be impacted by white-



nose syndrome between 2025 and 2028 (COSEWIC, 2013). The Recovery Strategy (Humphrey and Fotherby, 2019) identifies white-nose syndrome as the single most important threat to these species with population declines that could result in extirpation. Overall, little brown myotis and northern myotis populations in the RSA are likely to decline regardless of Project construction if the effects of white-nose syndrome are not halted and reversed.

The environmental consequences from climate change impacts to migratory songbirds in Ontario's Far North Region is rated as "high" by mid-century (2050s) (Climate Risk Institute, 2023). Migrant species may experience a disruption in ecological synchronicities between food and habitat availability with the earlier arrival of spring both along their migratory path and at their breeding grounds (Hoover and Schelsky, 2020). Songbird populations in Alberta are projected to experience a dramatic northward shift in suitable climates over the next century, which may be accompanied by northward shifts in vegetation (Stralberg and Bayne, 2013). Such northward shifts may additionally be associated with lengthened migratory distances for certain passerine species, resulting in increased physiological costs (Both et al. 2010). Conversely, shifting temperatures may present opportunities for upland forest bird species to thrive, which in turn may result in changes to species assemblages and abundances (Bouderbala et al. 2023).

According to ECCC (2022), habitat shifting due to climate change is considered to have a negligible impact on Evening Grosbeak populations. Evening Grosbeak populations in Canada have experienced a large decrease since the late 1990s and while the causes are unclear, identified threats to population recovery include collisions with windows, vehicular collisions, and forest harvesting (ECCC, 2022). Overall, upland forest bird populations in the RSA are likely to change in species composition regardless of Project construction due to the effects of climate change and Evening Grosbeak may continue to decline from continuing threats in its breeding and migratory ranges.

For Rusty Blackbird the increase in mean annual temperatures from climate change are predicted to have a negative effect, including range contraction (COSEWIC, 2017). Range contraction has already occurred for Rusty Blackbird with a 143 km northward shift of the southern boundary of its range since the 1960's. Drying of boreal wetlands from climate impacts is another potential impact on Rusty Blackbird populations, with loss of habitat and changes in the timing of prey emergence potentially affecting Rusty Blackbirds in the boreal. According to Stralberg et al. (2015b), Rusty Blackbird abundance could decline by 55% by the year 2100 from climate impacts. Rusty Blackbird populations are also threatened by habitat loss in both breeding and wintering grounds, blackbird pest control programs, insecticide use in migration and wintering areas and mercury exposure. Overall, the Rusty Blackbird population in the RSA is likely to decline regardless of Project construction due to threats such as climate alteration, loss of wintering habitat, and large-scale blackbird control programs in the U.S. (COSSARO, 2017).

For Olive-sided Flycatcher climate impacts are related to shifts in fire regimes, habitat shifts and prey abundance. Like Rusty Blackbird changes in the timing of prey emergence and a mismatch with bird arrival on breeding grounds may affect Olive-sided Flycatcher breeding success in the boreal (COSEWIC, 2018). According to Stralberg et al. (2015b), Olive-sided Flycatcher abundance could decline by 10% by the year 2070 from distribution shifts due to climate impacts. The most significant factor in Olive-sided Flycatcher declines may be loss of wintering habitat (Altman and Sallabanks 2012). Other factors include forest harvesting in their breeding habitat and pesticide use throughout their range. Overall, the Olive-sided Flycatcher population in the RSA is likely to decline regardless of Project construction primarily due to declines in forest cover in the wintering range (COSEWIC, 2018).



Shorebirds, including Lesser Yellowlegs were not specifically investigated in the Ontario PCCIA Technical Report (Climate Risk Institute, 2023), but the climate risk to birds in Ontario's northwest region is scored as "high" by mid-century (2050s). For shorebirds like Lesser Yellowlegs the primary impact of climate change will be the loss of intertidal habitat. While this could be a large impact on the coastal region of the Hudson Bay Lowlands, the loss of intertidal habitat would only indirectly affect populations within the Study Area. Temperature instability in breeding areas may also delay the start of the nesting season and cause a mismatch between prey emergence and the arrival of Lesser Yellowlegs on their breeding grounds. Lesser Yellowlegs populations are also threatened by impacts in both migratory and wintering grounds. The loss or degradation of stopover sites used by Lesser Yellowlegs during migration may degrade their condition prior to arriving on their breeding grounds. One of the largest threats is hunting of shorebirds within the Caribbean and northern South America (COSEWIC, 2020), this is particularly true of Lesser Yellowlegs that breed in eastern Canada. Overall, the Lesser Yellowlegs population in the RSA is likely to decline regardless of Project construction due to threats such as climate alteration, loss of wintering habitat, and hunting in its wintering areas. (COSSARO, 2017).

Common Nighthawk were not specifically investigated in the Ontario PCCIA Technical Report (Climate Risk Institute, 2023), but the climate risk to birds in Ontario's northwest region is scored as "high" by mid-century (2050s). For Common Nighthawk, climate warming may be reducing the availability of insect prey overall in addition to a mismatch between prey emergence and the arrival of Common Nighthawk on their breeding grounds. Increased weather variability due to climate change is another potential impact as Common Nighthawk have a tight energy budget and high precipitation events combined with cold temperatures can lead to starvation and nest failure. While Common Nighthawk population trend has been relatively stable in Ontario over the last decade, long term annual trends in Ontario show a large decline since the 1970s (Birds Canada and ECCC, 2024). Overall, the Common Nighthawk population in the RSA is likely to decline regardless of Project construction due to threats continuing threats in its breeding and migratory ranges, primarily associated with declining insect populations.

Bald Eagles were not specifically investigated in the Ontario PCCIA Technical Report (Climate Risk Institute, 2023), but the climate risk to birds in Ontario's northwest region is scored as "high" by mid-century (2050s). According to Armstrong (2014), Bald Eagle may be less vulnerable to climate change given its more generalized life history requirements and broad distribution, compared to other species. Warming temperatures in northern regions may lead to extending ice-free periods, allowing for Bald Eagle expansion in those areas (Grier et al., 2003). Bald Eagles in Canada have experienced a large increase since the 1970s (Birds Canada and ECCC, 2024) and they are no longer considered to be at-risk in Ontario. Overall, Bald Eagle populations in the RSA are likely to remain the same or increase regardless of Project construction.

While owls and raptors were not investigated as a category in the Ontario PCCIA Technical Report (Climate Risk Institute, 2023), the climate risk to birds in Ontario's northwest region is scored as "high" by mid-century (2050s). Climate change-induced losses are expected to occur in bogs and marshes which provide habitat for Short-eared Owls (Climate Risk Institute, 2023). COSEWIC (2021) classified habitat shifting and alteration as the second highest threat to the species due to projected increases in shrub biomass, cover, and abundance, reducing habitat suitability. COSSARO (2021) estimated that the number of mature individuals in the province will decrease by more than 20% over 2 generations (8-year period). Overall, the Short-eared Owl population in the RSA is likely to decline regardless of Project construction due to threats such as habitat shifting and alteration, loss of wintering habitat to urban expansion, and collisions with vehicles and airplanes (COSSARO, 2021).



If the Project does not proceed, the future condition of Lake Sturgeon in the area is likely to be unchanged from existing conditions. Long-term impacts due to climate change may occur regardless of whether the Project proceeds. In addition, extreme weather events in the region may increase over time may cause a reduction or creation of fish habitat as certain areas flood and others experience drought.

13.10 Follow-Up and Monitoring

This section describes the monitoring programs for SAR wildlife and SAR habitat including SAR fish. The purposes of the follow-up and monitoring programs are to:

- Verify environmental effects predictions made during the EA/IA for the Project;
- Provide data with which to evaluate the effectiveness of mitigation measures and modify or enhance these measures, where necessary;
- Provide data with which to implement adaptive management measures for improving future environmental protection activities;
- Document additional measures of adaptive measures to improve future environmental protection activities; and
- Document compliance with required conditions as stipulated in permits, approvals, licenses and/or authorizations.



The Project invites community members to participate in developing and implementing monitoring programs to assess the effectiveness of proposed mitigation measures and potential adverse effects to the environment. Where effects are considered unacceptable and/or based on concerns raised by Indigenous community members or other stakeholders, further mitigation options will be considered by the road operator in consultation with Indigenous communities and stakeholders.

The recommended monitoring program related to Species at Risk VC is outlined in the following subsections.

13.10.1 Pre-Construction Monitoring

Baseline monitoring for the WSR project took place between 2019 and 2025. Collection of caribou collaring data took place between 2021 and 2025. Winter aerial surveys were conducted in 2018, 2019, and 2021 within the RSA and recorded both caribou and wolverine. Wolverine run poles were deployed in 2021 and 2022. Bat ARUs were deployed in 2019, 2020 and 2023. For all SAR birds ARUs were deployed to survey bird presence in 2020 and 2021. Breeding bird point count surveys were conducted in 2019 and 2020. Shorebirds including Lesser Yellowlegs was included as part of waterfowl aerial surveys that took place during 2019 and 2020. Bald Eagle nests were noted when they were observed during winter aerial surveys and during surveys for waterfowl and shorebirds. These studies are presumed to meet the requirements for pre-construction monitoring and additional pre-construction monitoring is not required.

13.10.2 Construction Monitoring

During construction the following monitoring programs will be implemented as part of mitigation measures described in **Section 13.4**.



Compliance Monitoring

- Developing and implementing a CEMP that includes detailed plans for Species at Risk (SAR) wildlife management and monitoring.
- Qualified Environmental Monitors are to be present on-site prior to and during construction activities.
- A qualified Environmental Monitor will conduct a daily site inspection prior to commencement of project works and activities to ensure wildlife SAR are absent from work areas. A daily checklist will reflect completion of the inspection.
- Roads secured by exclusion fencing related to SAR will be monitored daily for wildlife road mortalities and injuries. Wildlife road mortalities will be submitted to a Qualified Biologist as part of a reporting protocol that will be developed and included in the environmental protection plan.
- An incidental wildlife reporting protocol will also be developed and included in the CEMP and OMEP.
- A qualified Environmental Monitor will inspect water crossings where aquatic SAR are known to be present to prevent fish passage interruptions and assess blockages and/or ponding.

All Species

- Remote Camera and ARU Monitoring will take place along the proposed road ROW and at reference sites to monitor the occurrence and distribution of SAR wildlife. This program will commence during the construction phase and continue during the operations phase.

Caribou

- GPS collars may be deployed on female caribou to determine if seasonal movements and habitat use change during or following road construction. The schedule for surveys in terms of number of collars, and the commencement and duration of the survey program, will be determined in consultation with the Ministry of Environment, Conservation and Parks (MECP) and Environment and Climate Change Canada.
- Data from GPS collars will be used to inform construction activities and may impose restriction on activities until collar data indicates the collared caribou have left the activity buffer area (designated space between wildlife features/sensitive areas and construction activities to protect them from potential effects of construction activities). Buffer distance will be dependant on the disturbance level of the activity and season.
- If clearing or construction activities are required to take place within Category 1 Caribou habitat during sensitive periods (May 1 to September 15 for Nursery use areas and December 1 to March 31 for Winter use areas) aerial caribou sweeps will be conducted prior to construction activities to ensure that there are no caribou are within activity buffer areas. Minimum flight separation distances will be maintained to minimize potential disturbance.

Wolverine

- Potential wolverine dens along the WSR ROW will be identified using aerial surveys during the denning period prior to the start of vegetation clearing activities.
- Where clearance of construction activities is required within the wolverine denning period (January 15 to May 31) target denning surveys will be conducted within a 4 km radius of the proposed activity.



SAR Bats

- Pre-construction bat maternity roost surveys will be conducted within the Project Footprint to identify potential maternity roosting habitat.
- If potential maternity roosting habitat is identified and vegetation clearing activities are scheduled to take place within the bat maternity roosting season (May 1 to August 31) exit surveys or acoustic monitoring may be required. Requirements will be determined in consultation with the MECP.

SAR Birds

- Where vegetation clearing activities are proposed outside of the migratory bird breeding window for nesting zone C6 (between August 30 and April 24) pre-clearing nest sweeps will be conducted by qualified avian biologists with support from Indigenous EM(s). If during the surveys birds are found within the proposed clearance area and are presenting breeding behaviour, these areas will be flagged and protected with a disturbance buffer which will be maintained until the fledglings have left the nest or the nest becomes unoccupied.
- While no Bald Eagle nests were recorded within the proposed ROW for the WSR, pre-clearance surveys for raptor nests are proposed to occur along parts of the road alignment in forest ecosystems containing suitable nesting trees.
- Lesser Yellowlegs will be part of pre-clearance wildlife surveys to determine the presence of any waterfowl and shorebird significant nesting habitats near the road ROW prior to vegetation clearing activities.
- Short-eared Owl road-side surveys will take place along the road ROW. These surveys will also follow the Saskatchewan Short-eared Owl Survey Protocol. The schedule for surveys in terms of frequency of surveys and the number of years post beginning of operation of the road will be determined in consultation with Environment and Climate Change Canada.

Lake Sturgeon

- Pre- and post-construction fish habitat assessments at select water crossing sites with known occurrence of Lake Sturgeon will be conducted to evaluate habitat alterations, including monitoring changes to stream morphology and substrate caused by increased sediment loads or changes in streamflow.

13.10.3 Operations Monitoring

All SAR

- The wildlife road mortality program will continue through the operations phase of the program. Road users will be encouraged to report any wildlife-vehicle encounters. When a carcass is present, mortality incidents will be investigated by an environmental monitor. Incidents will be tracked in order to identify locations with multiple encounters/mortalities, implement corrective actions and track effectiveness.
- Remote Camera Monitoring will take place along the proposed road ROW and at reference sites to monitor the occurrence and distribution of SAR wildlife. This program will commence during the construction phase and continue during the operations phase.



Caribou

- GPS collars may be deployed on female caribou to determine if seasonal movements and habitat use change during or following road construction. The schedule for surveys in terms of number of collars, and the commencement and duration of the survey program, will be determined in consultation with the MECP and Environment and Climate Change Canada.

Wolverine

- Wolverine run-pole station surveys will be conducted to model wolverine populations and behaviour response to the road during the operations phase. The schedule for surveys in terms of number of collars, and the commencement and duration of the survey program, will be determined in consultation with the MECP.

SAR Bats

- Bat presence and species diversity will be surveyed post-construction and compared to baseline data using acoustic monitoring. The surveys are proposed to occur a minimum of three times in the first five years of project operation.

SAR Migratory Songbirds

- ARU and point count surveys along the road ROW and at reference sites will be conducted and compared to baseline data. The surveys are proposed to occur a minimum of three times in the first five years of operation. The schedule for surveys in terms of frequency of surveys and the number of years following the commencement of road operations will be determined in consultation with Environment and Climate Change Canada.
- Nightjar surveys will take place along the road once operations commence. These surveys will follow the Canadian Nightjar Survey Protocol. The surveys are proposed to occur during years 1, 3 and 5 in the first five years of operation. The schedule for surveys in terms of frequency of surveys and the number of years following the commencement of road operations will be determined and confirmed in consultation with Environment and Climate Change Canada.

SAR Raptors

- Short-eared Owl road-side surveys will be conducted following opening of the road. These surveys will follow the Saskatchewan Short-eared Owl Survey Protocol. The surveys are proposed to occur during years 1, 3 and 5 in the first five years of operation. The schedule for surveys in terms of frequency of surveys and the number of years following the commencement of road operations will be determined and confirmed in consultation with Environment and Climate Change Canada.

SAR Shorebirds

- Surveys for Lesser Yellowlegs and other shorebirds will follow the Ontario Shorebird Survey Protocol. Surveys are proposed to take place four (4) times a year twice in the spring migration period and twice in the fall migration period. The surveys are proposed to occur during years 1, 3 and 5 in the first five years of operation. The schedule for surveys in terms of frequency of surveys and the number of years following the commencement of road operations will be determined and confirmed in consultation with Environment and Climate Change Canada.



Lake Sturgeon

- Lake Sturgeon monitoring at select water crossing sites with known presence of this species will be part of periodic fish community and habitat surveys to detect changes in fish assemblages.

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