Crawford Nickel Project
Impact Statement

Chapter 19 Assessment of Potential Effects on Wildlife and Wildlife Habitat

Prepared for:
Canada Nickel Company

Prepared by:
Stantec Consulting Ltd.

September 30, 2024

Table of Contents

List of Tables

List of Figures

Acronyms and Abbreviations

ADD	average daily dose
ARU	autonomous recording unit
BCI	Bat Conservation International
COPC	contaminant of potential concern
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
dB	un-weighted decibels
dBA	A-weighted decibels
dBL	linear (unweighted) decibels
CBD	Convention on Biological Diversity
ECCC	Environment and Climate Change Canada
END	endangered
EPC	exposure point concentration
ERA	Ecological Risk Assessment
ESA	*Endangered Species Act, 2007*
ESC	erosion and sediment control
FRI	Forest Resources Inventory
FWCA	*Fish and Wildlife Conservation Act, 1997*
HQ	hazard quotient
KMGBF	Kunming-Montreal Global Biodiversity Framework
LIO	Land Information Ontario

LSA	Local Study Area
MECP	Minister of the Environment, Conservation and Parks
MNR	Ministry of Natural Resources (formerly MNRF)
MNRF	Ministry of Natural Resources and Forestry
MTO	Ministry of Transportation Ontario
NHIC	Natural Heritage Information Centre
OBA	Ontario Butterfly Atlas
PA	Project Area
RSA	Regional Study Area
SAR	species at risk
SARA	*Species at Risk Act*
SARO	Species at Risk in Ontario
SC	special concern
SOCC	Species of Conservation Concern
THR	threatened
TMF	Tailings Management Facility
TRV	toxicity reference value
VC	Valued Component

Glossary of Technical Terms

Autonomous Recording Unit (ARU)	A stationary audio recording device that records sound continuously during a set period of time.
Boreal Caribou	Has the same meaning as Caribou (boreal population) under the ESA and SARA and Woodland Caribou or Caribou under the Woodland Caribou Conservation Plan.
Direct Effect	Refers to an immediate consequence of an action that occurs as a result of the activity itself. These effects are typically spatially and temporally associated with the action, meaning they happen in the same location and at the same time as the activity.
Indirect Effect	Refers to a consequence that occurs as a result of the direct effects, often happening later in time or farther away in distance from the initial activity. These effects are usually secondary and can be more diffuse or complex, sometimes involving interactions with other environmental, social, or economic factors.
Species at Risk (SAR)	Species designated as extirpated, endangered or threatened and protected under the or provincial ESA. This also applies to the federal SARA on federal lands or where critical habitat has been identified on non-federal lands.
Species of Conservation Concern (SOCC)	Species designated as special concern under the ESA or considered provincially rare with an S-rank of S1-S3 or SH by MNR. SOCC also includes species with federal designations of extirpated, endangered, or threatened or special concern under COSEWIC or SARA (where critical habitat has not been identified).
Wildlife of importance to Indigenous nations	Wildlife species identified as important by Indigenous nations listed in the Indigenous Engagement and Partnership Plan (IAAC 2023).
Wildlife	Wildlife is defined as any wild animal, including amphibians, reptiles, mammals and invertebrates, as well as those identified as a species of conservation concern or species at risk.
Wildlife Habitat	Wildlife habitat is defined as the natural environment in which wildlife lives, including all the necessary resources such as food, water, shelter, and breeding sites that support the survival, growth, reproduction and movement of wildlife species.

19 Assessment of Potential Effects on Wildlife and Wildlife Habitat

Wildlife and Wildlife Habitat was selected as a Valued Component (VC) because of their ecological, social, economic and cultural importance. Ecologically, wildlife and their habitats play crucial roles in maintaining biodiversity, ecosystem functions, and resilience. Socially and economically, they contribute to recreational activities, tourism, and economic benefits through wildlife-related activities. Culturally, wildlife species and their habitats holds value for Indigenous nations and local communities, often being integral to traditional practices, spiritual beliefs, and cultural heritage. Key indicator species or wildlife groups selected to assess biodiversity and Project effects include amphibians and reptiles, moose, furbearers, species of conservation concern (midland painted turtle, snapping turtle, monarch and yellow-banded bumble bee) and species at risk (Blanding's turtle, boreal caribou and bats).

For this assessment, 'wildlife' is defined as any wild animal, including amphibians, reptiles, mammals and invertebrates, as well as those identified as a species of conservation concern or species at risk. Birds are discussed separately in the Assessment of Potential Effects on Birds and Bird Habitat (Chapter 18 of the Impact Statement).

For this assessment, 'wildlife habitat' is defined as the natural environment in which wildlife lives, including all the necessary resources such as food, water, shelter, and breeding sites that support the survival, growth, reproduction and movement of wildlife species.

The Tailored Impact Statement (TIS) Guidelines require an assessment of the effects of the Project on wildlife. The Crawford Nickel Project ('the Project') may affect wildlife and wildlife habitat because of potential changes to habitat, movement, mortality risk, and health. These changes could affect species diversity and abundance directly or indirectly through habitat loss, alteration and fragmentation or changes in predator-prey dynamics.

Wildlife and Wildlife Habitat are linked to other VCs in the Impact Statement, including:

- Geology and Geologic Hazards (Chapter 11), whereby changes in terrain stability may affect wildlife habitat availability and quality.
- Atmospheric Environment (Chapter 12), whereby changes in light and air quality have the potential to affect wildlife behaviour, use of habitat, and health.
- Acoustic Environment (Chapter 13), whereby changes in noise and vibrations (e.g., blasting) have the potential to affect wildlife behaviour and use of habitat.
- Surface Water (Chapter 15), whereby changes in surface water quantity and quality have the potential to alter the quality and availability of wildlife habitat.
- Vegetation, Riparian and Wetland Environments (Chapter 16), whereby changes to the composition, structure, and quality of vegetation communities have the potential to affect habitat availability and use of those communities by wildlife.

- Fish and Fish Habitat (Chapter 17), whereby changes in fish communities, abundance, and health have the potential to affect wildlife movement, mortality risk, and health, for species that consume fish (e.g., American mink, North American river otter).
- Birds and Bird Habitat (Chapter 18), whereby changes in bird abundance and distribution and health may affect wildlife movement, mortality risk and health for species that prey on birds as a primary food source.
- Climate Change (Chapter 20), whereby changes in climate (seasonal patterns, temperature) have the potential to affect wildlife habitat availability and movement of species.
- Social Conditions (Chapter 22), whereby changes in wildlife movement and health have the potential to affect hunting, trapping, recreation, and corresponding tourism.
- Economic Conditions (Chapter 23), whereby changes in wildlife movement and health that affect social activities (i.e., hunting, trapping, recreation, and corresponding tourism) have corresponding economic impacts.
- Indigenous Interests (Chapters 25-28), whereby changes in wildlife movement and health have the potential to affect traditional practices, subsistence and livelihood, economic opportunities, and health and wellbeing of Indigenous nations.

19.1 Scope of Assessment

19.1.1 Regulatory and Policy Setting

The following provides a summary of federal regulations, policies, and/or guidelines that apply directly or indirectly to the management of wildlife and wildlife habitat.

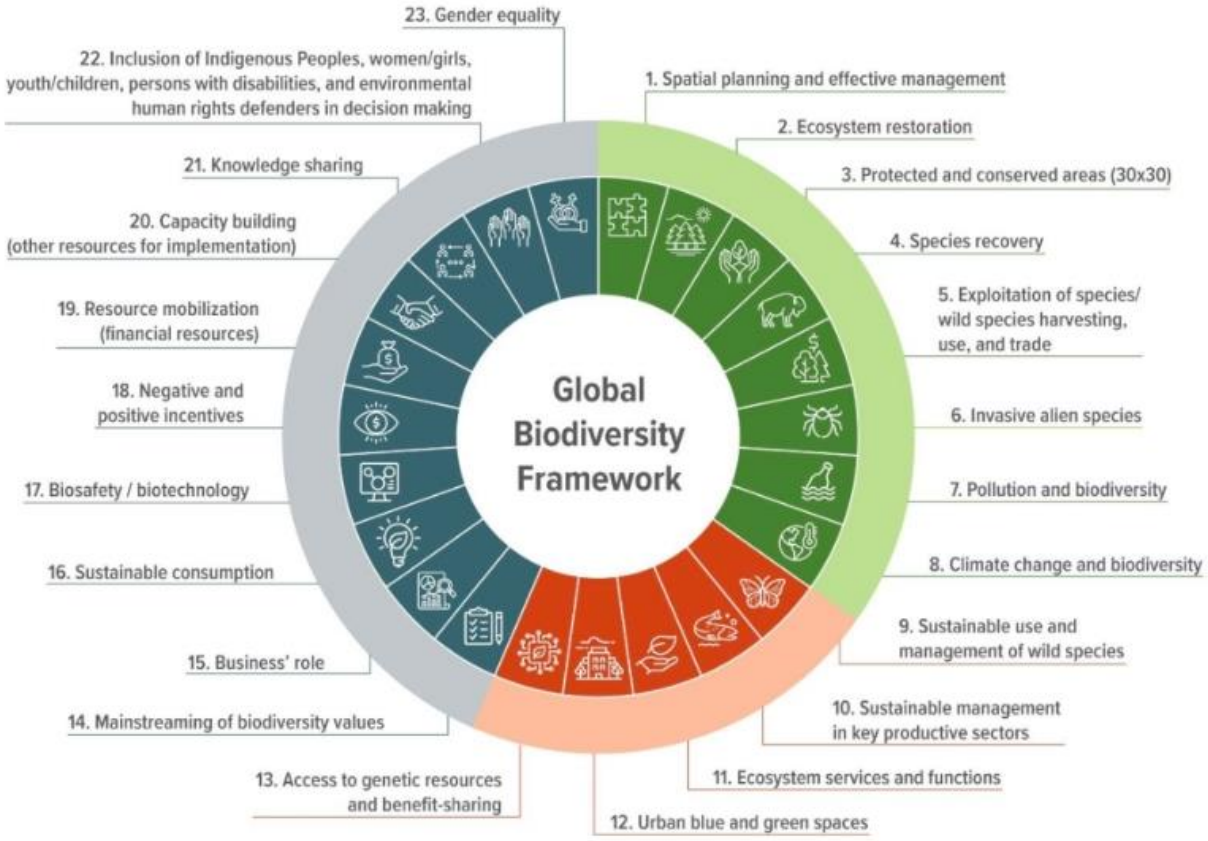
19.1.1.1 Federal Guidance

19.1.1.1.1 Convention of Biological Diversity

The Convention on Biological Diversity (CBD) is an international treaty signed in 1992 at the Earth Summit in Rio de Janeiro, Brazil. The CBD has three main goals: to conserve biological diversity, promote the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources. The CBD sets a global framework for countries to collaborate in protecting ecosystems, species, and genetic diversity, recognizing the intrinsic value of biodiversity as well as its role in supporting human well-being and sustainable development. The treaty also emphasizes the importance of preserving traditional knowledge and practices of Indigenous and local communities. With ratification by 196 countries, including Canada, the CBD is a key international agreement addressing biodiversity loss and promoting sustainable development through national strategies and action plans such as the Kunming-Montreal Global Biodiversity Framework, Canadian Biodiversity Strategy and Canada's Biodiversity Outcomes Framework.

19.1.1.1.1.1 Kunming-Montreal Global Biodiversity Framework

The Kunming-Montreal Global Biodiversity Framework (KMGBF) is a global agreement adopted in 2022, that includes four goals for 2050 and 23 targets for 2030.The goals aim to achieve the CBD vision of living in harmony with nature by 2050, while the targets focus on sustainable development to halt and reverse biodiversity loss by 2030. An overview of the 23 targets are depicted in the image below.



Source: ECCC 2024

19.1.1.1.1.2 Canada's Biodiversity Strategies

Canada has developed a number of strategies in response to its commitment to the CBD. The Canadian Biodiversity Strategy was developed in 1995, outlining Canada's vision, goals and objectives for biodiversity conservation. The Canada's Biodiversity Outcomes Framework (Canadian Council of Resource Ministers 2006) and Canada's Biodiversity Outcomes Framework and 2020 Goals and Targets (ECCC 2016) were developed as companion documents providing a more detailed and action-oriented approach to implementing the strategy, focusing on specific outcomes and indicators to measure progress. More recently, Canada's 2030 Nature Strategy: Halting and Reversing Biodiversity Loss in Canada (Nature Strategy; ECCC 2024) was developed and builds on past initiatives and commitments on implementing the KMGBF.

The Nature Strategy sets out a path to achieving the goals and targets of the KMGBF (Section 19.1.1.1.1.1). The following biodiversity targets relevant to the Wildlife and Wildlife Habitat VC, include but are not limited to:

- Target 2 (Ecosystem Restoration): Promoting reclamation strategies that focus on habitat diversity and connectivity
- Target 4 (Species Recovery): Promoting mitigations that contribute to species recovery, particularly those related to SAR, as well as managing human-wildlife interactions, conflicts and shifts in predator-prey dynamics effectively and sustainably
- Target 6 (Invasive Alien Species): Implementing mitigation measures to prevent and manage invasives species
- Target 7 (Pollution and Biodiversity): Reduce risks of harmful emissions and contaminants that can affect wildlife and wildlife habitat through sustainable business practices, management and mitigation strategies
- Target 8 (Climate Change and Biodiversity): Incorporating ecosystem-based approaches into reclamation activities that promotes resilience of species and habitats
- Target 11 (Ecosystem Services and Functions): Promoting reclamation activities that consider ecosystems services and functions

19.1.1.1.2 Species at Risk Act

The *Species at Risk Act* (SARA) provides a framework across Canada to prevent the extinction of wildlife species and to support actions for their recovery. Federal departments are responsible for preventing the disappearance of endangered or threatened species on their properties and to implement management plans to comply with the SARA.

General SARA prohibitions include section 32(1), which states that “no person shall kill, harm, harass, capture, or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species”, and section 33, which states that “no person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species, or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada.” In addition, critical habitat, defined as the habitat that is necessary for the survival or recovery of a listed wildlife species, may be defined and protected under section 58. Only those species currently listed in Schedule 1 of SARA (i.e., those listed as extirpated, endangered, or threatened) are protected by the prohibitions of sections 32 to 36 and 58 of SARA, and then only on federal lands, except for aquatic species and migratory birds which are protected throughout Canada. SARA-listed species designated as special concern are not protected by the prohibitions of sections 32 to 36 or 58 of SARA; however, these species are protected under section 79, which states that federal authorities must “identify adverse effects of the project on the listed wildlife species [including special concern species] and its critical habitat…and ensure that measures are taken to avoid or lessen adverse effects.” Furthermore, special concern species require that provincial or regional management plans, including conservation measures, be developed to protect the species.

Under SARA, a Recovery Strategy must be developed by Environment and Climate Change Canada (ECCC) for terrestrial species listed as threatened or endangered under Schedule 1 and a Management Plan must be developed for species listed as special concern under Schedule 1. The Recovery Strategy should include the identification of critical habitat and list examples of activities that are likely to result in its destruction.

19.1.1.1.2.1 Amended Recovery Strategy for the Woodland Caribou

The Amended Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population (ECCC 2020) is a federal plan that outlines the recovery goals, objectives, and strategies for boreal caribou.

19.1.1.1.2.2 Agreement for the Conservation of Caribou, Boreal Population in Ontario

The governments of Canada and Ontario signed a five-year conservation agreement in April 2022 under sections 10 and 11 of SARA. The Agreement for the Conservation of Caribou, Boreal Population in Ontario ('2022 Agreement') outlines a framework for collaborative action, committing both governments to implementing evidence-based conservation measures. These measures aim to maintain and recover self-sustaining local populations.

19.1.1.2 Provincial Guidance

19.1.1.2.1 Endangered Species Act, 2007

The *Endangered Species Act,* 2007 (ESA) applies to species that are designated as extirpated, endangered or threatened and listed on the Species at Risk in Ontario (SARO) List (Ontario Regulation (O.Reg.) 230/08). Species and general habitat apply to all species, except those designated as special concern which are not afforded protection under the ESA. Species specific habitat protection is also given to those species with regulated habitat, as identified in O.Reg. 832/21. The ESA also includes specific exemptions from the provisions of the ESA under certain conditions under O.Reg. 242/08 and O.Reg. 830/21. Exemptions and conditions vary by species, type of activity, the date the species was listed and the date the activity commenced.

19.1.1.2.2 Fish and Wildlife Conservation Act

The Ontario *Fish and Wildlife Conservation Act,* 1997 (FWCA) provides protection to many birds, mammals, reptiles, amphibians, fish, and invertebrates. FWCA legislation prohibits hunting (killing, capturing, injuring, and harassing) and trapping of 'specially protected wildlife' as defined in O.Reg. 699/98 of the FWCA. The FWCA protects individuals and their habitat (e.g., nests, roosts).

19.1.1.2.3 Woodland Caribou Conservation Plan

The Woodland Caribou Conservation Plan (MNRF 2020) provides policy direction for the management and recovery of boreal caribou (forest-dwelling boreal population) in Ontario. This plan applies to areas of continuous and discontinuous boreal caribou distribution, including the Kesagami Caribou Range ("Range") which overlaps the Project. This plan was considered along with the federal amended recovery strategy (ECCC 2020) and 2022 Agreement discussed in Sections 19.1.1.1.2.1 and 19.1.1.1.2.2, respectively.

19.1.2 The Influence of Consultation and Engagement on the Assessment

Canada Nickel Company (Canada Nickel) has engaged with potentially affected Indigenous nations, regulators, the public, and other stakeholders. Table 19.1 provides a summary of the topics, key information including Indigenous knowledge, and concerns that Canada Nickel identified as part of their engagement efforts that relate to wildlife and wildlife habitat, as well as a summary of the influence that the outcomes of this engagement had on the assessment.

Table 19.1 Summary of Key Information, Indigenous Knowledge, and Concerns for the Project Related to Wildlife and Wildlife Habitat

Topic	Key Information, Indigenous Knowledge, and Concerns	Influence on the Assessment	Where Information is Addressed in the Impact Statement

Species at Risk and/or Species of Conservation Concern	• Members of the public and/or other stakeholders expressed concern about:
	  - impacts to species at risk and their habitats, and that some species are unlikely to be present in the PA and therefore may not require further study (Blanding's turtle)
	  - impacts to bats of conservation concern
	  - impacts to boreal caribou
	• Apitipi Anicinapek Nation, Flying Post First Nation, Métis Nation of Ontario – Region 3, and Taykwa Tagamou Nation expressed concerns about effects to boreal caribou critical habitat and the Kesagami boreal caribou range.
	• Flying Post First Nation reported that boreal caribou have not been observed around the PA and LSA.
	• Mattagami First Nation and Métis Nation of Ontario – Region 3 expressed concern for species at risk including Blanding's turtle, salamanders, and native pollinators in the PA.
	• Apitipi Anicinapek Nation, Flying Post First Nation, Matachewan First Nation, Mattagami First Nation, Métis Nation of Ontario – Region 3, and Taykwa Tagamou Nation recommend additional baseline studies on species at risk, including recovery strategies, potential effects to species at risk from Project activities, recovery goals for the Kesagami caribou range and the need for mitigation measures.
	• Mattagami First Nation recommends using available technology and appropriate recovery timelines to reduce impacts on wildlife habitats and to be involved with species at risk mitigation plans.
	• Apitipi Anicinapek Nation and Flying Post First Nation, and Taykwa Tagamou Nation recommends consultation to identify species at risk. Additional baseline studies for species at risk including recover strategies, and potential effects from Project activities and the need for mitigation measures.
	• Apitipi Anicinapek Nation recommends that Woodland caribou be considered a valued component, considering its conservation status and cultural and ecological importance.
		• Contributed to an understanding of existing conditions for species at risk.
		• Informed the selection of key indicator species.
		• Considered in the development of mitigation and management measures and the Conceptual Wildlife Management Plan and supported scope of issues assessed.
		• Informed the spatial boundaries for this VC. While there are no recent records of boreal caribou within the southern limits of the Kesagami Range, the Project is located within the range and is therefore subject to the federal Amended Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada (ECCC 2020).
		• Informed the baseline studies prepared for the Impact Statement (Appendix B.7 of the Impact Statement).
		• Informed the assessment on Indigenous interests in Chapters 25 to 28 of the Impact Statement (Assessment of Potential Effects on Indigenous Interests).
		• Canada Nickel's responses to mitigation recommendations made by the Indigenous nations are provided in Chapters 25 to 28 of the Impact Statement (Assessment of Potential Effects on Indigenous Interests).
			• Chapter 19 (Assessment of Potential Effects on Wildlife and Wildlife Habitat), Sections 19.2.2.6, 19.1.4, 19.4.4
			• Terrestrial Baseline Reports (Appendix B.7 of the Impact Statement)
			• Chapters 25 to 28 (Assessment of Potential Effects on Indigenous Interests)

Wildlife Habitat	• Members of the public and/or other stakeholders expressed concern about:
	  - habitat loss outside of the PA
	  - methods for site clearing and potential use of wildlife trapping and relocation
	• Flying Post First Nation, Matachewan First Nation and Mattagami First Nation expressed concern of the effects on the Mattagami River resulting in impacts to wildlife and the exercise of harvesting rights.
	• Matachewan First Nation expressed concern about:
	  - Project activities resulting in wildlife habitat loss effects to beaver habitat
	  - effects to wolf habitat and displacement of wolves in the area
	  - increased predation and pressure on moose populations in other parts of the Nation's territory
	• Apitipi Anicinapek Nation expressed concern regarding effects to high quality wildlife habitat in the PA, including the Mattagami River and the Frederick House River.
		• Contributed to an understanding of existing conditions for wildlife habitat.
		• Considered in the development of mitigation and management measures and supported scope of issues assessed.
		• Informed the assessment on Indigenous interests in Chapters 25 to 28 of the Impact Statement (Assessment of Potential Effects on Indigenous Interests).
		• The Project design was modified so there is no direct discharge to the Mattagami River.
			• Chapter 3 (Project Description), Section 3.9
			• Chapter 19 (Assessment of Potential Effects on Wildlife and Wildlife Habitat), Sections 19.2, 19.4.2
			• Chapters 25 to 28 (Assessment of Potential Effects on Indigenous Interests)

Topic	Key Information, Indigenous Knowledge, and Concerns	Influence on the Assessment	Where Information is Addressed in the Impact Statement
Species of Cultural Importance	• Members of the public and/or other stakeholders expressed concern about impacts to species culturally significant to Indigenous nations. • Apitipi Anicinapek Nation, Flying Post First Nation, Matachewan First Nation, Mattagami First Nation, and Taykwa Tagamou Nation rely on an abundance and diversity of species to exercise hunting and trapping rights such as moose, black bear, partridge, lynx, rabbits, duck and beaver. Traditional species of importance also include fisher, American mink, fox, grey fox, muskrat, squirrel, North American river otter, weasel, coyote, wolverine, cougar, moose, boreal caribou, deer, deer, geese, eagle (bald eagle), duck, crane, and osprey. • Flying Post First Nation identified that the river systems are important habitat for moose. • Apitipi Anicinapek Nation, Flying Post First Nation, Matachewan First Nation, Mattagami First Nation, and Métis Nation of Ontario – Region 3 expressed concern regarding one or more of the following impacts to moose: - population changes due to predator and prey relationships, disease and parasites in wildlife, particularly in moose - Project emissions, sensory disturbances (noise) and increased mortality related to the rail line - Changes to habitat (calving sites, aquatic feeding areas, wintering grounds) • Flying Post First Nation, Matachewan First Nation, and Mattagami First Nation expressed concern regarding the Project's potential effects to spirit moose. Flying Post First Nation indicated that the spirit moose cannot be harvested, by law. • Flying Post First Nation, Matachewan First Nation, and Mattagami First Nation recommend: - Indigenous participation in wildlife studies and support for nation-led moose studies (methods for identifying the presence/absence of spirit moose) - large mammal analysis and surveys, specifically in relation to the presence of cougar. • Matachewan recommends modifying Project operations and infrastructure to reduce or eliminate impacts to wildlife.	• Contributed to an understanding of existing conditions for moose, including the spirit moose. • Considered in the development of mitigation and management measures and supported scope of issues assessed. • Informed the assessment on Indigenous interests in Chapters 25 to 28 of the Impact Statement (Assessment of Potential Effects on Indigenous Interests). • Canada Nickel's responses to mitigation recommendations made by the Indigenous nations are provided in Chapters 25 to 28 of the Impact Statement (Assessment of Potential Effects on Indigenous Interests).	• Chapter 19 (Assessment of Potential Effects on Wildlife and Wildlife Habitat), Sections 19.2, 19.4.2, 19.4.3, 19.4.4, 19.4.5, 19.4.6 • Chapters 25 to 28 (Assessment of Potential Effects on Indigenous Interests)
Wildlife Health	• Apitipi Anicinapek Nation, Flying Post First Nation, Matachewan First Nation and Taykwa Tagamou Nation expressed concern regarding declining wildlife health, including deformities in harvested animals, attributed to mining and forestry activities (including herbicide spraying). • Matachewan First Nation and Mattagami First Nation expressed concern regarding animal health and quality due to ingestion of airborne contaminants from mine tailings. • Matachewan First Nation expressed concern regarding effects to the health of harvested resources including wildlife, stating that members have observed diseased moose and beaver due to contaminants introduced by other projects in the region. • Flying Post First Nation, Matachewan First Nation, and Mattagami First Nation expressed concern regarding the impacts of the dry stack tailing on fauna. • Flying Post First Nation expressed concern regarding pollution and contamination from the Project would limit the areas to hunt and harvest due to fear of bioaccumulation in the hunted and harvest game meat. • Métis Nation of Ontario – Region 3 expressed concern that noise and pollution will affect its ability to harvest. • Matachewan First Nation expressed concern about noise disturbance from the Project and how it will affect the behaviours of animals in the surrounding area. • Flying Post First Nation expressed concern regarding health of wildlife and fear of consuming contaminated wildlife. • Flying Post First Nation recommends transparency regarding potential contamination and remediation is essential for restoring confidence in harvesting in the study area for future generations. Flying Post First Nation also recommends that herbicides are not used.	• Contributed to an understanding of existing conditions for wildlife health. • Considered in the development of mitigation and management measures and supported scope of issues assessed. • The Project's proposed tailings management facility will be operated as a "thickened tailings cone" and is described further in Chapter 3, Section 3.3.4 of the Impact Statement (Project Description). Canada Nickel will not have dry stack tailing storage. • Informed the assessment on Indigenous interests in Chapters 25 to 28 of the Impact Statement (Assessment of Potential Effects on Indigenous Interests). • Canada Nickel's responses to mitigation recommendations made by the Indigenous nations are provided in Chapters 25 to 28 (Assessment of Potential Effects on Indigenous Interests).	• Chapter 3 (Project Description), Section 3.3.4 • Chapter 19 (Assessment of Potential Effects on Wildlife and Wildlife Habitat), Sections 19.2, 19.4.6 • Chapters 25 to 28 (Assessment of Potential Effects on Indigenous Interests)

Topic	Key Information, Indigenous Knowledge, and Concerns	Influence on the Assessment	Where Information is Addressed in the Impact Statement
Wildlife Abundance and Distribution	• Members of the public and/or other stakeholders expressed concern about the timing of wildlife surveys. • Apitipi Anicinapek Nation, Flying Post First Nation, Matachewan First Nation, Mattagami First Nation, Métis Nation of Ontario – Region 3, and Taykwa Tagamou Nation, expressed concern regarding the declining abundance and displacement of important species as a result of forestry, mining, and increased traffic and noise. • Apitipi Anicinapek Nation expressed concern regarding the decline in wildlife populations.	• Contributed to an understanding of existing conditions for wildlife abundance and distribution. • Considered in the development of mitigation and management measures and supported scope of issues assessed. • Informed the assessment on Indigenous interests in Chapters 25 to 28 of the Impact Statement (Assessment of Potential Effects on Indigenous Interests).	• Chapter 19 (Assessment of Potential Effects on Wildlife and Wildlife Habitat), Sections 19.2, 19.4.5 • Chapters 25 to 28 (Assessment of Potential Effects on Indigenous Interests)
Wildlife Injury and Mortality Risk	• Members of the public and/or other stakeholders expressed concern about impacts of road construction on wildlife. • Flying Post First Nation, Matachewan First Nation, Mattagami First Nation, Métis Nation of Ontario – Region 3, and Taykwa Tagamou Nation expressed concern regarding effects of increased traffic associated with the Project, as well as the re-routing of Highway 655, including: - collisions between wildlife and motor vehicles - wildlife displacement, injury or mortality, with a particular focus on moose - barriers or other deterrents to wildlife movements (roads, railways) • Taykwa Tagamou Nation recommends Canada Nickel provide information on how the Project will mitigate collisions associated with increased traffic to reduce impacts on wildlife mortality. • Flying Post First Nation, Matachewan First Nation, Mattagami First Nation, and Taykwa Tagamou Nation recommend Canada Nickel consider historical wildlife travel corridors and construction of wildlife fences, overpasses and corridors during the realignment of Highway 655 to promote the protection of moose and other wildlife.	• Contributed to an understanding of existing conditions for wildlife injury and mortality risk. • Considered in the development of mitigation and management measures and supported scope of issues assessed. • Informed the assessment on Indigenous interests in Chapters 25 to 28 of the Impact Statement (Assessment of Potential Effects on Indigenous Interests). • Canada Nickel's responses to mitigation recommendations made by the Indigenous nations are provided in Chapters 25 to 28 of the Impact Statement (Assessment of Potential Effects on Indigenous Interests).	• Chapter 19 (Assessment of Potential Effects on Wildlife and Wildlife Habitat), Sections 19.2.2, 19.4.3, 19.4.4 • Chapters 25 to 28 (Assessment of Potential Effects on Indigenous Interests)

Where made available by Indigenous nations through engagement, information gathering, and voluntary information sharing, Indigenous knowledge has been considered and incorporated into the Impact Statement, as applicable. Refer to the Description of Engagement with Indigenous Peoples (Chapter 7 of the Impact Statement) for detailed methods regarding the incorporation of Indigenous knowledge to the Impact Statement.

19.1.3 Potential Effects, Pathways and Measurable Parameters

Table 19.2 lists the potential Project effects on wildlife and wildlife habitat, including effect pathways and measurable parameters. Potential environmental effects and measurable parameters were selected based on a review of recent environmental assessments for mining projects in Canada, comments provided during engagement, and professional judgement.

Table 19.2 Potential Effects, Effect Pathways and Measurable Parameters for Wildlife and Wildlife Habitat

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in habitat	• Construction, operations and/or decommissioning and closure of the Project could result in direct and/or indirect loss or alteration of wildlife habitat.	• Amount (ha) of suitable wildlife habitat directly and/or indirectly lost or altered • Area (ha) of SAR critical habitat directly or indirectly affected by the Project, including: - Blanding's turtle - Boreal caribou - Bats including the little brown myotis, northern myotis and tri-colored bat
Change in movement	• Construction, operations and/or decommissioning and closure of the Project could result in alteration of wildlife movement patterns (daily, seasonal) or movement corridors. • Alteration or impediment of wildlife movement, including physical barriers, sensory disturbance, or vegetation removal (e.g., gaps in forested habitat).	• Extent of area (ha) causing movement hindrance (regional scale) (e.g., mine sites) • Qualitative discussion of effects of Project on movement (e.g., fragmentation; sensory disturbance)
Change in mortality risk	• Direct and/or indirect activities associated with construction, operations, and/or decommissioning and closure of the Project could result in increased mortality risk or number of wildlife fatalities.	• Qualitative assessment of risk of mortality due to vegetation clearing, site preparation, and maintenance, collisions with vehicles and infrastructure, human-wildlife interactions, and change in predator-prey dynamics
Change in wildlife health	• Activities associated with construction, operations, and/or decommissioning and closure of the Project could result in increased risk of exposure of wildlife to contaminants.	• Change in contaminant pathways and exposure, done as ecological risk

19.1.4 Boundaries

19.1.4.1 Spatial Boundaries

The **Project Area (PA)** encompasses the Project footprint and is the anticipated area of physical disturbance associated with the construction, operations and decommissioning and closure of the Project. The PA covers an area of 11,785 hectares (ha) (118 square kilometres [km^2]) and includes the following key Project components: the relocated 500 kV transmission lines, future Highway 655 Right-of-Way, rail line, site roads, Ore Stockpiles (West and East), Open Pit (Main and East Zones), Collection Ponds (for collection and storage), Tailings Management Facility (TMF), and Impoundment Facility. The extent of the PA for the Project is shown on Figure 3.1 (Chapter 3 of the Impact Statement [Project Description]).

The **Local Study Area (LSA)** includes the area in which Project-related effects (direct or indirect) can be predicted or measured with a reasonable level of accuracy and confidence. The LSA encompasses the PA and is VC-specific, as it is based on the reasonable geographic extent by which Project-related effects can be predicted.

The LSA for wildlife and wildlife habitat (excluding boreal caribou) is identical to the Vegetation, Riparian, and Wetland Environments LSA (see Figure 19.1) because changes in vegetation, riparian and wetlands may result in changes to wildlife and wildlife habitat. The LSA includes the PA and subwatersheds on the west side of the West Buskegau River main channel, several catchments within the Jocko Creek watershed, and headwater subwatersheds of the North Driftwood River. The LSA continues downstream on the West Buskegau River and North Driftwood River, away from the PA.

The LSA for boreal caribou includes a 10 km buffer from the PA and is based on their current distribution, home range size, and level of disturbance within the southern portion of their Range (Figure 19.2). There have been no observations of boreal caribou within the southern portion of the Range since the early 2000s, including south of Pierre Lake (MNRF 2014) which is located 78 km northeast of the PA. These observations were consistent with recent surveys completed in 2023 (MECP 2024a). The level of disturbance within the southern portion of the Range, including south of Highway 11, is likely a contributing factor to their continued absence in the area. According to Brown (2005), boreal caribou travel between 34-53 km average distance between seasons and have a home range size between 3,000 to 5,000 km^2 in northeastern Ontario (MECP 2020). The LSA is beyond the area where boreal caribou are expected to travel or that could be affected by Project effects.

The **Regional Study Area (RSA)** includes the area within which cumulative effects on wildlife and wildlife habitat are likely to occur, depending on the location of other past, present or reasonably foreseeable future projects or activities. The RSA for wildlife and wildlife habitat (excluding boreal caribou) encompasses the PA and the LSA and was primarily based on major road networks that would present substantive deterrents or impediments to movement as well as species ranges (Figure 19.3). The RSA for boreal caribou is defined as the entire Range (Figure 19.4).

19.1.4.2 Temporal Boundaries

The temporal boundary of the assessment includes all Project phases from the start of construction through to the end of closure. Based on the current Project schedule, the Project phases include:

- Construction (Year -3 to Year -1)
- Operations
  - Operations phase 1 (Year 1 to Year 5); 60 kilotonnes/day (kt/d) milling capacity with ore extraction
  - Operations phase 2 (Year 5 to Year 30); 120 kt/d milling capacity with ore extraction
  - Operations phase 3 (Year 30 to Year 41); 120 kt/d milling capacity with no ore extraction
- Decommissioning and closure
  - Active closure (Year 41 to Year 46)
  - Passive closure (Year 46+)

19.1.5 Residual Effects Characterization

The characterizations used to assess residual effects on wildlife and wildlife habitat are provided in Table 19.3.

Table 19.3 Characterization of Residual Effects on Wildlife and Wildlife Habitat

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual effect	**Positive –** a residual effect that moves measurable parameters in a direction beneficial to wildlife and wildlife habitat relative to baseline **Adverse –** a residual effect that moves measurable parameters in a direction detrimental to wildlife and wildlife habitat relative to baseline **Neutral –** no net change in measurable parameters for the wildlife and wildlife habitat relative to baseline
Magnitude	The amount of change in measurable parameters or the VC relative to existing conditions	**No Negligible Change –** no measurable change in habitat, movement, mortality, or wildlife health, including SOCC and SAR **Low –** Project changes less than 10% for general wildlife in the LSA, or less than 5% for SOCC and SAR in the LSA **Moderate –** Project changes 10-20% for general wildlife in the LSA, or 5-10% for SOCC and SAR in the LSA **High –** Project changes more than 20% for general wildlife in the LSA, or more than 10% for SOCC and SAR in the LSA
Geographic Extent	The geographic area in which a residual effect occurs	**PA –** residual effects are restricted to the PA **LSA –** residual effects extend into the LSA **RSA –** residual effects extend into the RSA

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Timing[1]	Considers when the residual effect is expected to occur, where relevant to the VC	**No sensitivity –** effect does not occur during critical life stage (e.g., boreal caribou calving periods) or timing does not affect the VC **Moderate sensitivity –** effect may occur during a lower sensitive period of a critical life stage; for many species this is the start (e.g., several days prior to roosting for bats) or end (e.g., periods when pups become independent) of the critical period **High sensitivity –** effect occurs during a critical life stage (e.g., bat roosting or overwintering period)
Duration	The time required until the measurable parameter or the VC returns to its existing condition, or the residual effect can no longer be measured or otherwise perceived	**Short-term –** the residual effect is restricted to construction or decommissioning, and/or the rehabilitation and closure plans (<3 years) **Medium-term –**the residual effect extends through the operations phase (3 to 41 years) **Long-term –** the residual effect extends beyond the life of the Project (>41 years)
Frequency	Identifies how often the residual effect occurs and how often during the project or in a specific phase	**Single event** **Multiple irregular event –** occurs at no set schedule **Multiple regular event –** occurs at regular intervals **Continuous –** occurs continuously
Reversibility	Pertains to whether a measurable parameter or the VC can return to its existing condition after the project activity ceases	**Reversible –** the residual effect is likely to be reversed after activity completion and reclamation **Irreversible –** the residual effect is unlikely to be reversed

Note:

1 In terms of **Timing**, the critical life stages include episodes (such as, species nesting, roosting, calving, overwintering) which will vary both by VC and annually depending on seasonal conditions. For example, it is clear that winter is outside of turtle nesting periods and that spring/summer is fully within this critical time period, whereas early spring and late fall is a transitional period that, depending on the seasonal conditions, may affect the life stage. Timing is also relevant to Indigenous activities such as trapping and hunting.

19.2 Existing Conditions for Wildlife and Wildlife Habitat

The following Sections include a summary of methods and results from the Terrestrial Wildlife and Wildlife Habitat Supplemental Baseline Report (Appendix B.7.3 of the Impact Statement) and 2023 Terrestrial Ecology Baseline Study (Appendix B.7.4 of the Impact Statement).

19.2.1 Methods

Existing conditions for wildlife and wildlife habitat was based on a review of background information from publicly available data sources, feedback and engagement within stakeholders, government and Indigenous nations and site-specific field investigations. The methodology for data collection is provided in the following Sections.

19.2.1.1 Background Review

Background data sources from government agencies and non-governmental organizations and from background reports and published literature were reviewed to compile information on the occurrence, abundance, distribution, and habitat associations of Wildlife and Wildlife Habitat in the LSA and RSA. The following data sources were reviewed:

- Natural Heritage Areas Make-a-Map Application and Natural Heritage Information (NHIC) database (MNR 2024a)
- Ontario Reptile and Amphibian Atlas (ORAA 2023; Ontario Nature 2020)
- Ontario Butterfly Atlas (OBA; Toronto Entomologists' Association 2024)
- Atlas of the Mammals of Ontario (Dobbyn 1994)
- iNaturalist (2024)
- Critical Habitat for Species at Risk (SAR) National Dataset – Canada (GOC 2023)
- *Species at Risk Act* (SARA), Schedule 1 (GOC 2024)
- Species at Risk in Ontario (SARO) List (MECP 2024b)
- Federal and provincial recovery strategies and management plans
- Bat Conservation International Bat Profiles (BCI 2022)

19.2.1.2 Field Surveys

Wildlife surveys were completed by Wood and WSP from 2021 to 2023. The survey type, date and summary of survey effort are provided in Table 19.4, below. Further details can be found in the 2023 Terrestrial Ecology Baseline Study in Appendix B.7.4 of the Impact Statement.

Table 19.4 Summary of Field Studies

Survey Type	Date	Methods
Amphibian Call Survey	June 12-18, 2021 May 13-18, 2022 June 1-3, 2022 June 22-27, 2022	The Marsh Monitoring Program (BSC 2009)
Turtle Basking	May 13-17, 2022	Visual encounter survey by visually scanning suitable habitats with binoculars
Blanding's Turtle Habitat Assessment	August 16-17, 2023 (aerial) August 19-20, 2023 (ground)	Survey Protocol for Blanding's turtle (*Emydoidea blandingii*) in Ontario (MNRF 2015a)
eDNA	June 7-8, 2023 July 15-16, 2023	eDNA laboratory guidance for Blanding's turtle surveys

Survey Type	Date	Methods
Bat Maternity Habitat Assessment (including SAR) - Candidate Roost Survey	August 11-15, 2021 June 6-7, 2022 July 30, 2022 August 2, 2022 May 23-31, 2023	Bat and Bat Habitats: Guidelines for Wind Power Projects (MNRF 2011) Survey Protocol for Species at Risk Bats within Treed Habitats Little Brown Myotis, Northern Myotis & Tri-Colored Bat (MNRF 2017) Species at Risk Bats Survey Note 2022 (MECP 2022a) Maternity Roost Surveys (Forests/Woodlands) (MECP 2022b)
Bat Maternity Habitat Autonomous Recording Unit (ARU) (including SAR)	June 12-18, 2021 June 29-July 7, 2021 June 6-8, 2022 June 30 - July 1, 2022 May 23-31, 2023	
Bat Hibernacula Habitat Assessment (including SAR)	May 17-19, 2022	
Bat Hibernacula ARU (including SAR)	May 16-17, 2022 July 30 & August 2, 2022 July 7, 2023 September 11, 2023	
Moose / Furbearers / Boreal Caribou Aerial Survey	March 17 & 19, 2021 March 21, 2022 Concurrent with bird stick nest survey	Aerial transects with flight lines approximately 45 km in length

19.2.1.3 Habitat Assessment

Wildlife habitat was determined based on a combination of information collected from the background, engagement with Indigenous nations and field investigations. The type of wildlife habitats considered was generally based on guidance in the Significant Wildlife Habitat Technical Guide (MNR 2000) and Significant Wildlife Habitat Criteria Schedules for Ecoregion 3E (MNRF 2015b). General wildlife habitat was also identified based on species-specific life history requirements.

MNR data from open-source geospatial databases was used to identify the location of known wildlife habitat types such as denning sites, mineral licks, moose aquatic feeding areas, moose wintering areas (early and late) and moose calving sites.

Desktop mapping and land classification for areas of the RSA outside of the LSA was accomplished by using Ontario Land Cover Data Base, 2nd Edition (LIO 2002). Because wetlands were under-represented in the Ontario Land Cover Data Base, the Ontario Wetland Evaluation System was used where available (MNRF 2023).

Vegetation communities were used to inform the type of wildlife habitats present within the assessment areas. Wildlife habitat within the PA and LSA was determined based on vegetation communities delineated and described according to the Ontario Ecosite Classification system (Banton et al. 2009). Forest Resources Inventory (FRI) Versions 1 and 2 were used as a baseline for vegetation boundaries between wetlands, forests, and vegetation communities (LIO 2007, 2023). FRI from the Abitibi River Forest, Romeo Malette Forest, and Gordon Cousen's Forest were used to update the baseline FRI data.

Some manual adjustments to polygon boundaries and classification were made based on visual aspects of the polygon and surrounding habitats. Ontario Land Cover Classification v2 and the Ontario Wetland Evaluation System (obtained from Land Information Ontario; LIO) were used to categorize the RSA because FRI data were not available for the entire RSA (LIO 2023). For this reason, land cover mapping between the RSA and LSA is not directly comparable.

19.2.2 Overview

The Project is located within the Abitibi Ecoregion (Ecoregion 3E) in northeastern Ontario within the Ontario Shield Ecozone (Crins et al. 2009). Wildlife within the Ecoregion is typical of the boreal forest, which comprises moose, northern gray wolf, Canada lynx, American black bear, American marten, beaver, snowshoe hare and red squirrel. Representative species of amphibians and reptiles include blue-spotted salamander, boreal chorus frog, wood frog, mink frog, midland painted turtle, and eastern gartersnake.

There are several watercourses, waterbodies and wetlands throughout the Project. The wetlands within the PA and LSA are unevaluated with four provincially significant wetlands (PSW) within the southern boundary of the RSA: Kraft Creek/Murphy Creek, Little Goose Lake, Porcupine Lake and Frederick House River.

No designated natural areas are found in the PA or LSA; however, the following provincial parks and conservation reserves (regulated under the *Provincial Parks and Conservation Reserves Acts, 2006*) are within the RSA (Figure 19.2): Kettle Lakes Provincial Park (Recreational Class), Mahaffy Township Ground Moraine Conservation Reserve and Geary Township Shoreline Bluff Conservation Reserve.

19.2.2.1 Wildlife of Importance to Indigenous Nations

A preliminary list of wildlife of importance to Indigenous nations considered within the Assessment Areas is summarized in Table 19.5. The results are based on information made available by Indigenous nations through engagement, information gathering, and voluntary information sharing about species of importance to the Indigenous nations; additional information regarding wildlife of importance to Indigenous nations is provided in Chapters 25 to 28 of the Impact Statement (Assessment of Potential Effects on Indigenous Interests). In some instances, only wildlife groups (and not species) were identified by Indigenous nations. Where this occurs, all species within the wildlife group were recognized as important.

The list of wildlife of importance is preliminary, based on initial Indigenous engagement, and could be updated, as needed, as part of ongoing engagement. It is recognized that all wildlife would have value and importance to Indigenous nations for a variety of social, cultural, spiritual and economic purposes.

Table 19.5 Wildlife of Indigenous Importance

Species of Importance	Indigenous Nation					
	Métis Nation of Ontario	Apitipi Anicinapek Nation	Flying Post First Nation	Matachewan First Nation	Mattagami First Nation	Taykwa Tagamou Nation
Amphibians / Reptiles						
Salamanders	✓					
Reptiles (including Blanding's turtle)	✓					
Bats						
Bats	✓		✓	✓	✓	
Ungulates						
Boreal caribou	✓	✓	✓	✓	✓	✓
Moose (including spirit moose)	✓	✓	✓	✓	✓	✓
White-tailed deer	✓	✓	✓	✓	✓	✓
Furbearers						
American black bear	✓	✓	✓	✓	✓	✓
Grey fox (red fox, fox)	✓	✓	✓	✓	✓	✓
Wolf (assume this refers to Northern Gray Wolf)	✓	✓	✓	✓	✓	✓
*Eastern wolf						✓
Wolverine	✓	✓	✓	✓	✓	✓
Cougar	✓	✓	✓	✓	✓	✓
Coyote	✓	✓	✓	✓	✓	✓
Canada lynx	✓	✓	✓	✓	✓	✓
Snowshoe hare (rabbit)	✓	✓	✓	✓	✓	✓
Beaver	✓	✓	✓	✓	✓	✓

Species of Importance	Indigenous Nation					
	Métis Nation of Ontario	**Apitipi Anicinapek Nation**	**Flying Post First Nation**	**Matachewan First Nation**	**Mattagami First Nation**	**Taykwa Tagamou Nation**
American mink	✓	✓	✓	✓	✓	✓
American marten	✓	✓	✓	✓	✓	✓
Muskrat	✓	✓	✓	✓	✓	✓
North American river otter (otter)	✓	✓	✓	✓	✓	✓
Fisher	✓	✓	✓	✓	✓	✓
Weasel	✓	✓	✓	✓	✓	✓
Other						
Squirrel	✓	✓	✓	✓	✓	✓
Large game	✓	✓	✓	✓	✓	✓
Pollinators	✓					
Species at risk	✓	✓	✓	✓	✓	✓

Note:
*Taykwa Tagamou Nation identified a single eastern wolf sighting; however, the range of this species is considered limited to central Ontario based on genetic testing, with only a few records extending to Sault Ste. Marie and Manitoulin Island (COSSARO 2022). The wolves in the area are considered to be northern gray wolf and therefore, eastern wolf are not considered further (see the 2023 Terrestrial Ecology Baseline Study in Appendix B.7.4 of the Impact Statement)

19.2.2.2 Amphibians and Reptiles

This Section summarizes the amphibians and one reptile recorded within the LSA, as detailed in the 2023 Terrestrial Ecology Baseline Study (Appendix B.7.4 of the Impact Statement), turtles are discussed under SOCC (midland painted turtle and snapping turtle) in Section 19.2.2.5 and SAR (Blanding's turtle) in Section 19.1.1.1.

Seven species of toads and frogs were detected during the 2021 and 2022 amphibian call surveys and incidental observations. This included: American toad, boreal chorus frog, green frog, mink frog, northern leopard frog, spring peeper, and wood frog. Spring peeper was the most common species recorded during all field studies (42 locations), followed by wood frog (25 locations), American toad (17 locations), mink frog (10 locations), and boreal chorus frog (7 locations). The least common species was green frog, which was only detected at two locations.

Two incidental records of salamanders were documented in the western portion of the PA at two separate locations on May 14, 2022. An unidentified salamander (believed to be an *Ambystomid*) was found in a pond at amphibian calling point CL-AM-15, located on the east side of Camp 40 Road, near the intersection of Lower Sturgeon Dam Road and Camp 40 Road. A blue-spotted salamander was observed crossing Camp 40 Road at CL-OW-15.

One eastern gartersnake was incidentally recorded while assessing rocky slopes and rock barrens for bat hibernaculum candidacy in 2022. Suitable habitat is present throughout the RSA, LSA, and PA, with potential hibernaculum identified for the following ecosites: B012, B024, B128, B129, B133, B134, B135, B136, B137, B138, B139, and B164. Given the expanse of indicator ecosite types across the Assessment Areas, suitable snake hibernacula features are considered common and widespread.

19.2.2.3 Moose

Evidence of moose was observed throughout the RSA, LSA, and PA in relatively high density. As detailed in the 2023 Terrestrial Ecology Baseline Study (Appendix B.7.4 of the Impact Statement), moose observations included 27 individual sightings during the 2021 (n=15) and 2022 (n=12) winter aerial surveys. These sightings were primarily recorded within the RSA near the south, east and northern limits. Moose were also recorded within the LSA near the north and south limits and a portion of the PA near the southern portion associated with the transmission line. Moose sightings and tracks were typically associated with clearcuts, regenerating forest, and riparian areas, particularly those dominated by aspen and abundant young hardwood saplings and shrubs that provide a browse forage source to moose; these habitats, in proximity to adjacent thermal and hiding cover, are preferred by moose in northern Ontario. Moose are anticipated to occur throughout the Assessment Areas. Actual moose numbers will vary due to other factors such as disease, parasites (e.g., winter tick, brainworm), road/railway mortality, and predation by wolves, bears, and humans (e.g., hunters). As of 2023, MNR estimates the population size to be 288 individuals in Wildlife Management Unit 30 (MNR 2024b) which overlaps the PA and LSA.

19.2.2.4 Furbearers

Several furbearers were recorded during surveys completed between 2021 and 2023. Furbearer abundance is regulated by factors other than habitat availability, such as disease, predation (e.g., wolves), and trapping. As detailed in the 2023 Terrestrial Ecology Baseline Study (Appendix B.7.4 of the Impact Statement), the majority of species were recorded incidentally, with the following seven (7) species detected during aerial surveys.

- Evidence of snowshoe hare (i.e., tracks) was prevalent throughout the aerial surveys in high density and not individually recorded
- Red fox was recorded at 179 locations, followed by Canada Lynx (n=91) and American marten (n=70). Records of these species were found throughout the RSA, LSA, and PA
- North American river otter was recorded at 56 locations throughout the RSA and LSA and within the central-east limits of the PA. The greatest densities were documented at Kamiskotia Lake and along the Mattagami River
- Beaver was recorded at 28 locations, the majority of which are within the RSA and a few records within the central-east limits of the PA. Three lodges and two dams were also recorded in the southern portion of the RSA
- Northern gray wolf was recorded at 21 locations, the majority of which are located within the RSA, with the exception of one area near the Mattagami River that extends into the LSA and is identified as high density based on the 2021 surveys. Several areas within the 2022 aerial survey area exhibited sufficient evidence of northern gray wolf sign to be classified as medium-high to high relative northern gray wolf density; these areas were located near the northwest, northeast, and southwest extents of the RSA

19.2.2.5 Species of Conservation Concern

As detailed in the 2023 Terrestrial Ecology Baseline Study (Appendix B.7.4 of the Impact Statement), targeted surveys for turtles were completed between May 13 and 17, 2022. No turtles were recorded across the 17 locations surveyed. However, there are two (2) SOCC turtle species with the potential to occur within the LSA based on the background review and presence of suitable habitat. In addition, there are two SOCC insects that have the potential to occur in the LSA. None of these species were recorded during field studies completed between 2021 and 2023 (Table 19.6).

Table 19.6 Species of Conservation Concern Assessed within the Local Study Area

Species / Conservation Status	Habitat Description	LSA
Midland Painted Turtle (*Chrysemys picta marginata*) SARA: SC ESA: Not listed COSEWIC: SC COSSARO: Not at risk S-Rank: S5 Source: ORAA	Inhabits waterbodies, such as ponds, marshes, lakes, and slow-moving creeks, with a soft bottom and provide abundant basking sites and aquatic vegetation. This species often basks on shorelines or on logs and rocks that protrude from the water. Overwintering occurs on the bottom of waterbodies (ORAA 2023).	**High Potential** – Habitat is abundant throughout the LSA within lakes, marshes, ponds, and creeks. This species was not recorded during turtle basking surveys or other field studies for the Project.
Snapping Turtle (*Chelydra serpentina*) SARA: SC ESA: SC COSEWIC: SC COSSARO: No schedule, no status S-Rank: S4 Source: ORAA	Snapping turtles prefer slow-moving waters with a soft mud bottom and dense aquatic vegetation. Established populations are most often located in ponds, sloughs, shallow bays or river edges and slow streams and wetlands. Individuals can also exist in developed areas (e.g., golf course ponds, irrigation canals); however, it is unlikely that populations persist in such habitats. Snapping Turtles can occur in highly polluted waterways, but environmental contamination is known to limit reproductive success (COSEWIC 2008).	**High Potential** – Habitat is abundant in the LSA within lakes, marshes, and rivers. This species was not recorded during turtle basking surveys or other field studies for the Project.
Monarch (*Danaus plexippus*) SARA: END ESA: SC COSEWIC: END COSSARO: SC S-Rank: S2N, S4B Source: OBA	Monarch is very widely distributed across North America and found in a wide variety of habitats. Monarch require milkweeds (*Asclepias* sp.) as a larval host plant and will use a variety of other flowers for adult food. Different milkweed species grow in a variety of environments which include fields, roadsides, open areas, wet areas, and urban gardens (COSEWIC 2016a).	**Moderate Potential** – Host plants (milkweed) were not recorded during vegetation surveys conducted for the Project; however, it may be present in open habitats, particularly anthropogenic influenced habitats. Monarch may use milkweed where present.

Species / Conservation Status	Habitat Description	LSA
Yellow-banded Bumble Bee (*Bombus terricola*) SARA: SC ESA: SC COSEWIC: SC COSSARO: SC S-Rank: S4 Source: NHIC	This species is a forage and habitat generalist, able to use a variety of nectaring plants and environmental conditions. The yellow-banded bumble bee has a large range throughout much of Canada and parts of the United States. It can be found in mixed woodlands, particularly for nesting and overwintering, as well as a variety of open habitat such as native grasslands, farmlands, and urban areas. Nest sites are often underground in abandoned rodent burrows or decomposing logs (COSSARO 2016).	**Moderate Potential** – Potentially suitable habitat is present were there are a variety of nectaring plants are available to support feeding throughout the active season.

19.2.2.6 Species at Risk

As detailed in the 2023 Terrestrial Ecology Baseline Study (Appendix B.7.4 of the Impact Statement), there are eight SAR that have been confirmed or have the potential to occur within the LSA based on the background review and presence of suitable habitat (Table 19.7). Of these species, there are three bat species that were recently assessed as endangered in 2023, both federally (COSEWIC) and provincially (COSSARO): eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), and silver-haired bat (*Lasionycteris noctivagans*). Provincially, these species will be added to O.Reg. 230/08 and protected under the ESA, effective January 31, 2025. As a result, these species are being considered under SAR as they will receive protection prior to Project commencement. The federal status change is currently under consideration through 2024, and it is unknown when or if these species will be added to Schedule 1 of SARA.

Table 19.7 Species at Risk Assessed within the Local Study Area

Species / Conservation Status	Habitat Description	LSA (see Appendix B.7.4 of the Impact Statement)
Blanding's Turtle (*Emyonidea blandingii*) SARA: END ESA: THR COSEWIC: END S-Rank: S3 Source: Community Record	Blanding's turtles are found in a variety of productive wetlands, occurring primarily in shallow-water habitats-shallow lakes, ponds, and wetlands with mucky bottoms. This species hibernates in the soft bottoms of water bodies. Other habitat features include rocks, logs or substrates in sunny locations that provide basking opportunities (COSEWIC 2016b). Females nest on various substrates on land, while overwintering occurs underwater in permanent pools (COSEWIC 2016b).	**Confirmed** – There are historical records of Blanding's turtle in the LSA and suitable habitat present, although this species was not observed during field studies or through eDNA sampling. There are two community records within the LSA (east of the PA) and one in the RSA (west the LSA). Habitat Suitability Index mapping shows suitable nesting, overwintering and functional habitat throughout the LSA.
Boreal Caribou (Boreal population) (*Rangifer tarandus* pop. 14) SARA: THR ESA: THR COSEWIC: THR S-Rank: S4 Source: Ontario Mammal Atlas	At the broad landscape scale, boreal caribou require large, undisturbed areas of old or mature conifer upland forest and lowlands dominated by jack pine and/or black spruce. These areas allow boreal caribou to effectively separate themselves from higher densities of moose, white-tailed deer, northern gray wolf, and American black bear which tend to be associated with younger mixed or deciduous forest. At smaller scales, boreal caribou seasonally select specific habitat features and areas that support successful reproduction and calf rearing, provide summer and/or winter forage, and/or facilitate movement between discrete areas of use. Boreal caribou require large un-fragmented habitats for security from predators to space apart from other ungulate species, to distribute themselves over the landscape at naturally low population density, and to avoid disturbance from human activities that may increase mortality risk (COSEWIC 2002; ECCC 2020). Lichen species preferred by boreal caribou are a consistent feature of winter and summer home ranges. Lichens tend to be most abundant in mature and old forests, consequently fire, logging, and mining and sensory disturbance from linear anthropogenic disturbances can displace boreal caribou for decades (COSEWIC 2002; ECCC 2020).	**Low Potential** – There were no boreal caribou observed during field studies. The southern limit of the Range (ON8; ECCC, 2020) begins within the central portion of the LSA with limited suitable habitat present. This Range was last assessed provincially in 2010 (MNRF 2014) and was characterized at the time as 43.8% disturbed, with a minimum animal count of 178 boreal caribou and a declining population trend (low calf recruitment). Habitat in the LSA is characterized as Category 3: Remaining Areas. Within the RSA, Category 1: Nursery Areas, Winter Use Areas, Travel Corridors is present near the northern limits and Category 2: Seasonal Ranges is present in the north, south and east limits. The habitat configuration is conducive to increased numbers of alternate prey (moose) and associated predators (wolves) which represent a local landscape with high mortality risk to boreal caribou and has substantial anthropogenic disturbance; therefore, it currently has low habitat suitability. Boreal caribou are disturbance-sensitive with life history limitations (low reproductive output, low annual calf survival), resulting in sensitivity to minor changes in mortality risk. They naturally occur at low spatial density (typically 0.02 to 0.03 boreal caribou/km^2) but have large spatial home range requirements for well-connected old-growth boreal forest and lichen-rich peatlands. These large home ranges allow boreal caribou to spatially separate from predators and alternative prey and avoid disturbance (ECCC 2020).

Species / Conservation Status	**Habitat Description**	**LSA** (see Appendix B.7.4 of the Impact Statement)
Eastern Red Bat (*Lasiurus borealis*) SARA: Not listed, under consideration ESA: END (January 31, 2025) COSEWIC: END COSSARO: END S-Rank: S4 Source: ARU	Forage in open areas, forested and non-forested habitats, including both deciduous and coniferous forests. Maternity roosts tend to be large diameter and tall, exceeding the forest canopy. Saplings have been used for roosting by males. Roosts by hanging from branches and using several trees during the breeding season with high inter-annual roosting area fidelity. Migratory species that overwinter in the southern United States. (COSEWIC 2023).	**Confirmed** – Eastern red bat was recorded in the PA and LSA at two locations in 2021 and 2022: CL-DET-ET-G2-2, CL-DET-CBM-12. Several locations throughout the Assessment Areas were classified as high frequency bat species which could be eastern red bat, were also identified: 2021: CL-DET-ET-G2-1, CL-DET-ET-G2-2, CL-DET-EXTRA-03, CL-DET-G1-07, CL-DET-G1-10, CL-DET-WT-G2-02, CL-DET-WT-G2-02b 2022: CL-DET-CBM-11, 13, 14, 17, 18, 19, CL-DET-EXTRA-01, CL-DET-G2-01 2023: CL-DET-23-6, CL-DET-23-8 and CL-DET-23-9
Hoary Bat (*Lasiurus cinereus*) SARA: Not listed, under consideration ESA: END (January 31, 2025) COSEWIC: END COSSARO: END S-Rank: S4 Source: ARU	Forage in open areas, wetlands, open/patchy treed areas, open fields and grasslands. This species will use both deciduous and coniferous forests, with maternity roosts tending to be large diameter and tall, exceeding the forest canopy. Roosts by hanging from branches and using several trees during the breeding season with high inter-annual roosting area fidelity. Migratory species that overwinter in the southern United States. (COSEWIC 2023).	**Confirmed** – Hoary bat was recorded throughout the Assessment Areas at all locations in 2022 and 2023 and most locations in 2021, except CL-DET-G1-02 and CL-DET-G2-11.

Species / Conservation Status	Habitat Description	LSA (see Appendix B.7.4 of the Impact Statement)
Little Brown Myotis (*Myotis lucifugus*) SARA: END ESA: END COSEWIC: END S-Rank: S3 Source: ARU	Roosts in tree cavities, including small spaces or crevices found in loose bark, hollow trees, rock faces and is widespread throughout the southern half of Canada and is especially associated with human structures often forming nursery colonies in buildings, attics, walls, and bat boxes. Hibernates in caves and abandoned mines during the winter months. Typically forages over water (MECP 2021a) where their diet consists of aquatic insects, mainly midges, mosquitoes, mayflies, and caddisflies. They also feed over forest trails, cliff faces, meadows, and farmland where they consume a wide variety of insects, from moths and beetles to crane flies. Maternity roosts are primarily live deciduous trees and males, juveniles, and non-reproductive females can be found in dead trees, on average all trees are over 20 cm diameter at breast height (Humphrey and Fotherby 2019). Maternity sites typically have sufficient protection from predators, an abundance of roosting locations, and adequate solar exposure (Humphrey and Fotherby 2019).	**Confirmed** – Little brown myotis was recorded throughout the Assessment Areas at the following locations during 2021 and 2022 acoustic surveys: CL-DET-G2-04, CL-DET-CBM-11, CL-DET-CBM-12, CL-DET-CBM-19. There were several locations only classified to myotis species: 2021: CL-DET-ET-G2-1, CL-DET-ET-G2-2, CL-DET-EXTRA-03, CL-DET-G1-07, CL-DET-G1-10, CL-DET-G2-01, CL-DET-G2-04, CL-DET-WT-G2-02 2022: CL DET-CBM-2, 11, 12, 13, 14, 17, 18, 19, CL-DET-G1-04, CL-DET-G2-01 2023: CL-DET-23-1, CL-DET-23-6 and CL-DET-23-7. Suitable overwintering habitat was identified at seven locations (Rock Barren 6-3, 6-5, 6-8, 6-9, 6-12 and 8), although acoustic surveys concluded they were not being used.
Northern Myotis (*Myotis septentrionalis*) SARA: END ESA: END COSEWIC: END S-Rank: S3 Source: BCI, SARO List	Roosts in canopies of deciduous trees, including small spaces or crevices found in loose bark, hollow trees. Rock faces and human structures can also be used though less frequently than little brown myotis. Hibernates in caves and abandoned mines during the winter months. Maternity sites typically have sufficient protection from predators, an abundance of roosting locations, and adequate solar exposure (Humphrey and Fotherby 2019). The northern myotis is one of the less common species found to hibernate in Ontario. This species is closely associated with woodlands and uses trees as maternity sites (COSEWIC 2013).	**High Potential** - Although the presence of northern myotis was not confirmed, presence of this species cannot be ruled out in the Assessment Areas. In most instances, the northern myotis emits echolocation calls that resemble those of the little brown myotis. The northern myotis can, however, emit calls of much higher maximum frequency than the little brown myotis in highly cluttered habitat. Unfortunately, recordings made in high clutter are of poor quality and higher frequencies attenuate much more quickly making recordings of calls identifiable as northern myotis exceedingly rare. There were several locations only classified to Myotis species throughout the PA, LSA and RSA: 2021: CL-DET-ET-G2-1, CL-DET-ET-G2-2, CL-DET-EXTRA-03, CL-DET-G1-07, CL-DET-G1-10, CL-DET-G2-01, CL-DET-G2-04, CL-DET-WT-G2-02 2022: CL DET-CBM-2, 11, 12, 13, 14, 17, 18, 19, CL-DET-G1-04, CL-DET-G2-01 2023: CL-DET-23-1, CL-DET-23-6 and CL-DET-23-7

Species / Conservation Status	Habitat Description	LSA (see Appendix B.7.4 of the Impact Statement)
Silver-Haired Bat (*Lasionycteris noctivagans*) SARA: Not listed, under consideration ESA: END (January 31, 2025) COSEWIC: END COSSARO: END S-Rank: S4 Source: ARU	Forage along the edge of forests, forest openings, including young and old forests and edge of forests. Roost in tree cavities or under exfoliating bark. Migratory species that overwinters in the United States, southeastern British Columbia and occasionally the Great Lakes region (COSEWIC 2023).	**Confirmed** – Silver-haired bat was recorded throughout the Assessment Areas at all locations in 2022 and 2023 and most locations in 2021, except CL-DET-G1-02.
Tri-colored Bat (*Perimyotis subflavus*) SARA: END ESA: END COSEWIC: END S-Rank: S3? Source: Ontario Mammal Atlas	Within treed habitats, tri-colored bat primarily roosts in tree foliage (mainly within oak leaves). Leaf roosts are shaped like umbrellas with a "roof" and a hollow core where bats rest. Studies have shown that oak leaves are a preferred roost site. Maple leaves are also selected, although less commonly. It is thought that tri-colored bat may prefer roost trees in more open woodlands, as opposed to deep woods. Roosts in tree cavity are used less frequently than Myotis species (Humphrey and Fotherby 2019).	**Low Potential** – Tri-colored bat was not identified in the PA. Published results from a comprehensive bat monitoring program across northern Ontario (Layng et al. 2019) have led to speculation that tri-colored bats may occur further west than originally thought. No tri-colored bat was identified by automated or manual methods in either survey period, providing strong evidence that this species does not occur in the Assessment Areas.
Wolverine (*Gulo gulo*) SARA: SC ESA: THR COSEWIC: SC S-Rank: S2S3 Source: MECP	Wolverines use a wide variety of boreal habitats and are typically distributed relative to the availability of a diverse prey base that includes small mammals and large ungulates, although they are most dependent on upland forested habitats (COSEWIC 2014a). Wolverine occupy large home ranges and are sparsely dispersed on the landscape, with boreal densities ranging from 0.7-4.8 individuals per 1,000 km^2 (COSEWIC 2014a).	**Low Potential** – Unlikely present due to lack records south of Highway 11.

19.3 Project Interactions with Wildlife and Wildlife Habitat

Table 19.8 identifies, for each potential effect, the physical activities that might interact with the VC and result in the identified effect. These interactions are indicated by a check mark (✓) and are discussed in detail in Section 19.4, in the context of effects pathways, standard and Project-specific mitigation/enhancement, and residual effects.

Table 19.8 Project Interactions with Wildlife and Wildlife Habitat

Physical Activities	Effects			
	Change in habitat	**Change in movement**	**Change in mortality risk**	**Change in wildlife health**
Construction				
Mobilization of construction equipment and materials on site.	–	✓	✓	–
Vegetation clearing, including the removal and disposal of trees, brush, shrubs, and other foliage.	✓	✓	✓	–
Stripping, including the removal of topsoil and other organic materials, as well as storing of some materials for use in reclamation.	✓	✓	✓	–
Grading of overburden to be used as fill.	✓	✓	✓	–
Handling and use of explosives, including blasting.	–	✓	✓	✓
Excavating and pre-stripping of mine rock from the Open Pit and surrounding area.	✓	✓	✓	–
Development of the Impoundment Facility for storage of rock, clay, sand, and till.	✓	✓	✓	–
Preparation of construction surfaces, including hauling reclaimed graded material and crushed mine rock to construction locations.	✓	✓	✓	–
Construction of water management systems to collect, manage, treat and discharge contact water from mine components to the receiving waterbodies via collection ponds, ditches, and water treatment plants.	✓	✓	✓	–
Construction of minor water diversions around perimeter of the mine site to collect and divert flows.	✓	✓	✓	–
Dewatering of natural water bodies within the PA.	✓	✓	✓	–

Physical Activities	Effects			
	Change in habitat	**Change in movement**	**Change in mortality risk**	**Change in wildlife health**
Waste management, including collection and temporary storage.	✓	✓	✓	✓
Construction of mine infrastructure, including crusher facilities, process plant and TMF, as well as the potable water well, and ancillary infrastructure (e.g., offices, workshop, fuel farm, magazine storage and explosives pad).	✓	✓	✓	–
Construction of internal haul roads and internal access roads, including water crossings.	✓	✓	✓	–
Construction of power supply and distribution systems.	✓	✓	✓	–
Construction of temporary Highway 655 by-pass and overpass.	✓	✓	✓	–
Construction of the rail spur.	✓	✓	✓	–
Vehicle operation within the PA.	–	✓	✓	–
Employment and expenditures[1].	–	–	–	–
Operations (Mining and Processing)				
Construction of Project infrastructure, including the expansion of ore processing components.	✓	✓	✓	–
Relocation and decommissioning of Highway 655 and associated infrastructure.	✓	✓	✓	–
Relocation of 500 kV transmission line.	✓	✓	✓	–
Construction of the North Driftwood Diversion Channel.	✓	✓	✓	–
Handling and use of explosives including blasting.	✓	✓	✓	✓
Ore extraction in the Main Zone and East Zone of the Open Pit, including drilling, loading and hauling of mine rock from the pits.	✓	✓	✓	✓
Maintenance and management of mine rock stockpiles, overburden, and TMF.	✓	✓	✓	–
Ore processing, including conveyor, crushing and processing activities with and between the stockpiles, crusher facilities and process plant.	✓	✓	✓	✓

Physical Activities	Effects			
	Change in habitat	**Change in movement**	**Change in mortality risk**	**Change in wildlife health**
Operation of water management systems, including the collection, management, treatment and discharge of contact water from mine components to the receiving waterbodies via collection ponds, ditches and water treatment plants.	✓	✓	✓	✓
Transportation of Ore via the rail spur line.	–	✓	✓	–
Waste management, including collection and temporary storage.	✓	✓	✓	✓
Vehicle operation within the PA.	–	✓	✓	–
Progressive reclamation of disturbed areas.	✓	✓	✓	–
Employment and expenditures[1].	–	–	–	–
Decommissioning and Closure				
Pit flooding through the creation of channels from the collection ponds towards the Open Pit.	✓	✓	✓	✓
Water management, including groundwater and surface water.	✓	✓	–	✓
Decommissioning, dismantling and/or disposal of buildings and mine infrastructure.	✓	✓	✓	–
Removal of power lines and electrical equipment.	✓	✓	✓	–
Decommissioning of potable water and sewage systems.	✓	✓	✓	✓
Vehicle operation within the PA.	–	✓	✓	–
Reclamation, including the placement of overburden, seeding and re-grading.	✓	✓	✓	–
Monitoring and maintenance.	✓	✓	✓	–
Employment and expenditures[1].	–	–	–	–

Notes:

✓ = Potential interaction

– = No interaction

1. Project employment and expenditures are generated by most Project activities and are the main drivers of many potential socio-economic effects. Rather than acknowledging this by placing a checkmark against each of these activities, “Employment and expenditures” is listed as a separate item under each phase of the Project.

Employment and expenditure activities are not expected to interact with change in habitat, movement, mortality risk, or wildlife health for the lifetime of the Project as there is no pathway for these activities to affect wildlife and wildlife habitat.

Change in habitat is not expected to be affected by vehicle operation and transportation of materials. All activities and components, other than emissions, discharges, and waste, are not expected to affect wildlife health as there are no pathways for environmental contamination.

19.4 Assessment of Residual Effects on Wildlife and Wildlife Habitat

19.4.1 Analytical Assessment Techniques

The effects analysis for wildlife and wildlife habitat is carried out using a number of analytical methods and tools that are different based on the effects being assessed. The techniques are described in the following sections.

19.4.1.1 Change in Habitat

Change in habitat refers to the direct loss or alterations in the physical environment where a species lives, including availability, quality and structure. Change in habitat was assessed by quantifying direct changes in the amount of habitat available for key indicator species (amphibians and reptiles, moose, furbearers, SOCC and SAR) compared to baseline conditions. The change in habitat (i.e., habitat loss) was calculated as the loss of wildlife habitat that is no longer available to wildlife resulting from Project activities within the PA; effects do not extend into the LSA. In general, once vegetation clearing is completed, the PA is not expected to provide suitable wildlife habitat, except for a few species that may take advantage of developed sites. Indirect changes in habitat (i.e., sensory disturbance) was assessed qualitatively as the area of reduced habitat effectiveness. Effects are generally confined to the LSA in proximity to the PA as a result of Project activities but may extend into the RSA (e.g., noise). Potential effects are considered as a whole, inclusive of all seasonal and life history requirements for wildlife (e.g., refugia [turtle nesting, roosting, denning], overwintering, migration periods).

19.4.1.2 Change in Movement

Change in movement refers to alterations in the patterns and behaviours of species and how they access and utilize habitat. This includes migration routes, daily and seasonal movement, and dispersal behaviours and is assessed by focusing on behavioural and physiological responses to the environmental changes.

Change in movement was assessed by comparing direct and indirect changes in connectivity and extent of area (ha) used for movement. A qualitative assessment was also completed in consideration of species' sensitivity to human disturbance and seasonal movements, particularly related to sensory disturbance. For boreal caribou, a quantitative method (e.g., habitat quality analysis) was used to evaluate effects to habitat quality and habitat connectivity at the local, regional and range scales. The qualitative assessment was based on a literature review and professional judgement.

19.4.1.3 Change in Mortality Risk

Change in mortality risk refers to factors that influence the likelihood of mortality for individuals within a population. Change in mortality risk was assessed qualitatively through changes in direct and indirect sources using a combination of literature review and professional judgement.

Direct sources of mortality risk were estimated through predictions of increases in construction activity, equipment operation, vehicular traffic, and human-wildlife conflict. Direct sources of mortality risk were also assessed through predictions of wildlife interactions with Project infrastructure.

Indirect sources of mortality were assessed qualitatively and include predictions of changes in habitat fragmentation, linear disturbance, predator-prey dynamics, hunting/trapping pressure, and natural disturbance and disease. Indirect sources of mortality are associated with all phases of the Project.

19.4.1.4 Change in Wildlife Health

Change in wildlife health refers to the physical and physiological conditions of individuals within a population and risk of exposure to contaminants. Change in contaminant pathways and exposure, done as ecological risk. The ecological receptors were assessed for three watersheds: North Driftwood River and the West Buskegau River, both of which drain north into the Abitibi River, and Jocko Creek, which drains into Kidd Creek and subsequently the Mattagami River.

Quantifying the effect of environmental contamination on wildlife health is complex and influenced by a wide array of environmental factors. Bioavailability of different contaminants, interaction between metals and chemicals, methods of transport, pathways, environmental factors, and existing baseline concentrations of contaminants of potential concern (COPC) can influence the Project's effect on wildlife health. The results are based on the outcome of the Human Health and Ecological Risk Assessment (Appendix C.7 of the Impact Statement).

The framework used in the Ecological Risk Assessment (ERA) follows a standard risk assessment approach that includes five stages that are summarized below (see the Human Health and Ecological Risk Assessment in Appendix C.7 of the Impact Statement):

- Problem formulation: is an information gathering and interpretation stage that includes identifying ecological receptors, identification of COPC and the assessment of potential exposure pathways. The problem formulation culminates in a conceptual site model, which provides a visual depiction of the relevant pathways linking COPC in various environmental media and biota to the ecological receptors and biota of interest.
- Exposure assessment: quantifies an ecological receptor's total exposure to a COPC.
- Toxicity assessment: identifies the potential adverse effects associated with chronic exposure of ecological receptors to each COPC.
- Risk characterization: evaluates potential adverse effects of identified COPC by combining information from the exposure and toxicity assessments. For the assessment of mammalian receptors, the potential for adverse effects is quantified by comparing the dose of a substance

that can be tolerated on a daily basis, or below which adverse environmental effects are not expected (i.e., toxicological reference values [TRV]), to the expected daily dose, which is the amount of a COPC an organism is expected to be exposed to on a daily basis (i.e., the average daily dose [ADD]). The quotient of the two is unitless and referred to as a hazard quotient (HQ). The magnitude by which HQ values differ from parity (i.e., TRV = ADD, target HQ of 1.0) is used to make inferences about the magnitude of ecological risks. For the assessment of potential risk to community-based receptors, HQs are defined as the exposure point concentration (EPC) of the COPC in the associated environmental media (e.g., soil) divided by a toxicological benchmark for the community receptors (e.g., terrestrial plants). When the change in HQ between Baseline scenario and Baseline Plus Project scenario is less than 1.0, the probability of unacceptable levels of risk to ecological receptors at the population level, as a result of the Project, is expected to be negligible. When the change in HQ between Baseline scenario and Baseline Plus Project scenario is greater than 1.0, there is a potential (but not a certainty) that adverse effects to the ecological receptor as a result of the Project may exist. In these cases, additional analysis and considerations are required including a review of the assumptions applied in the assessment to provide a more accurate estimation of ecological risk. If it is ultimately determined that the HQ indicates an unacceptable ecological health risk, mitigation or remediation activities may be recommended to reduce potential risks to ecological receptors.

- Uncertainty assessment: provides details on the nature of the uncertainties and the conservative approach that was used in the ERA.

For the assessment of mammalian receptors, the potential for adverse effects is quantified by comparing the dose of a substance that can be tolerated on a daily basis, or below which adverse environmental effects are not expected (i.e., toxicity reference value [TRV]), to the expected daily dose, which is the amount of a COPC an organism is expected to be exposed to on a daily basis (i.e., the average daily dose). The quotient of the two is unitless and referred to as a Hazard Quotient (HQ). The magnitude by which HQ values differ from parity (i.e., target HQ of 1.0) is used to make inferences about the magnitude of ecological risks. For the assessment of potential risk to community-based receptors, HQs are defined as the EPC of the COPC in the associated environmental media (e.g., soil) divided by a toxicological benchmark for the community receptors (e.g., terrestrial plants).

When the change in HQ between Baseline scenario and Baseline Plus Project scenario (i.e., the Project Alone scenario) is less than 1.0, the probability of unacceptable levels of risk to ecological receptors at the population level, as a result of the Project, is expected to be negligible. When the change in HQ between Baseline scenario and Baseline Plus Project scenario (i.e., the Project Alone scenario) is greater than 1.0, there is a potential (but not a certainty) that adverse effects to the ecological receptor as a result of the Project may exist. In these cases, additional analysis and considerations are required including a review of the assumptions applied in the assessment to provide a more accurate estimation of ecological risk. If it is ultimately determined that the HQ indicates an unacceptable ecological health risk, mitigation or remediation activities may be recommended to reduce potential risks to ecological receptors.

The following COPCs were considered in the ERA for HQ calculations: antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, methyl mercury, molybdenum, nickel, selenium, silver, thallium, tungsten, uranium, vanadium, zinc.

19.4.2 Change in Habitat

19.4.2.1 Project Pathways

19.4.2.1.1 Construction

The primary pathways of effects during construction are predicted to occur during site preparation and earthworks activities, such as vegetation clearing, stripping, grading, and excavation. These activities are related to the development of the Impoundment Facility, construction of mine infrastructure, road networks (including internal haul roads/access roads), power supply and distribution systems, rail spur, temporary Highway 655 by-pass and overpass, water crossings, water management systems, water diversions and dewatering activities. While vegetation removal is expected to occur during construction, the associated effects are expected to occur throughout the life of the Project but will improve as progressive reclamation activities begin.

Direct effects to changes in habitat include habitat loss and fragmentation through land clearing for mine infrastructure, roads and facilities. These activities reduce available habitat and may create isolated patches, disrupting species that require large, continuous areas. Existing habitat fragmentation is present in the PA, comprising of Highway 655 (two-lane highway), a 500 kV transmission line and several active and inactive logging roads, representing approximately 1,223 ha within the PA. Relocation of approximately 26 km of Highway 655 and approximately 29 km of the 500 kV transmission line that runs north south through the central portion of the PA will be relocated to the western boundary. The existing section of the highway and transmission line will be removed once realignment is complete to facilitate the mine plan. A new 25 km rail spur will also be constructed along the western boundary of the PA to facilitate the transport of materials to and from the mine.

Vegetation clearing can result in habitat fragmentation, which can have particularly detrimental effects on species with large ranges, and those that require large patches of interior forest or other types of homogenous habitat. A decrease in patch size can result in isolation of habitat patches which can affect species diversity (Dunning et al.1992; Fahrig 2003). Clearings can also reduce winter habitat for Canada lynx yet provide foraging opportunities from early seral habitat (Koehler 1990; Koehler and Brittell 1990; Mowat et al. 2000). In northeastern Alberta, it was found that disturbed areas can provide preferred winter forage for moose (Nowlin 1978; Westworth and Associates 1982; Collister and Kansas 1997). In one study that involved radiotracking American marten, it was found that patch size was a good predictor of American marten occurrence, where larger patches were used more frequently than small patches (Chapin et al. 1998). This suggests that forest fragmentation could have adverse effects on American marten if the remaining habitat patches are not large enough. Bats require connectivity between roosting and foraging areas (Verboom and Huitema, 1997; Stone et al. 2015). As a result, fragmentation can affect bat populations and distribution. For example, a study on northern myotis and habitat fragmentation on Prince Edward Island found a positive relationship between forest cover and bat presence (Henderson et al. 2008). Fragmentation can also result in a reduction in animal movement, potentially resulting in a reduction of gene flow (Frankham 2006). Transmission line right-of-ways have the potential to provide bee-friendly habitat when vegetation management activities allow for flower availability and provide

potential nesting habitat (Russell et al. 2005). This could promote habitat for yellow-banded bumble bee and monarch.

Indirect effects involve altered habitat conditions and edge effects, which can change vegetation and microclimatic conditions, further reducing habitat suitability. Pollution from air emissions and fugitive dust can affect the quality of habitat, as well as sensory disturbances such as light, noise, vibrations and smells. Edge effects can include changes in microclimate, vegetation structure, changes to wildlife presence and/or abundance, and behavioral responses of wildlife (Harper et al. 2005; Murcia 1995). The magnitude of edge effects varies depending on the distance to the edge and is typically greater closer to the edge (Fuentes-Montemayor et al. 2009). Edge effects vary greatly by species. Species that are dependent on interior and mature forests as core habitat, including American marten and Canada lynx, may be the most adversely affected by edges, as they may avoid edge habitats. Some species may benefit from edge effects through changes in movement patterns (discussed further in Section 19.4.3.3.1).

Additionally, the overall availability and quality of habitat may decline, resulting in secondary sources of effects that influence wildlife behavior, sensory disturbances, changes in movement patterns, and access to essential resources. These habitat changes can lead to increased human-wildlife interactions, heightened hunting and trapping pressure, and altered predator-prey dynamics, all of which can influence the abundance, distribution, and resilience of wildlife populations. Effects related to these secondary sources are discussed in the Sections below for changes in movement, mortality risk, and wildlife health.

19.4.2.1.2 Operations

Some construction activities are anticipated to continue into the operations phase of the Project, and with those activities come similar effects as are described in Section 19.4.2.1.1, including vegetation removal and ground disturbance. However, the primary pathways of effects during operations are associated with pit dewatering. Dewatering of the Open Pit is predicted to cause water table drawdown in areas surrounding the PA, potentially causing a drop in water levels in the LSA close to the PA and resulting in indirect impacts to wetlands and riparian communities through changes in flood regime (discussed further under Chapter 16 (Assessment of Effect on Vegetation, Riparian and Wetland Environments) of the Impact Statement). Changes in hydrology and flood regime may alter wildlife habitat through changes in the composition, structure and quality of vegetation communities.

Indirect effects to habitat may result from sensory disturbances such as lighting, noise, vibrations and smells that could result in reduced quality of habitat and changes in behaviour through displacement and habitat avoidance (discussed further under change in movement).

Progressive reclamation is expected to occur during the operations phase which is predicted to have a positive change in habitat, allowing wildlife the opportunity to return to the area.

19.4.2.1.3 Decommissioning and Closure

The primary pathways of effects during decommissioning and closure are predicted to occur through removal of mine infrastructure, and the creation of habitat through reclamation and site stabilization activities through the formal closure of the mine. Sensory disturbances (light and noise), air emissions and fugitive dust are predicted to be similar as those described for construction. However, vegetation will be established through final reclamation and closure aimed at providing habitat for various species. Once complete, the Project will enter a passive closure phase as the Open Pit fills with water, which is predicted to take over 100 years. Surface contamination from facilities and equipment will be remediated.

As the Project transitions to passive closure, habitat will continue to regenerate and allow wildlife to return to the area. Habitat suitability will vary by species and across temporal scales as forested and wetland communities mature. Initial reclamation efforts will begin during the operations phase which will allow for different age classes of habitat through to decommissioning and closure. Habitat structure and characteristics may further influence wildlife behaviour, movement patterns and abundance and distribution of populations based on predator-prey dynamics and access to the area for hunting and trapping (discussed under change in movement).

19.4.2.2 Mitigation Measures

The following mitigation measures have been incorporated into the design of the Project and/or are proposed to avoid or reduce Project-related effects on wildlife habitat:

- Canada Nickel will limit the construction footprint (i.e., PA) to the extent possible and will restrict clearing to the approved Project Area.
- Canada Nickel will mark clearing boundaries prior to site preparation to maintain clearing activities within the designated footprint to mitigate potential for encroachment into sensitive features.
- Canada Nickel will prepare and implement a Construction Environmental Protection Plan and Wildlife Management Plan, which will include tailored strategies for species and sensitive habitats that align with the principles of the “hierarchy of mitigation measures.” Avoiding and restricting activities during sensitive and critical timing windows will be prioritized, to the extent practical.
- Canada Nickel will implement appropriate vegetation clearing techniques to reduce impacts on features to be retained (e.g., trees to be felled away from adjacent lands where natural areas are to be retained/protected).
- Canada Nickel will maintain vegetated buffers from sensitive features and retain natural vegetation, to the extent practical.
- Canada Nickel will implement progressive reclamation of the mine site and/or any temporarily disturbed areas.

- Canada Nickel will prepare and implement a Mine Development Closure Plan (refer to Appendix F of the Impact Statement for the Conceptual Closure Plan) that identifies the methods for restoration of the mine site, including opportunities for revegetation, restoration of wildlife corridors and habitat connectivity.
- When crossing wetlands that will be preserved over the Project duration with linear features such as roads, Canada Nickel will maintain hydrological connectivity using appropriate features such as properly placed and sized culverts.
- Canada Nickel will develop and implement an Erosion and Sediment Control Plan which will describe the measures and best management practices to be implemented to protect the environment through reduction of site erosion and protection of nearby watercourses and/or waterbodies from sedimentation.
- Canada Nickel will develop and implement a Spill Management and Contingency Plan which will describe the means (internal corporate procedures) by which the spill contingency plan is activated and steps to be taken to report, contain, clean up and dispose of contaminants following a spill, including appropriate contacts for responding to spills.
- Canada Nickel will consult with MECP and fulfill requirements under the ESA. This includes obtaining an Overall Benefit Permit, if required, for impacts to Blanding's turtle Category 2 and Category 3 habitat that extends into the PA. Any permit conditions, including compensation requirements, timing windows, and setbacks, will be integrated into the appropriate management plan (e.g., Construction Environmental Protection Plan and Wildlife Management Plan).
- Canada Nickel will incorporate the following mitigation measures as it relates to potential Project-related effects on boreal caribou:
  - The Wildlife Management Plan will take into consideration Ontario's best management practices for mineral exploration and development activities and Woodland Caribou in Ontario (MECP 2021b).
  - Consideration will be given to the creation of boreal caribou habitat onsite as part of the Mine Development Closure Plan (refer to Appendix F of the Impact Statement for the Conceptual Closure Plan), in conjunction with other priorities identified through engagement activities.
  - Obtain an Overall Benefit Permit under the ESA, if required, for impacts to Category 3 habitat within the PA. Any permit conditions, including compensation requirements, timing windows, and setbacks, will be integrated into the appropriate management plan (e.g., Construction Environmental Protection Plan and Wildlife Management Plan).
- Canada Nickel will consult with MECP and fulfill requirements under the ESA. This includes obtaining an Obtain an Overall Benefit Permit under the ESA, if required, for impacts to bat roosting habitat within the PA. Any permit conditions, including compensation requirements, timing windows, and setbacks, will be integrated into the appropriate management plan (e.g., Construction Environmental Protection and Wildlife Management Plan).
- Implement mitigation for lighting as described in Chapter 12 of the Impact Statement (Assessment of Potential Effects on the Atmospheric Environment).

19.4.2.3 Project Residual Effects

19.4.2.3.1 Direct Habitat Loss

Direct habitat loss for wildlife will primarily occur during the construction phase because of land clearing and land conversion. This will occur during the site preparation and civil works Project activities. Site preparation and vegetation clearing during the construction phase is expected to be the primary pathway to habitat loss. Direct loss of habitat will occur incrementally until Year 18 of the Project. This incremental approach can help wildlife by providing a more gradual transition, allowing species time to adapt and find alternative habitats.

Most terrestrial species occupy a variety of habitats at different stages of their life cycles. Therefore, the extent and magnitude of effects will vary depending on species and their life history requirements. For example, amphibians and reptiles rely on both aquatic and terrestrial environments to carry out their life cycle requirements. Bats will use forests and swamps (coniferous and deciduous) for roosting and foraging and use anthropogenic structures, caves and mineshafts for overwintering. Meadows, cutovers and other disturbed communities are often used during movement to access necessary habitats.

As shown in Table 19.9, the Project will result in a total loss of 22% (11,785 ha) of overall wildlife habitat within the LSA and is represented by the following habitats:

- Upland Forest Habitat: Represents 14,273 ha, accounting for 26% of the habitat types within the LSA. The Project will result in direct loss of 2,837 ha (20%) of upland forest habitat within the LSA
- Wetland Habitat: Represents 39,175 ha, accounting for 72% of the habitat types within the LSA. The Project will result in direct loss of 8,667 ha (22%) of wetland habitat within the LSA
- Active Mineral Barren: Represents 12 ha, accounting for 0.02% of the habitat types within the LSA. The Project will result in direct loss of 0.4 ha (3%) of active mineral barren habitat within the LSA.
- Water Habitat: Represents 288 ha, accounting for 0.5% of the habitat types within the LSA. The Project will result in direct loss of 26 ha (9%) of water habitat within the LSA
- Anthropogenic Habitat (e.g., pavement, concrete, developments, utilities): Represents 576 ha, accounting for 1% of the habitat types within the LSA. The Project will result in direct loss of 254 ha (44%) of anthropogenic habitat within the LSA

This is expected to impact all terrestrial wildlife based on habitat needs during various life stages, such as movement, feeding, breeding/rearing, nesting, roosting, denning and overwintering. For the purposes of this assessment, it has been assumed that the full extent of the PA will be cleared and/or disturbed to accommodate Project components and activities. A discussion of habitat loss for each of the key indicator species is provided in the Sections below.

Rehabilitation of the PA will occur as part of progressive reclamation and during decommissioning and closure. This will provide habitat opportunities for amphibians and reptiles (including SOCC and SAR), moose, bats and boreal caribou. Following decommissioning and closure, habitat within the PA will be restored, and over time, it will naturally regenerate to be more consistent with habitats in the LSA.

Opportunities for wildlife habitat enhancement will be developed through development of the Mine Development Closure Plan in consultation with agencies and Indigenous nations to incorporate Indigenous knowledge and values and to set key objectives and targets that promote diverse, self-sustaining ecosystems.

Table 19.9 Estimated Change in Ecological Land Classification in the Project Area and Local Study Area

Ecological Land Classification Ecosite	PA (ha)	LSA (ha)	% Change	Key Indicator Species						
							SOCC			SAR[2]
				Amphibians and Reptiles	Moose	Furbearers	Midland Painted Turtle, Snapping Turtle	Monarch	Yellow-banded Bumble Bee	Bats
Upland Coniferous Forest	*2,521*	*12,386*	20	✓	✓	✓			✓	✓
Upland Deciduous Forest	*316*	*1,887*	17	✓	✓	✓			✓	✓
Subtotal Upland Forest	**2,837**	**14,273**	**20**							
Wetland – Bog	*2,358*	*7,892*	30	✓	✓	✓	✓			✓
Wetland – Fen	*789*	*4,698*	17	✓	✓	✓	✓			✓
Wetland – Marsh	*752*	*1,295*	58	✓	✓	✓	✓			✓
Wetland – Swamp	*4,768*	*25,290*	19	✓	✓	✓	✓			✓
Subtotal Wetland	**8,666**	**39,175**	**22**							
Active Mineral Barren	0.4	12	3							
Water – Lakes, Rivers, Ponds	26	288	9	✓	✓	✓	✓		✓	✓
Anthropogenic	254	576	44					✓	✓	✓
GRAND TOTAL	**11,783[1]**	**54,324**	**22**							

Note:

1. Total area is under 11,785 due to rounding
2. Blanding's turtle has not been recorded in the PA and therefore, area calculations are based on habitat within 2 km of known records and is discussed further in Section 19.4.2.3.1.5.1. Boreal caribou habitat is only associated with the portion of the PA and LSA that overlaps the Range. Therefore, habitat type, area calculations and percent change are discussed separately in Section 19.4.2.3.1.5.2.

19.4.2.3.1.1 Amphibians and Reptiles

Amphibians and reptiles will experience an overall loss of 21% of available habitat in the LSA. This includes 20% loss of upland forest, 22% loss of wetland, and 9% loss of water habitats.

19.4.2.3.1.2 Moose

Moose will experience a total loss of 21% of available habitat in the LSA. This includes 20% loss of upland forest, 22% loss of wetland, and 9% loss of water habitats. Additionally, specialized habitat for moose will also be directly affected, including a loss of 222 ha of late wintering habitat and 0.12 ha of aquatic feeding habitat within the LSA. These losses are expected to affect moose populations by reducing their access to essential habitats, potentially impacting their seasonal movement and feeding behaviors.

19.4.2.3.1.3 Furbearers

Furbearers will experience an overall total loss of habitat, representing 21% of the LSA. This includes 2,837 ha (20%) loss of upland forest, 8,667 ha (22%) loss of wetland, and 26 ha (9%) loss of water habitats. Semi-aquatic furbearers, such as American mink, North American river otter, beaver and muskrat primarily use wetlands, water and riparian habitats, as well as upland habitats adjacent to these communities. Furbearers with core habitat that is primarily upland forest include American black bear, red fox, coyote, Canada lynx, cougar, northern gray wolf and snowshoe hare. These species will experience a loss of 20% of upland forest and can also be affected by loss of wetland and water habitats used for foraging or travel. American marten prefers mature coniferous or mixed woodlands. Mixed woodlands were not characterized in the LSA; however, a loss of 2,521 ha (20%) of coniferous forest is anticipated.

19.4.2.3.1.4 SOCC

19.4.2.3.1.4.1 Midland Painted Turtle and Snapping Turtle

Midland painted turtle and snapping turtle will experience an overall loss of 21% of available habitat within the LSA. This includes 22% loss of wetland habitat and 9% loss of water habitat.

19.4.2.3.1.4.2 Monarch

Habitat for monarch represents approximately 0.8% of landcover (i.e., anthropogenic and poorly vegetated areas) in the LSA. The majority of this habitat is considered marginal, primarily limited to road rights-of-way and transmission lines. Loss of habitat encompasses a total of 254 ha which represents 44% of available habitat in the LSA.

19.4.2.3.1.4.3 Yellow-banded Bumblebee

Yellow-banded bumble bee will experience an overall total loss of habitat, representing 21% of the LSA. This includes 20% loss of upland forest, 9% loss of water habitats and 44% of anthropogenic and poorly vegetated habitat.

19.4.2.3.1.5 SAR

19.4.2.3.1.5.1 Blanding's Turtle

There are three historical records (i.e., more than 20 years ago) of Blanding's turtle in the RSA from data collected from community members. This species was not confirmed at these locations or surrounding areas during field studies, including eDNA sampling. There are two records of Blanding's turtle within the LSA within 1 km and 6 km east of the PA, and one record in the RSA approximately 13 km west of the LSA. Although suitable habitat is present throughout the LSA, direct loss of habitat was based on the regulated habitat of known occurrences of Blanding's turtle. This includes the portion of Category 2 habitat (which represents habitat within 2 km of a known occurrence) that extends into the PA. Overall, direct loss of prescribed habitat in the LSA, of known records of Blanding's turtle, is approximately 0.7% (382 ha).

19.4.2.3.1.5.2 Boreal Caribou

The southern limit of the Range (ON8; ECCC, 2020) begins within the central portion of the LSA with limited suitable habitat present. The Range was last assessed provincially in 2010 (MNRF 2014) and was characterized at the time as 44% disturbed, with a minimum animal count of 178 boreal caribou and a declining population trend (low calf recruitment). At that time, no boreal caribou were observed south of Pierre Lake in the southern half of the Range (MECP 2024a), which is located 78 km northeast of the PA. In 2023, subsequent monitoring was completed with 167 individuals observed, belonging to 18 groups (MECP 2024a). No boreal caribou were observed in the southern portion of the Range, consistent with previous findings from the MNRF (2014) Integrated Range Assessment report. There have been no records of boreal caribou in the southern portion of the Range since the early 2000s (MNRF 2014). Historically, the southern limits of the Range have always had low occupancy with relatively few records south of Highway 11 (MNRF 2014). The southern limits of the Range was established based on the potential for connectivity, particularly north of Highway 11 where forest stands are coming of age to support caribou re-occupation (MNRF 2014).

There have been no recent records of boreal caribou within the PA or LSA. The southern limits of the Range extends into the central-northern portion of the PA, LSA and RSA. Habitat within the PA (6,020 ha) and LSA (64,558 ha) is primarily characterized as Category 3 which has a high tolerance to alteration before function is compromised. Existing habitat was calculated using the following formula based on the TIS Guidelines: (Project footprint + 500-metre buffer) – overlapping (permanent alteration(s) + 500 m buffer) to account for the minimal zone of influence to fragmentation and human disturbance. This represents a total of 7,133 ha, or 11% of the LSA where direct and indirect effects are predicted. Direct loss of habitat is predicted to be 6,020 ha within the PA or 9% of the LSA. Indirect effects within 500 m of the PA accounts for an additional 1,113 ha. Category 3 habitat indirectly supports boreal caribou by maintaining the overall predator refuge function. Boreal caribou habitat within the PA showing the Project components overlaid is provided in Figure 19.5 (LSA extent) and Figure 19.6 (RSA extent). A map showing existing disturbance within boreal caribou habitat within the PA is provided in Figure 19.7.

19.4.2.3.1.5.3 Bats

Total loss of potential roosting habitat for bats (upland forest) is 20% (2,837 ha) of the LSA. Wetland and water habitat, which is often important for foraging, will also be lost, representing 22% (8,667 ha) and 9% (26 ha) of the LSA, respectively. It is possible that some Project infrastructure could provide roosting opportunities for bats during the spring, summer or fall. This may include structures such as the processing plant, warehouses, storage buildings and contractor offices. It is expected that most infrastructure would not be attractive for bats due to high levels of human activity and other Project noise and lighting. However, if Project infrastructure is used during operations, this habitat will be removed during decommissioning and closure.

19.4.2.3.2 Habitat Alteration, Fragmentation and Edge Effects

Habitat alteration, fragmentation, and edge effects can affect the quality and availability of habitat and access to resources. This will primarily occur during construction, with habitat alteration extending into the operations phase. Habitat alteration due to sensory disturbances (e.g., light, noise, vibrations, smell) can degrade the quality and availability of suitable habitat. How these changes influence wildlife behaviour is discussed further in Section 19.4.3.3.1.

Site preparation and vegetation clearing will occur incrementally until Year 18 of the Project which will reduce the extent of habitat changes. The design and construction phasing will include measures to maintain the quality of habitat, ecological processes (e.g., pollination, seed dispersal, predator-prey interactions) and resource availability. Mitigation measures to limit effects to existing habitat will include maintaining vegetated buffers and habitat connectivity. Vegetated buffers can help maintain habitat function by reducing edge effects such as changes in microclimate, preserve vegetation structure and species composition. Access to necessary resources will be preserved by maintaining connectivity between habitat patches that support a diversity of species.

19.4.2.3.3 Summary of Change in Habitat

Project residual effects for change in habitat are predicted to be adverse during all Project phases with positive effects through progressive reclamation during operations and restoration during decommissioning and closure.

Magnitude of effects during construction is predicted to be high for most species due to loss of approximately 20% of habitat in the LSA and then will be low during operations and decommissioning and closure. For monarch, the magnitude of effects is predicted to be low (<5 %) during all Project phases due to the limited amount of habitat available and monarch are unlikely to occur at high numbers. For Blanding's turtle, the magnitude of effects is predicted to be low (<5 %) during all Project phases for direct and indirect effects of habitat within 2 km of known occurrences. Once construction is complete, only indirect effects are anticipated due to sensory disturbance.

The geographic extent will predominantly be confined to the PA, although sensory disturbance will extend into the RSA for most species, except boreal caribou. For boreal caribou, sensory disturbance will extend into the LSA, within 500 m of the PA.

Timing is predicted to be high sensitivity when activities occur during sensitive periods. Change in habitat will primarily occur during the construction phase, while sensory disturbances will extend into operations. Mitigation measures and adhering to timing windows will be followed to avoid activities during critical life stages (e.g., overwintering, nesting) and sensitive habitats, where possible.

Duration is predicted to be medium-term, and frequency will be continuous, with both extending to all Project phases. The effects are predicted to be reversible through progressive reclamation during operations and restoration during decommissioning and closure.

19.4.3 Change in Movement

19.4.3.1 Project Pathways

19.4.3.1.1 Construction

The pathways of effects during construction are predicted to occur during site preparation and earthworks activities, such as vegetation clearing, stripping, grading, and excavation. These activities are related to the development of the Impoundment Facility, construction of mine infrastructure, road networks (including internal haul roads/access roads), power supply and distribution systems, rail spur, temporary Highway 655 by-pass and overpass, water crossings, water management systems, water diversions and dewatering activities. These effects are expected to occur throughout the life of the Project but will improve as progressive reclamation activities begins.

Direct effects include temporary or permanent physical barriers that impede movement, such as construction fencing, excavations and Project infrastructure (e.g., Impoundment Facility, Open Pit, TMF, and water diversion channels). Construction of roads, power and distribution lines, rail spur and other linear disturbances may inhibit and alter movement patterns. Sensory disturbances such as lighting, noise, vibrations and smells may affect wildlife behaviour and how they travel across the Project.

Indirect effects include displacement and changing movement patterns to avoid disturbance which may affect a species' ability to access resources. This could further compound effects to wildlife as they must expend more energy, potentially travelling longer distances and through unknown routes or corridors which may leave them vulnerable to harm, such as predators or collisions (discussed further under change in mortality risk). Sensory disturbance may also affect wildlife behaviour and how they travel across the Project.

19.4.3.1.2 Operations

The pathways of effects during operations are predicted to include Project infrastructure, linear disturbances, human activity and sensory disturbances. Direct effects that can alter wildlife movement include physical barriers such as temporary fencing or permanent mine infrastructure (e.g., buildings, Open Pit, TMF). Water diversions, crossings and linear disturbances such as roads, rail spur, power and distribution lines, can also impede wildlife movement. Linear disturbances, such as roads, rail spurs, power lines, and distribution lines, can fragment habitats and create obstacles for wildlife. Many species may avoid these features due to the risks of vehicle collisions, increased predation pressure or because

they perceive these areas as unsafe due to increased human presence and noise. Indirect effects include human activity and sensory disturbances such as lighting, noise, vibrations and smells that can disrupt natural migration paths. These direct and indirect effects are similar to those discussed for the construction phase but may occur at different spatial and temporal scales. Progressive reclamation is expected to occur during the operations phase which can improve habitat connectivity and reduce the magnitude of sensory disturbance. Improving habitat connectivity can have a both a positive and negative effect to movement depending on species' needs and predator-prey interactions.

19.4.3.1.3 Decommissioning and Closure

The pathways of effects during decommissioning and closure include increased human presence, traffic and equipment activity and sensory disturbances. These effects are predicted to be similar to, or less than, that occurring during construction. Impediments to movement and altered migration routes are expected to continue through removal of mine infrastructure, and reclamation and site stabilization activities. As the Project transitions to passive closure, habitat will continue to regenerate and allow wildlife to return to the area. Habitat suitability will vary by species and across temporal scales as forested and wetland communities mature. Initial reclamation efforts will begin during the operations phase which will allow for different age classes of habitat through to decommissioning and closure. Habitat structure and characteristics may further influence wildlife behaviour, movement patterns and abundance and distribution of populations based on predator-prey dynamics and access to the area for hunting and trapping.

19.4.3.2 Mitigation Measures

The mitigation measures described in Section 19.4.2.2 also apply to wildlife movement. The following mitigation measures have been incorporated into the design of the Project and/or are proposed to avoid or reduce Project-related effects on wildlife movement:

- Canada Nickel will prepare and implement a Construction Environmental Protection Plan and Wildlife Management Plan, which will include tailored strategies for species and sensitive habitats that align with the principles of the "hierarchy of mitigation measures." Avoiding and restricting activities during critical timing windows will be prioritized, to the extent practical.
- Canada Nickel will maintain vegetation cover along the boundaries of high activity areas (e.g., access roads) to reduce sensory effects such as noise and visual disturbances, where practical
- Canada Nickel will implement measures to deter or exclude wildlife, where feasible. Measures will focus on directing wildlife away from construction activities, mining activities and infrastructure, and towards essential habitat outside of the PA.
- Canada Nickel will consider wildlife friendly road and railway design principles and features, such as signage, adapting crossings (e.g., culverts) to allow small wildlife passage, speed limits, where relevant and practical.
- Implement mitigation for lighting as described in Chapter 12 of the Impact Statement (Assessment of Potential Effects on the Atmospheric Environment) and the following measures specific to wildlife:

- directing light away from wildlife habitat, particularly marsh communities and other areas that may be used as refugia, nesting, thermoregulation, or overwintering to the extent practical
- select low intensity lighting, where practical

19.4.3.3 Project Residual Effects

Following the implementation of mitigation measures described above, the following residual effects for change in movement have been identified.

19.4.3.3.1 Habitat Alteration, Fragmentation and Edge Effects

Wildlife movement can be influenced by habitat alteration, fragmentation, and edge effects through avoidance, displacement and predator-prey dynamics. It is expected that the construction phase will have the greatest effect on wildlife movement in correlation to changes in habitat (discussed in Section 19.4.2.3.1.1).

Wildlife may need to adjust their foraging strategies in response to altered habitat and access to resources. This can result in increased stress and vigilance causing them to expend more energy and resources on time spent on essential activities like feeding and breeding.

Conversely, some species preferentially choose edge habitats for foraging or travelling. Moose commonly use edge habitat for foraging year-round as these habitats provide high value browse (Ardea Biological Consulting 2004). American black bears also forage in open and edge habitats, and mother bears with cubs may prefer edge habitats because of the protection that the nearby forest provides (Lindzey and Meslow 1977). The presence of moose could attract an increase in predators such as American black bears, coyotes, and red foxes. These predators are also known to prey on other wildlife species, including muskrats (while traveling on land) and boreal caribou (Banfield 1974; Hearn et al., 1987; Rayl 2012; Mumma 2014).

Predators such as coyote and red fox could benefit from linear features through improved lines-of-sight (and potential increased hunting efficiency) as well as reduced energetic costs for travel in otherwise deep snow conditions.

19.4.3.3.2 Impediments to Movement

Project infrastructure will include physical barriers or other deterrents that can restrict and alter wildlife movement during all Project phases. Physical barriers include construction of temporary and permanent fencing and mine infrastructure (e.g., Open Pit, TMF, buildings, processing plants and storage facilities). Water diversions, crossings and linear disturbances such as roads, rail spur, power and distribution lines, can also act as deterrents and impede wildlife movement. These physical barriers and deterrents can limit access to essential resources, cause shifts in range, and disrupt seasonal movement patterns and dispersal events (Ament et al. 2014; Nathan et al. 2008; Johnson et al. 1992). Both human-induced disturbances, such as industrial and recreational activities, and natural disturbances, such as fire and forest succession, can act as structural barriers to movement (Leblond et al. 2011; Dyer et al. 2001). These impediments to movement can also reduce landscape connectivity, which is especially detrimental

to species with limited dispersal capabilities, such as amphibians, affecting local and regional population viability (Cushman 2006).

The Mattagami River and West Buskegau River are within the LSA, located approximately 4 km west and immediately east, respectively. These large river systems may function as a travel corridor, as well as a natural deterrents and impediments to movement for terrestrial species that are not well-suited for crossing large bodies of water. The existing Hwy 655 may also function as a travel corridor for some species but impede movement for others, primarily amphibians, reptiles and small mammals where ecopassages are not present (e.g., culverts).

A series of ditches, culverts and bridges will be installed along the Highway 655 to collect and convey water along and beneath the highway. Culverts and bridges will be located where the realigned highway is proposed to cross existing watercourses to reduce impacts on flows and fish habitat. Major watercourse crossings, such as Jocko Creek and North Driftwood, are expected to have bridges, while smaller tributaries will include culverts (size and dimensions to be determined).

Habitat fragmentation can impede wildlife movement and reduce gene flow among populations (Bare et al. 2009), which is critical for species like boreal caribou that avoid linear features and resource development areas (COSEWIC 2014b, Dyer et al. 2001, Nagy 2011). Fences can disrupt daily and seasonal movement of ungulates (Visscher et al. 2016) but can be modified to facilitate movement across the landscape and reduce injuries (Visscher et al. 2016). Roads can act as a deterrent to movement, particularly for low-flying bats such as myotis spp. that tend to avoid flying over roads (Fensome and Mathews 2016). Factors such as surrounding vegetation, road width and noise levels can influence the ability of bats to cross roads (Abbott et al. 2012; Bennett and Zurcher 2013; Kitzes and Merenlender 2014).

19.4.3.3.3 Sensory Disturbance

Wildlife movement can be affected by sensory disturbances such as lighting, noise, vibrations and smells can degrade the quality and availability of suitable habitat. The extent and magnitude of effects will depend on several factors, such as timing and frequency of events, and proximity to the activity. The effects of sensory disturbance on wildlife during construction would vary with disturbance type (e.g., blasting), species tolerance, as well as road type and traffic volume (Northrup et al. 2012; Buchanan et al. 2014; Prokopenko 2016). Project-related noise from most construction activities (e.g., heavy equipment operation, infrastructure construction, increased traffic volumes) have the potential to disturb wildlife and cause habitat avoidance or change how the habitat is used (Bayne et al. 2008). Noise will be produced during operations and maintenance associated with mining activities, including blasting and the loading and hauling of mined material, and by the operations of the processing plant. Blasting will be a regular part of mining operations and will occur at a maximum rate of once per day, with a limited duration of one to two minutes (see Chapter 3 of the Impact Statement [Project Description]). Blasting results in noise and vibrations, which may cause wildlife to avoid the area. The roads associated with the Project will have traffic throughout the operations phase, resulting in both noise and light effects. Traffic noise is relatively low, and both noise and light are temporary as vehicles pass.

Noise-related effects to wildlife have the potential to occur beyond 40 dBA (Shannon et al., 2016) and unexpected noises above 90 dBA can elicit a flight response in mammals (Manci et al. 1988). Research by Shannon et al. (2016) further reveals that terrestrial mammals exhibit increased stress levels and decreased reproductive efficiency when exposed to noise levels between 52 and 68 dBA. Additionally, traffic noise above 60 dBA disrupts the vocal behavior of male anurans, such as frogs and toads and gleaning bats experience reduced foraging efficiency when exposed to traffic noise exceeding 80 dBA. According to a study by the United States Government Department of Transportation (US DoT 2004), the hearing frequency range of the following wildlife groups was identified: mammals (< 10 Hz to 150 kHz; sensitivity to -20 dB), reptiles (50 Hz to 2 kHz; sensitivity at 40-50 dB), and amphibians (100 Hz to 2 kHz; sensitivity from 10-60 dB). Mammals and amphibians, especially those with high sensitivity to faint sounds and greater hearing frequency range, might experience greater disturbance from noise levels >40 dBA if these sounds include enough of an amount of sound energy at frequencies outside the human hearing range. Reptiles and are generally less sensitive to faint noises compared to mammals.

There are no noise or vibration guidelines for wildlife. The Environment Code of Practice for Metal Mines (EC 2009) recommends the equilibrium sound pressure level (Leq) from mining activities should not exceed 55 dBA during the day and 45 dBA at night for ambient noise. As discussed in Chapter 13 of the Impact Statement (Assessment of Potential Effects on the Acoustic Environment), MECP publication NPC-119 restricts ground-born vibration or peak particle velocity to 10 mm/s as a cautionary limit. If the blasting operation carries out routine monitoring of noise and vibration, limits can be relaxed to 128 dBL for noise and 12.5 mm/s for vibration per the guideline. Blasting from Open Pit operations are expected to occur at an anticipated rate of once per day, with a limited duration of one to two minutes and is not expected to exceed 120 dBL (see the Noise and Vibration Assessment in Appendix C.3 of the Impact Statement).

The Project uses 40 dBA as the minimum threshold for noise-related effects to wildlife. Noise levels 40 dBA or greater are expected to extend into the RSA. Beyond the PA, this includes approximately 4 km for Leq and 6 km for Ldn during the construction phase (Figure 19.8) and approximately 5 km during the operations phase (Figure 19.9). Leq is the equivalent continuous sound averaged over each hour and Ldn is the day-night average sound level over a 24-hour period with a penalty applied to nighttime sound levels (see Chapter 13 of the Impact Statement [Assessment of Potential Effects on the Acoustic Environment). The total area of noise effects to wildlife habitat during construction (Leq and Ldn combined) and operations is provided in Table 19.10.

Sensory disturbances from Project activities can alter the movement patterns of moose and boreal caribou, causing shifts in their home ranges (MacNearney et al. 2016) or changes in the timing and direction of migration (Mahoney and Schaefer 2002). Both species move seasonally between different habitat types, and these movements may be affected by the Project. Canada lynx are known to move long distances, although open areas and human activity are typically avoided (Koehler and Aubrey 1994). Changes in bat movement also occur as a results of sensory disturbance. Bats may avoid activities with loud noises or artificial lighting, thus changing their movement patterns.

Wildlife that avoid using habitat adjacent to disturbance may experience increased energy expenditure and lost foraging opportunities (Bayne et al. 2008; Jalkotzy et al. 1997). Noise may result in bat

avoidance (Schaub et al. 2008) and can cause other wildlife to avoid the area or to alter their behaviour and may cause stress or other physiological effects (Shannon et al. 2016, Naguib 2013, Barber at al. 2010). Noise can also affect the ability of wildlife to communicate, which can interfere with finding mates (Naguib 2013). Amphibians, such as frogs, vocalize to attract mates, and anthropogenic noise has been shown to alter call rates in males (Sun and Narins 2005; Cunnington and Fahrig 2010).

As a nocturnal species, bats can be affected by artificial light. The natural light dark cycle is important for the biological circadian rhythms of animals, and influences behaviour and activity (Stone et al. 2015; Haeussler and Erkert 1978). In some cases, artificial light near bat roosts can cause delayed emergence in some species (Stone et al. 2015; Boldogh et al. 2007). This delay may result in decreased foraging. The peak of insect activity typically occurs at dusk, and if bats are delayed in emerging, they may miss this peak, thus resulting in reduced foraging success (Rydell at al. 1996). Bats may avoid areas that are artificially lit up, resulting in reduced habitat availability and foraging opportunities (Stone et al. 2012).

The effects of artificial lighting on bats differs by species, and by type of light. For example, some studies have shown that certain species avoid streetlights (e.g., Rydell 1992), while other studies show attraction to streetlights (Rydell and Racey 1995). Light pollution may also alter myotis use of habitat as foraging activity can be concentrated near light sources (e.g., Furlonger et al. 1987). The highest levels of bat activity seem to be associated with white lights, likely because insects are also attracted to white lights (Rydell and Racey 1995; Rydell, 1992). Artificial light can result in a decrease in species richness. Prey species may avoid lit areas because of increase risks of predation (Willems et al. 2022).

A variety of mitigation will be implemented to reduce Project related noise (Section 19.4.2.2). For example, Project vehicles, heavy equipment, and machinery will be shut down when stationary for long periods of time, and vehicles, equipment and machinery and associated exhaust systems and mufflers (mufflers (and/or other appropriate sound attenuation devices) will be regularly inspected.

Table 19.10 Predicted Noise Effects (≥ 40 dBA) on Wildlife Habitat within the Project Area and Local Study Area

Feature	Construction (ha)			Operations (ha)		
	PA	**LSA**	**RSA**	**PA**	**LSA**	**RSA**
Wildlife Habitat						
Woodland Habitat	2,797	3,481	1,183	2,837	4,162	1,681
Wetland Habitat	8,648	10,729.86	3,343	8,667	13,085	3,297
Water Habitat	26	167	28	26	186	92
Anthropogenic Habitat	242	132	304	255	159	265
TOTAL NOISE	**11,713**	**14,510**	**4,858**	**11,785**	**17,592**	**5,335**
% of Study Area	**100%**	**27%**	**1%**	**100%**	**32%**	**1%**
Specialized Wildlife Habitat						
Blanding's Turtle Habitat, Category 1	0	1	0	0	1	0

Feature	Construction (ha)			Operations (ha)		
	PA	LSA	RSA	PA	LSA	RSA
Blanding's Turtle Habitat, Category 2	382	1,531	0	382	1,730	0
Blanding's Turtle Habitat, Category 3	1	125	0	1	147	0
Boreal Caribou	6,020	9,277	0	6,020	17,896	0
Bat Hibernacula	0	0	0	0	2	0
Moose Aquatic Feeding (120 m buffer)	16	133	70	16	132	76
Moose Late Winter Cover (300 m buffer)	408	964	50	440	1,160	13
Relatively High Moose Density Areas (2021)	36	80	953	36	80	776
Relatively High Moose Density Areas (2022)	414	1,072	107	414	1,169	107
Relatively High Wolf Density Areas (2021)	0	55	77	0	93	714
Note: See Chapter 13 of the Impact Statement (Assessment of Potential Effects on the Acoustic Environment) for details on how noise was modelled						

19.4.3.3.4 Summary of Change in Movement

Project residual effects for change in movement are predicted to be adverse during all Project phases with positive effects through progressive reclamation during operations and restoration during decommissioning and closure.

Magnitude of effects is predicted to be low to moderate during construction for most species and negligible for boreal caribou. Following construction, only indirect effects are anticipated and would have low magnitude for all species, except for boreal caribou where the magnitude is predicted to be negligible as this species is not anticipated to occur in the LSA.

The geographic extent will be confined to the PA with sensory disturbance extending into the RSA for most species, except boreal caribou. For boreal caribou, sensory disturbance will extend into the LSA, within 500 m of the PA.

Timing is predicted to be high sensitivity where activities occur during sensitive periods. Habitat loss causing a change in movement will primarily occur during the construction phase, while sensory disturbances will extend into operations. Mitigation measures and adhering to timing windows will be followed to avoid activities during critical life stages (e.g., overwintering, nesting) and sensitive habitats, where possible.

Duration is predicted to be medium-term and frequency will be continuous, with both extending to all Project phases. The initial effects to wildlife movement are expected to occur during construction when individuals are displaced from the PA. The effects to wildlife movement are predicted to be reversible once displaced individuals adapt to their new surroundings and through progressive reclamation during operations and restoration during decommissioning and closure.

19.4.4 Change in Mortality Risk

19.4.4.1 Project Pathways

19.4.4.1.1 Construction

The primary pathways of effects will occur during site preparation and earthworks activities, such as vegetation clearing, stripping, grading, and excavation. These activities are related to the development of the Impoundment Facility, construction of mine infrastructure, road networks (including internal haul roads/access roads), power supply and distribution systems, rail spur, temporary Highway 655 by-pass and overpass, water crossings, water management systems, water diversions and dewatering activities. Additionally, the operation of equipment and vehicles within the PA during construction will increase risk of collisions and wildlife-human interactions.

Direct wildlife mortalities may occur through encounters with equipment or vehicle collisions, interactions with infrastructure, and destruction of wildlife residences. Indirect sources of mortality can result from habitat fragmentation, linear disturbance, changes in predator-prey dynamics and hunting access. Habitat fragmentation could affect all of the key indicator species while linear disturbance, predator-prey dynamics and hunting access would apply more to moose, furbearers and boreal caribou.

19.4.4.1.2 Operations

During operations, direct effects include wildlife collisions through increased traffic, human-wildlife interactions (e.g., food waste, garbage, nuisance wildlife) and interactions with infrastructure. Indirect effects associated with habitat fragmentation, linear disturbance, predator-prey dynamics and hunting and trapping would be the same as described during the construction phase.

19.4.4.1.3 Decommissioning and Closure

Wildlife collisions through increased traffic, interactions with equipment and human-wildlife encounters are expected to be similar to, or less than, the construction phase. Therefore, Project pathways during this period are expected to be similar as those described for construction.

During post-closure, however, there may be increased access for humans and predators. Linear features created during construction and operations will cease to have mine-related activity after closure and may become attractive and accessible to predators and hunters. This increased access may result in an indirect change to mortality risk, such as shifts in predator-prey relationships and harvest pressure on certain species (e.g., moose).

19.4.4.2 Mitigation Measures

The mitigation measures described in Section 19.4.2.2 also apply to wildlife mortality. The following mitigation measures have been incorporated into the design of the Project and/or are proposed to avoid or reduce Project-related effects on wildlife mortality:

- Canada Nickel will prepare and implement a Construction Environmental Protection Plan and Wildlife Management Plan, which will include tailored strategies for species and sensitive habitats that align with the principles of the "hierarchy of mitigation measures." Avoiding and restricting activities during critical timing windows will be prioritized, to the extent practical.
- Canada Nickel will complete pre-disturbance surveys during the appropriate timing windows for target species and/or sensitive habitats, where necessary.
- Canada Nickel will not remove occupied mammal dens, except where appropriate mitigation has been identified and authorized through permits or approvals by appropriate regulatory agencies.
- Canada Nickel will remove beaver dams or lodges in accordance with the FWCA.
- Canada Nickel will implement measures to deter or exclude wildlife, where feasible. The specific measures and locations will be determined on a case by case scenario and will be monitored for effectiveness.
- Canada Nickel will consider wildlife friendly road and railway design principles and features, such as signage, adapting crossings (e.g., culverts) to allow small wildlife passage, speed limits, where relevant and practical.
- Canada Nickel will implement measures to control site access from new access roads and the railway, which may include gates.
- Canada Nickel will prohibit Project personnel from hunting and bringing firearms to the site while working to limit competition for wildlife.
- Canada Nickel will log wildlife-vehicle collisions, near misses or observations of mortality in the Project Area and will use this information to inform the implementation of adaptive management strategies at high frequency locations, if necessary.
- Canada Nickel will follow best management practices for general site housekeeping to reduce wildlife attraction to the site (e.g., food and chemical storage, prompt removal of roadkill).
- Canada Nickel will develop wildlife protocols and implement awareness training to educate Project personnel on measures to take in the event of potential encounters and reduce risk of human-wildlife conflict. This policy will also restrict Project personnel for harming or harassing wildlife.
- Canada Nickel will provide SAR training to Project personnel and species information sheets will be provided to assist with identification and measures to take if encountered.
- If wildlife are encountered, Project personnel will temporarily suspend activities until the species is out of harm's way. The encounter will be reported to Canada Nickel representative (e.g., environmental department).

- If wildlife salvage and relocation is necessary, a qualified biologist or trained Project personnel will handle and transport the species following the MNRF Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders. Details on salvage and relocation protocols will be identified in the Construction Environmental Protection Plan and Wildlife Management Plan.
- Canada Nickel will incorporate the following mitigation measures into the design of the Project and will be included in the Construction Environmental Protection Plan and Wildlife Management Plan to avoid or reduce Project-related effects on turtles:
  - Where practical, conduct vegetation clearing within turtle habitat between October 16 to April 14, outside of the active period, except where appropriate mitigation has been identified and authorized through permits or approvals by appropriate regulatory agencies.
  - Removal of an occupied turtle nest will not be permitted except where appropriate mitigation has been identified and authorized through permits or approvals by appropriate regulatory agencies.
  - If an occupied turtle nest is identified, the nest shall be left undisturbed, the area flagged, and a 30 m setback applied. Work within the 30 m setback will temporarily cease until such time that the nest is vacated and/or relocated. Any salvage and relocation will require approval under applicable legislation.
  - If an occupied overwintering site is confirmed during construction, the overwintering site shall be flagged, and a 30 m setback applied where work will temporarily cease until such time that the overwintering is vacated and or the individuals are salved and relocated. Any relocation will require approval under applicable legislation.
  - If a turtle is encountered, Canada Nickel will temporarily suspended work until the species is out of harm's way. If relocation is necessary, the species shall be handled and transported by a qualified biologist or trained Project personnel following the MNRF Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders.
- Canada Nickel will only remove Category 2 and 3 Blanding's turtle habitat (near the northeast boundary of the Project Area) between October 16 to April 14, outside of the active period for turtles, unless otherwise approved by MECP. This will be incorporated into the Construction Environmental Protection Plan and Wildlife Management Plan.
- If a boreal caribou is observed onsite, Canada Nickel will temporarily suspend work in the area that could pose a threat to the individual, when safe to do so, until it is out of harm's way. The encounter will be logged by Canada Nickel and reported to MECP and ECCC. This will be incorporated into the Construction Environmental Protection Plan and Wildlife Management Plan, which will include a more detailed intervention and communication process.
- Canada Nickel will incorporate the following mitigation measures into the design of the Project and will be included in the Construction Environmental Protection Plan and Wildlife Management Plan to avoid or reduce Project-related effects on bats:
  - Conduct tree removals between September 1 and April 30, outside of the active period for bats, where possible.

- When tree removal is proposed within candidate bat roosting areas between May 1 and August 31, conduct roost surveys prior to disturbance, with the exception of between June 1 and July 31 (core roosting/rearing period), where no clearing will be permitted.
- Removal of occupied roosts will not be permitted unless authorized through permits or approvals.
- If an occupied bat roost is identified, the tree shall be left undisturbed, the area flagged, and a 120 m setback applied, and work will temporarily cease until such time that the roost is vacated.
- In the unlikely event that an occupied hibernacula is identified, work within a 120 m setback will cease until the hibernacula has been vacated or alternative mitigations have been agreed to with MECP.
- During the construction of buildings or other structures, bats will be discouraged from establishing roost or overwintering sites.
- Use of sticky traps for problem rodents will be avoided, as bats are often attracted to these.

19.4.4.3 Project Residual Effects

19.4.4.3.1 Vehicle Collisions and Interactions with Equipment

Construction activities are expected to have the greatest risk of mortality during site preparation and land clearing activities. Mortality risk during operations will be primarily related to traffic due to ore hauling and collisions with vehicles and equipment. Decommissioning and closure will be similar to construction, but to a lesser extent.

The timing of activities plays an important role in determining individual and population-level responses to stressors. Species and populations may be more susceptible to disturbance-related mortality during construction activities if they coincide with sensitive periods (e.g. breeding, overwintering, seasonal movement patterns) or critical habitat. Overwintering amphibians, reptiles and mammals (e.g., American black bear) are also at greater risk during site clearing activities in the winter and interactions with Project equipment during ground disturbance activities. For species that hibernate communally (e.g., eastern gartersnake), destruction to hibernacula could affect local populations. Wildlife mortality could also occur during decommissioning and closure through the removal of Project infrastructure. For example, if bats have established a maternity colony in a building, the destruction of the building could result in bat mortality, particularly for young bats that are not yet able to fly.

Small mammals and amphibians and reptiles may be more susceptible to mortality risk during site clearing due to their limited mobility and are not as visible to equipment operators. Nocturnal species are also difficult for drivers to see and may be at higher risk. Ungulates are particularly vulnerable to road mortality due to their use of roadway habitat (Dodd et al. 2006; Bissonette and Rosa 2012). There is low risk of boreal caribou being encountered as there are no recent records with the PA. Further, this species would unlikely be encountered due to their tendency to avoid areas with human activity (Dyer et al. 2001, 2002; Bradshaw et al. 1997, 1998; Brown and Ross 1994; Apps and McLellan 2006; Vistnes and Nellemann 2008). Road mortality for Canada lynx is also expected to be lower given their tendency to cross highways during periods of low traffic (Baigas et al. 2017). Amphibians and reptiles are vulnerable to road mortality, especially where habitat is bisected by roadways and used for travel between sensitive features such as breeding and hibernacula sites (Mazerolle 2004; Garrah et al. 2015).

As discussed in Chapter 22 of the Impact Statement (Assessment of Potential Effects on Social Conditions), Highway 655 is a two-lane highway with a design speed of 110 km/hour (hr) and is posted with a regulatory speed limit of 90 km/hr. The Annual Average Daily Traffic for Highway 655, north of Kidd Creek Mine Road and Highway 11 is 1,200 vehicles per day with a forecast Annual Average Daily Traffic for 2030 of 1,300 vehicles per day. The Project is expected to result in an increase in vehicles along Highway 655 and through the LSA/RSA communities as employees travel to and from the Project site. It is estimated that at peak concentrate production, 4 trains with 24 cars per train will be used to transported nickel and magnetite concentrate off-site daily (see the Air Quality Assessment in Appendix C.1 of the Impact Statement).

19.4.4.3.2 Human-Wildlife Conflicts

An increase in human presence during all Project phases may result in increased human-wildlife conflicts. Human-wildlife conflicts can result if wastes are improperly disposed of (e.g., food waste, garbage) or if pets (i.e., dogs) are brought on site, which can attract potential predators (e.g., American black bear) and result in unintended injury or mortality. Wildlife that become accustomed to people, particularly American black bears, can become a threat to human safety. Project staff and contractors will adhere to waste management procedures and proper housekeeping to avoid attracting wildlife.

19.4.4.3.3 Predator-Prey Dynamics

The creation of access roads, right-of-ways and other linear features can have indirect effects on wildlife mortality leading to changes in abundance or distribution of predator and prey species (e.g., Serrouya et al. 2011; Latham et al. 2011; Fortin et al. 2013) and increased hunting and trapping pressure (Gratson and Whitman 2000).

The creation of regenerating habitat along right-of-ways may increase moose abundance, as areas of forest regrowth provide attractive habitat. The presence of moose could result in an increase in predators such as northern gray wolf, American black bear, coyote, and red fox, which are also known predators of other wildlife species including beaver, muskrat (while traveling on land), boreal caribou, and arctic hare (Banfield 1974, Hearn et al., 1987, Rayl 2012, Mumma 2014). High densities of prey species, such as moose, can support a larger population of predators. Access management and the reclamation of roads and other linear features to reduce mobility of predators can help decrease risk of predation for species

such as boreal caribou and ungulates (McKenzie et al. 2012; Dyer et al. 2002) and reduce risk of hunting and trapping pressure.

19.4.4.3.4 Summary of Change in Mortality Risk

Project residual effects for change in mortality risk is predicted to be adverse during all Project phases, with the highest risk during the construction phase.

Magnitude of effects is predicted to be moderate for most species at the population level, including those with limited mobility (e.g., small mammals and herptiles) and negligible to low for bats and medium-to-large-sized mammals. For boreal caribou the magnitude of effects is predicted to be negligible as this species is not expected to occur in the LSA.

The geographic extent will be confined to the PA; however, indirect effects, such as increased predation risk, could extend into the LSA. Indirect effects are expected to be highest during construction when displaced species are relocated to unfamiliar areas and become more vulnerable to predators. Over time, wildlife are predicted to adapt to their new surroundings with predator-prey dynamics stabilizing.

Timing is predicted to be high sensitivity when works occur during sensitive periods. Mitigation measures and adhering to timing windows will be followed to avoid activities during critical life stages (e.g., overwintering, nesting) and sensitive habitats, where possible.

Duration is predicted to be long-term, extending throughout the duration of the Project. However, the highest risk is predicted to occur during the construction phase. Frequency is predicted to be continuous during the construction phase with irregular events predicted during the operations and decommissioning and closure phases.

The effects are predicted to be reversible and irreversible. Loss of most species is not expected to deplete a population and is therefore, considered to be reversible. However, loss of a SOCC or SAR is considered to be irreversible as population-level effects could occur.

19.4.5 Change in Wildlife Health

19.4.5.1 Project Pathways

Changes in wildlife health are based on outcomes from the Ecological Risk Assessment (ERA) where changes in contaminant pathways and exposure are identified (discussed further in the Human Health and Ecological Risk Assessment in Appendix C.7 of the Impact Statement).

Activities associated with construction, operations, and/or decommissioning and closure of the Project could result in increased risk of exposure of wildlife to contaminants. This includes exposure to emissions, discharge of waste, Project-related chemicals in air or water, accidental spills, among others. Exposure pathways with potential to affect wildlife health include the ingestion of soil, sediment, food, or water, and through direct contact with soil, sediments, or water (Appendix C.7 of the Impact Statement [Human Health and Ecological Risk Assessment]). The effect pathways that may result in a change in wildlife health include:

- Deposition of fugitive dust from waste rock, overburden and low grade ore stockpiles, and roads onto the surrounding terrestrial and aquatic environment during transport, extraction (e.g., drilling, blasting, removal of ore), milling and processing.
- Discharges and runoff from Project activities, both planned and unplanned, may release a contaminant of potential concern (COPC) into surface water and/or groundwater, affecting wildlife and wildlife habitat.
- Collection Ponds (i.e., storage and treatment of contact water) may have elevated levels of COPCs and attract wildlife as a source of drinking water or foraging, breeding, and overwintering habitat.

19.4.5.1.1 Construction

Atmospheric fugitive dust emissions (e.g., combustion byproducts, roads) from Project activities may result in direct changes to wildlife health through ingestion by wildlife. Dispersal and deposition of emissions across the environment (i.e., into soil or sediment, food, or water) may elevate environmental levels of COPCs, indirectly affecting wildlife health through contamination of the food chain (Sanderfoot and Holloway 2017).

Like atmospheric emissions, discharges released into the environment may elevate levels of environmental contaminants in surface water, sediments, soils, and vegetation, indirectly affecting wildlife health through contamination of the food chain. Collection Ponds and ditches in the PA have the potential to affect wildlife health through consumption of mine contaminants within the water, plants or aquatic organisms. Solid and/or liquid wastes (e.g., garbage, sewage) may directly affect wildlife health during the construction phase of the Project through ingestion by wildlife.

19.4.5.1.2 Operations

Atmospheric emissions during operations are expected to increase during milling and processing, drilling, blasting, removal, and transport of ore. Fugitive dust from waste rock, overburden, low grade ore stockpiles and roads released into the atmosphere may contain heavy metals known to be persistent in the environment and potentially toxic to wildlife. The dispersal of fugitive dust may have indirect effects through the contamination of surface water, sediments, soils, vegetation, and contamination of the food chain. Atmospheric emissions from fugitive dust will be highest during operations. The Collection Ponds and ditches, discharges and wastes component of the Project and their associated effect pathways are expected to be the same during operations as the construction phase described above.

19.4.5.1.3 Decommissioning and Closure

The emissions, discharges, and wastes component of the Project and their associated pathways are expected to be the same during the decommissioning and closure phase of the Project as during operations. During reclamation and closure of the site, pathways will be reduced as mine activities are wound down and sources of emissions, discharges, and wastes are removed. As a result, direct and indirect effects on wildlife health are expected to decrease.

19.4.5.2 Mitigation Measures

The mitigation measures described in Section 19.4.2.2 also apply to wildlife health. The following mitigation measures have been incorporated into the design of the Project and/or are proposed to avoid or reduce Project-related effects on wildlife health:

- Canada Nickel will prepare and implement a Construction Environmental Protection Plan and Wildlife Management Plan.
- Canada Nickel will develop and implement a Waste Management Plan that will include procedures for the handling and storage of chemical and hazardous materials.
- Canada Nickel will implement measures in the Spill Management and Contingency Plan to prevent the release of harmful substances into waters or areas that could be accessed by wildlife.
- Canada Nickel will implement emissions and dust control measures as described in Chapter 12 of the Impact Statement (Assessment of Potential Effects on the Atmospheric Environment) and will implement an Air Quality Management Plan.
- Canada Nickel will develop and implement a Site-Wide Water Management Plan (Appendix J of the Impact Statement) for the Project. This Plan will include the following mitigation measures:
  - Divert clean, non-contact water around the Project so that it discharges to its natural watershed (including the North Driftwood River), to the extent practical.
  - Capture contact water in collection ditches and ponds and treat water effluents prior to discharge to the receiving environment, as required, to meet regulatory criteria.
- Canada Nickel will prevent the growth of trees and shrubs and will maintain low-growing vegetation around the TMF and Collection Ponds until reclamation activities are underway.

19.4.5.3 Project Residual Effects

As detailed in the Human Health and Ecological Risk Assessment (Appendix C.7 of the Impact Statement), Project-related contributions of a COPC are not expected to result in unacceptable levels of risks to amphibians, reptiles, or mammals.

As presented in the Human Health and Ecological Risk Assessment (Appendix C.7 of the Impact Statement), the differences between HQ for the Baseline scenario and the Baseline Plus Project scenario (i.e., the Project Alone scenario) were less than 1.0 for most COPCs and most ecological receptors assessed in the three watersheds assessed, suggesting that the Project-related risks for ecological receptors are expected to be negligible for most COPCs. However, changes in calculated HQs between the Baseline scenario and the Baseline and Project scenario (i.e., the Project Alone scenario) were greater than 1.0 for the masked shrew (used as a representative for insectivorous mammals, including SAR bats) for nickel as well as for the North American river otter and American mink for selenium, which are discussed further below.

19.4.5.3.1 Amphibians and Reptiles

Amphibians and reptiles (including turtles and snakes) were evaluated by considering their most sensitive life stage (e.g., neonatal period, tadpoles) where individuals live in close association with their surrounding environment (e.g., soil, aquatic communities). As such, animals living in close proximity to their surrounding environment may be suitable surrogates. For amphibian exposure, where tadpoles live in close proximity to water, fish may be a suitable surrogate. Unacceptable risks to amphibians are not anticipated based on evaluation of aquatic communities. For reptiles, exposure is evaluated using terrestrial and aquatic communities as representative of the most sensitive life stages (i.e., neonatal period); unacceptable risks to reptiles are not anticipated.

For freshwater aquatic communities, calculated HQs for aquatic communities are less than 1.0 other than for cadmium and copper in the Baseline and Baseline Plus Project scenarios in the Jocko Creek watershed, and copper in the Baseline Plus Project scenario in the North Driftwood River and West Buskegau River watersheds. Given that the calculated HQs are only marginally greater than the target HQ of 1.0 and that conservative assumptions were made during surface water modelling and selection of EPCs, unacceptable risks to aquatic communities due to Project-related contributions are not expected.

HQ values for the aquatic communities (surrogate ecological receptor for amphibians and reptiles) were also not calculated for tungsten as suitable toxicity benchmarks were not identified. The increases in surface water concentrations for mercury and tungsten may be reflected in increase of exposures through various pathways associated with the aquatic environment. Actual increases in mercury and tungsten concentrations in surface water may be lower than those modelled. Refer to the Surface Water Resources Assessment in Appendix C.5 and Surface Water in Chapter 15 of the Impact Statement (Assessment of Potential Effects on Surface Water) for concentrations in water.

19.4.5.3.2 Mammals

The COPCs considered in the HQ calculations are the same as those discussed for amphibians and reptiles (Section 19.4.5.3.1) plus methyl mercury related to the fish ingestion pathway for applicable ecological receptors (e.g., American mink)related to the fish ingestion pathway for applicable ecological receptors (e.g., American mink).

HQs were calculated for the following representative receptors:

- Herbivorous: Beaver, meadow vole, snowshoe hare, moose, white-tailed deer, boreal caribou
- Insectivorous: Masked shrew
- Omnivorous: American mink, American black bear,
- Carnivorous: North American river otter, red fox, bobcat

As noted previously, the differences between HQs for the Baseline scenario and the Baseline Plus Project scenario (i.e., the Project Alone scenario) were less than 1.0 for most COPCs (including moose and black bear) and most ecological receptors assessed in the three watersheds assessed, suggesting that the Project-related risks for ecological receptors are expected to be negligible for most COPCs.

However, changes in calculated HQs between the Baseline scenario and the Baseline and Project scenario (i.e., the Project Alone scenario) were greater than 1.0 for the masked shrew (standard and representative of SAR) for nickel in the three watersheds assessed as well as for the North American river otter for selenium in the North Driftwood River which are discussed further below.

HQ values for the Project Alone scenario were greater than 1.0 for nickel in the three watersheds assessed for the masked shrew. For the masked shrew, the terrestrial invertebrate ingestion pathway represents a substantial contribution to the overall HQ (more than 95%) calculated for nickel. COPC concentrations in terrestrial invertebrates were estimated by applying soil-to-terrestrial invertebrate uptake factors for earthworms. For the masked shrew, given that the modelled COPC concentrations in terrestrial invertebrates are based on a higher range of concentrations (95th percentile), that earthworm may represent a single component of its diet, and that the geology of the area exhibits elevated concentrations of nickel in soil, unacceptable risks to population of masked shrews due to exposure to nickel as well as other COPCs assessed are not expected.

The masked shrew was also selected as a representative of SAR bats. Bats have larger home ranges than masked shrews and generally capture insects in flight. Bats feed on a variety of small, flying insects such as moths, flies, mosquitoes, mayflies, caddisflies, beetles, and midges; many of which have aquatic life stages (COSEWIC 2013). Aerial insects have limited contact with soil and are thus not expected to be highly exposed to soil COPC. Therefore, exposure estimates for the insectivorous bat based on consumption of earthworms likely overestimates their exposures. Given that the modelled COPC concentrations in terrestrial invertebrates are based on earthworms, and that bats do not actually consume earthworms (preferring instead small flying insects), it expected that the exposure that bats would receive from consuming aerial invertebrates in the three watersheds assessed would be much less than calculated based on earthworm ingestion and thus unacceptable risks to bats due to exposure to nickel as well as other COPCs assessed are also not expected. It is however noted that the overall exposure to nickel (and several other metals) for the masked shrew is mainly associated with the terrestrial invertebrate ingestion pathway.

For the North American river otter and the American mink, HQ values for the Project Alone scenario greater than 1.0 were calculated for selenium in the North Driftwood River (HQ values for the Project Alone scenario were less than 1.0 in the other two watersheds assessed). For both the North American river otter and the American mink, the fish ingestion pathway represents a substantial contribution to the overall HQ (more than 85%) calculated for selenium. The North American river otter and the American mink have larger foraging ranges (0.1 to 17.1 km^2 and 0.06 to 16.3 km^2, respectively) than that conservatively represented by the area of full mixing in the North Driftwood River (30 m downstream of the FDP for both discharges) that was used to represent concentrations in surface water for surface water-to-fish uptake calculations. Given these large foraging ranges, it is expected that the exposure that they would receive from consuming fish would be less than calculated. As such, unacceptable risks to population of North American river otters, American minks, and those species they represent due to exposure to selenium as well as other COPCs assessed are not expected.

19.4.5.3.3 Summary of Change in Wildlife Health

Project residual effects for change in wildlife health are predicted to be adverse during all Project phases. Exposure to COPCs was considered negligible to low for all species; however, exposure risk of nickel was identified for the masked shrew (used as a representative for insectivorous mammals, including SAR bats) and selenium for North American river otter and American mink. Unacceptable risks to wildlife are not anticipated.

Magnitude of effects is predicted to be negligible for most species with no measurable changes to wildlife health anticipated. Although HQ values are greater than 1 for selenium, it is expected this calculation is conservative and that the exposure that they would receive from consuming fish would be less than calculated. As such, unacceptable risks to populations of North American river otters, American minks, and those species they represent due to exposure to selenium as well as other COPCs assessed are not expected.

The geographic extent is predicted to extend into the LSA. The duration of the effects is predicted to be long-term with frequency predicted to be continuous, extending throughout the Project. The effects are predicted to be reversible following the decommissioning and closure phase.

19.4.6 Summary of Project Residual Effects

Table 19.11 summarizes Project residual effects on wildlife and wildlife habitat.

Table 19.11 Project Residual Effects on Wildlife and Wildlife Habitat

Residual Effect	Residual Effects Characterization							
	Project Phase	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility
Change in Habitat	C	A	L/H	PA/ LSA	HS	MT/LT	C	R
	O	A	L	PA/ LSA	HS	MT/LT	IR/C	R
	D	P	L	PA/ LSA	HS	ST	C	R
Change in Movement	C	A	N/L/M	PA/ LSA/RSA	HS	LT	C	R
	O	A	N/L	PA/ LSA/RSA	HS	LT	C	R
	D	A/P	N/L	PA/ LSA/RSA	HS	LT	C	R
Change in Mortality Risk	C	A	N/L/M	PA/ LSA	HS	LT	C	IR/R
	O	A	N/L/M	PA/ LSA	HS	LT	IR	IR/R
	D	A	N/L/M	PA/ LSA	HS	LT	IR	IR/R
Change in Wildlife Health	C	A	N	PA/ LSA	NS/MS/HS	LT	C	R
	O	A	N	PA/ LSA	NS/MS/HS	LT	C	R
	D	A/P	N	PA/ LSA	NS/MS/HS	LT	C	R

KEY

See Table 19.3 for detailed definitions

Project Phase:
C: Construction
O: Operations
D: Decommissioning and Closure

Direction:
P: Positive
A: Adverse
N: Neutral

Magnitude:
N: Negligible
L: Low
M: Moderate
H: High

Geographic Extent:
PA: Project Area
LSA: Local Study Area
RSA: Regional Study Area

Timing:
NS: No sensitivity
MS: Moderate sensitivity
HS: High sensitivity

Duration:
ST: Short-term
MT: Medium-term
LT: Long-term

N/A: Not applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

Change in habitat pathways will primarily occur during construction through site preparation and earthworks activities, such as vegetation clearing, stripping, grading, and excavation. Construction of other Project components will extend into the operations and decommissioning and closure, particularly sensory disturbances. Residual effects are predicted to be adverse throughout all Project phases but improve through progressive reclamation during operations and restoration during decommissioning and closure. Habitat loss is highest during construction, with about 20% of habitat in the LSA affected, though this is lower for species like the monarch and Blanding's turtle. Sensory disturbances will also affect some species, such as boreal caribou, beyond the immediate PA. Adverse effects are expected to be reversible through reclamation and restoration.

Change in movement pathways during construction are similar to those described for change in habitat. Sensory disturbances are also predicted to affect wildlife movement patterns during all Project phases. Residual effects are predicted to be adverse throughout all Project phases, particularly during construction when habitat loss causes displacement. However, the magnitude of effects is predicted to be low to moderate for most species and negligible for boreal caribou. Sensory disturbances may extend beyond the PA, but movement effects are anticipated to diminish as displaced individuals adapt and as reclamation efforts progress. Adverse effects are expected to be reversible through reclamation and restoration.

Change in mortality risk pathways during construction are similar to those described for change in habitat. Collisions with equipment and vehicles, interactions with infrastructure and destruction of occupied wildlife residences will be highest during construction, with some activities extending into operations, decommissioning and closure. Residual effects are predicted to be adverse throughout all Project phases, but will be highest during construction, with moderate effects on small mammals and herptiles and low risk for bats and larger mammals. The risk for boreal caribou is negligible. Indirect effects, such as increased predation, may extend beyond the PA. Although population-level losses are not expected and can be reversible, mortality of SOCC or SAR could be irreversible. Risk is expected to decrease after construction and through Project mitigation efforts.

Change in wildlife health pathways will primarily occur through atmospheric fugitive dust emissions and contaminants discharged in surface water, sediments, soils, and vegetation which may extend to all Project phases. Residual effects are predicted to be adverse throughout all Project phases but considered negligible for most species. While some risks are identified, particularly regarding nickel for the masked shrew and selenium for North American river otters and American minks, these risks are expected to be conservative and manageable. The effects will persist through the duration of the Project but are reversible following decommissioning and closure.

19.4.6.1 Summary of Adverse Residual Effects

The Project is expected to have adverse effects during all Project phases. Implementation of mitigation measures will reduce the magnitude and extent of effects. The Project will lead to direct habitat loss for wildlife, mainly during the construction phase due to land clearing and site preparation. A total of 22% of the Local Study Area (LSA), equivalent to 11,785 hectares, will be affected. This includes 20% of upland forest, 22% of wetland, 9% of water habitats, and 44% of anthropogenic and poorly vegetated areas. This habitat loss will impact various species depending on their specific life cycle requirements, such as amphibians, reptiles, moose, furbearers, and bats, which utilize different habitats for movement, feeding, breeding, and overwintering. Habitat fragmentation and sensory disturbances from construction activities will further degrade habitat quality, alter wildlife movement patterns, and increase stress and energy expenditure, potentially leading to shifts in home ranges and reduced foraging efficiency. Direct loss of habitat will occur within the PA but will be reversible through progressive reclamation which will be initiated in Year 7. Habitat loss will be incremental, giving wildlife time to adapt to activities occurring within the PA and relocate to the LSA and RSA.

19.4.6.2 Summary of Positive Residual Effects

Progressive reclamation will be initiated in Year 7 to restore habitat lost within the PA by incorporating biodiversity-focused strategies. This process aims to create more suitable habitats for various wildlife species, including amphibians, reptiles, moose, bats, and boreal caribou, eventually resulting in a landscape that is more consistent with the natural habitats of the LSA. Over time, it is predicted that wildlife will return to the area. Further, there will also be a net positive effect for SAR through the overall benefit permit.

19.5 Potential Effects on Federal Lands

There are no federal lands within the wildlife and wildlife habitat LSA and or RSA (excluding the RSA for boreal caribou). The closest lands under federal jurisdiction are the Taykwa Tagamou Nation Reserve lands located approximately 37 km away (straight line) from the PA (14 km southeast of Cochrane). No additional mitigation measures beyond those identified are specifically required for federal lands.

19.6 Prediction Confidence

The prediction confidence is considered moderate to high based on:

- The quantity and quality of data available
- Field studies conducted to date
- A conservative approach to address uncertainty in the environmental effects assessment, which increases confidence in the final determination of residual effects. Assumptions used to address uncertainty are identified as part of the description of analytical assessment techniques for each of the respective environmental effects.

- Professional judgement and experience with similar projects
- Understanding of final closure plan and reclamation and revegetation activities
- Effectiveness of mitigation measures, which reflect best industry practices

While the prediction confidence is high for most aspects of the assessment (e.g., presence and distribution of some species), there remains some uncertainty regarding other components (e.g., bat hibernacula, dens, species abundance and migration corridors), resulting in overall prediction confidence being moderate to high.

19.7 Assumptions

Species and habitat presence in the Project will be based on both results from field studies and modelling of suitable habitat. The assumption of species or habitat presence will be informed by known habitat preferences based on published literature, previous studies of their occurrence in similar habitat types, areas of presumed presence (e.g., species commonly found throughout the RSA), feedback received from Indigenous knowledge, and through field studies. A conservative prediction of residual effects assumes that the assessed species would be present in available suitable habitat throughout the RSA. For example, direct habitat loss was calculated using the entire PA when in fact not all species are expected to occur ubiquitously throughout the PA.

19.8 Follow-up and Monitoring

Canada Nickel will implement follow-up and monitoring programs to verify the accuracy of effects and to evaluate the effectiveness of mitigation measures, the results of which will be used to identify and implement adaptive management measures, as appropriate. As it relates to wildlife and wildlife habitat, follow-up and monitoring measures will include targeted species surveys around the PA to track relative abundance and spatial distribution of species compared to baseline conditions. Chapter 34 of the Impact Statement includes additional details on follow-up and monitoring programs proposed by Canada Nickel.

19.9 References

Abbott I.M., F. Butler, S. Harrison. 2012. When flyways meet highways – the relative permeability of different motorway crossing sites to functionally diverse bat species. Landscape and Urban Planning 106: 293–302.

Ament, R., R. Callahan, M. McClure, M. Reuling and G. Tabor. 2014. Wildlife Connectivity: Fundamentals for conservation action. Center for Large Landscape Conservation: Bozeman, MT.

Apps, C.D. and B.N. McLellan. 2006. Factors influencing the dispersion and fragmentation of endangered mountain caribou populations. Biological Conservation 130: 84–97.

Ardea Biological Consulting. 2004. Moose Habitat Model Morice and Lakes Forest Districts IFPA: Draft. Available online at: https://a100.gov.bc.ca/pub/acat/documents/r1526/hsm_4065_malal_1115306754884_ee60c663264b43aba7b2a8923b1f9018.pdf

Baigas, P. E., J.R. Squires, L. E. Olson, J. S. Ivan, E. K. Roberts. 2017. Using environmental features to model highway crossing behavior of Canada lynx in the Southern Rocky Mountains. Landscape and Urban Planning. 157: 200-213.

Banfield, A.W.F. 1974. The Mammals of Canada. University of Toronto Press, Toronto, Canada.

Banton, E., Johnson, J., Lee, H., Racey, G., Uhlig, P., and Wester, M. 2009. Ecosites of Ontario, Operational Draft April 20th, 2009. Ontario Ministry of Natural Resources, Ecological Classification Working Group.

Barber, J.R., K. Crooks and K. Fristrup. 2010. The costs of chronic noise exposure for terrestrial organisms. Trends in Ecology and Evolution. 25(3):180-189.

Bare L, Bernhardt T, Chu T, Gomez M, Noddings C, Viljoen M. 2009. Cumulative impacts of large-scale renewable energy development in the West Mojave: effects on habitat quality, physical movement of species, and gene flow. A group project submitted in partial satisfaction of the requirements for the degree of Master of Environmental Science and Management at the Donald Bren School of Environmental Science and Management. University of California, Santa Barbara, p. 134. https://www.bren.ucsb.edu/research/documents/WestMojave_Final_Report.pdf

Bayne, E.M., L. Habib, and S. Boutin. 2008. Impacts of chronic anthropogenic noise from energy-sector activity on abundance of songbirds in the boreal forest. Conservation Biology 22(5): 1186-1193

BCI (Bat Conservation International). 2022. Species Profiles. Cited online: http://www.batcon.org/resources/media-education/species-profiles.

Bennett, V.J. and A.A. Zurcher. 2013. When corridors collide: Road-related disturbance in commuting bats. Journal of Wildlife Management 77(1): 93–101.

Bissonette, J.A. and S. Rosa. 2012. An evaluation of a mitigation strategy for deer-vehicle collisions. Wildlife Biology 18: 414-423.

Boldogh, S., Dobrosi, D., Samu, P., 2007. The effects of illumination of buildings on house-dwelling bats and its conservation consequences. Acta Chiropterol. 9, 527–534.

Bradshaw, C.J., S. Boutin and D.M. Hebert. 1997. Effects of petroleum exploration on woodland caribou in northeastern Alberta. Journal of Wildlife Management 61: 1127–1133.

Bradshaw, C.J., S. Boutin and D.M. Hebert. 1998. Energetic implications of disturbance caused by petroleum exploration to woodland caribou. Canadian Journal of Zoology 76: 1319-1324.

Brown, W.K. and I. Ross. 1994. Caribou-vehicle collisions: a review of methods to reduce caribou mortality on Highway 40, west-central Alberta. Prepared by Terrestrial and Aquatic Environmental Managers Ltd. for Alberta Environmental Protection, Fish and Wildlife Services and Alberta Transportation and Utilities, Research and Development Branch, Calgary, Alberta.

Brown. G.S. 2005. Habitat selection by woodland caribou in managed boreal forest of northeast Ontario. Ph.D. dissertation, University of Guelph, Guelph, Ontario, Canada.

BSC. 2009. 2009 Edition. Marsh Monitoring Program Participant's Handbook for Surveying Amphibians Revised 2008. Bird Studies Canada in cooperation with Environment Canada and the U.S. Environmental Protection Agency. February 2009. 13 pp.

Buchanan, C.B., J.L. Beck, T.E. Bills and S.N. Miller. 2014. Seasonal Resource Selection and Distributional Response by Elk to Development of a Natural Gas Field. Society for Range Management 67: 369 – 379.

Canadian Council of Resource Ministers. 2006. A Biodiversity Outcomes Framework for Canada. 8 pages.

CFIA (Canadian Food Inspection Agency). 2021. Directive (D-03-08): Phytosanitary Requirements to Prevent the Introduction into and Spread within Canada of the Emerald Ash Borer, *Agrilus planipennis* (Fairmaire)

Chapin, T.G., D.J. Harrison, and D.D. Katnik. 1998. Influence of landscape pattern on habitat use by American marten in an industrial forest. Conservation Biology 12(6): 1327-1337.

Collister, D.M. and J.L. Kansas. 1997. Wildlife field surveys Mobil Lease 35. Ursus Ecosystem Management Ltd. Calgary, AB.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2002. COSEWIC assessment and update status report on the woodland caribou *Rangifer tarandus caribou* in Canada. COSEWIC. Ottawa. xi + 98 pp.

COSEWIC. 2008. COSEWIC assessment and status report on the Snapping Turtle *Chelydra serpentina* in Canada. COSEWIC. Ottawa: vii + 47 pp.

COSEWIC. 2013. COSEWIC assessment and status report on the Little Brown Myotis *Myotis lucifugus*, Northern Myotis *Myotis septentrionalis* and Tricolored Bat *Perimyotis subflavus* in Canada. COSEWIC. Ottawa. xxiv + 93 pp.

COSEWIC. 2014a. COSEWIC assessment and status report on the wolverine *Gulo gulo* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, Ontario.

COSEWIC. 2014b. COSEWIC assessment and status report on the Caribou *Rangifer tarandus*, Newfoundland population, Atlantic-Gaspésie population and Boreal population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxiii + 128 pp.

COSEWIC. 2016a. COSEWIC assessment and status report on the Monarch *Danaus plexippus* in Canada. COSEWIC. Ottawa. xiii + 59 pp.

COSEWIC. 2016b. COSEWIC assessment and status report on the Blanding's Turtle *Emydoidea blandingii*, Nova Scotia population and Great Lakes/St. Lawrence population in Canada. COSEWIC. Ottawa. xix + 110 pp.

COSEWIC. 2023. COSEWIC assessment and status report on the Hoary Bat *Lasiurus cinereus*, Eastern Red Bat *Lasiurus borealis* and Silver-haired Bat, *Lasionycteris noctivagans*, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxi + 100 pp. https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html.

COSSARO (Committee on the Status of Species at Risk in Ontario). 2016. Ontario Species at Risk Evaluation Report for Yellow-banded Bumble Bee (*Bombus terricola*). Available online at: https://cossaroagency.ca/wp-content/uploads/2017/06/Accessible_COSSARO-evaluation-Yellow-banded-Bumble-Bee.pdf

COSSARO. 2022. Ontario Species at Risk Evaluation Report for Eastern Wolf (Canis sp.). Available online at: https://cossaroagency.ca/wp-content/uploads/2023/04/COSSARO-Eastern-Wolf-March-2022_final.pdf

Crins, W.J., Gray, P.A., Uhlig, P.W.C. and Wester, M.C. 2009. The Ecosystems of Ontario, Part 1: Ecozones and Ecoregions. MNRF Science and Information Branch, Technical Report SIB TER IMA TR-01. 87 pp.

Cunnington, G.M and L. Fahrig. 2010. Plasticity in the vocalizations of anurans in response to traffic noise. Acta Oecologica 36: 463 – 470.

Cushman, S. 2006. Effects of habitat loss and fragmentation on amphibians: A review and prospectus. Biological Conservation 128: 231-240.

Dickie, M., R. Serrouya, S. McNay, S. Boutin. 2016. Faster and farther: wolf movement on linear features and implications for hunting behaviour. Journal of Applied Ecology: 10.1111/1365-2664.12732.

Dobbyn, J. 1994. Atlas of the Mammals of Ontario. Federation of Ontario Naturalists.

Dodd, N.L., J.W. Gagnon, S. Boe, and R.E. Schweinsburg. 2006. Characteristics of Elk-Vehicle Collisions and Comparison to GPS-Determined Highway Crossing Patterns. In Proceedings of the 2005 International Conference on Ecology and Transportation, Eds. C.L. Irwin, P. Garrett, and K.P. McDermott. Center for Transportation and the Environment, North Carolina State University, Raleigh, NC: 461-477.

Dunning, J.B., B.J. Danielson, and H.R. Pulliam. 1992. Ecological processes that affects populations in complex landscapes. Oikos 65: 169-175.

Dyer, S.J., J.P. O'Neill, S.M. Wasel, and S. Boutin. 2001. Avoidance of industrial development by woodland caribou. Journal of Wildlife Management 65: 531-542.

Dyer, S.J., J.P. O'Neill, S.M. Wasel, and S. Boutin. 2002. Quantifying barrier effects of roads and seismic lines on movements of female woodland caribou in northeastern Alberta. Canadian Journal of Zoology 80: 839–845.

ECCC (Environment and Climate Change Canada). 2016. Canada's Biodiversity Outcomes Framework and 2020 Goals and Targets (Cat. No.: CW66-525/2016E-PDF, ISBN: 978-0-660-04250-3). © Her Majesty the Queen in Right of Canada, represented by the Minister of Environment and Climate Change.

ECCC. 2020. Amended Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. xiii + 143pp. Cited online: https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/plans/Rs-CaribouBorealeAmdMod-v01-2020Dec-Eng.pdf.

ECCC. 2024. Canada's 2030 Nature Strategy: Halting and Reversing Biodiversity Loss in Canada. Environment and Climate Change Canada, iii + 177pp. Cited online: https://publications.gc.ca/collections/collection_2024/eccc/en4/En4-539-1-2024-eng.pdf

EC (Environment Canada). 2009. Environmental Code of Practice for Metal Mines. Available online at: https://www.canada.ca/content/dam/eccc/migration/main/lcpe-cepa/documents/codes/mm/mm-eng.pdf

Fahrig, L. 2003. Effects of habitat fragmentation on biodiversity. Annual Review of Ecology, Evolution, and Systematics 34: 487-515.

Fensome, A.G., and F. Mathews. 2016. Roads and bats: a meta-analysis and review of the evidence on vehicle collisions and barrier effects. Mammal Review 46:311-323.

Fortin, D., P. L. Buono., A. Fortin, N. Courbin, C.T. Gingras, P.R Moorcroft, R. Courtois, and C. Dussault. 2013. Movement responses of caribou to human-induced habitat edges lead to their aggregation near anthropogenic features. American Naturalist 181: 827-836

Frankham, R. 2006. Genetics and landscape connectivity. Pages 72–96 in K.R. Crooks and M.A. Sanjayan, editors. Connectivity conservation. Cambridge University Press, Cambridge, England, UK.

Fuentes-Montemayor, E., Cuarón, A.D., Vázquez-Domínguez, E., Benítez-Malvido, J., Valenzuela-Galván, D., Andresen, E., 2009. Living on the edge: roads and edge effects on small mammal populations. J. Anim. Ecol. 78, 857–865.

Furlonger, C.L., H.J., Dewar, M.B Fenton. 1987. Habitat use by foraging insectivorous bats. Canadian Journal of Zoology 65:284–288.

Garrah, E., R.K. Danby, E. Eberhardt, G.M. Cunnington, and S. Mitchell. 2015. Hot spots and hot times: Wildlife road mortality in a regional conservation corridor. Environmental Management 56: 874-889.

Gratson, M.W., and C.L. Whitman. 2000. Road closures and density and success of elk hunters in Idaho. Wildlife Society Bulletin 28:302–310.

Haeussler, U., Erkert, H., 1978. Different direct effects of light intensity on the entrained activity rhythm in neotropical bats (*Chiroptera, Phyllostomidae*). Behav. Process. 3, 223–239.

Halloran, J., H. Anderson, D. Tassie. 2013. Clean Equipment Protocol for Industry. Peterborough Stewardship Council and Ontario Invasive Plant Council. Peterborough, Ontario.

Harper, K., S. Macdonald, P. Burton, J. Chen, K. Brosofske, S. Saunders, E. Euskirchen, D. Roberts, M. Jaiteh, and P. Esseen. 2005. Edge influence on forest structure and composition in fragmented landscapes. Conservation Biology. 19, 768–782.

Hearn, B.J., L.B. Keith, and O.J. Rongstad. 1987. Demography and ecology of the arctic hare (*Lepus arcticus*) in southwestern Newfoundland. Canadian Journal of Zoology 65(4):852-861.

Henderson, L.E., L.J. Farrow, and H.G. Broders. 2008. Intra-specific effects of forest loss on the distribution of the forest-dependent Northern Long-eared Bat (*Myotis septentrionalis*). Biological Conservation 141:1819-1828.

Humphrey, C. and H. Fotherby. 2019. Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*) and Tri-colored Bat (*Perimyotis subflavus*) in Ontario. Ontario Recovery Strategy Series. Prepared by the Ministry of the Environment, Conservation and Parks, Peterborough, Ontario. vii + 35 pp. + Appendix. Adoption of the Federal Recovery Strategy.

iNaturalist. 2024. iNaturalist. https://www.inaturalist.org/observations.

Jalkotzy, M.G., P.I. Ross and M.D. Nasserden. 1997. The effects of linear developments on wildlife: A Review of Selected Scientific Literature. Prepared for the Canadian Association of Petroleum Producers. Arc Wildlife Services Ltd. Calgary, AB. 115 pp.

James, A.R.C. and Stuart-Smith, A.K. 2000. Distribution of Caribou and Wolves in Relation to Linear Corridors. The Journal of Wildlife Management. 64: 154-159.Kambourova-Ivanova, N., Y.

Johnson AR, Wiens JA, Milne BT, Crist TO. 1992. Animal movements and population dynamics in heterogeneous landscapes. Landscape Ecol. 7:63–75.

GOC (Government of Canada). 2024. Critical Habitat for Species at Risk National Dataset – Canada. Government of Canada. Available Online: https://open.canada.ca/data/en/dataset/47caa405-be2b-4e9e-8f53-c478ade2ca74.

Kitzes J. and A. Merenlender. 2014. Large roads reduce bat activity across multiple species. PLoS One 9: e96341.

Koehler, G.M. 1990. Population and habitat characteristics of lynx and snowshoe hares in North Central Washington. Canadian Journal of Zoology 68: 845–851.

Koehler, G. M. and J. D. Brittell. 1990. Managing spruce-fir habitat for lynx and snowshoe hares. Journal of Forestry 88: 10–14.

Koehler G.M. and K.B. Aubrey. 1994. Lynx. In: L.E Ruggiero, K.B. Aubrey, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski [eds.]. The Scientific Basis for Conserving Forest Carnivores: American marten, fisher, lynx, and wolverine, pp. 74–98. United States Forest Service General Technical Report RM-254.

Latham, A.D.M, Latham, M. C., Boyce, M.S., and Boutin, S. 2011. Movement responses by wolves to industrial linear features and their effect on woodland caribou in northeastern Alberta. Ecological Applications 21: 2854-2865.

Layng, A. M., A. M. Adams, D. E. Goertz, K. W. Morrison, B. A. Pond, and R. D. Phoenix. 2019. Bat species distribution and habitat associations in northern Ontario, Canada. Journal of Mammalogy 100:249–260.

Leblond, M., J. Frair, D. Fortin, C. Dussault, J.P. Ouellet and R. Courtois. 2011. Assessing the influence of resource covariates at multiple spatial scales: an application to forest-dwelling caribou faced with intensive human activity. Land Ecology 26: 1433–1446.

Lindzey FG & Meslow EC (1977) Home range and habitat use by black bears in southwestern Washington. Journal of Wildlife Management 41: 413–425.

LIO (Land Information Ontario). 2002. Ontario Land Cover Data Base, 2nd Edition. Available at: https://geohub.lio.gov.on.ca/documents/1cd492c45f1145daa49b19cc541d0a0c/about

LIO. 2007. Forest Resources Inventory Packaged Products - Version 1. Land Information Ontario. Available online: https://geohub.lio.gov.on.ca/documents/lio::forest-resources-inventory-packaged-products-version-1/about.

LIO. 2015. Provincial land cover. Land Information Ontario. Available online: https://geohub.lio.gov.on.ca/documents/lio::provincial-land-cover/about.

LIO. 2023. Forest Resources Inventory Packaged Products - Version 2. Land Information Ontario. Available online: https://geohub.lio.gov.on.ca/maps/lio::forest-resources-inventory-packaged-products-version-2/about.

MacNearney, D., Pigeon, K.E., Stenhouse, G., Nijland, W., Coops, N., Finnegan, L., 2016. Heading for the hills? Evaluating spatial distribution of woodland caribou in response to a growing anthropogenic disturbance footprint. Ecol. Evol. 6 (18), 6484–6509.

Mahoney, S.P. and J.A. Schaefer. 2002. Hydroelectric Development and the Disruption of Migration in Caribou. Biological Conservation 107: 147-153.

Manci, K.M., D.N. Gladwin, R. Vilella and M.G. Cavendish. 1988. Effects of aircraft noise and sonic booms on domestic animals and wildlife: a literature synthesis. National Ecology Research Center Report# NERC-88/29.

Mazerolle, M.J. 2004. Amphibian road mortality in response to nightly variations in traffic intensity. Herpetologica 60: 45-53.

McKenzie, H.W., E.H. Merrill, R.J. Spiteri, and M.A. Lewis. 2012. How linear features alter predator movement and the functional response. Interface Focus 2: 205–216.

MECP (Ministry of the Environment, Conservation and Parks). 2019. Recovery Strategy for the Blanding's Turtle (*Emydoidea blandingii*) in Ontario. Ontario Recovery Strategy Series. Prepared by the Ministry of the Environment, Conservation and Parks, Peterborough, Ontario. iv + 6 pp. + Appendix. Adoption of the Recovery Strategy for Blanding's Turtle (*Emydoidea blandingii*), Great Lakes / St. Lawrence population, in Canada (Environment and Climate Change Canada 2018).

MECP. 2020. General habitat description for the Forest-dwelling Woodland Caribou. Available online at: https://www.ontario.ca/page/general-habitat-description-forest-dwelling-woodland-caribou

MECP. 2021a. Species Profile. Little Brown Myotis. Published July 17, 2014. Updated August 12, 2021. Retrieved from https://www.ontario.ca/page/littlebrown-myotis.

MECP. 2021b. Best management practices for mineral exploration and development activities and Woodland Caribou in Ontario. Available online at: https://www.ontario.ca/page/best-management-practices-mineral-exploration-and-development-activities-and-woodland-caribou

MECP. 2022a. Species at Risk Bats Survey Note 2022. Ministry of the Environment, Conservation and Parks. 3pp.

MECP. 2022b. Maternity Roost Surveys (Forests/Woodlands). Ministry of the Environment, Conservation and Parks. 3pp.

MECP. 2024a. Ontario Boreal Caribou Monitoring Program. 2023 Aerial Survey Results. Available online at: https://www.ontario.ca/files/2024-05/mecp-ontario-boreal-caribou-monitoring-program-en-2024-05-14.pdf

MECP. 2024b. Species at Risk in Ontario List. Available online: https://www.ontario.ca/page/species-risk-ontario.

MNRF (Ministry of Natural Resources). 2000. Significant Wildlife Habitat Technical Guide. 344 pp.

MNR. 2024a. Natural Heritage Information Centre Make-a-Map: Natural Heritage Areas Application. Available online at: http://www.giscoeapp.lrc.gov.on.ca/web/MNR/NHLUPS/NaturalHeritage/Viewer/Viewer.html.

MNR. 2024b. Moose population monitoring summaries. Available online at https://data.ontario.ca/dataset/moose-population-monitoring-summaries.

MNR. 2024c. Trapper harvests (1993-2022). Available online at https://data.ontario.ca/dataset/trapper-harvests/resource/63bfc593-4923-4eb4-bed8-ee97d9fac0b0.

MNRF (Ministry of Natural Resources and Forestry). 2011. Bat and Bat Habitats: Guidelines for Wind Power Projects. Second Edition. ©2011 Queen's Printer for Ontario. 24 pp. Cited online: https://www.ontario.ca/page/batsand-bat-habitats-guidelines-wind-power-projects.

MNRF. 2014. Integrated Range Assessment for Woodland Caribou and their Habitat: Kesagami Range 2010 Version 1.1. Thunder Bay, Ontario xi + 83pp: Species at Risk Branch.

MNRF. 2015a. Survey Protocol for Blanding's Turtle (*Emydoidea blandingii*) in Ontario. Species Conservation Policy Branch. Peterborough, Ontario. ii + 16 pp.

MNRF. 2015b. Significant Wildlife Habitat Criteria Schedules for Ecoregion 3E.

MNRF. 2017. Survey Protocol for Species at Risk Bats within Treed Habitats Little Brown Myotis, Northern Myotis & Tri-Colored Bat. Guelph District.

MNRF. 2020. Best management practices for mineral exploration and development activities and Woodland Caribou in Ontario

MNRF. 2023. Wetlands evaluation. Ministry of Natural Recourses. Available online: https://www.ontario.ca/page/wetlands-evaluation

MNRF. Undated. Ontario species at risk handling manual: for endangered species act authorization holders. Website: http://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_tx_sar_hnd_mnl_en.pdf

Mowat, G., K.G. Poole and M. O'Donoghue. 2000. Ecology of lynx in northern Canada and Alaska. In: L.F. Ruggiero, K. B. Aubry, S. W. Buskirk, G.M. Koehler, C.J. Krebs, K.S.

MTO (Ministry of Transportation Ontario). 2020. Interim Environmental Guide for Fisheries Best Management Practices Manual. April, 2020.

Murcia, C. 1995. Edge effects in fragmented forests: implications for conservation. Trends in Ecology & Evolution 10: 60-62.

Mumma, M.A. 2014. Using molecular tools to evaluate predator-prey relationships in Newfoundland. Ph.D. Thesis. University of Idaho. Moscow, ID, USA.

Naguib, M. 2013. Living in a noisy world: indirect effects of noise on animal communication. Behaviour, 150(9-10), pp.1069-1084.

Nagy, J. 2011. Use of space by caribou in northern Canada. Ph.D. Thesis, Biological Sciences, University of Alberta.

Nathan, R., Getz, W. M., Revilla, E., Holyoak, M., Kadmon, R., Saltz, D., et al. 2008. A movement ecology paradigm for unifying organismal movement research. Proc. Natl. Acad. Sci. U.S.A. 105, 19052–19059. doi: 10.1073/pnas.0800375105.

Northrup, J.M., J. Pitt, T.B. Muhly, G.B. Stenhouse, M. Musiani and M.S. Boyce. 2012. Vehicle traffic shapes grizzly bear behaviour on a multiple-use landscape. Journal of Applied Ecology 49: 1159 – 1167.

Nowlin, R.A. 1978. Relationships between habitats, forages and carrying capacity of moose range in northern Alberta. Part 1: moose preferences for habitat strata and forages. Alberta Recreation, Parks and Wildlife, Fish and Wildlife Division. Edmonton, AB.

Ontario Nature. 2020. Ontario Reptile and Amphibian Atlas: a citizen science project to map the distribution of Ontario's reptiles and amphibians. Ontario Nature, Ontario. Cited online: https://www.ontarioinsects.org/herp.

ORAA (Ontario Reptile and Amphibian Atlas). 2023. Ontario Reptile and Amphibian Atlas, 2009-2019. Ontario Nature, Toronto. 443 pp.

Prokopenko, C.M. 2016. Multiscale Habitat Selection and Road Avoidance of Elk on their Winter Range. M.Sc. Thesis, University of Alberta, Edmonton, AB.

Rayl, N. 2012. Black bear movements and caribou calf predation in Newfoundland. M.Sc. Thesis. University of Massachusetts, Amherst. Amherst, MA, USA

Russell, K.N., H. Ikerd and S. Droege. 2005. The potential conservation value of unmowed powerline strips for native bees. Biological Conservation 124(1): 133-148.

Rydell, J. 1992. Exploitation of insects around streetlamps by bats in Sweden. Functional Ecology, 6, 744–750.

Rydell, J. and Racey, PA. 1995. Street lamps and the feeding ecology of insectivorous bats. Symposia of the Zoological Society of London, 67, 291–307

Rydell, J., Entwistle, A., Racey, P.A. 1996. Timing of foraging flights of three species of bats in relation to insect activity and predation risk. Oikos 76, 243–252.

Sanderfoot, O.V., and T. Holloway. 2017. Air pollution impacts on avian species via inhalation exposure and associated outcomes. Environmental Research Letters 12 083002.

Schaub, A., Ostwald, J., and Siemers, B.M. 2008. Foraging bats avoid noise. J. Exp. Biol. 211, 3174–3180.

Serrouya R, McLellan BN, Boutin S, Seip DR, Nielsen SE. 2011. Developing a population target for an overabundant ungulate for ecosystem restoration. Journal of Applied Ecology 48:935–942

Shannon, G., M.F. McKenna, L.M. Angeloni, K.R. Crooks, K.M. Fristrup, E. Brown, K.A. Warner, M.D. Nelson, C. White, J. Briggs, S. McFarland and G. Wittemyer, 2016. A synthesis of two decades of research documenting the effects of noise on wildlife. Biological Reviews 91: 982–1005.

Stone, E.L., Jones, G., Harris, S. 2012. Conserving energy at a cost to biodiversity? Impacts of LED lighting on bats. Glob. Change Biol. 18, 2458–2465.

Stone, E.L., Harris, S. and Jones, G. 2015. Impacts of artificial lighting on bats: a review of challenges and solutions. *Mammalian Biology*, *80*(3), pp.213-219.

Sun, J.W.C and P.M. Narins. 2005. Anthropogenic sounds differentially affect amphibian call rate. Biological conservation 121: 419 – 427.

Tanner AL, Leroux SJ. 2015. Effect of Roadside Vegetation Cutting on Moose Browsing. PLoS ONE 10(8): e0133155. https://doi.org/10.1371/journal.pone.0133155.

Toronto Entomologists' Association. 2024. Ontario Butterfly Atlas. Available online at: https://www.ontarioinsects.org/atlas/.

US DoT (United States Department of Transportation). 2004. Synthesis of noise effects on wildlife populations. Publication No. FHWA-HEP-06-016. 75 pp.

Van Sleeuwen, M. 2006. Natural Fire Regimes in Ontario. Ontario Ministry of Natural Resources, Queen's Printer for Ontario, Toronto, Ontario. 143pp.

Verboom, B., Huitema, H., 1997. The importance of linear landscape elements for the *pipistrelle Pipistrellus pipistrellus* and the serotine bat *Eptesicus serotinus*. Landscape Ecol. 12, 117–125.

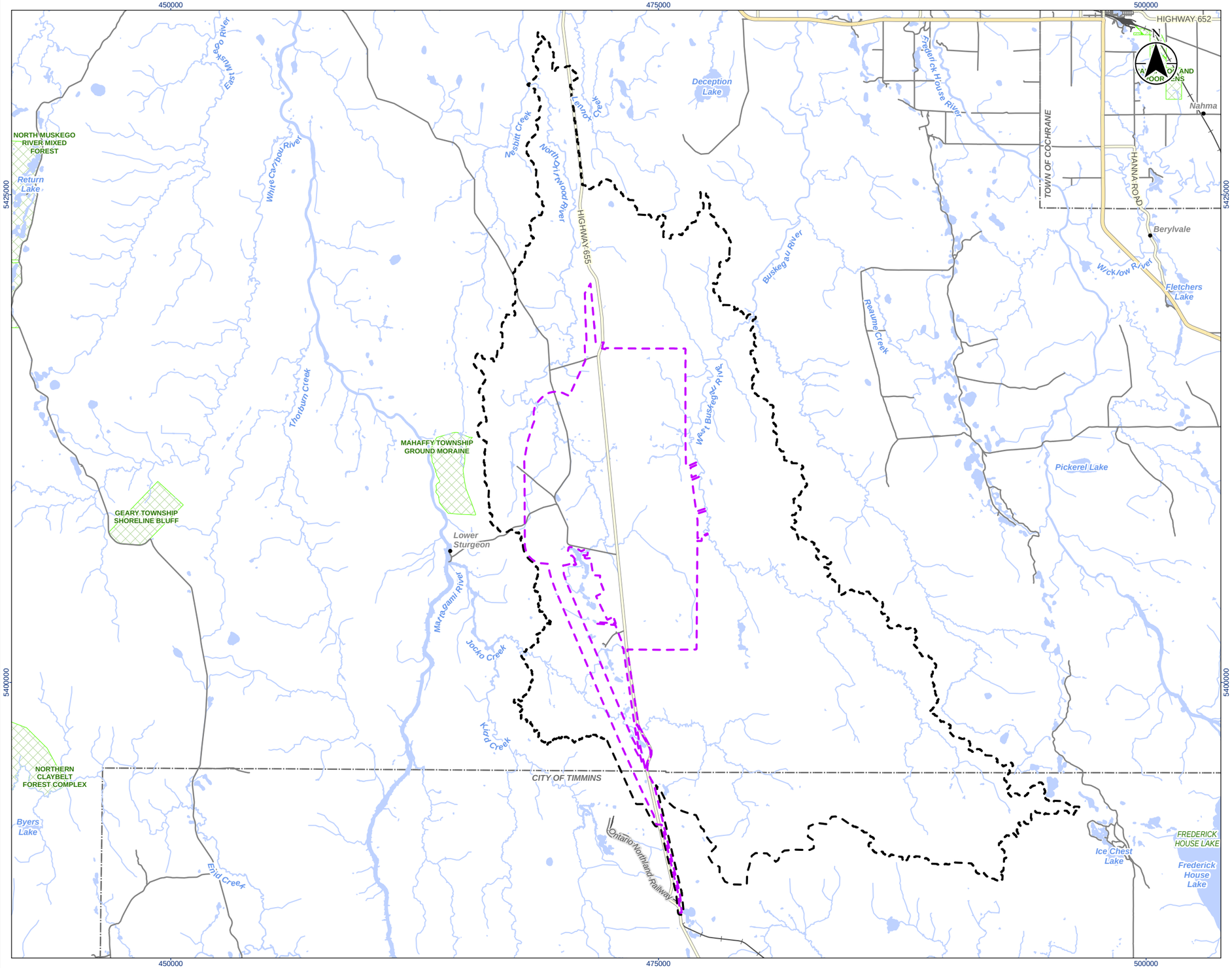
Visscher, D.R., I. MacLeod, M. Janzen, K. Visser, and A. Lekas. 2016. The impact of wildlife friendly fences on ungulate crossing behaviour at the Wainwright Dunes Ecological Reserve. The King's University. Edmonton, AB. 52 pp.

Vistnes, I. and C. Nellemann. 2008. The matter of spatial and temporal scales: a review of reindeer and caribou response to human activity. Polar Biology 31: 399–407.

Westworth and Associates Ltd. 1982. Wildlife resources of the Canstar Leases. Prepared for Canstar Oil Sands Ltd. Fort McMurray, AB.

Willems, J.S., J.N. Phillips and C.D. Francis. 2022. Artificial light at night and anthropogenic noise alter the foraging activity and structure of vertebrate communities. Science of The Total Environment, 805, p.150223.

19.10 Figures



Stantec

CANADA NICKEL COMPANY

Legend

- Project Area
- Local Study Area

Base Features

- Expressway / Highway
- Major Road
- Minor Road
- Railway
- Watercourse
- Conservation Reserve (Regulated)
- Municipal Boundary - Lower Tier
- Provincial Park
- Waterbody

0 5 10 km

1:200,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.

Project Location
Timmins, Ontario

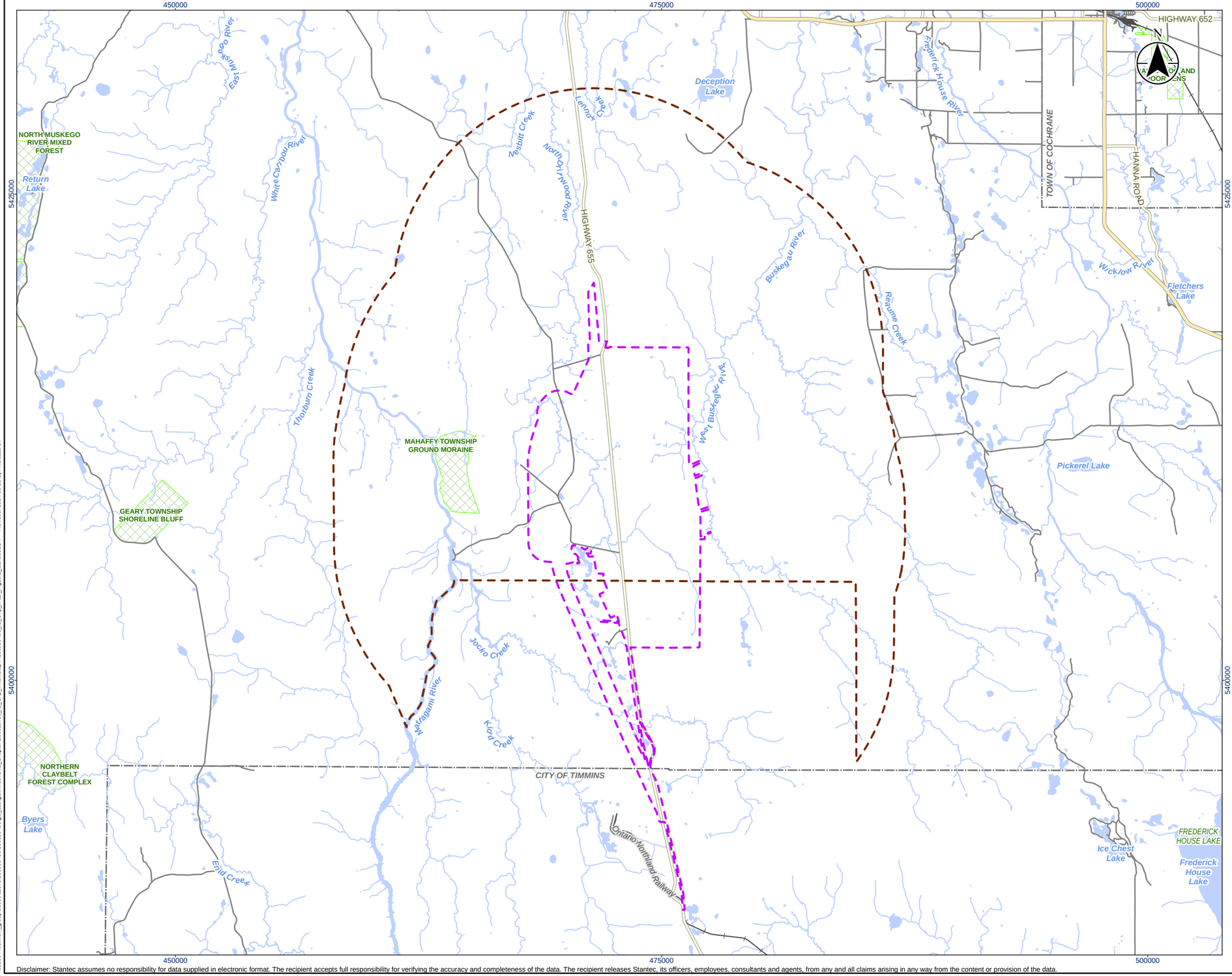
160930456 REVA
Prepared by malcazaren on 2024-09-26

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
19.1

Title
Local Study Area for Wildlife and Wildlife Habitat

\\cd1004-f01\work_group\03\160930456\active\160930456\gis_cadfg\esri\xds\IS\IS_Chapter\160930456_IS_Chp_Wildlife.aprx\160930456_IS_Chp_WLD_Fig19.1_Wildlife.SA Revised: 2024-09-26 By: malcazaren



\\ca1004-f01\work_group\01609\active\160930456\160930456_IS_Chp_Wildlife.aprx\160930456_IS_Chp_WLD_Fig19.2_CaribouLSA Revised: 2024-09-26 By: malcazaren

Stantec

CANADA NICKEL COMPANY

Legend

- Project Area
- Local Study Area,Wildlife - Caribou

Base Features

- Expressway / Highway
- Major Road
- Minor Road
- Railway
- Watercourse
- Conservation Reserve (Regulated)
- Municipal Boundary - Lower Tier
- Provincial Park
- Waterbody

0 5 10 km

1:200,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.

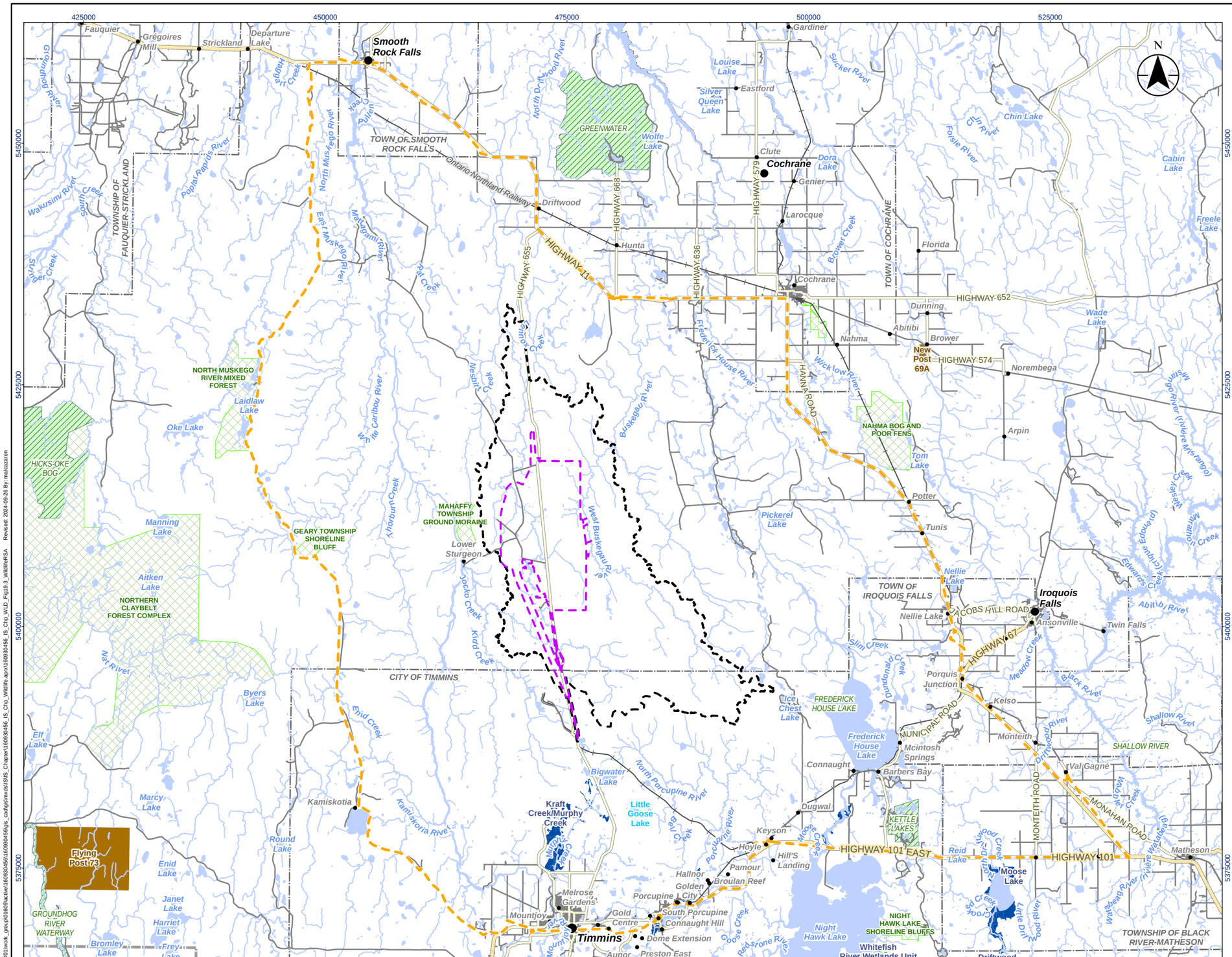
Project Location
Timmins, Ontario

REVA
Prepared by malcazaren on 2024-09-26

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
19.2

Title
Local Study Area for Boreal Caribou



Stantec

CANADA NICKEL COMPANY

Legend

- Project Area
- Local Study Area
- Regional Study Area

Base Features

- Expressway / Highway
- Major Road
- Minor Road
- Railway
- Watercourse
- Conservation Reserve (Regulated)
- First Nation Reserve
- Municipal Boundary - Lower Tier
- Municipal Boundary - Upper Tier
- Provincial Park
- Waterbody
- Wetland, Provincially Significant
- Wetland, Other Evaluated

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.

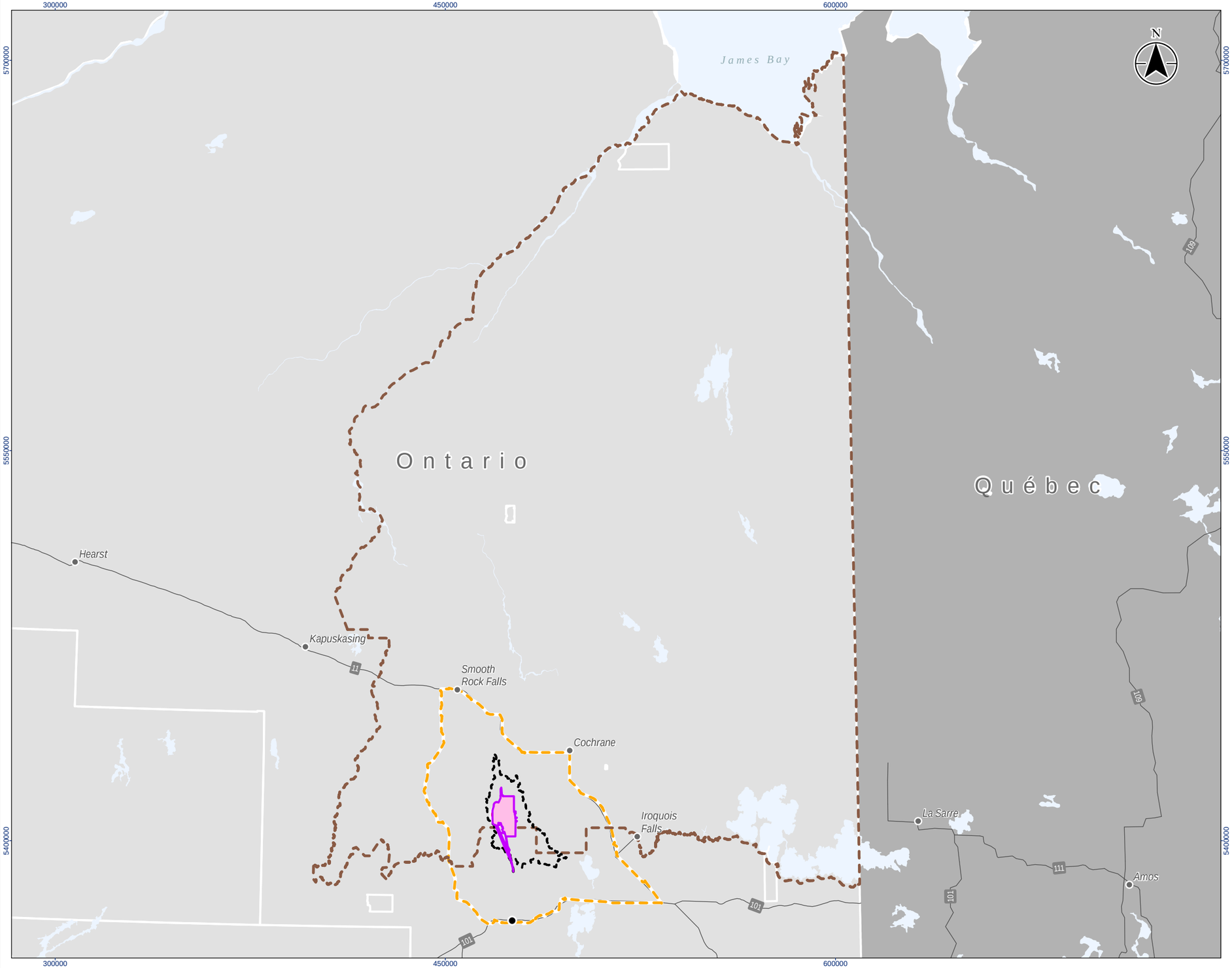
Project Location
Timmins, Ontario

160930456 REVA
Prepared by malcazaren on 2024-09-26

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
19.3

Title
Regional Study Area for Wildlife and Wildlife Habitat



Legend

- Project Area
- Local Study Area
- Regional Study Area
- Regional Study Area - Caribou

Base Features

- Major Roads
- Waterbody
- ON
- Quebec

0 50 100 km

1:1,500,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.

Project Location
Timmins, Ontario

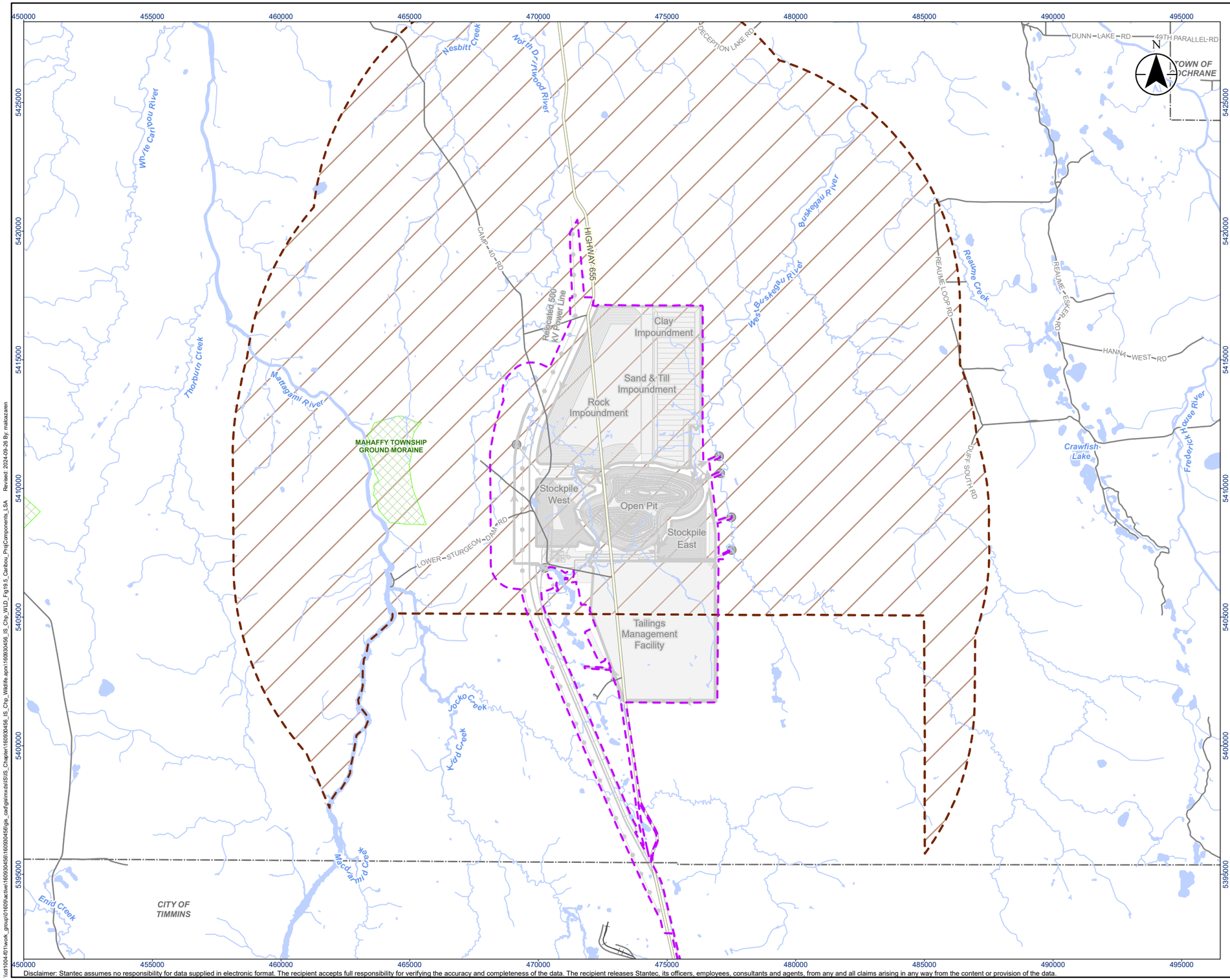
REVA
Prepared by malcazaren on 2024-09-26

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
19.4

Title
Regional Study Area for Boreal Caribou

\\cd1004-01\work_group\01609\active\160930456\160930456\gis_cad\gis\mxd\sIS\IS_Chapter\160930456_IS_Chp_Wildlife.aprx\160930456_IS_Chp_WLD_Fig19.4_CaribouRSA Revised: 2024-09-26 By: malcazaren



Stantec

CANADA NICKEL COMPANY

Legend

- Project Area
- Local Study Area,Wildlife - Caribou

Base Features

- Major Road
- Minor Road
- Railway
- Watercourse
- Conservation Reserve (Regulated)
- Municipal Boundary - Lower Tier
- Waterbody
- Proposed Project Components

0 5 10 km

1:150,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.

Project Location
Timmins, Ontario

160930456 REVA
Prepared by malcazaren on 2024-09-26

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
19.5

Title
Boreal Caribou Habitat and Project Components (LSA Extent)

Stantec

CANADA NICKEL COMPANY

Legend

- Project Area
- Regional Study Area - Caribou
- Project Components that Overprint the Kesagami Caribou Range

Base Features

- Expressway / Highway
- Major Road
- Minor Road
- Watercourse
- First Nation Reserve
- Municipal Boundary - Lower Tier
- Municipal Boundary - Upper Tier
- Waterbody
- Wetland, Provincially Significant
- Wetland, Other Evaluated

0 15 30 km

1:700,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.

Project Location
Timmins, Ontario

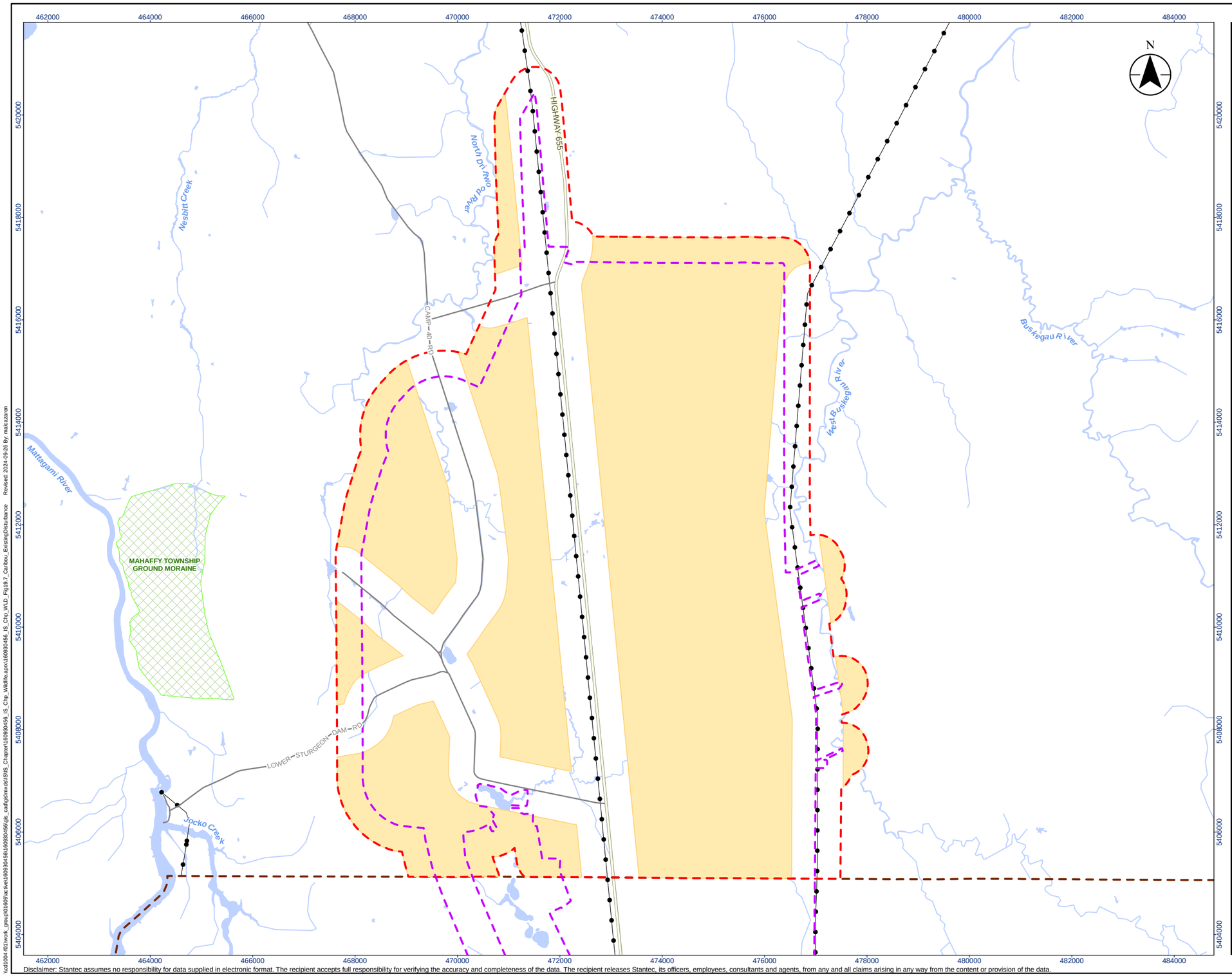
160930456 REVA
Prepared by malcazaren on 2024-09-26

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
19.6

Title
Boreal Caribou Habitat and Project Components (RSA Extent)

\\cd1004-f01\work_group\01609\active\160930456\160930456_IS_Chp_Wildlife.aprx\IS_Chapter\160930456_IS_Chp_Wildlife.aprx\IS\IS_Chapter\160930456_IS_Chp_WLD_Fig19.6_Caribou_ProjComponents_RSA Revised: 2024-09-26 By: malcazaren



Stantec

CANADA NICKEL COMPANY

Legend

- Project Area
- Project Footprint (500 m buffer)
- Local Study Area,Wildlife - Caribou
- Existing Caribou Habitat Affected

Base Features

- Major Road
- Minor Road
- Transmission Line
- Watercourse
- Conservation Reserve (Regulated)
- Waterbody

0 2 4 km

1:75,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.

Project Location
Timmins, Ontario

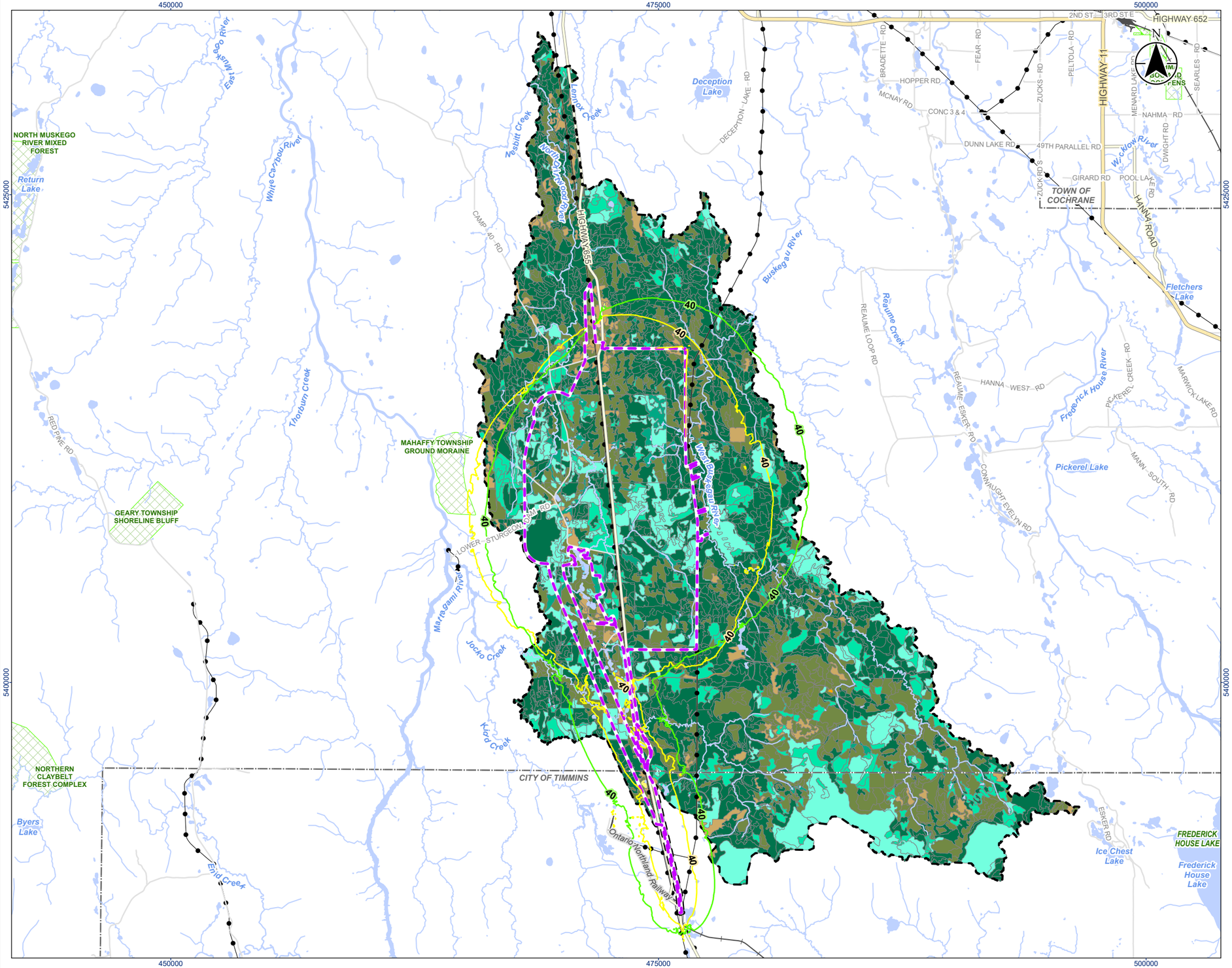
REVA
Prepared by malcazaren on 2024-09-26

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
19.7

Title
Boreal Caribou Habitat and Existing Disturbance

\\cd1004-f01\work_group\01609\active\160930456\160930456gis_cad\gis\mxd\sIS\IS_Chapter\160930456_IS_Chp_Wildlife.aprx\160930456_IS_Chp_WLD_Fig19.7_Caribou_ExistingDisturbance Revised: 2024-09-26 By: malcazaren



Stantec

CANADA NICKEL COMPANY

Legend

- Project Area
- Local Study Area
- $L_{eq(1\text{-}hour)}$ Noise Contour - 40 dBA
- L_{dn} Noise Contour - 40 dBA

Base Features

- Expressway / Highway
- Major Road
- Minor Road
- Railway
- Transmission Line
- Watercourse
- Conservation Reserve (Regulated)
- Municipal Boundary - Lower Tier
- Provincial Park
- Waterbody

Forested Area

- Coniferous Forest/Stand
- Deciduous Forest/Stand

Wetland

- Bog
- Fen
- Meadow Marsh
- Swamp

Water

- Water

Anthropogenic

- Anthropogenic
- Constructed

Rock

- Barren

0 5 10 km

1:200,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.
3. Orthoimagery:

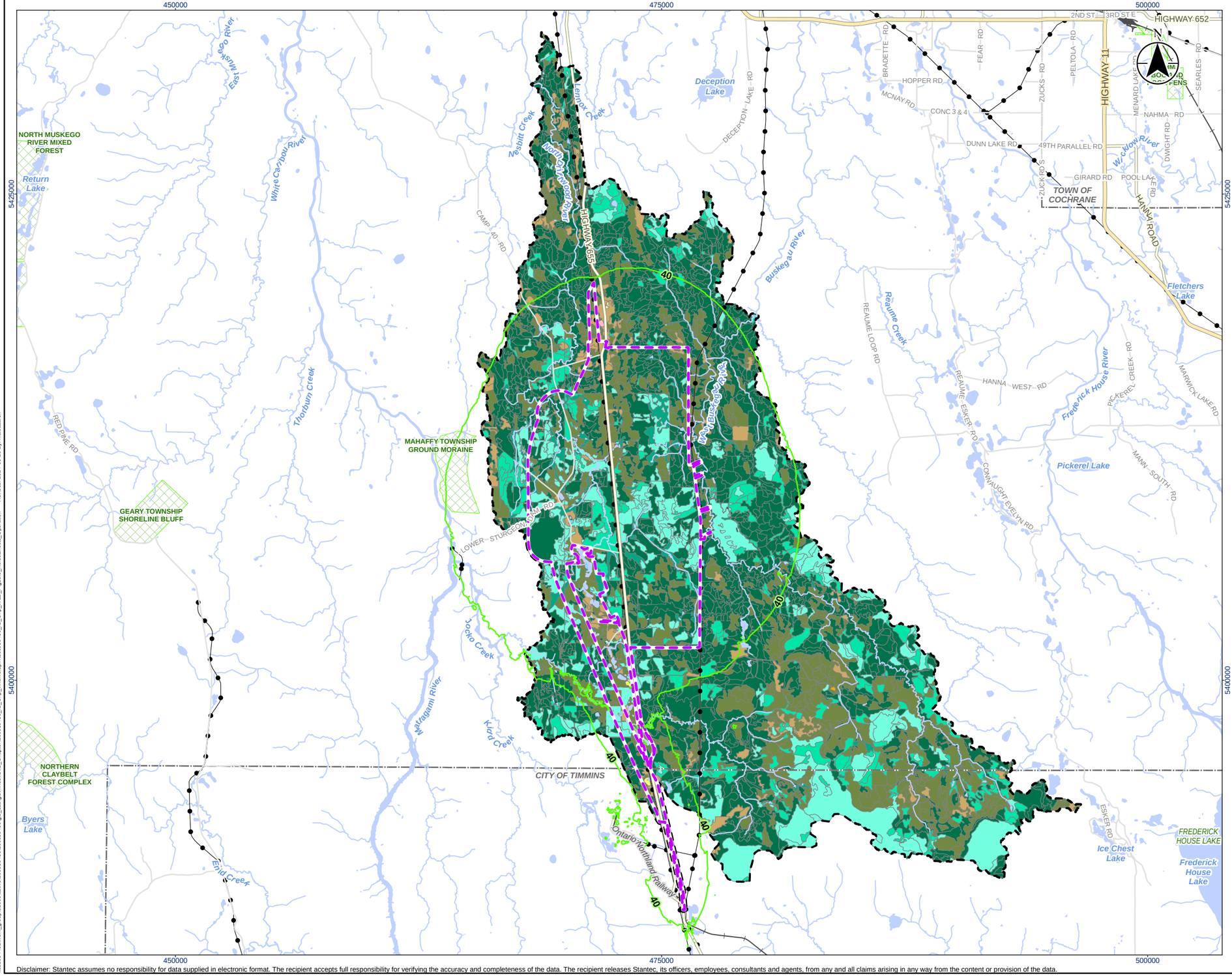
Project Location
Timmins, Ontario

160930456 REVA
Prepared by malcazaren on 2024-09-26

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
19.8

Title
Noise Effects (>40 dBA) on Wildlife Habitat During Construction



Legend

- Project Area
- Local Study Area
- L_{dn} Noise Contour - 40 dBA

Base Features

- Expressway / Highway
- Major Road
- Minor Road
- Railway
- Transmission Line
- Waterbody
- Watercourse
- Conservation Reserve (Regulated)
- Municipal Boundary - Lower Tier
- Provincial Park

Forested Area

- Coniferous Forest/Stand
- Deciduous Forest/Stand

Wetland

- Bog
- Fen
- Meadow Marsh
- Swamp

Water

- Water

Anthropogenic

- Anthropogenic
- Constructed

Rock

- Barren

0 5 10 km

1:200,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.
3. Orthoimagery:

Project Location
Timmins, Ontario

160930456 REVA
Prepared by malcazaren on 2024-09-26

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
19.9

Title
Noise Effects (>40 dBA) on Wildlife Habitat During Operations