Marathon Palladium Project Environmental Impact Statement Addendum

VOLUME 2 OF 2

6.2.7 Wildlife

Prepared for:

GENERATIONPGM

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Date: April 2021
Environmental Assessment by Review Panel under CEAA 2012
Reference Number 54755

Table of Contents

LIST OF TABLES

LIST OF FIGURES

Abbreviations

AIR	Additional Information Request
BCR	Bird Conservation Region
BMAs	Bear Management Areas
CEZ	Cervid Ecological Zone
CIAR	Canadian Impact Assessment Registry
dB	decibel
dBa	A-weighted decibel(s): the sound pressure level modified by application of A-weighting
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
FMP	Forest Management Plan
FMU	Forest Management Unit
FWCA	*Fish and Wildlife Conservation Act*
FRI	Forest Resource Inventory
GIS	Geographic information system
GLSL	Great Lakes – St. Lawrence
IR	Information Request
LIO	Land Information Ontario
LSA	Local Study Area
m	metres
M2W	Terrace Bay-Manitouwadge transmission line

MAFA	Moose Aquatic Feeding Area
MBCA	Migratory Birds Convention Act
MNR	Ministry of Natural Resources (now MNRF)
MNRF	Ministry of Natural Resources and Forestry (formerly MNR)
MRSA	Mine Rock Storage Area
OLT	Ontario’s Landscape Tool
PSMF	Process Solids Management Facility
ROW	right-of-way
RSA	Regional Study Area
SAR	Species at Risk
SID	Supporting Information Documents
SIR	Supplemental Information Request
SOCC	Species of Conservation Concern
SRNV	Simulated Range of Natural Variation
SSA	Site Study Area
TLRU	Traditional Land and Resource Use
WMU	Wildlife Management Unit
VEC	Valued Ecosystem Component

6.2.7 Wildlife

Wildlife was selected as a Valued Ecosystem Component (VEC) in the original EIS (2012). Wildlife that are Species at Risk (SAR) are assessed separately in Section 6.2.8 of this EIS Addendum (Vol 2). Of particular interest for assessment were migratory birds, mammals including furbearers (e.g., beaver, American marten, and gray wolf), as well as black bear and moose due to their intrinsic ecological importance, traditional use by Indigenous and other communities, and potential sensitivity to development. Gray wolf, black bear, and moose also have potential impacts on Threatened woodland caribou, a SAR, through predator-prey dynamics (see Section 6.2.8 of this EIS Addendum [Vol 2]).

Wildlife is linked to other VECs, including:

- Atmospheric Environment (Section 6.2.1 of this EIS Addendum [Vol 2]) due to potential effects of air quality (including olfactory environment), fugitive dustfall, and increased ambient light levels
- Acoustic Environment (Section 6.2.2 of this EIS Addendum [Vol 2]) due to potential effects from noise and vibration
- Water Quality and Quantity (Section 6.2.3 of this EIS Addendum [Vol 2]) due to potential impacts on vegetation (particularly wetlands) due to increased or lowered groundwater or surface water levels
- Vegetation (Section 6.2.5 of this EIS Addendum [Vol 2]) upon which most of the wildlife habitat models are based
- Species at Risk (Section 6.2.8 of this EIS Addendum [Vol 2]) which includes wildlife species at risk
- Indigenous Considerations (Section 6.2.12 of this EIS Addendum [Vol 2]) since changes in wildlife have the potential to affect traditional land and resource use by Indigenous communities for food, medicine, or other cultural significance
- Human health (Section 6.2.10 of this EIS Addendum [Vol 2]) since vegetation affected by dust deposition could potentially affect organisms or humans that ingest this vegetation

6.2.7.1 Summary of Original Wildlife Assessment

6.2.7.1.1 Assessment of Residual Effects in Original EIS

Section 6.2.7 of the original EIS (2012), the original assessment of impacts on birds (Northern Bioscience, 2012b) (SID #25) (CIAR #234), and subsequent responses to information requests from the Panel provided an assessment of the following effects to wildlife as a result of the Project:

- changes to furbearers and their habitat
- changes to moose and their habitat
- changes to grey wolf and their habitat
- changes to black bear and their habitat
- changes to migratory birds and their habitat

Additional information on the assessment of effects on wildlife was provided in responses to the following IRs:

- Responses to IRs 23.2, 23.4, and 23.5 (CIAR #410 and 428)
- Responses to SIR #11 (CIAR #586)

Main predicted effects to wildlife included the following:

- removal of forest, wetlands, and other non-forested habitats will alter/remove some wildlife habitat for furbearers, wolf, black bear, and moose during construction and lead to their displacement during operations due to loss of habitat and/or prey
- sensory disturbance (noise, dust) of wildlife from Project activities during construction and operation
- potential for collisions of birds and other wildlife with Project infrastructure and vehicles during construction and operation
- potential for habituation of black bears, wolves, and other furbearers to human presence and supplemental food sources during construction and operation
- removal of forest, wetlands, and other non-forested habitats will alter/remove some habitat for birds, with potential negative impacts on forest and wetland birds during construction, with positive impacts on edge-adapted or open habitat birds at closure
- removal of forest cover during construction will contribute to forest fragmentation and may have negative effects on forest interior bird species
- clearing of vegetation for mine infrastructure, transmission line, and roads could disturb or destroy bird nests and their young during the breeding season

Key mitigation measures originally proposed to avoid, reduce and/or offset potential effects of the Project on vegetation include:

- optimizing the Project footprint to reduce forest clearing and loss of non-forested habitats
- clearing vegetation outside the bird breeding season, where feasible
- employing noise mitigation and dust suppression measures
- enforcing speed limits on mine roads
- establishing wildlife policy to reduce human interaction with wildlife and decrease potential for habituation
- designing the transmission line to reduce collisions, limiting the use of guy wires, and marking the line to increase visibility where practical
- selective re-vegetation at closure to restore wildlife habitat, to the extent feasible

6.2.7.1.2 Determination of Significance in Original EIS

For wildlife, the original EIS (2012) concluded that there would be no significant adverse effect. Loss of habitat and wildlife population will be limited to the SSA; furbearers, moose, wolves, bears, and birds are mobile and will return once the Project ceases, and the effects are at least partly reversible through reclamation and habitat restoration. For many species, habitat is not thought to be limiting; rather, populations are regulated by other factors such as predation, hunting, trapping, disease, or loss of overwintering habitat elsewhere.

6.2.7.2 Approach to Update the Assessment

The following subsections provide an update to the assessment of residual environmental effects of the Project, including a determination of their significance based on the following:

- Updated environmental conditions within the SSA, LSA and RSA, as appropriate
- Recognition of updated standards, criteria, guidelines, or other thresholds that inform the determination of significance
- Consideration and recognition of project refinements, including changes to the project components and project activities, that may affect potential project interactions, mitigation measures and residual effects

Changes to the results of the previous assessment have been highlighted and discussed below, as appropriate. Supplementary rationale and explanation for the conclusions of the assessment have been provided based on the previous responses to the information requests (IRs, SIRs, AIRs) and additional input from the various technical discipline leads based on the current assessment.

6.2.7.3 Scope of the Assessment

6.2.7.3.1 Regulatory and Policy Setting

There have been no changes to the regulatory and policy setting since the preparation of the original EIS (2012). As described in Section 5.2 of the Terrestrial Baseline Update report (Northern Bioscience, 2020) (CIAR #722) there have been some changes to the ranking of some provincially or federally listed species at risk (SAR). SAR are addressed in Section 6.2.8 of this EIS Addendum (Vol 2).

The environmental effects assessment for wildlife has been prepared in accordance with the approved EIS Guidelines (Appendix B of this EIS Addendum [Vol 2]). Concordance tables, indicating how the EIS Guidelines have been addressed, are provided in (Appendix A of this EIS Addendum [Vol 2]).

6.2.7.3.2 Influence of Consultation and Engagement on the Assessment

Consultation for the Project has been ongoing since 2004 and will continue throughout the life of the Project. Chapter 4 of the original EIS (2012) and Chapter 5 of this EIS Addendum (Vol 2) covers the consultation process and activities undertaken by GenPGM and formerly by Stillwater. Comments and feedback received throughout the consultation process pertaining to wildlife are summarized below:

- Information was requested on the mitigation measures to keep wildlife out of mine areas, specifically the process solids management facility (PSMF)
- Concern relating to the potential effects to furbearers as a result of Project activities

Feedback related to wildlife has been addressed through updates to the EIS Addendum and supporting materials, responses and meetings with communities and stakeholders, as appropriate.

Traditional knowledge and traditional land and resource use (TLRU) information provided by Indigenous communities identified the importance of plants, fungi, and wildlife to these communities. Specifically, wildlife species of interest to Indigenous peoples with an interest in the Project were identified in Table 13 of the Terrestrial Environment Baseline Report Update (Northern Bioscience 2020) (CIAR #722), has been incorporated into the effects assessment, mitigation, and monitoring, where appropriate. However, given the confidentiality of this material, explicit details are not included nor are communities identified. Section 6.2.12 of this EIS Addendum (Vol 2) provides further details on how traditional knowledge and TLRU have been incorporated into the assessment.

6.2.7.3.3 Potential Effects, Pathways and Measurable Parameters

Table 6.2.7-1 summarizes the potential environmental effects of the Project on wildlife, the effect pathway, and the measurable parameters. These potential environmental effects and measurable parameters were selected based on professional judgment, recent EAs for mining projects in Ontario, and comments provided during consultation. The original EIS (2012) often had these various pathways assessed collectively; they are separated in this update to facilitate a more explicit examination of effects, pathways, and measurable parameters.

Table 6.2.7-1: Potential Effects, Effects Pathways and Measurable Parameters for Wildlife

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in Wildlife Habitat Quantity	• Direct loss of habitat through the removal of forest, wetland, and aquatic habitat to facilitate the development of the project site, including access roads and utility corridors	• Area (ha) of lost furbearer habitat in SSA (e.g., beaver, American marten) • Area (ha) of lost moose habitat in SSA • Area (ha) of lost black bear habitat in SSA • Area (ha) of lost bird habitat in SSA
Change in Wildlife Habitat Quality	• Impairment of wildlife habitat due to dust • Impairment of wildlife habitat due to edge effects e.g., wind, light, evapotranspiration • Impairment of wildlife habitat due to invasive species • Impairment of wildlife habitat due to groundwater and surface hydrology effects • Impairment of use of wildlife habitat due to sensory disturbance e.g., noise, light, olfactory	• Area (ha) of wildlife habitat in LSA impaired due to dust • Area (ha) of wildlife habitat in LSA impaired due to edge effects • Area (ha) of wildlife habitat in LSA impaired due to invasive species • Area (ha) of wildlife habitat in LSA impaired due to groundwater and surface hydrology effects • Area (ha) in LSA impaired due to sensory effects
Change in Wildlife Survival	• Interaction or collision with mine equipment and infrastructure including transmission lines • Collision with vehicles • Indirect impacts from potential change in predator/prey abundance or behaviour	• Number of potentially affected wildlife
Change in Wildlife Habitat Fragmentation and Movement Patterns	• Physical barrier to movement through SSA • Avoidance of SSA	• Patch size metrics
Change to Wildlife of Interest to Indigenous Peoples	• Any of the above pathways that could impact wildlife of interest	• Number of potentially affected wildlife of interest

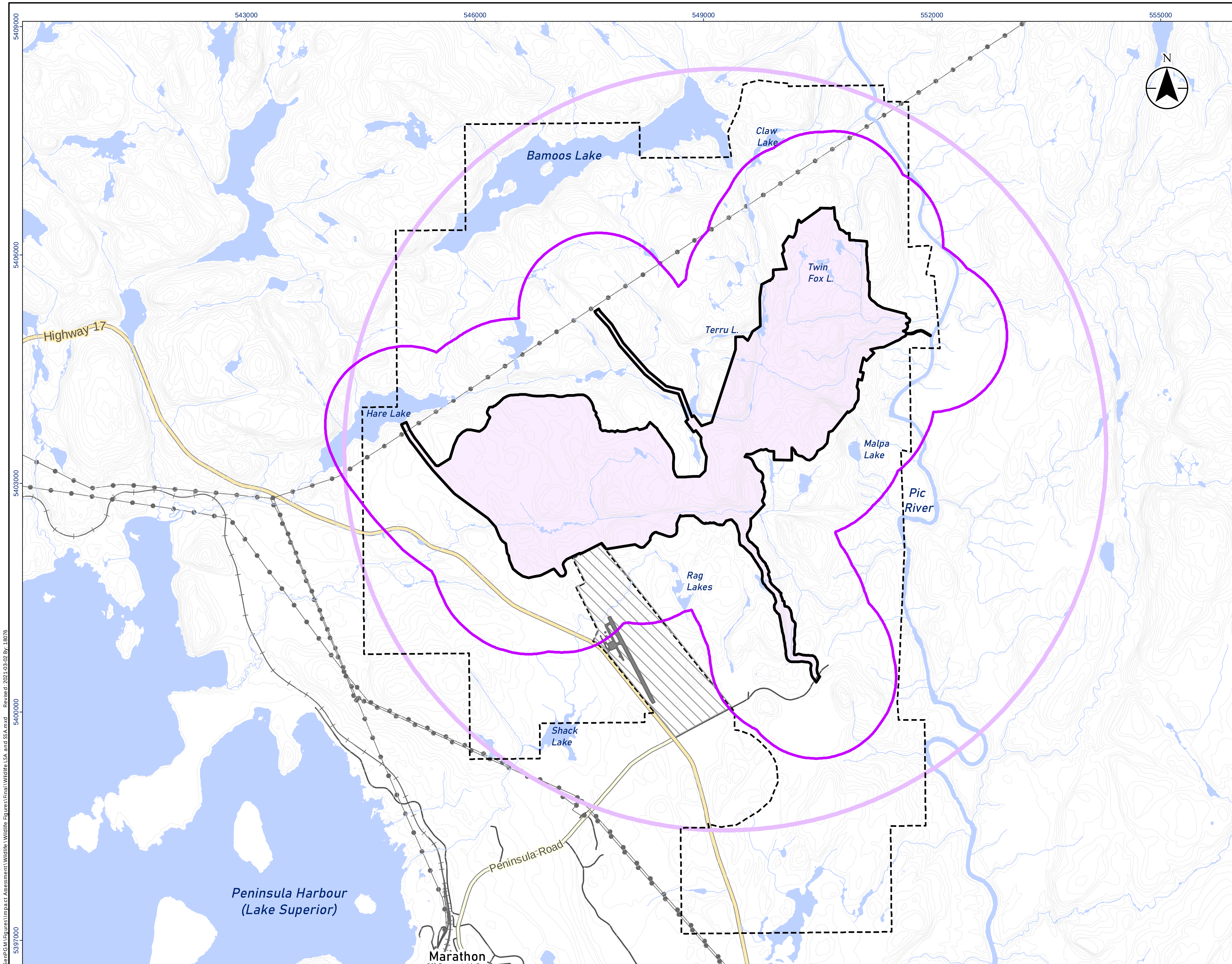
6.2.7.3.4 Assessment Boundaries

In general, the spatial boundaries for the assessment of environmental effects are presented in Section 2.4 of the EIS Addendum (Vol 1) (CIAR #727), while the LSA and RSA are defined based on the extent of potential effects specific to each VEC.

- **Site Study Area**: The SSA is the direct footprint of the Project and is consistent across all VECs. The SSA has been revised from the original EIS to reflect changes and refinements to the Project design. The SSA encompasses 1,116 ha.
- **Local Study Area**: The Wildlife LSA represent the area within which changes to wildlife from Project activities and components can be predicted or measured with a reasonable degree of accuracy and confidence. In the original EIS, the Wildlife LSA consisted of a 5 km buffer from the approximate centroid of the Project footprint or SSA. This LSA was overly conservative for assessing impacts on wildlife VECs however, and the LSA has been refined to better reflect potential direct and indirect effects on wildlife (SAR excluded). The revised LSA encompasses a 1 km buffer from the updated Project footprint or SSA. This is anticipated to reflect the potential spatial extent of sensory disturbance of wildlife more accurately (i.e., auditory, visual, and olfactory) and indirect effects on habitat (e.g., edge effects, groundwater). The revised wildlife LSA is consistent with the revised LSA used for vegetation.
- **Regional Study Area**: The wildlife RSA is the area within which residual environmental effects from Project activities and components may interact cumulatively with the residual environmental effects of other past, present, and future (i.e., certain, or reasonably foreseeable) physical activities. The RSA is based on the potential for interactions between the Project and other existing or future potential projects with regard to wildlife effects. The original EIS did not explicitly define the spatial extent of the RSA for most wildlife. To facilitate a more quantitative assessment of effects on wildlife habitat, the wildlife RSA has been defined as the Pic Forest Management Unit (FMU). Forests are the primary vegetation community and wildlife habitat type in the LSA and surrounding landscape. Commercial forestry has by far the largest footprint of any reasonably foreseeable project in the landscape surrounding the Project, and forests are managed for sustainability at the FMU scale. This makes the Pic FMU an appropriate scale of analysis. This RSA encompasses 1,153,240 ha and includes both the SSA and LSA.

The modified and original Wildlife LSA boundaries are depicted on Figure 6.2.7-1 and the RSA boundaries are depicted on Figure 6.2.7-2.

The temporal boundaries for the Project that have been considered in the determination of environmental effects are described in Section 1.5 of EIS Addendum (Vol 1) (CIAR #727). The temporal boundaries used to assess potential effects on the wildlife VEC span all phases of Project life.



Legend
- Site Study Area
- Local Study Area
- Original Terrestrial Local Study
- Project Boundary (MLAS, MENDM Changed 2017)
- Airport Property
- Airport Infrastructure
- Waterbody (LIO)
- Watercourse (LIO)
- Contour
- Hydro Line
- Highway
- Major Road
- Minor Road
- Railway

0 1 2 3 km

1:51,254 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.

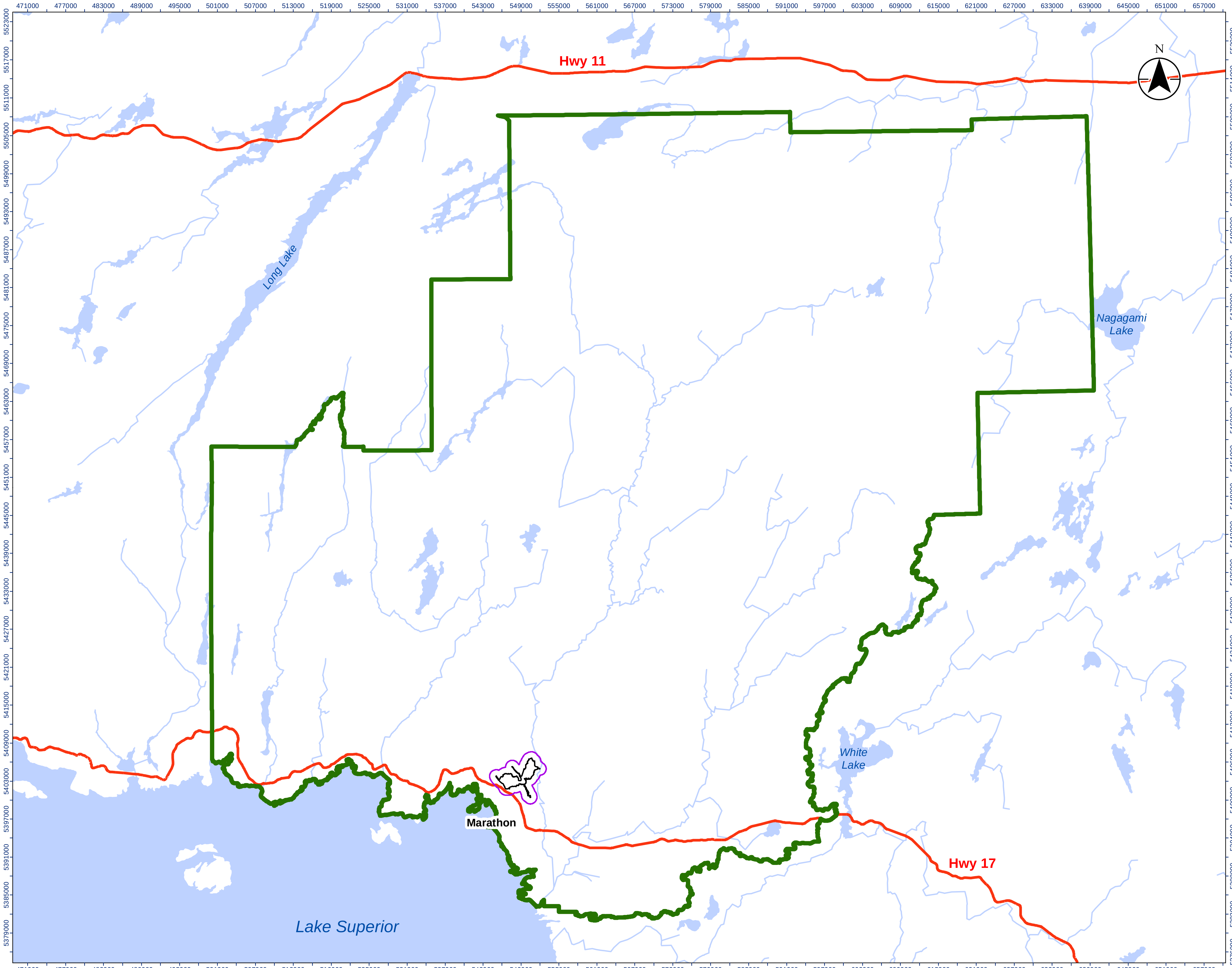
Project Location
Marathon

Prepared by D Harvey & R. Foster on 2021-03-02

Client/Project
GENERATION MINING LTD.
MARATHON PALLADIUM PROJECT

Figure No.
6.2.7-1

Title
Wildlife Spatial Boundaries of the **LSA and SSA**



Legend

- Site Study Area
- Local Study Area
- Regional Study Area
- Expressway / Highway
- Waterbody (LIO 1:2M)
- Watercourse (LIO 1:5M)

0 6 12 18 24 30 36 km

1:618,592 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.

Project Location
Marathon

Prepared by R. Foster on 2021-03-02

Client/Project
GENERATION MINING LTD.
MARATHON PALLADIUM PROJECT

Figure No.
6.2.7-2

Title
Wildlife **Spatial Boundaries of the RSA and LSA**

C:\GIS\GenPGM\Figures\Impact Assessment\Wildlife\Wildlife Figures\Final\Wildlife RSA2.mxd Revised: 2021-03-02 By: 18076

6.2.7.3.5 Residual Effects Characterization

Table 6.2.7-2 summarizes how residual environmental effects are characterized in terms of direction, magnitude, geographic extent, timing, frequency, duration, reversibility, and ecological and socio-economic context. Quantitative measures or definitions for qualitative categories are provided.

Table 6.2.7-2: Characterization of Residual Effects on Wildlife

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual effect	**Positive** – Effect moves measurable parameters in a direction beneficial to wildlife relative to baseline conditions. **Adverse** – Effect moves measurable parameters in a direction detrimental to wildlife relative to baseline conditions.
Magnitude	The amount of change in measurable parameters of the VEC relative to existing conditions	**Change to Wildlife Habitat Quantity and Quality** **Negligible –** no measurable change in habitat for wildlife Species of Conservation Concern (SOCC) **Low –** Project changes less than 10% of general wildlife habitat in the RSA, or less than 5% of habitat for wildlife SOCC in the RSA **Medium –** Project changes 10-20% of general wildlife habitat in the RSA, or 5-10% of habitat for wildlife SOCC in the RSA **High –** Project changes more than 20% of general wildlife habitat in the RSA, or more than 10% of habitat for wildlife SOCC in the RSA **Change to Wildlife Survival** **Negligible –** no measurable change in wildlife populations **Low –** Project changes less than 10% of population in the RSA **Medium –** Project changes 10-20% of wildlife population in the RSA **High –** Project changes more than 20% of wildlife encounters in the RSA **Wildlife Habitat Fragmentation and Change to Movement Patters** **Negligible –**no habitat fragmentation or impairment of movement **Low** – fragmentation at local level is within range of natural variation **Medium –** fragmentation at local level is changed beyond range of natural variation **High –** fragmentation at landscape level is changed beyond range of natural variation **Change to Wildlife of Interest to Indigenous Communities**

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Table 6.2.7-2: Characterization of Residual Effects on Wildlife

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
		Negligible – no measurable change to species of interest to Indigenous peoples **Low** – Project changes less than 10% of the population in the RSA of species of interest to Indigenous peoples **Medium –** Project changes 10-20% of the population in the RSA of species of interest to Indigenous peoples **High –** Project changes more than 20% of the population in the RSA to species of interest to Indigenous peoples
Geographic Extent	The geographic area in which a residual effect occurs	**Negligible (SSA) –** residual effects are limited to SSA **Low –** residual effects are restricted to the SSA or immediate surroundings **Medium (LSA) –** residual effects extend into the LSA **High (RSA) –** residual effects extend into the RSA
Timing	Considers when the residual effect is expected to occur, where relevant to the VEC.	**No sensitivity** - Effect does not occur during critical life stage (e.g., moose calving periods or cultural activity times) or timing does not affect the VEC. **Medium 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 nesting for birds) or end (e.g., periods when birds have fledged but remain in proximity to their nest) of the critical period. **High sensitivity** - Effect occurs during a critical life stage (e.g., bird nesting periods) or culturally important activities (e.g., wildlife harvesting)
Duration	The time required until the measurable parameter or the VEC returns to its existing condition, or the residual effect can no longer be measured or otherwise perceived	**Negligible –** residual effect is limited to a single event **Low (short-term) –** the residual effect is limited to short term events (a few years or less) **Medium –** the residual effect is limited to the operational/decommissioning phases (years to decades) **High (Long-term) –** the residual effect extends beyond the life of the project (centuries)
Frequency	Considers whether the residual effect is expected to occur once, at regular or irregular intervals or continuously	**Negligible –** the condition or phenomena causing the effect rarely occurs **Low (Multiple irregular event) –** occurs at no set schedule and are unlikely to occur **Medium (Multiple regular event) –** occurs at regular intervals (i.e., >1% of the time) **High (Continuous) –** occurs continuously

Table 6.2.7-2: Characterization of Residual Effects on Wildlife

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Reversibility	Considers whether the residual effect is reversible or irreversible.	**Negligible –** effect ceases immediately once source or stressor is removed **Low –** effect ceases once source or stressor is removed **Medium –** effect persists for some time after source or stressor is removed **High (Irreversible) –** the residual effect is unlikely to be reversed
Ecological/Societal Value	Considers the magnitude that the residual effect is expected to have on the ecological or societal community, as determined through consultation and engagement.	**Negligible –** the VEC has no value from a cultural or societal context **Low –** the VEC is common in the LSA and/or has little to no value from a cultural or societal context **Medium –** the VEC is abundant in the RSA, though may be less so in the LSA, and/or has moderate cultural or societal value **High –** the VEC is rare and/or of high cultural or societal value

Note: Timing was not included in the original EIS.

6.2.7.3.6 Significance Definition

A significant residual environmental effect on wildlife or their habitat is defined as one that:

- results in long-term, irreversible loss of a species of interest to Indigenous communities
- results in a decrease in habitat that threatens the long-term viability of wildlife in the RSA
- results in a change in health of one or more wildlife species compared to baseline conditions, where the change is likely to threaten the long-term sustainability in the RSA or impairment of use

6.2.7.4 Existing Conditions for Wildlife

Existing conditions are described in Chapter 4 of the EIS Addendum (Vol 1) (CIAR #727). The updated baseline report (Northern Bioscience, 2020) (CIAR #722) provides an overview of how baseline conditions have changed since the original EIS (2012) and/or how the understanding of the baseline conditions has evolved.

6.2.7.5 Determining Project Interactions with Wildlife

Table 6.2.7-3 identifies, for each potential effect, the project's physical activities that might interact with the wildlife and result in the identified effect. This table is based on a similar table from the original EIS (2012) and has been updated to reflect changes to the Project. The original EIS (2012) often had these various pathways assessed collectively; they are separated in this update to facilitate a more explicit examination of effects, pathways, and measurable parameters.

Table 6.2.7-3: Project Interactions with Wildlife

Physical Activities	Potential Effects Prior to Mitigation				
	Change in Habitat Quantity	Change in Habitat Quality	Change in Wildlife Survival	Change in Habitat Fragmentation & Movement	Change to Wildlife of Interest to Indigenous Communities
Site Preparation/ Construction					
Clearing, grubbing and stripping of vegetation, topsoil and other organic material	✓	✓	✓	✓	✓
Grading with topsoil	–	✓	✓	✓	✓
Drilling and blasting to develop the open pits and plant site area	–	✓	✓	✓	✓
Excavation and pre-stripping to remove mine rock and overburden	–	✓	✓	✓	✓
Preparation of construction surfaces and installation of temporary construction facilities	–	✓		✓	✓
Site preparation for waste management	–	✓		✓	✓
Construction of administration buildings, storage buildings, other ancillary structures and site services such as parking lots, area fencing, and security systems	✓	✓		✓	✓
Construction of explosives facilities	✓	✓		✓	✓
Construction of PSMF containment dams and MRSA	–	✓	✓	✓	✓
Management of surface water and groundwater on the site, including seepage and run-off	–	✓		✓	✓
Maintenance and management of mine rock stockpiles, overburden, and PSMF	–	✓	✓	✓	✓
Construction of water management facilities and drainage works (including but not limited to pipelines, dewatering facilities, stormwater management, control ponds, sediment control ponds and water management ponds)	–	✓	✓	✓	✓
Dewatering of natural water bodies in the project area	–	✓	✓	✓	✓

Table 6.2.7-3: Project Interactions with Wildlife

Physical Activities	Potential Effects Prior to Mitigation				
	Change in Habitat Quantity	Change in Habitat Quality	Change in Wildlife Survival	Change in Habitat Fragmentation & Movement	Change to Wildlife of Interest to Indigenous Communities
Construction of new mine site access and haul roads, including any water crossings and water body shoreline works or undertaking	✓	✓	✓	✓	✓
Upgrading of the existing mine access road(s) and entrance(s) to the project area including any water crossings and water body shoreline works or undertakings	✓	✓	✓	✓	✓
Construction of a 115kV electrical transmission line within a new right-of-way from the M2W Transmission corridor	✓	✓	✓	✓	✓
Aggregate sources and amounts	–	✓	✓	✓	✓
Management of waste	–	–	✓	–	✓
Any works or undertakings associated with upgrading a rail load-out facility for mine concentrate and off-site accommodations complex	✓	✓	✓	✓	✓
Operating vehicles	–	✓	✓	✓	✓
Hiring and management of workforce	–	–	–	–	–
Taxes, contracts and purchases	–	–	–	–	–
Operation					
Drilling, blasting, loading, and hauling of mine rock from the pits to ROM stockpile pad, crushed, or the MRSA	✓	✓	✓	✓	✓
Operation of explosives facilities	–	✓	–	✓	✓
Handling, transportation, use and disposal of explosives	–	✓	–	✓	✓
Transportation of crushed material to coarse ore stockpile	–	✓	–	✓	✓
Transportation of mill feed (ore) to the Process Plant	–	✓	–	✓	✓
Process Plant operation	✓	✓	✓	✓	✓
Transportation of filtered concentrate	–	✓	✓	✓	✓

Table 6.2.7-3: Project Interactions with Wildlife

Physical Activities	Potential Effects Prior to Mitigation				
	Change in Habitat Quantity	Change in Habitat Quality	Change in Wildlife Survival	Change in Habitat Fragmentation & Movement	Change to Wildlife of Interest to Indigenous Communities
Management and maintenance of the entire mine waste stream, including but not limited to process solids and mine rock	✓	✓	✓	✓	✓
Decommissioning of the temporary process water pond (proposed during mine operations), including removal or breaching of dams	–	✓	✓	✓	✓
Dewatering activities (e.g., open pit)	–	✓	✓	✓	✓
Management of surface water and groundwater on the site; including seepage, run-off, contact eater, process water, and storm water	–	✓	✓	✓	✓
Management of surface water on site during dam removal or breaching	–	✓	✓	✓	✓
Management of domestic waste from the mine site	–	–	✓	–	–
Management of hazardous waste	–	–	✓	–	–
Environmental safety procedures	–	–	✓	–	–
Operating vehicles	–	✓	✓	✓	✓
Hiring and management of workforce	–	–	–	–	–
Taxes, contracts and purchases	–	–	–	–	–
Decommissioning and Closure/Post-Closure					
Installation of barriers around the pit perimeters	✓	✓	✓	✓	✓
Management of inputs from groundwater and surface water run-off into pits	✓	✓	✓	✓	✓
Decommissioning, dismantling and/or disposal of equipment	✓	✓	✓	✓	✓
Demolition/removal of surface buildings and associated infrastructure and disposal of resulting rubble	✓	✓	✓	✓	✓
Decommissioning/removal of explosives facilities	✓	✓	✓	✓	✓
Removal of power lines and electrical equipment	✓	✓	✓	✓	✓
Decommissioning of the potable water and sewage treatment systems (e.g., water treatment and membrane bioreactor)	✓	✓	✓	✓	✓

Table 6.2.7-3: Project Interactions with Wildlife

Physical Activities	Potential Effects Prior to Mitigation				
	Change in Habitat Quantity	Change in Habitat Quality	Change in Wildlife Survival	Change in Habitat Fragmentation & Movement	Change to Wildlife of Interest to Indigenous Communities
Maintenance and management of mine rock stockpiles and PSMF	✓	✓	✓	✓	✓
Following removal of infrastructure, soil, groundwater, and surface water testing for residual contamination, and disposal of contaminated soils and treatment of groundwater and surface water, as required	✓	✓	✓	✓	✓
Reclamation and restoration of landscape (including water bodies) to productive capacity including management and monitoring	✓	✓	✓	✓	✓
Management of flooded pits to protect groundwater and surface water quality during flooding and pit overflow	✓	✓	✓	✓	✓
Operating vehicles	–	✓	✓	✓	✓
Hiring and management of workforce	–	–	–	–	–
Taxes, contracts and purchases	–	–	–	–	–

Notes:
✓ = Potential interaction
– = No interaction
* Minor wording changes to the physical activities list have been made to better align with the updated Project description covered in Chapter 1 (EIS Addendum [Vol 1])

Justifications for the non-interactions identified depend on the potential environmental effect but generally conform to one of the following categories:

- Localized or more passive activities within the SSA (e.g., water management) for which the effects on wildlife are encompassed within the range of the much greater effects associated with open pit mining and ore processing.
- Activities for which no apparent pathway exists to a potential environmental effect (e.g., employment and expenditure and potential environmental effects on wildlife; processed solids management and change in habitat).

6.2.7.6 Assessment of Residual Effects on Wildlife

A conservative approach has been taken for assessment of residual effects to reduce the likelihood that an effect will be understated.

6.2.7.6.1 Change in Wildlife Habitat Quantity

Analytical Assessment Techniques

Habitat availability for moose and woodland caribou were characterized in the original wildlife baseline report (Northern Bioscience, 2012a) (SID #24) (CIAR #227), expanded for woodland caribou in the Woodland Caribou Impact Assessment (Northern Bioscience, 2012c) (SID #26) (CIAR #234), and updated based on new Forest Resources Inventory (FRI) in Response to IR 23 (CIAR #345). Bird habitat was initially described in (Northern Bioscience, 2012a) (SID #24) (CIAR #227), further quantified in (Northern Bioscience, 2012b) (SID #25) (CIAR #234), and similarly updated in IR 23 (CIAR #345). This EIS Addendum updates the analyses for birds, moose, and woodland caribou[1] to reflect the revised SSA, LSA and RSA. This assessment also includes quantitative analyses of habitat impacts on black bear (an ecologically and socio-economically important species), beaver, and American marten, with the latter two species among the most trapped species in the LSA, as well as being representative aquatic and forest-dwelling furbearers, respectively.

The assessment of residual environmental effects on wildlife habitat used a geographic information system (GIS) (ESRI ArcMap) to overlay the Project components and physical activities. Existing disturbed areas (e.g., roads, trails, mineral exploration trenching) and anthropogenic vegetation communities (e.g., transmission right of way) were not included in the assessment of habitat loss. Loss of vegetation was considered equivalent to direct loss of wildlife habitat.

The assessment assumes that rehabilitation and revegetation activities will only commence during the closure phase, although progressive rehabilitation will occur during operation as Project components reach design capacities. Additional details are provided in the Conceptual Closure Plan (see Section 1.5.2.3 of the EIS Addendum [Vol 1]) (CIAR #727).

Ontario's Landscape Tool (OLT) (Elkie et al. 2021) was used to quantify wildlife habitat for American marten, beaver, black bear, and moose. OLT is an integrated package of spatially-explicit habitat suitability models that use FRI in a GIS environment. OLT models for beaver and black bear were developed for the Great Lakes - St. Lawrence forests and have not been validated for the boreal forest (P. Elkie pers. comm.). This limitation notwithstanding, they are nonetheless the only MNRF-supported models for these species and remain useful for better understanding potential Project effects on the habitat availability for these species. Details of OLT models are provided in Appendices D8.1 to D8.4 of this EIS Addendum (Vol 2). The following OLT habitat models were used:

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[1] presented in the Chapter 6.2.8 Species at Risk

- Beaver: general habitat. Watercourse gradient was not used as a constraining factor. Potential beaver habitat was also assessed by comparison with small waterbody availability in the LSA and RSA using the Land Information Ontario (LIO) waterbody layer.

- American Marten: preferred habitat at the stand-level and 3,000 ha block

- Black Bear: spring suitability, summer suitability. Fall suitability was not used due to the lack of hard mast tree species in the boreal forest (e.g., oak, beech); den suitability was not calculated due to the rarity of red and white pine in the RSA which are important in the Great Lakes – St. Lawrence (GLSL) model. Total suitability depends in part on fall and den suitability, so it was not calculated for the Project assessment.

- Moose: total carrying capacity, moose aquatic habitat, moose aquatic carrying capacity, growing season carrying capacity, dormant season carrying capacity, dormant season browse, growing season forage, dormant season cover, growing season cover, dormant season range, and growing season range

For birds, habitat modelling used a combination of established methods for songbirds (e.g., Blancher et al. 2007, 2017) and FRI-based models. Where appropriate, guidance from Hanson et al. (2009) was considered.

Density of forest-breeding songbirds was estimated from point count data using the following formula (Blancher et al. 2007, 2013):

$$\text{Density} = (n * P * T) / (\pi * DD^2)$$

Where n = number of birds tallied on point count

P = Pair adjustment - multiplies estimate by up to 2, depending on whether one or both members of a pair are likely to be detected (a species-specific constant provided in Blancher et al. 2017)

T = time of day adjustment - Average Time of Day Adjustment: adjusts average count across all 50 BBS stops to a smoothed peak count.

DD = approximate detection distance (m) at peak time of day during a 3-minute BBS count, accounting for movement of birds during the count (a species-specific constant provided in Blancher et al. 2017)

Average density for each forest-breeding species and all species combined in the SSA were calculated from the individual point-count densities.

In addition to forest-breeding songbirds, impacts on habitat for raptors, shorebirds, waterfowl, and wetland birds was assessed by comparing abundance or relevant FRI ecosites in the SSA relative to locals and regional studies areas.

Wildlife habitat within the LSA is conservatively considered to have no value to wildlife during construction, operation, and active closure of the Project. The sensory disturbance zones are applied around the outer extent of the LSA and, therefore, these areas are beyond the SSA where vegetation will be removed. Wildlife habitat that occurs within these zones has been quantified and conservatively assumed to have no value to wildlife during construction and operation of the Project because of the potential for avoidance or reduced use of the habitat because of sensory disturbance. However, it may retain some value for wildlife, depending on species and Project phase.

Project Pathways

Site Preparation and Construction

The activity with the greatest potential interaction with wildlife is the removal of forest cover and associated vegetation for Project development during the site preparation and construction phase. This includes the development of infrastructure (i.e., roads, Process Plant, transmission line) and major components (i.e., pits, mine rock storage area (MRSA), PSMF). It is conservatively assumed that all vegetation in the SSA will be removed or substantially altered. Most of the clearing will occur during the site preparation phase, while recognizing this may somewhat overestimate the impacts on wildlife habitat during early stages of the Project. Indirect loss of wildlife habitat is expected to occur as a result of sensory disturbance.

Operation

No additional wildlife habitat will be removed during operation. However, it is predicted that limited vegetation regrowth or regeneration in the SSA will occur, and progressive rehabilitation of select areas will commence. Progressive rehabilitation is discussed in the Conceptual Closure Plan (see Section 1.5.2.3 of the EIS Addendum [Vol 1]) (CIAR #727). Indirect loss of wildlife habitat is expected to occur as a result of sensory disturbance.

Closure

No additional vegetation removal will occur during closure. Potential impairment from fugitive dustfall, sensory disturbance, and edge effects will lessen as the site activity decreases and progressive rehabilitation activities implemented during operation will continue as outlined in the Conceptual Closure Plan (see Section 1.5.2.3 of the EIS Addendum [Vol 1]) (CIAR #727).

Mitigation and Enhancement Measures

During Project planning and optimization of the conceptual mine design, efforts have been made to optimize the location of Project components to reduce the environmental impact including area of vegetation clearing. Existing disturbed areas were incorporated into the SSA to accommodate Project components and, where possible, to reduce direct effects on forest cover and other vegetation communities.

As discussed for vegetation (Section 6.2.6. of this EIS Addendum [Vol 2]), standard construction best practices will be used during the site preparation and construction phase to reduce the potential negative interactions with vegetation.

As outlined in the Conceptual Closure Plan (see Section 1.5.2.3 of the EIS Addendum [Vol 1]) (CIAR #727), progressive rehabilitation will be used to recover some of the area lost during mine operation, including the access road and transmission line, and return it to a vegetated state. Progressive reclamation will commence as early in the process as practicable to encourage early re-establishment of vegetation. Following closure, stockpiled overburden will be spread over portions of the MRSA and seeded and/or planted with native vegetation where practicable to meet habitat reclamation objectives.

Project Residual Effect

Residual effects for change in habitat quantity are summarized in Table 6.2.7-5 and discussed below. Site development and construction will result in the loss of approximately 1,081 ha of forested habitat in the SSA, 21 ha of wetland, and less than 1 ha of rock barren/talus habitat. These habitats and ecosites are common and widespread in the RSA (see Vegetation Section 6.2.6 of this EIS Addendum [Vol 2]) and their loss in the SSA is not predicted to jeopardize their long-term habitat availability. In comparison, 17,514 ha of forest is scheduled to be harvested in the Pic Forest in 2020-2021 alone (NFMC 2019) and the area cleared for commercial forestry on the Pic Forest during the life of the mine will be at least two orders of magnitude larger than the SSA. The boreal forest is a disturbance-driven ecosystem and loss of forest due to the Project is well within natural variation, and orders of magnitude smaller than annual disturbance levels from commercial forestry in the RSA (Big Pic FMU) that are determined to be sustainable by the MNRF.

Unlike clearcut or burned landscapes, much of the SSA will not return to similar forest communities as pre-Project conditions. Rehabilitated upland communities are predicted to include early successional treed areas, open meadows, and a mosaic of mixed early successional trees and shrubs, meadow, and exposed rock. See Vegetation Section 6.2.6 of this EIS Addendum (Vol 2) for conceptual post-closure vegetation communities and habitats. Rehabilitated areas are predicted to develop into mature forest over succeeding decades; however, it is also likely that productive commercial forest will not be restored in the SSA. Open habitats are relatively limited in the RSA (see Vegetation Section 6.2.6 of this EIS Addendum [Vol 2]), and species that prefer open, early successional, or edge habitats may benefit.

Furbearers

Most furbearers will be displaced from the SSA through site development and construction. Some species that are more tolerant of human disturbance (e.g., red fox) may become accustomed to human activity and move back to the periphery of the site, particularly portions of the SSA where at least some vegetation remains (e.g., understory vegetation or uncut pockets of overstory). Furbearer species less tolerant of open habitats or anthropogenic disturbance (e.g., Canada lynx, fisher, American marten) may be completely displaced during construction and operations. At closure, furbearers such as red fox and short-tailed weasel that prey upon small mammals may become more prevalent within the partially rehabilitated open areas of the SSA. Approximately 20 years following suspension of mining operations, red fox, snowshoe hare, short-tailed weasel, least and eastern chipmunks were observed using partially rehabilitated areas of the former Inmet zinc mine at Winston Lake, 20 km northwest of Schreiber (Foster 2019). Beaver, river otter, and American mink may recolonize riparian and aquatic habitats in the SSA or LSA.

Beaver

Habitat suitability for beaver is quite variable in the SSA and broader RSA (Appendix D8.1 of this EIS Addendum [Vol 2]), reflecting varied terrain, hydrology, and forest composition. Approximately 400 ha (35% of the SSA) has at least 60% modelled occupancy for beaver based on FRI attributes. Beaver lodges (active or inactive) were found on at least 11 waterbodies of less than 10 ha size in the SSA in 2020, with beaver activity found along most large stream systems as well. Aerial surveys in 2010 indicated beaver presence on at least 7 waterbodies or watercourses in the SSA (Northern Bioscience 2012a). Potential beaver habitat is widespread within the broader RSA as well, as indicated by FRI-based models and by the number of waterbodies of similar size as utilized in the SSA. There are 23 waterbodies in the SSA, all less than 10 ha in size, which collectively encompass a total of 17.7 ha. Those represent less than 0.2% of the 11,256 remaining waterbodies of the same size class (i.e., <10 ha) in the RSA that collectively cover 11,409 ha. This comparison suggests that the loss of actual and potential beaver habitat in the SSA is minor compared to available habitat in the surrounding landscape. The 11,409 ha likely underestimates potentially available habitat in the RSA since beaver can also use larger waterbodies and create ponds on watercourses.

Although some lost habitat may be partially recovered by revegetation efforts post-closure, it may be several decades before preferred tree species are available as a major food source, even though shrub species such as speckled alder (*Alnus incana*) may provide forage sooner. Beaver abundance is regulated by factors other than habitat availability such as disease, predation (e.g., wolves), and trapping, with beaver being one of the most harvested furbearer species in the Project landscape. As a result, modelled habitat availability in the study areas may not be at carrying capacity with respect to beaver population size.

Marten

Approximately 62% of the SSA is modelled as preferred marten habitat (>75% suitability) (Appendix D8.2 of this EIS Addendum [Vol 2]), which is not surprising given that marten typically prefer mature to old growth mixedwood and conifer-dominated forests with abundant coarse woody debris (Thompson 1994; Wiebe et al. 2012). Marten do use the Project site, which was confirmed by a trail camera image of a marten in the SSA west of Malpa Lake (Northern Bioscience 2020) (CIAR #722), within what was modelled as preferred habitat. Approximately 691 ha of preferred marten habitat will be lost due to clearing of the Project footprint. In the boreal forest, marten density typically ranges from 0.6 to 1.8 individuals/km^2 depending on the time of year and presence of juveniles vs. resident adults; home range size is typically larger for males (e.g., 2-15 km^2) for males than females (e.g., 1-8 km^2) (Watt et al. 1996 and references therein). The modelled marten habitat in the SSA may therefore have the potential to support approximately 4-12 marten. However, marten abundance is regulated by factors other than habitat availability, particularly trapping, so modelled habitat in the study areas may not be at carrying capacity with respect to marten population size. Due to their mobility, any marten present in the SSA are expected to be displaced, rather than killed, by forest clearing activity given appropriate mitigation (e.g., timing). Juvenile martens routinely disperse from their natal territories, often 10s of kilometres distance (Bull and Heater 2001), and marten are generally adapted to life in the disturbance-driven boreal forest. Clearing of the SSA will displace marten to adjacent landscape, where factors other than just habitat availability will influence marten numbers, such as prey availability, trapping, and predation by fishers, lynx, wolves and other species (e.g., Suffice et al. 2017).

Although some lost habitat may be partially recovered by revegetation efforts post-closure, it will be decades before any of it becomes the late seral conifer forest that this species prefers. With mitigation, some of the SSA may earlier represent suitable foraging habitat for marten as the small mammal (e.g., voles, snowshoe hare) populations rebound in the rehabilitated area. The loss of habitat in the SSA represents only a small fraction (<0.2%) of the 392,000 ha of preferred marten habitat (>75% suitability) available in the RSA. In addition, the marten habitat in the SSA is not part of a larger (i.e., 3,000 ha) block of contiguous habitat at the landscape scale (Appendix D8.2 in this EIS Addendum [Vol 2]).

Gray Wolf

Gray wolf habitat models are not available for the Project study areas, but numerous trail camera photos indicated that a pack of wolves (2 adults, 3 pups) used at least the southwestern and central portions of the SSA in 2020 (Northern Bioscience 2020) (CIAR #722). Overall wolf numbers are reported to have increased regionally (Patterson and de Almeida 2011), with a predicted wolf density in the RSA of approximately 12-13 wolves per 1,000 km^2 (Northern Bioscience 2012c). Given that average annual home range size for wolf packs in and near Pukaskwa National Park ranged from 101 km^2 to 644 km^2 with a mean of 388 km^2 (Forshner et al 2003), this suggests that the Project SSA represents only a portion of the home range of one wolf pack. Wolf abundance and distribution within the SSA is at least partly dependent upon prey availability, which along the north shore of Lake Superior is primarily beaver, moose, and white-tailed deer (Forshner 2000; Neale 2000; Peterson 1955). The proximity of the municipal landfill immediately south of the SSA may also provide scavenging opportunities. Sources of human-caused mortality (e.g., hunting, trapping, and vehicle collisions) may also limit the abundance of wolves in the RSA. For example, 8 of 17 wolves in a 1994-1996 study in and near Pukaskwa National Park died of anthropogenic causes (Forshner 2000; Forshner et al. 2003).

Site development and construction are expected to displace wolves to other parts of their home range due to loss of habitat and potential prey and their main prey.

Gray wolf distribution and density within the SSA and LSA will be affected through Project phases by prey availability. The potential and magnitude of the effect of decommissioning and closure on grey wolf are largely indirect and tied to the effect on prey species. Grasses and forbs from early vegetation rehabilitation efforts may attract deer and ultimately wolves, with moose and beaver predicted to return as woody vegetation establishes. If potential prey attracted by the vegetation changes become habituated to human activities associated with operations in the SSA, wolves may follow.

Black Bear

Black bear are habitat generalists but depend heavily on forested areas for food resource and security requirements (e.g., escape trees for cubs). Open disturbed areas such as roadsides, cutovers, and burns are also heavily used for foraging, which in the spring can provide clover, dandelion, hawkweed, and a variety of grasses and later in the year raspberry, blueberries, and fruiting shrubs such as pin cherry, chokecherry, and service berries (Romain 1996). Black bear abundance is regulated by factors other than modelled habitat availability such as food availability (e.g., weather effects on berry crops) and hunting, so modelled habitat in the study areas may not be at carrying capacity with respect to bear population size. For example, there are 37 Bear Management Areas (BMAs) on the Pic Forest, with 10 licensed operators whose clients kill approximately 150-200 bears annually (MacDonald 2021); this does not include additional bear mortality from hunter harvest.

Clearing of the Project footprint will result in the loss of habitat for black bear, at least during the duration of operations. Habitat models (Appendix D8.3 of this EIS Addendum [Vol 2]) suggest the existing habitat in the SSA may be lower suitability for black bears relative to other areas of the RSA. However, the habitat models have not been validated for the boreal forest and the presence of the landfill immediately to the south of the SSA, which may increase suitability in the local landscape through additional food supply. Although black bears and their sign were widespread throughout the SSA (Northern Bioscience 2020) (CIAR #722), bears were most frequently observed along the access road near the landfill in 2020 and previous fieldwork.

Bears can become habituated to anthropogenic activities and it is expected that bears displaced by the Project will remain in the local landscape and may use some of the margins of the cleared SSA footprint that do not have intensive industrial activities. At closure, revegetation efforts will likely create open habitats that may be a source of forage for bears,

Moose

Clearing of the SSA will result in the loss of moose habitat. As identified in the original EIS (2012), the SSA does not appear to represent high quality moose habitat and generally provides poor winter habitat. Consistent with MNRF's models used for the 2021-2031 Pic FMU (MacDonald 2021), updated moose habitat models presented in Appendix D8.4 of this EIS Addendum (Vol 2) confirm the SSA has a lower overall carrying capacity compared to other areas in the RSA, with the SSA having a mean[2] carrying capacity of approximately 0.13 moose/km^2. In contrast, the total carrying capacity for the RSA is, on average, 0.24 moose/km^2, with some portions of the RSA having carrying capacity as high as 0.55 moose/km^2. Although the SSA has relatively good forage, particularly in dormant season browse, it has limited identified aquatic feeding areas and poor cover (particularly summer thermal cover) relative to the rest of the RSA. MNRF has identified a moose aquatic feeding area (MAFA) in the Pic FMU forest management plan (FMP) (McDonald 2021), but it is located approximately 300 m north of the LSA and will not be impacted by the Project (Appendix D 8.4 of this EIS Addendum [Vol 2]). Based on the

[2] area-weighted

modelled total carrying capacity of 0.13 moose/km², the 11.16 km² SSA is expected to be able to support less than two moose (1.4). The carrying capacity is not intended to represent the actual number of moose on the landscape, but rather the capacity of the habitat to support moose populations without consideration of additional management decisions. 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). A moose aerial survey conducted for the Project in March 2013 (Response to IR 23.3 (CIAR #410) observed one moose in the LSA (two total – the other was northeast of Bamoos Lake); one or two moose individuals were also captured on trail cameras deployed in 2020 (Northern Bioscience 2020) (CIAR #722).

In Ontario, moose habitat management is guided by moose population objectives which, in turn, are guided by the broad approach to cervid management outlined in Ontario's Cervid Ecological Framework (MNR 2009b) and Moose Management Policy (MNR 2009c). The Project is located within Cervid Ecological Zone (CEZ) B, whose management intent is to maintain a low to moderate moose density population, and to emphasize moose habitat where appropriate. The SSA straddles the boundary between Wildlife Management Unit (WMU) 21A and 21B (Appendix D8.4 of this EIS Addendum (Vol 2)), with the RSA encompassing about 30% of WMU21A and 50% of WMU 21B. Historical moose observations for both WMU 21A and 21B suggest that moose populations have been relatively stable over the last 25 years (Figure 6.2.7-3), while recent surveys indicate approximately 2,828 and 3,539 moose currently in WMU 21A and 21B respectively (Table 6.2.7-4). Given the proportion of each WMU in the Pic FMU (and assuming a roughly even distribution of moose), this suggests there are approximately 2,600 moose in the RSA. One or two moose are projected to be impacted by habitat loss in the SSA and given their mobility, it is expected they will be displaced rather than killed by the forest clearing. Therefore, potential impacts on moose populations from the Project due to habitat loss appear limited, particularly given that moose population levels currently meet (WMU 21A) or exceed (WMU 21B) target objectives at the landscape scale. Furthermore, site rehabilitation may recover somelost habitat for moose after closure, such as shrubby browse along the transmission line corridor. The MRSA and PSMF will likely be revegetated with forbs and grasses initially to stabilize the soils, but as succession continues and forested areas begin to expand, early successional shrub and tree species such as willow (*Salix* spp.), balsam poplar (*Populus balsamifera*), and trembling aspen (*P. tremuloides*) are expected to provide increased moose browse. Approximately 20 years since suspension of mining operations, moose are regularly observed using partially rehabilitated areas of the former Inmet zinc mine at Winston Lake, 20 km northwest of Schreiber (Foster 2019).

Table 6.2.7-4: Moose population objectives and estimates within the Wildlife Management Units (WMU) overlapping the Project (McDonald 2021)

WMU	Year 2030 Moose Population Objective	Population Objectives (moose/100km²)	Current Density (moose/100km²)	Current Population Estimates (Year)
21A	2,800 – 3,800	21.0 – 28.5	22.0	2,928 (2018)
21B	2,400 -3,100	17.8 – 23.0	26.2	3,539 (2015)

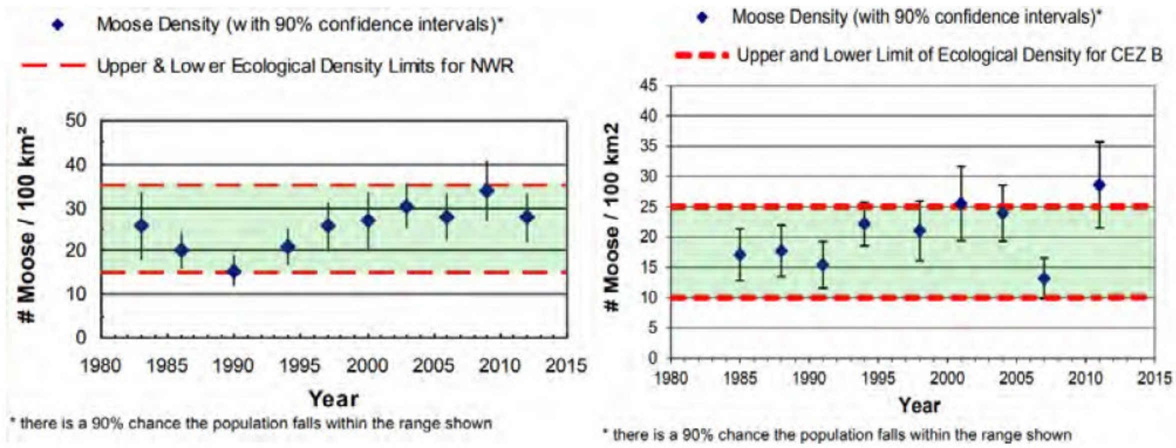


Figure 6.2.7-3: Moose Density Trends in the Wildlife Management Units that Overlap the Project (21A left, 21B right) (McDonald 2021)

Birds

Forest Birds

Residual effects from direct loss of habitat in the SSA are expected to be greatest for forest-dependent birds, since forest habitats account for more than 90% of the SSA area and forest-dwelling species currently dominate the avian community at the SSA (see Northern Bioscience 2012b [CIAR #234], 2020 [CIAR #722]). Individuals of these species will largely be displaced by forest clearing for the Project footprint, although direct mortality will be reduced by mitigation (e.g., clearing vegetation outside the breeding season).

Based on observed breeding bird densities for the LSA and updated bird density models available from the Partners in Flight Program (Blancher et al. 2007, 2017), it is predicted that 8,700 birds of 72 species are found in the SSA for an approximate total density of 7.8 birds/ha or 391 pairs/km^2 (Appendix D8.5 of this EIS Addendum [Vol 2]). This is considerably higher than the density of 243 pairs/km^2 in the original EIS (2012) and bird impact assessment (Northern Bioscience 2012b), likely due to the use of repeat-visit plots in 2020 including earlier in the breeding season when bird acoustic activity is higher. The current value is within the range (200-600 pairs/km^2) reported by Erskine (1977) for aspen and birch dominated stands in boreal forest region of Canada. The highest densities on morning point counts were recorded for pine siskin, white-throated sparrow, golden-crowned kinglet, black-throated green warbler, and American redstart; these are common birds in the boreal forest and, except for pine siskins that were highly irruptive in 2020 (TNAS 2021), these species were also abundant during previous point counts reported in the original EIS.

The Project is located within Bird Conservation Region (BCR) 8: Boreal Softwood Shield (EC 2014). The Partners in Flight Program has identified over 70 priority species in the Ontario portion of BCR 8. Densities were calculated for 26 of these species (Appendix D8.5 of this EIS Addendum [Vol 2]); approximately 20 other priority species have been observed at or near the Project (see Northern

Bioscience 2020) (CIAR #722) but are species that cannot be effectively surveyed by morning point counts (e.g., waterfowl, raptors, shorebirds) and therefore no densities were calculated. Most of these priority species are relatively abundant in the Project study area; those that are of heightened concern (e.g., federally or provincially listed) are addressed in Section 6.2.8 of this EIS Addendum (Vol 2).

The clearing of approximately 1,116 ha of the SSA will result in the temporary loss of habitat for about 8,700 forest birds. The overall impact of loss of forest habitat on the bird populations is uncertain because breeding habitat is likely not limiting for at least some species (e.g., species limited by wintering habitat or other mortality factors) and displaced birds may be able to occupy vacant territories nearby (see Response to IRs 23.4.3 & 23.5.5 (CIAR #428)). Habitat removal will affect local bird species at the SSA level, but the mature mixedwood forest habitat that will be removed is common in the LSA and RSA and located near proposed disturbed areas (see Response to IRs 23.4.3, 23.5.5 (CIAR #428)). A meta-review of passerines in eastern North America indicated that adults of forest-dependent species had a mean return rate of 0.35 to former breeding sites, with yearlings dispersing away from natal sites at higher rates than adults (Schlossberg 2009). With clearing outside the breeding season, returning migrants are less likely to be negatively impacted than year-round resident bird species such as grouse, northern saw-whet owl, Canada jay, common raven, and chickadees that may loosely hold territories throughout the non-breeding season (e.g., boreal chickadee (Hadley and Desrochers 2008). Mark-recapture study with boreal songbirds (e.g., Whitaker et al. 2008), including many of the species present at the SSA, suggest that they are resilient to localized disturbance in boreal landscapes because of landscape-scale movement by adults including breeding dispersal, extra-territorial forays, and transience. Boreal forests are naturally heterogeneous systems where regular large-scale disturbance (e.g., wildfire, spruce budworm outbreaks) creates a shifting mosaic of stands in varying successional stages (Niemi et al. 1998; Perera et al. 2001). Such landscape dynamics and unpredictable weather during the spring breeding season may have favoured patterns of site fidelity, local space use, and dispersal that allow boreal songbirds to exploit or colonize suitable habitat at a broad spatial scale and to relocate when a site becomes unsuitable (e.g., Betts et al. 2006a,b; Leonard et al. 2008; Whitaker et al. 2008). This resiliency will likely reduce potential effects on songbirds whose home ranges could potentially overlap the SSA.

Residual effects are expected to be at least partly reversible following the implementation of the mine decommissioning plan. There are few scientific studies on the response of bird communities to mine restoration in the boreal forest. At closure there is potential for positive changes for migratory birds within the site and local study areas. Open country species such as savannah sparrow and American kestrel, presently rare or absent in the SSA, are likely to increase on restored lands (e.g., Galligan et al. 2006). Succession of these lands to shrub-dominated communities will probably support a bird community similar to that of an early successional cutover and include such species as Lincoln's sparrow, common yellowthroat, mourning warbler, and chestnut-sided warbler (e.g., Northern Bioscience 2012b). Common yellowthroat, chestnut sided warbler, and chipping sparrow were abundant in the shrubby and open areas of the former Inmet zinc mine at Winston Lake, 20 km northwest of Schreiber approximately 20 years since suspension of mining operations (Foster 2019). In the longer term as revegetation continues and succession leads to trees species replacing grasses, more forest dwelling species will use the site. Until trees recolonize the site to recreate continuous tracts of forest, interior forest preferring birds will continue to be scarce.

Raptors

American kestrel, presently rare or absent in the project footprint, are likely to increase on restored lands (e.g., Galligan et al.; 2006, Peters, 1984). Other open country raptors (e.g., northern harrier, rough-legged hawk) may find the post-closure conditions suitable for foraging, at least during migration. Open habitats are relatively limited in the RSA and along the north shore of Lake Superior in general, with only scattered wetlands, cutovers, and burned areas (see Vegetation Section 6.2.6 of this EIS Addendum [Vol 2]); large meadows and fields are uncommon in the regional landscape. Present in the SSA, broad-winged hawks may also benefit, as they are commonly observed along roadways foraging from perches on transmission lines in northern Ontario. Other forest-dwelling raptors such as northern goshawk (not recorded but potentially present at the Project site) may find the rehabilitated SSA less suitable.

Waterfowl

The SSA provides limited waterfowl habitat, with nine small waterbodies (between 0.5 ha and 5.0 ha in size) and a total of 17.7 ha of aquatic habitat when smaller ponds are included as well. An aerial survey in late May 2011 of 50 lakes and ponds in the LSA typically found a single pair of nesting waterfowl on each waterbody, primarily hooded mergansers, ring-necked ducks, and common goldeneye (Northern Bioscience 2012b) (SID #25) (CIAR #234). Fieldwork in 2020 confirmed continued low densities of waterfowl using small waterbodies in the SSA during the breeding season. Piscivorous waterfowl (common loon and common merganser) are apparently uncommon, possibly related to the small size of waterbodies and the lack of fish in many of the lakes and ponds (Section 6.2.4 of this EIS Addendum [Vol 2]).

Assuming a density of 1-2 nesting pairs per waterbody, potentially 10-20 pairs of waterfowl could potentially be displaced by site development and construction in the SSA. Some waterbodies will eventually be reestablished (e.g., filling of the pit), but will likely not have the same productivity and characteristics of the waterbodies lost during side development of the SSA. However, similar habitat is widespread, with over 11,000 remaining waterbodies of similar size (i.e., <10 ha) in the RSA that collectively cover 11,409 ha.

Wetland Birds

Given the apparently low density of wetland birds in the SSA (Northern Bioscience 2012b (SID #25) (CIAR #234), 2020) (CIAR #722) and limited wetland habitat (see Section 6.2.6 of this EIS Addendum [Vol 2]), negligible residual effects are anticipated for this avian guild. The LSA encompasses only about 20 ha of wetlands and very little emergent marsh preferred by most marsh birds.

Shorebirds

As discussed in the updated baseline terrestrial report (Northern Bioscience 2020) (CIAR #722), there is no substantial shorebird habitat for resident breeders or migrants. Residual effects from the loss of wetland habitat (discussed above) and limited shoreline habitat along the margins of the few waterbodies within the SSA is expected to be negligible given the low density of spotted sandpiper, solitary sandpipers, or other shorebirds (nesting or migrating). There is limited shoreline habitat in the SSA relative to the availability abundance in the RSA, where there is approximately 9,700 km of shoreline on over 9,200 waterbodies. Furthermore, there are no large beaches, mudflats, or other suitable habitat for migrants in the SSA or LSA, particularly compared to habitat availability along the Lake Superior shoreline or muddy riverbanks and mouth of the Pic River.

Determination of Significance

The residual effects of the Project arise from the loss of approximately 1,116 ha of wildlife habitat in the SSA. With remediation at closure, at least some of this loss will be mitigated. As with the original EIS, the residual environmental effect of a change in wildlife habitat quantity is predicted to be **not significant** because the decrease in wildlife habitat is not expected to threaten the long-term viability of wildlife in the RSA. Wildlife habitat is abundant and widespread in the RSA and the Project-associated loss is well within the range of annual disturbance considered sustainable in boreal ecosystems.

6.2.7.6.2 Change in Wildlife Habitat Quality

Analytical Assessment Techniques

The assessment of a change in wildlife habitat quality employed a combination of quantitative and qualitative techniques.

GIS (ESRI ArcMap) mapping was used to overlay the Project components and physical activities and predicted indirect effects on modelled wildlife habitat for the following:

- a 10 m buffer from the outer boundary of the SSA to encompass any potential edge effects on wildlife habitat from increased sunlight, wind, and resultant evapotranspiration (see Section 6.2.6 of this EIS Addendum [Vol 2])
- a 30 m buffer around the edge of the SSA to reflect the area with the greatest potential fugitive dust deposition on wildlife habitat (see Sections 6.2.1 and 6.2.6 of this EIS Addendum [Vol2])
- areas of the LSA adjacent to the SSA where groundwater is predicted to decrease or increase 0.5 m or greater (see Sections 6.2.3 and 6.2.6 of this EIS Addendum [Vol 2])
- areas of the LSA adjacent to the SSA where background sound is expected to increase by at least 50 decibels (ECCC 2021) (see Section 6.2.2 of this EIS Addendum [Vol 2]). The sensory

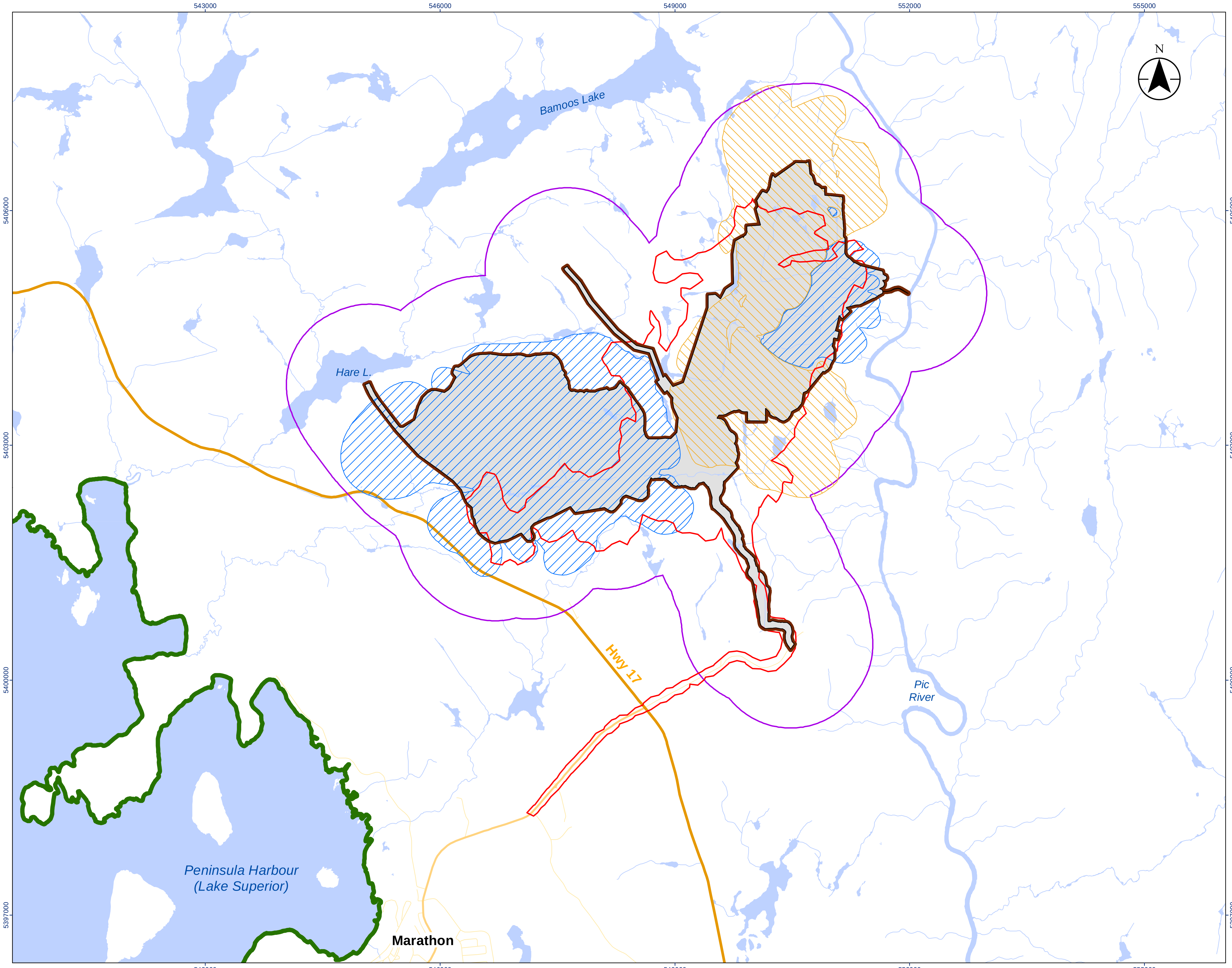
disturbance zone defines the area over which the effects of a disturbance are assumed to reduce the effectiveness of the adjacent wildlife habitat due to avoidance or underutilization. For this assessment, three sensory disturbance zones have been applied around the SSA:

  - mammals (except caribou) and birds: 200 m around the SSA based on provincial guidance (e.g., MNR 2000)
  - birds (50 dB) (Environment Canada 2019). Modelled in Section 6.2.2 of this EIS Addendum (Vol 2)
  - other wildlife: 100 m from the SSA edge for wildlife groups presumed to be less sensitive to sensory disturbance

A primarily qualitative approach informed by relevant literature, project-specific information (including multiple years of fieldwork), and professional opinion was used to assess potential impacts on wildlife habitat and its use for the following:

- changes in ambient light levels and the olfactory environment (i.e., smells - see Section 6.2.1 of this EIS Addendum [Vol 2])
- increased levels of ambient light (see Section 6.2.1 of this EIS Addendum [Vol 2])
- invasive plant species (see Section 6.2.6 of this EIS Addendum [Vol 2])

Change in wildlife habitat quality, or impairment of habitat, is conservatively assumed for the duration of the Project life from site preparation and construction, through operation, with levels generally declining at closure and after rehabilitation.



Stantec

NORTHERN BIOSCIENCE

Legend

- Predicted 50 Decibel Noise Extent
- Predicted Groundwater Increase > 0.5 m at Closure
- Predicted Groundwater Decrease > 0.5 m at Closure
- Predicted Maximum Extent of Fugitive Dustfall (30 m)
- Site Study Area
- Local Study Area
- Regional Study Area
- Highway
- Major Road
- Minor Road
- Waterbody (LIO)
- Watercourse

0 1 2 3 km

1:50,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.

Project Location
Marathon

Prepared by R. Foster on 2021-03-02

Client/Project
GENERATION MINING LTD.
MARATHON PALLADIUM PROJECT

Figure No.
6.2.7-**4**

Title
Predicted Extent of Indirect Effects in the Wildlife SSA and LSA

C:\GIS\GenPGM\Figures\Impact Assessment\Wildlife\Wildlife Figures\Final\Wildlife LSA Indirect Effects2.mxd Revised: 2021-03-02 By: 18076

Project Pathways

Site Preparation and Construction

Pathways for potential effects on wildlife habitat through its effects on vegetation are discussed for dustfall, edge effects, invasive plant species, and changes to groundwater or surface water hydrology. See Section 6.2.6 of this EIS Addendum (Vol 2) for more details.

Edge effects will be most pronounced on the periphery of the SSA and along the new access road and transmission line corridor. There is greater potential for residual effects for area-sensitive species such as Canada lynx, American marten, and fisher (MNR 2009) and forest interior songbirds such as black-throated green warbler, ovenbird, and veery (Appendix D8.5 of this EIS Addendum [Vol 2]). The SSA will have an approximate perimeter of 24.9 km excluding the new road (3 km) and transmission line (2.2 km).

Site preparation and construction activities have the potential to impair habitat use as the result of sensory disturbance from changes in noise, light, vibration, and odours. Noise and light may cause wildlife to avoid or abandon habitat (e.g., nesting locations) and may cause stress or other physiological effects (e.g., Ortega 2012). Noise may also affect the ability of wildlife species to detect and find prey or mates. These effects are generally considered greatest if disturbance occurs during critical life stages such as courtship or early in the nesting cycle. In terms of noise disturbance, an increase of 3 dB to 10 dB corresponds to a 30% to 90% reduction in alerting distances (maximum distance at which a signal can be heard by an animal) for wildlife (Barber et al. 2010). The predicted noise levels in the SSA may decrease alerting distances in wildlife and particularly birds; however, noise during construction would be of relatively short duration and is not expected to greatly affect wildlife.

Operation

In the absence of mitigation, sensory disturbance during operation is likely to be more pronounced than those during construction or closure given the larger scale and more prolonged time frame. Vibration from the equipment and processes associated with the continuous Project operation (e.g., blasting and mine rock processing equipment) may cause levels of vibration that extend beyond the SSA.

The main noise-generating sources associated with Project operation include process plant equipment such as rock breakers and feeders; mobile sources such as trucks, excavators, and bulldozers; as well as blasting that is anticipated to occur once daily during weekdays. Lighting sources from the Project construction and operation phases will include stationary lighting sources associated with buildings/infrastructure and mobile sources from the equipment and traffic.

Stray lighting can cause light pollution which can cause adverse effects for surrounding wildlife. The extent of sensory disturbance experienced by wildlife because of Project operation will vary with the type of disturbance, the intensity of human use, season, and spatial scale. Changes in ambient light levels in the SSA and adjacent LSA are expected to affect wildlife behaviour primarily. For example, artificial light sources are known to both attract and repel specific species (Longcore and Rich 2004), can increase the incidence of bird mortality through strikes (Jones and Francis 2003), and can change photosensitive biorhythms (Miller 2006). Migrating birds may be particularly sensitive to increased ambient light levels.

Closure

Indirect effects will subside when the Project closes, with reduced traffic levels and the cessation of Project activities.

Mitigation and Enhancement Measures

Project design, planning, and management as well as the application of standard proven mitigation measures will be employed to reduce impairment of habitat use from sensory disturbance and indirect effects.

Mitigation for air quality (Section 6.2.1 of this EIS Addendum [Vol 2]) will address potential effects on the olfactory environment.

Waste control measures discussed in Section 1.5.4.15 of the EIS Addendum (Vol 1) (CIAR #727) will mitigate impacts from garbage on site and associated smells that may change wildlife habitat use. Proper waste management will reduce the risk of increasing numbers of subsidized predators such as foxes, common raven, and American crow.

Feeding of wildlife at the Project site will be prohibited, including the use of bird feeders. In addition to reducing the risk of window bird strike (see Section 6.2.7.6.3 of this EIS Addendum [Vol 2]), such measures will prevent subsidizing potential nest predators such as American crows, blue jays, and red squirrels.

Mitigation measures to reduce ambient light levels will be used such as directional lighting (see Section 6.2.1 of this EIS Addendum [Vol 2]).

Mitigation measures for fugitive dustfall and smells are discussed in 6.2.1 of this EIS Addendum [Vol 2].

Mitigation of potential effects on the acoustic environment and measures employed to reduce noise and vibration are discussed in Section 6.2.2 of this EIS Addendum [Vol 2].

Additional mitigation measures will be employed as necessary to address noise or other disturbance to breeding birds in the event nests are established during Project operations for species that are protected under federal (e.g., Migratory Birds Convention Act) or provincial (e.g., Fish and Wildlife Conservation Act) legislation or regulations.

Mitigation for invasive plant species is discussed in Section 6.2.6 of this EIS Addendum [Vol 2].

Mitigation measures to reduce changes to groundwater and surface water hydrology are discussed in Section 6.2.3 of this EIS Addendum [Vol 2].

Project Residual Effect

Dustfall and Edge Effects

After mitigation, negligible effects on wildlife habitat are expected due to dustfall. As discussed in Section 6.2.1 of this EIS Addendum [Vol 2], the amount of dust generated during construction and closure will be less than that generated during operation. Other edge effects will likely vary with local topography, aspect, and other factors, and will be broadly comparable to those experienced in clear-cuts associated with commercial forestry on the Pic FMU or along forest access roads. With mitigation (i.e., no feeding of wildlife including bird feeders), substantial edge effects from subsidized nest predators are not anticipated. In remote boreal forests, where important non-forest nest predators or nest parasites such as brown-headed cowbirds are absent (as at the Project site), productivity rates on ground and above-ground nests were unaffected by edge proximity (Ball et al. 2008).

Invasive Plant Species

Invasive plant species already exist within portions of the SSA and the surrounding landscape; however, areas within the SSA and LSA not currently affected may be affected by the spread of these invasive species by new roads, construction equipment and vehicles, or imported fill. Wildlife habitat within 30 m of the SSA will be most susceptible to the introduction of invasive and non-native plant species. With mitigation, residual effects are predicted to be less than would be typically associated with cutovers and access roads associated with commercial forestry on the Pic Forest FMU.

Groundwater and Surface Water

Potential effects to wildlife habitat from predicted increases or decreases in groundwater levels, as well as changes to surface water hydrology, will be limited to the LSA. Figure 6.2.7-1 depicts the predicted geographic extent of groundwater increases or decreases with respect to the LSA in closure, after the pit lakes have formed. Approximately 442 ha in the LSA, outside the limits of the SSA, are predicted to have at least a 0.5 m increase in groundwater level in closure compared to baseline conditions due to mounding of the water table associated with the MRSA and PSMF. Approximately 400 ha in the LSA, outside the limits of the SSA, are predicted to have at least a 0.5 m decrease in groundwater level in closure compared to baseline conditions due to the pit lake water level elevations being lower than original baseline water table elevation.

Effects on wildlife habitat from predicted changes in groundwater and surface water hydrology are expected to manifest slowly as they are reflected in altered successional pathways of the overstory trees. Forested areas within the LSA with raised or lowered groundwater or surface water may see a slow replacement in overstory tree species. However, many of the predominant boreal tree species (e.g., black spruce, balsam fir) in the LSA have rather broad tolerance with respect to soil moisture regime. Understory effects are predicted to be more pronounced but may be difficult to differentiate from natural variation and ecological processes associated with succession and will be of much lower magnitude than observed with natural disturbance (e.g., wildfire, forest pest and disease outbreaks, windthrow).

Light

With mitigation, residual effects from light are generally not considered to be of concern for the Project as lighting will be restricted to developed areas of the site where wildlife activity is likely to be low. Existing development immediately south of the Project along Highway 17 (e.g., hotels, gas stations, airport) and the Town of Marathon are much greater sources of light pollution.

Noise and Vibration

With respect to indirect habitat loss as the result of sensory disturbance, construction noise and vibration, levels will vary for specified locations as activities change in position and intensity. During construction, the predicted sound levels at the perimeter of the SSA are anticipated to range from 45 to 60 dBA. Sensory disturbance will be more pronounced during operation, with approximately 444 ha within the LSA expected to experience noise levels up to 50 dBA. Most of the affected area is within 500 m of the SSA, primarily along the southern periphery of the Project footprint and some to the northwest of the proposed pit and processing facility (Figure 6.2.7-4).

Some wildlife species may exhibit habitat avoidance of the SSA and affected LSA because of noise, artificial lights, and vibrations (Habib et al., 2007; Narins 1990). Vibration may occur during operation from normal process equipment operation and from blasting activities in the open pit. Vibration due to blasting extends beyond the LSA and may be perceived by some wildlife depending on the species – hibernacula (e.g., bats, snakes) are expected to be most sensitive but none are known for the site. Levels of noise that may be experienced by wildlife from operation of the Project will be influenced by multiple factors such as distance and direction (e.g., downwind from noise emission sources), habitat, time, weather (wind speed and direction) and temporal factors (time of year, time of day). The response to noise and vibration by wildlife will vary depending on the species.

Mammals

Furbearers and other mammals will likely be displaced initially in affected areas of the SSA and LSA as a result of the stripping, grubbing, and noise. Effects will likely be greatest on marten, fisher, and gray wolf and less pronounced on species such as red fox and black bear that are more tolerant of anthropogenic noise (e.g., highways, urban areas) disturbances. The portion of the LSA area affected by noise >50 dB (440 ha) is approximately 1/3 the size of the cleared SSA, and relatively few individuals will be impacted. Habituation to noise is anticipated, with individuals of some species likely to return to using those areas of the LSA. Although moose can be sensitive to anthropogenic activities and avoid areas where occasional or unpredictable disturbances occur, they often will habituate to non-threatening disturbances that are constant or ongoing (e.g., Horesji 1979; Rudd and Irwin 1985); they are routinely observed along highways in northern Ontario, for example.

Birds

Physiological responses to noise exposure in birds may begin to appear at exposure levels of 55 to 60 dB (Barber et al. 2010). Given that approximately 444 ha within the LSA may experience more than 50 dB, with an estimated density of 7.8 birds/ha (Appendix D8.5 of this EIS Addendum [Vol 2]), potentially about 3,500 forest-dwelling birds could be disturbed by noise from the SSA. Approximately 70% of the habitat within the potentially affected LSA is Ecosite B052 Spruce-Fir Conifer Forest or B055 Aspen-Birch Hardwood; avian species that prefer those habitats are most likely to be affected. Actual impacts will vary according to species and site fidelity.

Residual effects will depend upon sensitivity to disturbance and site fidelity of affected species. Some species, particularly those that prefer edges, may be more tolerant of noise and more likely to use disturbed habitat compared to more sensitive forest interior species such as veery and ovenbird. Tolerance to noise can even vary amongst individuals of the same species. At least some birds can compensate for the masking effect of noise through shifts in vocal amplitude, song and call frequency, and song component redundancies, as well as temporal shifts to avoid particularly noisy times of day (Ortega 2012). Predicted impacts may therefore overestimate the likely impacts from noise disturbance.

There may be some disturbance of nesting songbirds and other bird species during site development and operation, but they will recolonize the LSA at closure. No raptor nests were observed in the LSA and potential residual effects are expected to be minimal. It is assumed that raptors building nests in the LSA once operations commence would be at least somewhat tolerant of noise (otherwise they would not establish them). Additional mitigation, if required, will be employed on a case-specific basic to avoid disturbing nesting birds as per the federal *Migratory Birds Convention Act* (MBCA) and provincial *Fish and Wildlife Conservation Act* (FWCA).

Limited residual effects are predicted on shorebirds, wetland birds, or waterfowl from sensory disturbance due to the low numbers of potentially impacted individuals and limited habitat in the LSA. The affected area of the LSA encompasses 12 small waterbodies totaling 14.4 ha, and limited wetland habitat according to the FRI i.e., 1.1 ha of meadow marsh and 2.2 ha of treed fen (unsuitable for marsh birds or waterfowl). If sensitive to disturbance, returning migrants will likely avoid the Project site and be displaced to available habitat elsewhere in the RSA.

Determination of Significance

With mitigation, the residual effect of a change in wildlife habitat quality will be **not significant** because the change in wildlife habitat quality is not expected to threaten the long-term viability of wildlife in the RSA**.** Potential effects from elevated sound, vibration, light, smells, and dustfall, as well as possible changes to wildlife habitat from invasive species, groundwater or surface hydrology, or edge effects will only affect a relatively small proportion of the RSA and will not result in the permanent impairment of habitat or its use by wildlife.

6.2.7.6.3 Change in Wildlife Survival

Analytical Assessment Techniques

Change in wildlife survival is assessed qualitatively through a review of the literature, consideration of the factors that can contribute to the susceptibility of a species or species group to the Project-specific effect mechanisms and professional judgment. The construction and operation phases are the focus of the assessment of mortality risk. During closure, adverse Project effects on mortality risk are expected to be less pronounced relative to the construction and operation phases and to be in decline over the duration of the phase, with a return to the baseline (existing) condition at the end of active closure. A conservative approach of characterizing closure effects the same as construction effects has been used.

Project Pathways

Site Development

Clearing of forest cover and other vegetation during site development and stripping of overburden clearing is the primary risk of mortality or injury during site development and construction, particularly for smaller or less mobile wildlife. Land clearing activities during the nesting season could cause the loss of migratory bird nests and young, as well as the young of roosting bats.

Collisions with Vehicles

A new access road alignment has been established to increase separation from the Pic River, based on feedback received from Indigenous communities, and to better align with the revised location of the Process Plant. As a result, approximately 2.8 km of new access road will be constructed and used throughout operation Figure 1.5-1 of the EIS Addendum (Vol 1) (CIAR #727).

At closure, this road will be fully decommissioned and revegetated as per the Conceptual Closure Plan (see Section 1.5.2.3 of the EIS Addendum [Vol 1]) (CIAR #727); access to the site post-closure will be via the road that currently exists on site.

In the absence of mitigation, traffic is the primary effect mechanism that may result in direct wildlife mortality or injury given the frequency of vehicle trips described in Section 1.5.4.4 (EIS Addendum, Vol 1) (CIAR #727) and longer stopping distances for large trucks, especially when fully loaded. Daily traffic (24hr) to site will typically be 10-40 large trucks and 150 passenger vehicles during operation. Roads may be attractive to wildlife (e.g., Bennett 1991; Kociolek and Clevenger 2011; Rytwinski and Fahrig 2012) for:

- ease of travel, particularly in winter or where the surrounding landscape is dense vegetation or difficult terrain
- forage plants that are later in phenology and/or not as abundant in the adjacent forested landscape such as newly emerged grass, clover, or dandelions in the spring that may attract black bears, white-tailed deer, groundhogs, and other herbivores

- sources of grit to aid in digestion or sand/silt for dust-bathing e.g., ruffed grouse and other birds
- sunning opportunities, particularly in the spring e.g., snowshoe hare, grouse
- roadside perches for hunting prey attracted to the road and Right-of-way (ROW) e.g., broad-winged hawk, red-tailed hawk, great horned owl, great gray owl (especially winter)
- for accumulated road salt as well as escape from biting flies, particularly in the spring e.g., moose
- roadkill that may attract opportunistic scavengers e.g., wolves, red foxes, bald eagles, common ravens, and turkey vultures.

These sources of attraction increase the likelihood of wildlife on or near the Project access road, which increases the potential risk of collisions resulting in injury or mortality of wildlife (and people). Moose are adaptable to artificially disturbed habitat and are often found in close proximity to roads, leading to frequent collisions with vehicles (Franzmann and Schwartz 1997).

On average, an estimated 1,167 birds are killed annually per 100 km of road in Canada (Bishop and Brogan 2013), although the effects are expected to be much less on secondary roads due to lower speeds and traffic volumes (e.g., Kline and Swann 1998). For most bird species, the peak collision period appears to be during the breeding and fledging period (Bishop and Brogan 2013). Collisions can occur even for species that typically perch high in the forest (e.g., red-eyed vireo) or typically migrate at high altitude (Siebert and Conover 1991), presumably when forced down for rest, cover, food, or by inclement weather.

Potential road effects on Species at Risk are discussed under Section 6.2.7 of this EIS Addendum (Vol 2).

Collisions with Project Infrastructure including Transmission Lines

Collisions with Project infrastructure is another potential pathway that may result in injury or mortality of wildlife. This risk is higher during the operating lifespan of the mine, compared to the relatively brief construction period. The greatest risk of collision is likely with the new 115-kV overhead transmission line that will link the Project to the existing Terrace Bay-Manitouwadge (M2W) transmission line to the north. The new line will be 2.2 km in length, including 130 m that crosses Canoe Lake, and will have a 30-m ROW. The transmission line will be decommissioned at closure, eliminating the potential risk.

There is potential for physical injury to birds from collision with the wires, as well as electrocution risk from perching, particularly on transformers (APLIC 2006). An estimated 2.5 million to 25.6 million birds die annually in Canada from collision with transmission lines, with waterfowl, grebes, shorebirds, and cranes being the most vulnerable bird groups (Rioux et al. 2013), although raptors and passerines can be at risk as well (Bevanger 1998). Particularly vulnerable species are those that flock, have rapid flight, and are large with slow maneuverability (high wing loading and low wing aspect ratio); younger individuals and nocturnal migrants exhibit further vulnerability (Bevanger 1998; Jenkins et al. 2010; Manville 2005). Poor vision may increase risk for cranes (Martin and Shaw 2010) and waterfowl (APLIC 2012; Jones et al.

2007). There is seasonality of effects, with the rate of collisions typically higher in fall and spring during migration (Morkill and Anderson 1991; Rioux et al. 2013). The risk of collision is also influenced by environmental factors and site attributes such as adverse weather conditions, time of day, disorientation from lighting, topography that funnels migrants, and human disturbance that may flush birds towards transmission line (APLIC 1994, 2012; Bevanger 1990).

There is risk of mortality from birds colliding with windows of Project buildings located in the SSA. An estimated 25 million birds are killed annually in Canada from striking windows, comprising a wide range of species but most commonly sparrows and warblers (Machtans et al. 2013). Simulation modelling suggested a range of 0.4 to 55 bird deaths per low rise commercial building per year; however, overall mortality is greatest from residential homes due to their ubiquity (Machtans et al. 2013). Collision risk increases with the proximity and abundance of vegetation, presence of bird attractants (e.g., feeders), and the glass surface area of the structure (Chace and Walsh 2006; Gelb and Delacretaz 2009; Hager et al. 2013; Klem et al. 2009). At night, the amount of light emitted by a structure is thought to cause a 'beacon effect' attracting and confusing birds; mortality is increased during nocturnal migration (Drewitt and Langston 2008), particularly when cloud cover forces migrants lower (Longcore et al. 2012; Newton 2008). At the Project site, potential effects could be exacerbated during migration by fog rolling in off Lake Superior.

Waste-Wildlife Interactions

Human-wildlife interactions due to improper storage and disposal of waste products particularly food refuse and petroleum-based lubricants may lead to negative outcomes in the absence of mitigation. Black bears, wolves, foxes, American crows, common raven, and other wildlife may have adverse health effects from anthropogenic food sources, and habituation may lead to the forced relocation or death of problem wildlife due to human safety concerns. Subsidized predators may also have negative impacts on other VECs such as increased nest predation from crows and ravens or elevated risk of predation for woodland caribou and moose from bears and wolves.

Effect mechanisms that indirectly result in wildlife mortality through increased access for hunters and trappers were not considered in this assessment given the Project site can currently be accessed by a gated gravel road and access restriction will remain in place for the duration of the Project.

Mitigation and Enhancement Measures

Site Development

The risk of mortality and injury from site clearing and development will be mitigated by the following:

- Where possible, forest clearing will not occur from May 15 to August 31 to avoid potential destruction of bat-occupied maternity trees.

- If limited clearing must be done during this window, bat maternity surveys using approved bat survey protocols (e.g., MNRF 2011) would be used to confirm bat presence/absence in suitable tress (e.g., large diameter chicots) and appropriate protection measures applied.
- Clearing outside the main bird breeding window as determined by confirmed species present on site and guidance from Environment Canada's nesting calendars for Nesting Zone C5 (ECCC 2021) and Birds Canada's (2021) Nesting Canada Query Tool.
- Where clearing outside this window is not practicable and the area to be disturbed is relatively small and/or not complex, nest surveys will be conducted by trained biologists to reduce the risk of incidental take.

Collisions with Vehicles

Risk of collisions during all Project phases, but particularly operations, will be mitigated by the standard measures such as:

- Sufficiently cleared ROW to provide adequate lines of sight to give advance warning of wildlife, particularly on corners
- Signed speed limits on the access road and at the Project site
- Wildlife crossing signs at the beginning of the main access road coming from both directions and at strategic locations as necessary
- Driver training to reduce risk of collision
- Removal of roadkill to reduce the risk to scavenging birds (e.g., common raven, bald eagle, turkey vulture) and mammals (e.g., red fox, coyote, gray wolf)
- Plowing practices in winter that provide gaps where mammals can easily exit the road (MNR 2013).

Collisions with Infrastructure including Transmission Lines

Risk of collisions with infrastructure during operations and, to a lesser extent, during other Project phases, will be mitigated by the following measures:

- Using directional lighting to reduce potential disorientation and collision with windows by migratory birds.
- Luminescent and/or reflective markers will be used on transmission lines over Canoe Lake where there is greater risk of collision due to the topography and presence of waterbodies that may attract species that are more susceptible to collisions e.g., waterfowl, sandhill crane, great blue heron, bald eagle, osprey. Yellow marker balls (50 cm diameter) at a spacing of 100 m were recommended for sandhill cranes (Morkill and Anderson 1991).

- Vegetation will be cleared within 50 m of the side of building with windows to reduce potential bird abundance and collisions.
- Bird feeders will not be allowed at the Project site and feeding of wildlife, including birds, will be prohibited, to reduce potential risk of collisions with windows.
- Directional lighting will be used to reduce the potential "beacon effect" for nocturnal migrants and mitigate the risk of collisions with windows.
- If monitoring indicates elevated window strikes at the Project site (e.g., >50 bird deaths/year), additional mitigation measures will be employed as necessary (e.g., non-reflective films on problematic windows).

Waste-Wildlife Interactions

Adverse human-wildlife interactions will be mitigated during the construction and operations phases with the following measures:

- Proper on-site management and off-site disposal of food refuse, lubricants, and other waste that may be attractive to wildlife.
- Training program will raise understanding and awareness of adverse human-wildlife interactions.
- Staff and contractors will be prohibited from feeding wildlife.
- Proper handling and disposal of road salt, reagents used in ore processing, or other substances that may be attractive to moose or other mammals craving dietary salt or trace minerals.

Project Residual Effect

Mammals

With appropriate timing, mortality of furbearers and larger mammals from site clearing is expected to be negligible. Residual effects from vehicle collisions may be higher for species that use roadways more frequently for foraging or travel (e.g., red fox, gray wolf) but are not expected to have effects on wildlife populations beyond the LSA. Relatively few moose use the LSA and appropriate mitigation should reduce the risk of collisions and residual effects. Total daily traffic to site will be less than 200 vehicles compared to more than 2,100 average annual daily traffic along Highway 17 near the Project (EIS Addendum, Vol 1) (CIAR #727).

Proper waste management should reduce the risk of habituation and adverse human-wildlife interactions.

Birds

Forest Birds

Incidental take (i.e., destruction or disturbance of tree-, shrub-, or ground-nesting bird nests or nestlings) is a Project risk, particularly during initial site development and construction of the 1,116 ha SSA. This can be effectively mitigated by vegetation clearing outside the avian breeding season. Residual effects are expected to be negligible and will not affect forest bird populations in the RSA. In comparison, 17,514 ha of forest is scheduled to be harvested on the Pic Forest in 2020-2021 alone (NFMC 2019), much of it during the breeding season when incidental take must be occurring (e.g., Hobson et al. 2013), yet is considered ecologically sustainable by MNRF.

With appropriate mitigation, mortality or injury from window bird strikes and vehicle collisions are expected to be negligible. Collisions with transmission lines is not expected to have an effect on populations outside the LSA given the Project is not on a major flyway and that small, agile passerines are less at risk.

Raptors

With appropriate mitigation (e.g., removal of roadkill, speed limits), residual effects from vehicle collisions are expected to be negligible. Few large raptors use the LSA, and the Project lacks topography that creates updrafts or funnels that raptors use during migration, so no residual effects are expected from transmission line strikes given the use of line markers over Canoe Lake.

Waterfowl

Waterfowl may be susceptible to adverse effects from transmission lines, particularly near Canoe Lake. However, there are relatively few breeding waterfowl on Canoe Lake and other LSA waterbodies. The project is not on a major flyway, and the relatively small number of migratory waterfowl are likely to move primarily along the Pic River approximately 2.5 km to the east. Furthermore, there is no wild rice and limited wetlands on Canoe Lake and other LSA waterbodies to attract migrating waterfowl. Therefore, collisions with mine infrastructure and the transmission line should not have a substantial effect on the bird populations outside of the LSA.

Shorebirds

Given the relative lack of breeding shorebirds and very limited suitable habitat for migrants, residual impacts on shorebirds are expected to be negligible.

Wetland Birds

Although typically vulnerable due to their large wingspan and relatively poor mobility, the risk to sandhill cranes is believed to be negligible due to their low number in the LSA and since the transmission line does not cross any of their preferred meadow marsh or open peatland habitat, reducing the risk of negative interaction. Mortality from transmission line collisions is not biologically significant for sandhill crane populations (Morkill and Anderson 1991). Great blue herons, American bitterns, and other large wetland birds are absent or at low density in the LSA and residual effects from collisions are expected to be negligible.

Determination of Significance

With mitigation, residual effects on wildlife survival will be **not significant** because clearing, collisions with Project vehicles, transmission lines and other infrastructure, and waste-related interactions will affect few individuals and will not substantively affect the sustainability of wildlife populations in the LSA or RSA.

6.2.7.6.4 Change in Wildlife Habitat Fragmentation and Movement

Analytical Assessment Techniques

Effects on wildlife movement patterns due to habitat fragmentation from clearing of the SSA was assessed using OLT approved for use by MNRF for examining landscape patterns during forest management planning (Elkie 2021). The impact on landscape metrics from clearing the SSA was assessed at several spatial scales:

- SSA + 10 km buffer (i.e., LSA for woodland caribou – see Section 6.2.7 of this EIS Addendum [Vol 2])
- Ecodistrict 3W-5 RSA, and 3) Pic FMU RSA

The proportion and distribution of mature/old forest as well as young forest patches (<37 years age) were calculated for two scenarios:

- The current condition without the Project and 2) with the Project
- The simulated range of natural variation (SRNV) was also calculated

Tabular, graphical, and map outputs of these analyses are presented in Appendix D8.6 of this EIS Addendum [Vol 2].

Change in wildlife movement is assessed qualitatively using professional judgment, including an assessment of habitat connectivity, consideration of species' sensitivity to human disturbance and seasonal movements. The evaluation is focused on furbearers, gray wolf, black bear, moose, and birds. Given the link between project-related habitat loss and the creation of barriers to wildlife movement, the movement assessment assumes the presence of Project components/barriers to movement from the onset of construction through to closure.

Project Pathways

The presence of Project infrastructure and/or sensory disturbance has the potential to modify wildlife movement through and around the site. Smaller furbearers have the greatest potential to be impacted compared to more mobile birds and larger mammals (e.g., gray wolf, black bear, moose). The open pits, MRSA, stockpiles, PSMF, and other infrastructure may collectively act as a barrier to wildlife movement. In the absence of mitigation, site roads and transmission corridors also have the potential to alter wildlife movement. Wildlife may be reluctant to cross these features because of high levels of human activity, sensory disturbance, or because the features are too high or wide to physically move across. Although most birds (grouse being possible exceptions) can easily fly over the site, sensory disturbance such as noise and light may deter them from doing so, particularly during operation.

Potential interaction between safety fencing and wildlife in the former pit area of the site may occur at closure. The pit area will be encircled for public safety which may affect the movement of certain wildlife, at least temporarily.

Mitigation and Enhancement Measures

During Project planning and optimization of the conceptual mine design, efforts have been made to optimize the Project footprint and reduce clearing of the SSA. Existing disturbed areas were incorporated into the SSA to accommodate Project components and, where possible, to reduce direct effects on habitat. This has served to decrease the fragmentation and potential barriers to wildlife movement.

Although some fencing or other control measures may be required during the site preparation and construction phase to prevent public access to the site and isolate potentially hazardous areas, fences or other control measures installed during the initial phase of the project will not be extensive and should not materially inhibit the movement of wildlife.

At closure, infrastructure will be removed where no longer needed. The transmission line and new access road will be decommissioned and revegetated to minimize long-term impacts to wildlife movement. Where practicable, remaining areas of the SSA will be revegetated as per the Conceptual Closure Plan (see Section 1.5.2.3), which will further reduce fragmentation and improve permeability of the site to wildlife movement.

Project Residual Effect

Forest clearing for the Project will fragment wildlife habitat along the boundary of the SSA. The following mammal species that potentially occur at the Project site are considered area-sensitive by MNRF (2000): northern flying squirrel, marten, fisher, lynx, and moose. Woodland caribou is also considered area-sensitive by MNRF (2000); this species is discussed in Section 6.2.8 of this EIS Addendum (Vol 2). Eighteen of the forest-dependent bird species for which densities were calculated (Appendix D8.5 of EIS Addendum [Vol 2]) are also considered area-sensitive by MNRF (2000). Other area-sensitive species from the LSA (according to MNRF 2000) include common merganser, red-breasted merganser, common goldeneye, broad-winged hawk, bald eagle (discussed under SAR), sandhill crane, and black-backed woodpecker, with additional species reported from the surrounding RSA.

Landscape texture and patch size analyses (Appendix D8.6 of this EIS Addendum [Vol 2]) indicate that forest clearing in the SSA will have little effect on fragmentation at the RSA level, either for Ecodistrict

3W-5 or the Pic FMU, with the texture of mature and old forest similar between the current state and the site if the Project goes ahead. Mature and old forest is much more abundant in the RSA currently than expected under the SRNV, with or without the Project. Within a 10 km buffer of the Project, clearing of the SSA would reduce the relative proportion of mature and old forests compared to the existing scenario resulting in localized fragmentation (at both the 500 ha and 5,000 ha hexagon size), but mature and old forest still far exceed what would be expected under natural conditions (SNRV), mainly due to modern fire suppression efforts. With respect to young forest, there is little change in the distribution of patch sizes at the RSA level, with or without the project; there are generally fewer small patches (<100 ha) of young forest than expected compared to SNRV but more medium-sized patches (100-1000 ha). Within the 10 km buffer of the Project, the SSA would represent the largest block of young forest, although the Town of Marathon would be a larger generally non-forested disturbance.

Although habitat fragmentation will reduce local connectivity within the LSA and SSA during the life of the Project, the fragmentation will not substantially alter the broad-scale landscape connectivity in the RSA. As discussed for Vegetation (Section 6.2.6 of this EIS Addendum [Vol 2]), with respect to forest fragmentation, the 1,116 ha SSA is larger than the average clearcut size on the Pic Forest FMU, which is projected to be 495 ha for the 2019-2029 period (Pic FMP unpublished data). In addition, 87% of the areas disturbed by wildfire over the last 60 years on the Pic FMU were from fires greater than 1,000 ha in size (NFMC 2018). During closure, it is anticipated fragmentation will also be reduced following the re-establishment of vegetation. Given the resilience of the boreal landscape to disturbance, the relatively small changes restricted to the SSA are not predicted to threaten the function of landscape connectivity.

Proposed roads and transmission lines will contribute to forest fragmentation and may adversely affect forest-interior bird species. Conversely, edge adapted birds may benefit from the habitat alteration. The transmission line and some of the roads will be decommissioned and rehabilitated after closure, reducing the amount of fragmentation from linear disturbance. The tolerance fragmentation for boreal forest birds is poorly understood, and residual effects are difficult to quantify, but are likely negligible given the predominantly forested landscape in the LSA and RSA.

Determination of Significance

With mitigation, particularly rehabilitation of residual effects on wildlife habitat fragmentation, the residual effect of a change on wildlife habitat fragmentation and movement will be **not significant.** Potential effects from habitat clearing, collisions with Project vehicles, transmission lines and other infrastructure, and waste-related interactions will affect few individuals and not substantively affect the sustainability of wildlife populations in the LSA or RSA.

6.2.7.6.5 Change to Wildlife of Interest to Indigenous Communities

Analytical Assessment Techniques

Wildlife species of interest to Indigenous communities are discussed in the updated baseline terrestrial report (Northern Bioscience 2020) (CIAR #722). Analytical assessment techniques are generally as described in Section 6.2.7 of this EIS Addendum (Vol 2).

Project Pathways

Project pathways are as described in the previously assessed effects on wildlife, presented in Sections 6.2.7.1 to 6.2.7.4 of this EIS Addendum (Vol 2).

Mitigation and Enhancement Measures

Mitigation and enhancement measures are generally as described in the assessment of other effects on wildlife presented above.

Project Residual Effect

The residual effects described above also include wildlife species of interest to Indigenous communities. Residual changes to wildlife habitat quantity and quality, wildlife survival, and wildlife habitat fragmentation and movement also apply to changes to wildlife of interest to Indigenous communities.

Determination of Significance

Consistent with the determination of significance for wildlife, with mitigation and environmental protection measures, residual effects on wildlife of interest to Indigenous communities are predicted to be **not significant.**

6.2.7.7 Prediction Confidence

Overall confidence in the residual environmental effect and significance predictions for wildlife and their habitat is high. This prediction confidence is based on consideration of the following:

- The potential environmental effects and effect mechanisms for the Project are known based on similar mining operations and other large construction projects and are well understood
- The mitigation measures are well understood and align with provincial standards and standard management practices
- The understanding of existing conditions is supported by high quality background information, including detailed FRI mapping, literature review, traditional knowledge studies/information and baseline reports from multiple years of field studies

- The assessment uses conservative assumptions and methods to increase the level of confidence, specifically:
  - The SSA, while assumed to be entirely cleared and developed in the assessment, includes areas that will not be physically altered
  - Although progressive revegetation will occur during operation, the analysis assumes that revegetation activities will only commence during the closure phase. Since progressive rehabilitation of wildlife habitat will occur, this is a conservative case scenario.
  - The Project effects on wildlife habitat are quantified using GIS

6.2.7.8 Summary of Project Residual Effects

A summary of residual environmental effects that are likely to occur because of the Project is provided in Table 6.2.7-5.

Table 6.2.7-5: Project Residual Effects on Wildlife

Residual Effect	Residual Effects Characterization									
	Project Phase	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility	Ecological/ Societal Value	Significance Determination
Change in Wildlife Habitat Quantity	C, O, D	A	N	N	MS	M	M	L	L	NS
Change in Wildlife Habitat Quality	C, O, D	A	N	N	MS	M	M	L	L	NS
Change to Wildlife Survival	C, O, D	A	N	N	HS	M	M	L	L	NS
Change in Wildlife Habitat Fragmentation and Wildlife Movement	C, O, D	A	N	N	MS	M	M	L	L	NS
Change to Wildlife of Interest to Indigenous Communities	C, O, D	A	N	N	MS	M	M	L	L	NS

Table 6.2.7-5: Project Residual Effects on Wildlife

Residual Effect	Residual Effects Characterization									
	Project Phase	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility	Ecological/ Societal Value	Significance Determination

KEY

See Section 2.5 of EIS Addendum (Vol 1) and Table 6.2.7-2 for detailed definitions

Project Phase:
C: Site Preparation / Construction
O: Operation
D: Decommissioning

Direction:
P: Positive
A: Adverse

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

N/A: Not applicable

Geographic Extent:
N: Negligible
L: Low
M: Medium
H: High

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

Duration:
N: Negligible
L: Low
M: Medium
H: High

Significance Determination
S: Significant
NS: Not Significant

Frequency:
N: Negligible
L: Low
M: Medium
H: High

Reversibility:
N: Negligible
L: Low
M: Medium
H: High

Ecological / Societal Value:
N: Negligible
L: Low
M: Medium
H: High

Note: Timing was not included in the original EIS.

6.2.7.9 References

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