Webequie Supply Road

Species at Risk Study Plan

Webequie First Nation

February 26, 2021
661910

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1. Introduction

The proposed Webequie Supply Road Project (WSR) is a new all-season road of approximately 107 km in length from Webequie First Nation to the mineral deposit area near McFaulds Lake (also referred to as the Ring of Fire). A Location Plan for the Project is shown on **Figure 1**. The preliminary corridor for the road consists of a northwest-southeast segment running 51 km from Webequie First Nation to a 56 km segment running east before terminating near McFaulds Lake. A total of 17 km of the corridor is within Webequie First Nation Reserve lands.

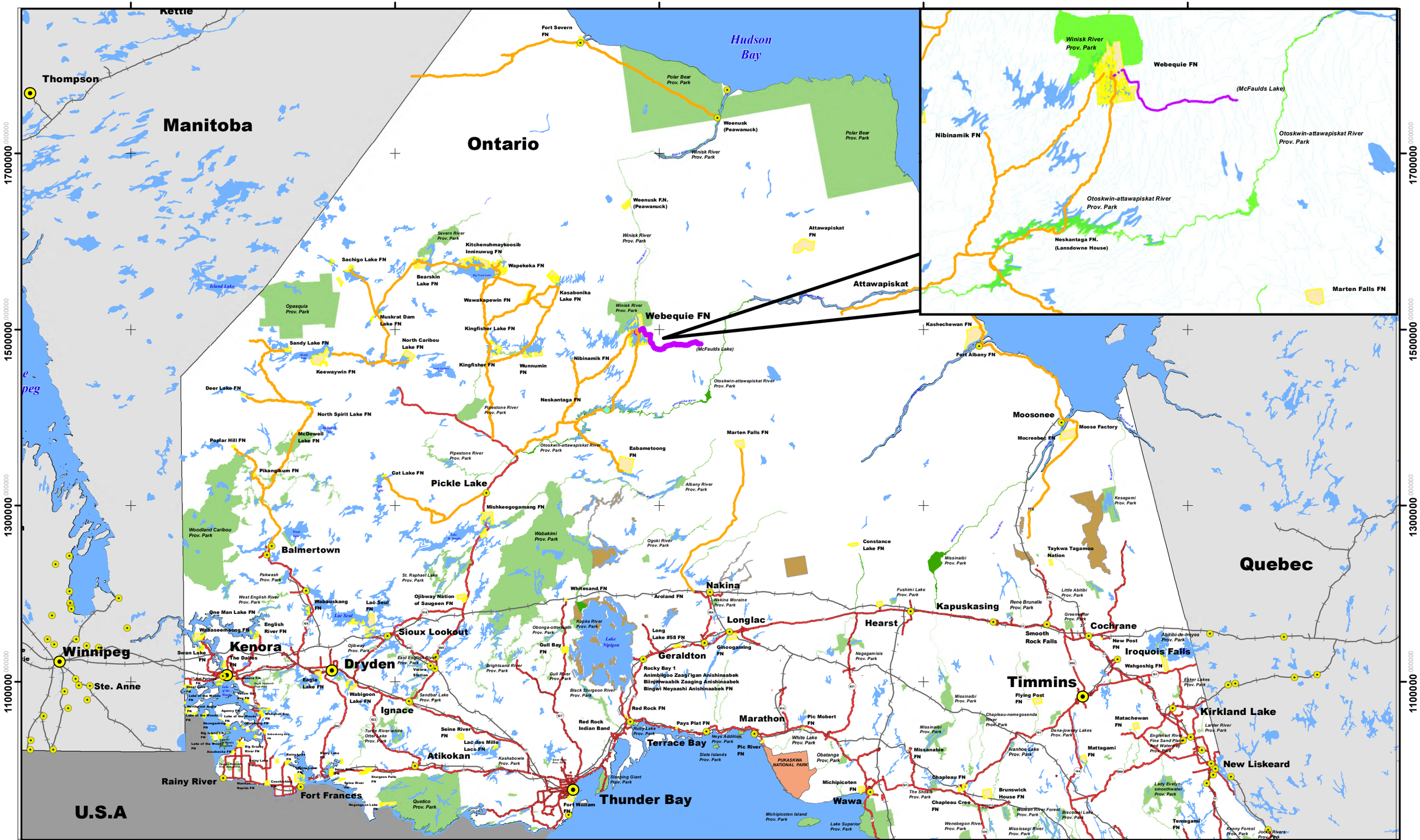
The goals and objectives of the Webequie Supply Road Project are as follows:

- To facilitate the movement of materials, supplies and people from the Webequie Airport to the area of existing mineral exploration activities and proposed mine developments in the McFaulds Lake area;
- To provide employment and other economic development opportunities to WFN community members and businesses that reside in or around the community's reserve and traditional territory, while preserving their language and culture; and
- To provide experience/training opportunities for youth to help encourage pursuit of additional skills through post-secondary education.

On May 3, 2018, the Ontario Minister of the Environment, Conservation and Parks (then Minister of the Environment and Climate Change) signed a voluntary agreement with Webequie First Nation to make the Webequie Supply Road Project subject to an Individual Environmental Assessment under Ontario's *Environmental Assessment Act.* The Project is also subject to meeting the requirements of the federal *Impact Assessment Act.* For the purposes of this Study Plan, the term "EA" is meant to include both the provincial environmental assessment and the federal impact assessment.

The purpose of this document is to present the Study Plan developed to assess the impact of the Webequie Supply Road Project (WSR, the Project) on Species at Risk (SAR) and their habitat. It describes the general approach that will be applied during the EA process to address the requirements of the Impact Assessment Agency of Canada (IAAC, 'the Agency") Tailored Impact Statement Guidelines (TISG) and meet the expectations of the Ontario Ministry of the Environment, Conservation and Parks (MECP) in the context of established SAR considerations governing environmental assessments for road projects.

The SAR Study Plan is being submitted to the IAAC and the MECP requesting that a coordinated review be undertaken with the objective to provide Webequie with technical guidance in meeting the requirements of the federal TISG and provincial Terms of Reference (ToR) for the Project, which is pending approval by Ontario. Note that Ontario's review of the Study Plan is preliminary and secondary to any further review and decisions related to a final approved ToR.



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1.1. Defining Spatial and Temporal Boundaries

1.1.1. Spatial Boundaries

Spatial boundaries define the geographic extent within which the potential environmental effects of the Project are considered. As such, these spatial boundaries define the study areas for the effects assessment. Spatial boundaries to be established for the EA will vary depending on the valued component and will be considered separately for each. The spatial boundaries to be used in the EA will be refined and validated through input from federal and provincial government departments and ministries, Indigenous groups, the public and other interested parties. Spatial boundaries will be defined taking into account the appropriate scale and spatial extent of potential effects of the Project; community knowledge and Indigenous knowledge; current or traditional land and resource use by Indigenous communities; exercise of Aboriginal and Treaty rights of Indigenous peoples, including cultural and spiritual practices; and physical, ecological, technical, social, health, economic and cultural considerations.

At this stage in the EA process, the spatial boundaries for the EA will include the following three (3) study areas to capture the potential direct and indirect effects of the Project for each valued component, unless otherwise specified in a Study Plan:

- **Project Footprint (PF)** – is the identified areas of direct disturbance (i.e., the physical area required for Project construction and operation). The PF is defined as the 35 metres right-of-way (ROW) width for the WSR and temporary or permanent areas needed to support the Project, including laydown/storage yards, construction camps, access roads and aggregate extraction sites. The project footprint is located within the preliminary proposed corridor which is a 2 km wide corridor (same width as the Local Study Area) that will be retained to provide flexibility for refining/developing route options.
- **Local Study Area (LSA)** - is identified as the area where most effects of the Project are likely to be measurable; therefore, along the PF, the LSA will be the focus of data collection to characterize existing environmental conditions. The LSA for most valued components will extend or buffer approximately 1 kilometer (km) from the footprint of the supply road route alternatives within the preliminary proposed corridor (approx. 2 km in width), and 500 m from the temporary or permanent supportive infrastructure. For Caribou (*Rangifer tarandus*) and Wolverine (*Gulo gulo*) the LSA will include the standard LSA for most valued components plus a 10-km buffer and will be spatially applied beyond the preliminary proposed corridor.
- **Regional Study Area (RSA)** – encompasses the area outside of the LSA used to measure broader-scale existing environment conditions and provide regional context for the maximum predicted geographic extent of direct and indirect effects of the Project (e.g., changes to downstream surface water quality, caribou, or changes to socio-economic conditions such as regional employment and incomes). Cumulative effects of the Project in combination with past, present, and reasonably foreseeable developments are typically assessed at this larger spatial scale. The RSA is defined as extending approximately 5 km from the LSA boundary. The Caribou RSA encompasses the entire Missisa and Ozhiski Ranges for the species in Ontario, the Wolverine RSA is proposed to extend 50 km from the outer Wolverine LSA boundary.

For the purposes of the SAR Study Plan the PF, LSA and RSA have been used for the majority of SAR identified (refer to **Table 1**, **Section 2.2** and **Figure 2**) to have a high probability of presence. Study areas were selected to characterize existing environmental conditions and predict the direct and indirect changes from the Project on the subject valued component on a continuum of increasing spatial scales from the

Project Footprint to broader, regional levels. The preliminary selection of study areas also considered the physical and biological properties of the valued component and related evaluation criteria.

The baseline data collection and effects assessment relative to the spatial boundaries will focus on the set of supply road conceptual alternatives within the preliminary proposed corridor, as identified in the federal Impact Assessment Detailed Project Description (November 2019) and the provincial Environmental Assessment draft Terms of Reference (September 2019). The alternatives include the Webequie First Nation community's preferred route for the supply road (35 m right-of-way width) along the centreline of an approximately 2 km wide preliminary proposed corridor and the optimal geotechnical route within the same corridor. The route alternatives are shown in **Figures 2, 3 and 4** with the LSA and RSA boundaries for each route alternative combined to reflect the study area for the Project. At this stage of the EA process the supportive infrastructure components have yet to be determined. It is anticipated that additional alternative routes may be developed during the EA. For example, a route that may be based on optimizing the geometric design of the community preferred route or optimal geotechnical route may be included. Where such additional alternatives are identified, the study area will be adjusted.

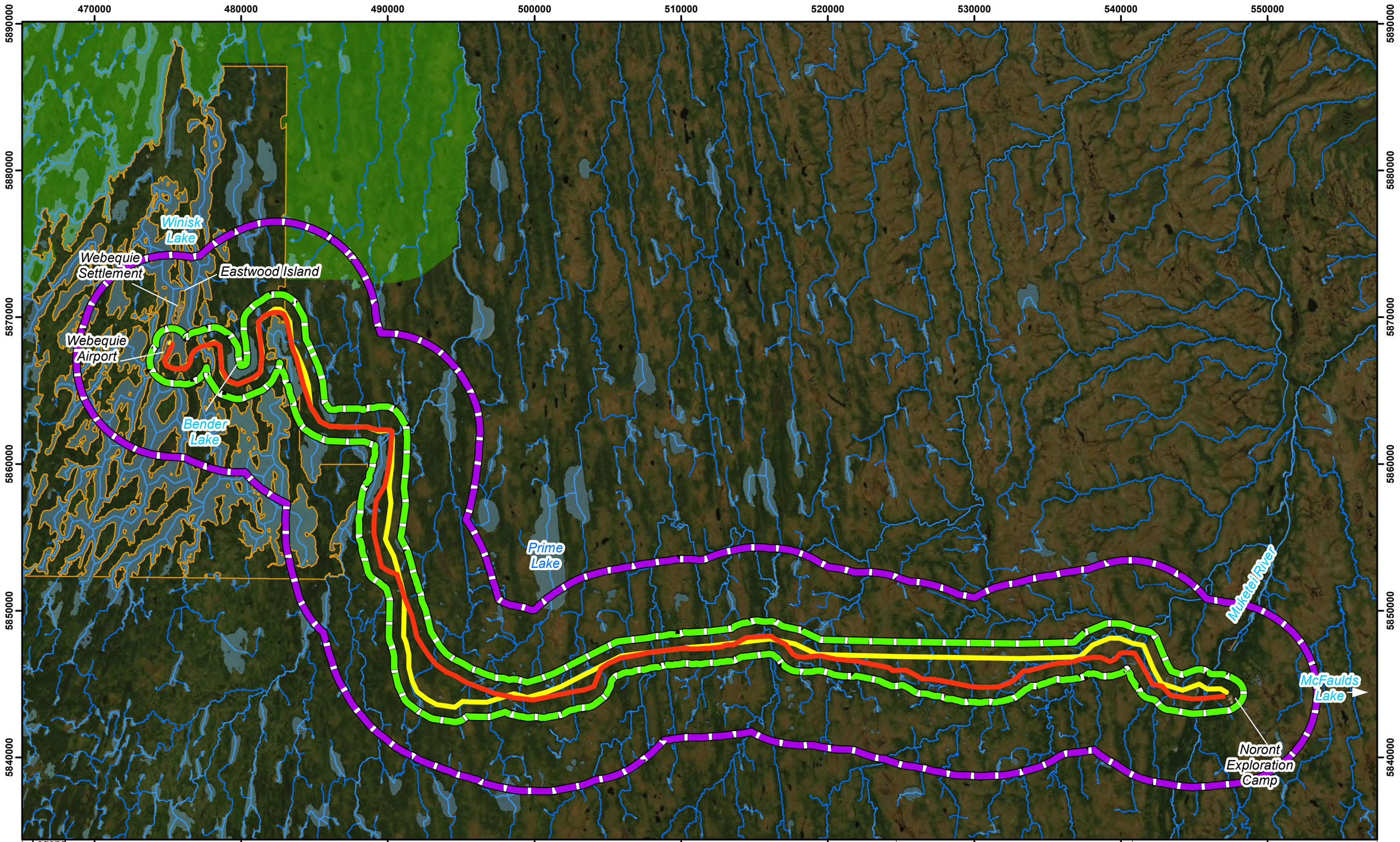
The LSA and RSA have been adjusted for both Caribou and Wolverine (refer to **Figures 3** and **4**). For both species the LSA will include the standard LSA plus a 10 km buffer. The extent of the Caribou and Wolverine LSA is based on minimum recommendations in Section 7.4.1 of the TISG and simulation modeling may indicate a larger buffer. At present, the RSA for Wolverine is proposed to extend 50 km from the Wolverine LSA boundary (61 km from the PF boundary). In order to approximate the area outside the LSA in which maximum geographic extent of direct or indirect effects to Wolverine by the Project might occur, maximum home range size for male Wolverines was used. Dawson *et al*. (2010) determined an average male Wolverine home range size of 2563 km^2 between December and October near Red Lake Ontario. The largest male home range calculated during this study was 4109km. Under the assumption of a circular homerange of 4000 km^2 in area, the approximate diameter of is 75 km . As such, a buffer of 75 km has been applied to the Wolverine LSA to determine the RSA for this species. The Caribou RSA encompasses the entire Missisa and Ozhiski Ranges for the species in Ontario, as requested by MECP and outlined within the TISG.

1.1.2. Temporal Boundaries

The EA process was designed to evaluate the short-term and long-term changes resulting from the implementation of the Project and associated effects on the environment, including where project activities may overlap such as the restoration (e.g., revegetation) of temporary access roads that could occur during the operation.

Implementation of the Project will occur in phases (refer to Section 4.3.4 of the ToR). The potential interactions with the natural, cultural and socio-economic environments and the potential occurrence of residual impacts are anticipated to be different in each phase. In order to focus the assessment, the key activities can be divided into the three main phases:

- **Construction Phase**: All the activities associated with the initial development of the road and supportive infrastructure;
- **Operations Phase**: All activities associated with operation and maintenance of the road and any other permanent supportive infrastructure (e.g., operations and maintenance yard, aggregate pits) that will start after construction and continue indefinitely; and



Legend

- Optimal Geotechnical Route
- Community Preferred Route
- Local Study Area (LSA 1km From Alternative Footprints)
- Regional Study Area (RSA 5km From Alternative LSA's)
- Webequie First Nation Reserve
- Waterbody
- Watercourse
- Winisk River Provincial Park

WSR WEBEQUIE SUPPLY ROAD

0 5 10 Km

N

NAD 83
UTM Zone 16N

Webequie Supply Road

Preliminary Route Alternatives and Combined Study Areas

Date: 2020/06/03	File Number: 649920	Sub Code: 0000
Figure Number: 2		Rev. 0

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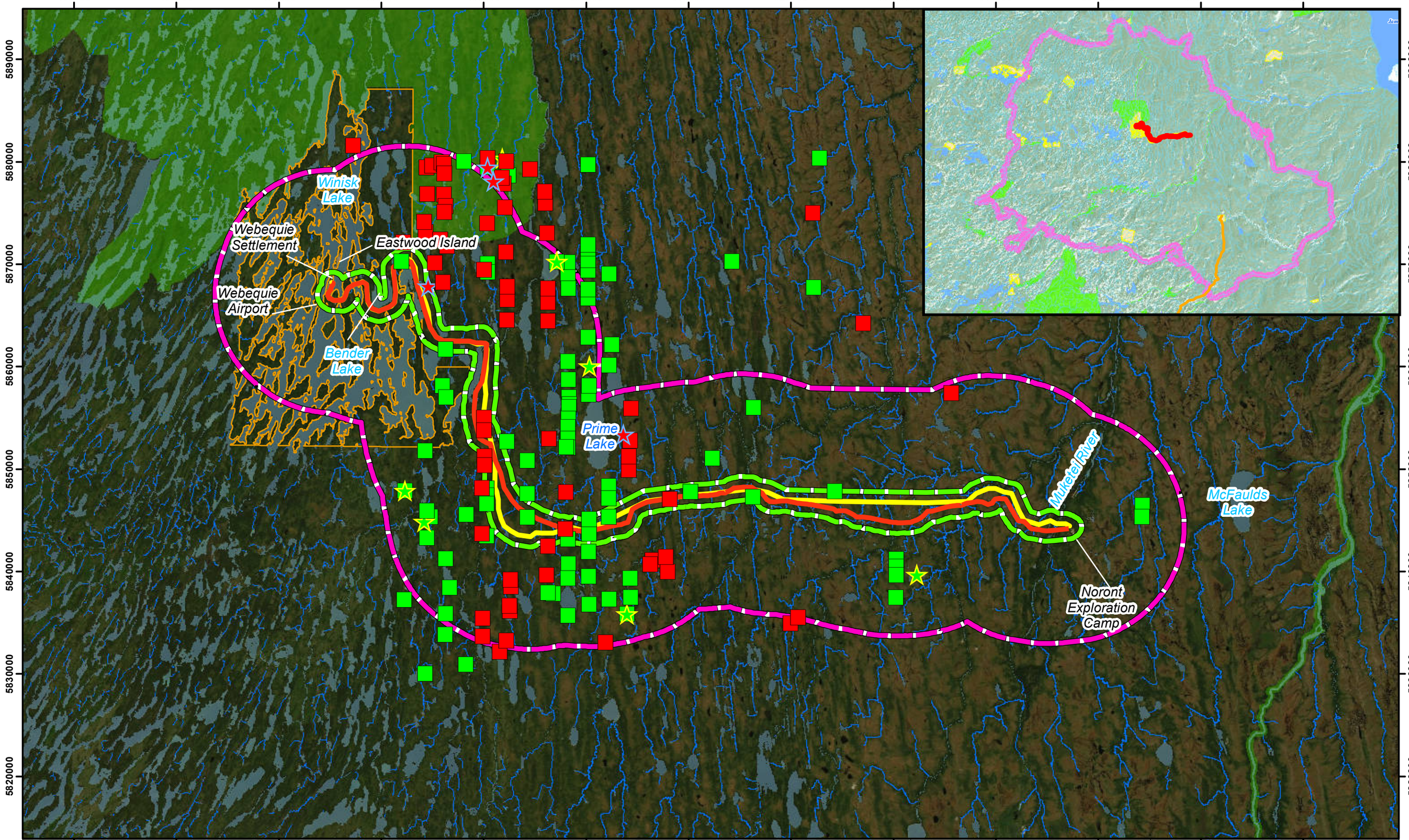

Legend

Caribou Observations

- Live Sighting
- Live Sighting
- Tracks
- Live Sighting

- Optimal Geotechnical Route
- Community Preferred Route
- Caribou Local Study Area
- Standard SAR Local Study Area
- Caribou Regional Study Area
- Webequie First Nation Reserve
- First Nations Reserve
- Winisk River Provincial Park
- Waterbody
- Watercourse

WSR WEBEQUIE SUPPLY ROAD

0 5 10 Km

N

NAD 83
UTM Zone 16N

Webequie Supply Road

Caribou Observeations and Study Areas

Date: 2020/11/27	File Number: 649920	Sub Code: 0000
Figure Number: 3		Rev. 0

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Winisk Lake
Webequie Settlement
Eastwood Island
Webequie Airport
Bender Lake
Prime Lake
Mukatei River
McFaulds Lake
Noront Exploration Camp

Legend

2019 Wolverine Observation
Live Sighting
Tracks
Tracks
Optimal Geotechnical Route
Community Preferred Route
Wolverine Local Study Area
Wolverine Regional Study Area
Webequie First Nation Reserve
Winisk River Provincial Park
Waterbody

WSR WEBEQUIE SUPPLY ROAD

0 5 10 20 30 Km

N

NAD 83
UTM Zone 16N

Webequie Supply Road

Wolverine Observations and Study Areas

Date: 2020/11/27	File Number: 649920	Sub Code: 0000
Figure Number: 4		Rev. 0

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- **Decommissioning/Abandonment/Closure Phase**: The Project will be operated for an indeterminate time period; therefore, retirement (decommissioning/abandonment/closure) is not anticipated and will not be addressed in the EA. Note that clean-up and site restoration, including the decommissioning and removal of temporary infrastructure (e.g., access roads) will be addressed in the construction phase.

Although generally based on the planned stages described above, the final selection of temporal boundaries is criteria-specific and further detail will be provided in the discipline-specific assessment sections of the EAR/IS. Temporal variation or patterns in potential effects associated with different criteria (e.g., habitat use by migratory birds or fish spawning, or trends over time in populations and employment) will also be considered. Baseline data collection for all biophysical valued components will be provided for a minimum of two (2) years, unless specified otherwise. Temporal boundaries spanning more than one (1) year will enable accounting for annual or seasonal variations (e.g., the effects of storms on migration, delays in the onset of spring conditions, or early snowfalls).

2. Study Plan

2.1. Methodology

This section describes the planned approach to baseline data collection and the assessment of the potential impacts of the WSR Project to SAR and their habitat to meet the requirements of the TISG (Sections 8.11 and 15.4) and, where applicable, to meet the requirements of the Ministry of the Environment, Conservation and Parks.

A list has been provided of all provincially listed protected SAR, species assessed by the COSEWIC that have the status of Extirpated, Endangered, Threatened or of Special Concern; and species listed under Schedule 1 of the federal *Species at Risk Act* that may be directly or indirectly effected by the Project, and is provided in **Appendix A** (this list was originally presented in the provincial draft EA Terms of Reference).

Baseline investigations for the WSR will endeavour to collect data in the project area of sufficient quantity and quality, and using standardized methodologies, to achieve the following requirements and objectives outlined in the TISG issued by IAAC with respect to SAR and those requirements identified by the MECP SAR Branch from their comments on the draft ToR and other correspondence. At a minimum, the combined information from existing data and field surveys will be detailed enough to describe the distribution and abundance of all SAR in relation to the defined study areas (i.e., PF, LSA, and RSA). Data will be collected in a manner that enables reliable extrapolations in space (i.e., at minimum to PF, LSA and RSA) and in time (i.e., across years), and will identify any and all federal and provincial SAR and/or critical habitat in the defined study areas for the Project. Generally, the field investigations/programs outlined in the following sections are designed to:

- Optimize detectability and provide for comprehensive coverage at the appropriate time of year (e.g., survey breeding habitat during breeding season, stopover habitat during migration);
- Collect SAR data to represent the following temporal sources of variation: among years; within and among seasons (e.g., spring dispersal, breeding, late summer/fall migration and swarming, hibernation); and within the 24-hour daily cycle;
- Use existing data and literature as well as surveys to collect field data for at least two (2) years to provide current field data that reflects the natural interannual and seasonal variability;
- Describe the distribution and abundance of SAR in relation to the PF, LSA and RSA;
- Provide data and summary lists for each species at risk ranked according to: abundance; distribution across survey sites (i.e., percentage of survey stations at which they were recorded); abundance in each habitat type; and map showing areas of highest concentrations or areas of use by species;
- Identify and map all SAR, critical habitat, and residences within the PF and LSA; and
- Document baseline conditions within the PF, LSA and RSA to support the effects analysis in the ESR/IS.

The following additional objectives apply to SAR bats (i.e., Little Brown Bat):

- Quantify baseline bat activity (e.g., using acoustic detection to calculate an index of bat activity) to evaluate relative use of different habitats or features in the project area to help support and evaluate project siting decisions or impact predictions;
- Locate and confirm use of high-value features, such as roosts, foraging areas and hibernacula;

- Identify potential regional migration corridors; and
- Identify site-specific travel corridors and movement patterns.

The following additional objectives apply to Caribou:

- Describe boreal Caribou use of the study areas (e.g., distribution, movement) over time; complement existing data if data within the project study areas are insufficient or unavailable to be able to understand how caribou use the habitat;
- Describe the type and spatial extent of biophysical attributes, as defined in Appendix H of the 2019 proposed amended boreal caribou Recovery Strategy 45 present in the study areas;
- Identify and characterize general habitat (GHD) for caribou under the *Endangered Species Act, 2007* using provincial policy and technical direction (sources llisted in **Section 2.2**); and
- Conduct surveys to complement existing data if data within the project study areas are insufficient or unavailable, to be able to understand where the biophysical attributes occur.

Further description of information sources, methodologies, analysis, and data standards applied to achieving the above objectives are presented in the following sections.

2.2. Background Information Review

Information to characterize existing conditions for SAR and their habitat for the Project will draw upon the following secondary sources:

- Indigenous Knowledge information obtained through consultation with Indigenous communities;
- Regulatory databases;
- Aerial photography;
- Project LiDAR imagery and terrain data gathered by J. D. Mollard and Associates; 20 cm resolution (2016);
- Geographic Information System (GIS) databases;
- Information obtained from regulatory agencies and other stakeholders;
- Canadian Conservation Data Centres;
- Environment and Climate Change Canada's guidance on Bird Surveys;
- Natural Heritage Reference Manual (2010);
- Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (2010);
- Significant Wildlife Habitat Technical Guide (2000);
- Significant Wildlife Habitat Ecoregion Criteria Schedules (2012);
- Natural Heritage Information Center (NHIC) Biodiversity Explorer database;
- Provincial Park Management Plans and Life Science Reports (various dates);
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC) reports;
- Species at Risk in Ontario (SARO) List;
- Ontario's Caribou Conservation Plan (2009);
- Integrated Assessment Protocol for Woodland Caribou Ranges in Ontario (IAP);
- *Categorizing and Protecting Habitat under the Endangered Species Act* (2012),
- General Habitat Description for the Forest-dwelling Woodland Caribou (*Rangifer tarandus caribou*; GHD);
- Caribou GHD Mapping (MECP);
- Range Management Policy in Support of Woodland Caribou Conservation and Recovery (RMP);

- Integrated Range Assessment for Woodland Caribou and their Habitat: The Far North of Ontario, 2013 (IRAR);
- Far North Technical Report (FNTR);
- Caribou Resource Selection probability Functions Describing the Probability of Resource Use at the Range Scale (Hornseth and Rempel, 2016);
- Caribou, Moose, and Wolf Occupancy Models Describing their Distribution in the Far North (Poley *et al.*, 2014);
- Wolverine Occupancy Models Describing the Distribution of Wolverine in the Far North (Ray *et al.*, 2018);
- Relevant SAR Recovery Plans;
- Ontario Mammal Atlas. 1994;
- North American Landbird Conservation Plan (Bird Conservation Regions 7 and 8);
- iNaturalist.com;
- The Atlas of the Breeding Birds of Ontario, 2007; Bird Conservation Region Strategies;
- eBird.org;
- Ontario Nature Reptile and Amphibian Atlas;
- Ontario Freshwater Fishes Life History Database;
- Department of Fisheries and Oceans Aquatic Species at Risk Mapping;
- Royal Ontario Museum Ichthyology Collection Mapping (Royal Ontario Museum, 2016);
- MNRF Fish ON-line (MNRF, 2016b) database;
- MNRF trapping records;
- The Ecosystems of Ontario, Part 1, Ecozones and Ecoregions, William J. Crins *et al*. (Ministry of Natural Resources, 2009);
- Geology Terrain Data (1:100K), Northern Ontario Engineering Geology Terrain Study, published by Ministry of Northern Development and Mines (MNDM), March 2006;
- Noront Eagle's Nest Environmental Studies Report (Noront, 2017);
- Far North Biodiversity Project; and
- Other previously conducted environmental studies and academic publications.

Based on the background information review, field studies conducted to date, and consultations with the MECP, SAR species known to occur within the project area are listed in **Table 1**. Additional details about SAR known to inhabit the region, habitat requirements, and reason for inclusion/exclusion from the project area are included in **Appendix A**.

Table 1: Species at Risk Known to Occur within the Project Area

Species					
Common Name	Scientific Name	COSEWIC[1]	SARA[2]	ESA[3]	S-RANK[4]
Little Brown Myotis	*Myotis lucifugus*	Endangered	Endangered (Schedule 1)	Endangered	S3
Wolverine	*Gulo gulo*	Special Concern	Special Concern (Schedule 1)	Threatened	S2S3
Caribou (Boreal population)	*Rangifer tarandus*	Threatened	Threatened (Schedule 1)	Threatened	S4

Species					
Common Name	Scientific Name	COSEWIC[1]	SARA[2]	ESA[3]	S-RANK[4]
Caribou (Eastern migratory population)	*Rangifer tarandus*	Endangered	No Status	Special Concern	S4
Bald Eagle	*Haliaeetus leucocephalus*	Not at Risk	No Status	Special Concern	S2N, S4B
Bank Swallow	*Riparia riparia*	Threatened	Threatened (Schedule 1)	Threatened	S4B
Barn Swallow	*Hirundo rustica*	Threatened	Threatened (Schedule 1)	Threatened	S4B
Canada Warbler	*Cardellina canadensis*	Threatened	Threatened (Schedule 1)	Special Concern	S4B
Common Nighthawk	*Chordeiles minor*	Special Concern	Threatened (Schedule 1)	Special Concern	S4B
Evening Grosbeak	*Coccothraustes vespertinus*	Special Concern	Special Concern (Schedule 1)	Special Concern	S4B
Olive-sided Flycatcher	*Contopus cooperi*	Special Concern	Threatened (Schedule 1)	Special Concern	S4B
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Special Concern (Schedule 1)	Special Concern	S4B
Yellow Rail	*Coturnicops noveboracensis*	Special Concern	Special Concern (Schedule 1)	Special Concern	S4B
Lake Sturgeon (Southern Hudson Bay - James Bay populations)	*Acipenser fulvescens*	Threatened	No Status	Special Concern	S4B

[1] Committee on the Status of Endangered Wildlife in Canada
[2] Federal Species at Risk Act
[3] Species at Risk in Ontario List. (2014, August 11). Ministry of Natural Resources and Forestry. Retrieved September 12, 2014, from http://www.ontario.ca/environment-and-energy/species-risk-ontario-list
[4] Provincial Sub-rank

Status

No Status: Species has not been assessed under the Species at Risk Act.

Special Concern: Species that may become threatened or an endangered species because of a combination of biological characteristics and identified threats.

Threatened: Species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.

Endangered: Species that is facing imminent extirpation or extinction.

2.3. Survey Site Selection

The study areas under consideration include the standard project definitions (PF, LSA, and RSA) described in **Section 1.1.1.** Survey site selection is described in the methodology for each survey type.

Survey site selection focused on sampling of the lands proximal to the identified conceptual route alternatives within the proposed preliminary corridor, that make up the proposed PF, LSA and RSA. After much consideration, it was determined that developing a stratified computer driven sampling model was not an appropriate method to determine survey sites at this stage of the study. This decision was based on the fact that field work had already been completed in 2019 and the selection of a preliminary proposed corridor and alternative conceptual routes for further consideration and analysis in the EA, as detailed in the ToR and Detailed Project Description. Instead a more focused approach was used to fully capture data along the selected conceptual routes, and known rare habitat types, to support the effects assessment. For example, an increased sampling effort was applied to upland habitat since only 6.284% of the LSA is considered upland forest type, of which 0.334% is deciduous, 0.51 % mixed, and 5.44% conifer. The site selection process was done by reviewing existing aerial/lidar and satellite imagery, the results from on-going vegetation/habitat classification, along with other background information, and consultation undertaken to date. These data sources were then used to establish locations for survey sites based on the professional opinion of EA biologists to ensure a stratified sampling of all habitat types with adequate distribution across the LSA and RSA were captured, as well as suitable number of sample locations within known rare habitat types and areas that may be potentially directly impacted by the Project. This selection process was conducted prior to all SAR field studies that were conducted in 2019, and those planned for 2020. As such sample locations have been selected to ensure adequate representation in the PF, LSA, and RSA for the proposed WSR and supportive infrastructure (e.g., aggregate extraction areas, construction camps, access roads, etc,.) with the goal of determining any potential variation between the study areas as well as the variation between discrete habitats found therein. Species area curves will also be used to make a final determination of whether sampling has been effective in capturing the potential species present within each site.

2.4. Geomatics and Habitat Typing

The ongoing vegetation classification program (refer to Vegetation Study Plan) will support the SAR program habitat classification process. For that program, original source data were taken from the most recent Land Information Ontario (LIO) Wetland, Watercourse/Waterbody dataset, and the Far North Land Cover files. Digital satellite imagery was sourced from the ArcGIS base maps. It was determined that the LIO wetland and waterbody data provided the most accurate starting point for wetland feature refinement, since it generally agreed with the Far North land Cover data, while providing more detailed delineation of both the wetlands and waterbody features. Areas of no data/unknown in the LIO wetland and waterbody datasets were filled in with the values from the Land Cover dataset where applicable.

The supply road conceptual alternatives (i.e., community preferred route and optimal geotechnical route) within the preliminary proposed corridor were buffered to 1 km from the PF for the LSA, and 5 km from the LSA boundary for the RSA, and then superimposed over the resulting mapping. Within the RSA, a desktop aerial interpretation survey of the forests, wetlands, lakes and rivers was conducted to refine and re-delineated all feature class polygons, and an initial vegetation type definition was applied based on published sources and available satellite imagery. The definition of the polygons within the data set were further refined to coarse ecosites, such as Shrub Bog, Conifer Forest and Treed Fen. These combined and

revised data were used as the new baseline for the selection of sample points for the 2019 field season, and further refinement.

The second round of refinement, of the baseline data resulting from step one, was done within the LSA at a smaller scale, using additional LiDAR imagery and terrain and soil data gathered by J. D. Mollard and Associates (2016). These data, as well as the results of the 2019 summer field surveys, were used to more accurately define ecosites and their boundaries within the LSA. Data from the field survey were treated as the most accurate and those points were used to refine the classification of the polygons in which they were located; these classifications were then extrapolated to other polygons with similar visual characteristics, but not to the same degree of specificity. For example, a point may suggest an area as a specific conifer forest type, but visually similar areas separated from the polygon in which the point is located would be labelled only to Conifer Forest, since information such soil type, a key determinant of ecosite classification, is unavailable at this time. These data will be updated as future field surveys are completed and more data collected.

Habitat type will also be characterized at each distinct survey station visited during baseline studies. In order to support characterization at these locations, each site will be photographically documented with 13 photos, one at each cardinal direction (N, E, S, W): 1 photo at shoulder height with arm and camera extended parallel to ground, 1 photo with arm at 45-degrees (from body position) pointing down, and 1 photo with arm extended at 135-degrees (from body position) pointing up, and one photo with arm extended vertically. Photos will be interpreted by qualified individuals according to one or each of the classification schemes: Ontario Ministry of Natural Resources and Forestry's (MNRF) Ecosites of Ontario: Boreal Range ELC system, and/or the Canadian Wetland Classification System. To the extent possible, all candidate survey sites will be attributed to a 100m buffer around site centroid, areal coverage and percentage of each land cover class be assigned to sites, and these values will be used as inputs to evaluations of representative habitat.

Complete data sets from any survey sites, including GIS files will be provided. Databases and GIS files will be accompanied by detailed metadata that meets ISO 19115 standard 29.

2.5. Data Analysis/Abundance and Distribution Modelling

Correlative Species Distribution Models (SDMs), will be developed to provide quantitative descriptions of species distributions within the project study areas based on associations between observational data and species-specific environmental predictors determined through review of existing literature. These will be further refined with point count, acoustic, and aerial survey data from the 2019, and 2020 field programs. Where sufficient field data is available, species abundance models (SAMs), will be used to quantify indices of abundance or density rather than occurrence. The combination of these models will be used to identify key habitat factors for species of interest, where data is sufficient to validate the model (Milsom *et al*. 2000, Morrison *et al*. 2006). When possible, model data will be used to develop predictive maps on species distribution and abundance. These maps will be also used to predict population responses to the development of the project and inform future monitoring requirements.

Explanatory (i.e. covariate) data will be collected during each bird survey as well as through the vegetation sampling programs and background information review to support modelling so as to adequately represent the spatial and temporal sources of variation. The following presents a preliminary list of covariates which may be used to support the modelling process, dependant on individual species habitat requirements that may be extrapolated across a landscape scale (Additional covariates may be identified at a later time):

- *Land Cover Composition*
  - Land Information Ontario (LIO) Wetland, Watercourse/Waterbody classification
  - Far North Land Cover classification
  - Percent deciduous cover
  - Percent Conifer cover
  - Forest age (years)
  - Percent shrub cover
  - Area of waterbody or open wetland
  - Area and % coverage of marsh or emergent vegetation
  - Percent coverage of emergent vegetation
- *Soil Type*
  - Mineral
  - Organic
- *Geomorphology*
  - Percent exposed rock
  - Eskers
- *Hydrological Processes*
  - Distance to nearest waterbody or watercourse
  - Density of Waterbodies (neighbourhood metric)
  - % Open Water (HWL) for open wetlands
- *Climatic Conditions*
  - Annual Range in Temperature
  - Mean seasonal Minimum/Maximum Temperature (autumn, winter, spring, summer)
  - Mean Climate Moisture Index
  - Mean Seasonal Precipitation (autumn, winter, spring, summer)

2.6. Field Surveys

A corridor-specific assessment of SAR wildlife and habitat within the preliminary proposed corridor for the WSR was conducted in 2018 and 2019, including efforts to confirm species presence for all SAR listed in **Table 1** as likely to inhabit the project area. It is the Project Team's intent to conduct future scheduled field surveys using consistent accepted scientific protocols, supplemented by additional guidance provided by provincial and federal experts since the completion of the surveys cited herein. Relevant additional/alternative methods are described below, as appropriate.

To gather the information required to support the EA, the following field surveys have been conducted, or are ongoing as of 2020:

- Winter Aerial Surveys for Caribou and Wolverine in 2018 and 2019;
- Caribou Nursery Surveys;
- Bat Hibernacula and Maternity Roost Screening;
- Bat Acoustic Surveys in 2019 and 2020;
- Breeding Bird Point Count Survey in 2019 and 2020;
- Bird Acoustic Surveys;
- Crepuscular Bird Surveys; and
- Raptor Nesting Data Collection in 2019 and 2020.

These surveys were designed and implemented with the purpose of sampling wildlife diversity and composition within the project area, as well as informing the presence of provincial Significant Wildlife Habitat (SWH) types. Data collected during each survey contributed to the assessment of multiple SWH types, as well as the presence/absence of SAR that use those specialized habitat types. Targeted, species-specific surveys for Caribou, Wolverine, and bats (notably Little Brown Myotis [*Myotis lucifugus*] and Northern Myotis [*Myotis septentrionalis*]) and crepuscular birds (Common Nighthawk [*Chordeiles minor*]) reflect the secretive nature of these species and the increased survey effort (in number and duration) required to gather sufficient occurrence, distribution, abundance, and habitat availability data in relation to the study areas and inform a robust impact assessment. Aspects of both provincial and federal methodologies and recommendations were considered to the extent possible during the execution of the WSR field program. In addition to the studies listed above that have been completed and/or are ongoing, the following surveys have been proposed for 2021 as a result of consultation (February 2020) with the Species at Risk Branch of the MECP:

- Caribou Collaring Survey
- Wolverine Occupancy Survey

Existing aerial/satellite imagery, along with other background information has (and will) be used to establish survey locations prior to execution of the field program. It is Webequie's intent to collect field data over multiple years (2018 and 2020) to understand natural variability in populations.

2.6.1. 2018 Winter Aerial Surveys for Caribou and Wolverine

In support of the coordinated federal-provincial environmental assessment process, a winter aerial survey plan was developed in consultation with the Ministry of Natural Resources and Forestry (MNRF, Nipigon District MNRF biologist Philip Wilson and Regional Manager Dave Barker; email and phone communication) in late 2017 and January 2018. The three primary objectives for surveys agreed upon with the MNRF included: 1) inventory the winter presence of Caribou, 2) identify Caribou winter habitat in proximity to the proposed preliminary route, and 3) inventory the winter presence of Wolverine.

Caribou has been determined to exist as two distinct populations in Ontario. The Boreal population is distributed broadly across Northern Ontario from the Québec to the Manitoba border. The northern boundary for the Boreal population occurs along the southern boundary of the Northern Taiga Ecoregion (1E) (Crins *et al*., 2009). The Eastern Migratory population uses tundra and forest-tundra transitional zones along the Hudson Bay coast during the spring and summer periods. In the Far North, it is recognized that caribou movements across this zonal boundary do occur (Berglund *et al*., 2014; MNRF, 2014). The Eastern Migratory population moves south to boreal forest habitat within the Big Trout Lake (2W) and Hudson Bay Lowlands (2E) Ecoregions, which includes James Bay, in the fall and winter. Movement and habitat use by this population is complex, but males are thought to remain in the forest and forest-tundra areas during the spring calving season, while females move further north to the calving grounds.

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

Only Boreal Caribou would typically be expected to calve within the RSA and LSA during the summer; however, both Boreal and Eastern Migratory Caribou are expected to occur within the LSA and RSA during the winter and during the spring and fall seasonal movement periods. Winter surveys would simply detect

the presence of "Caribou". The aerial surveys are purely designed to spot caribou presence and sign within the study area, and as such it is not possible to make a determination of the specific population observed. Further collaring studies are being planned (refer to **Section 2.6.4**), during which geolocation data will be collected and seasonal and annual movements will be determined for collared individuals to help confirm the populations utilizing the study areas.

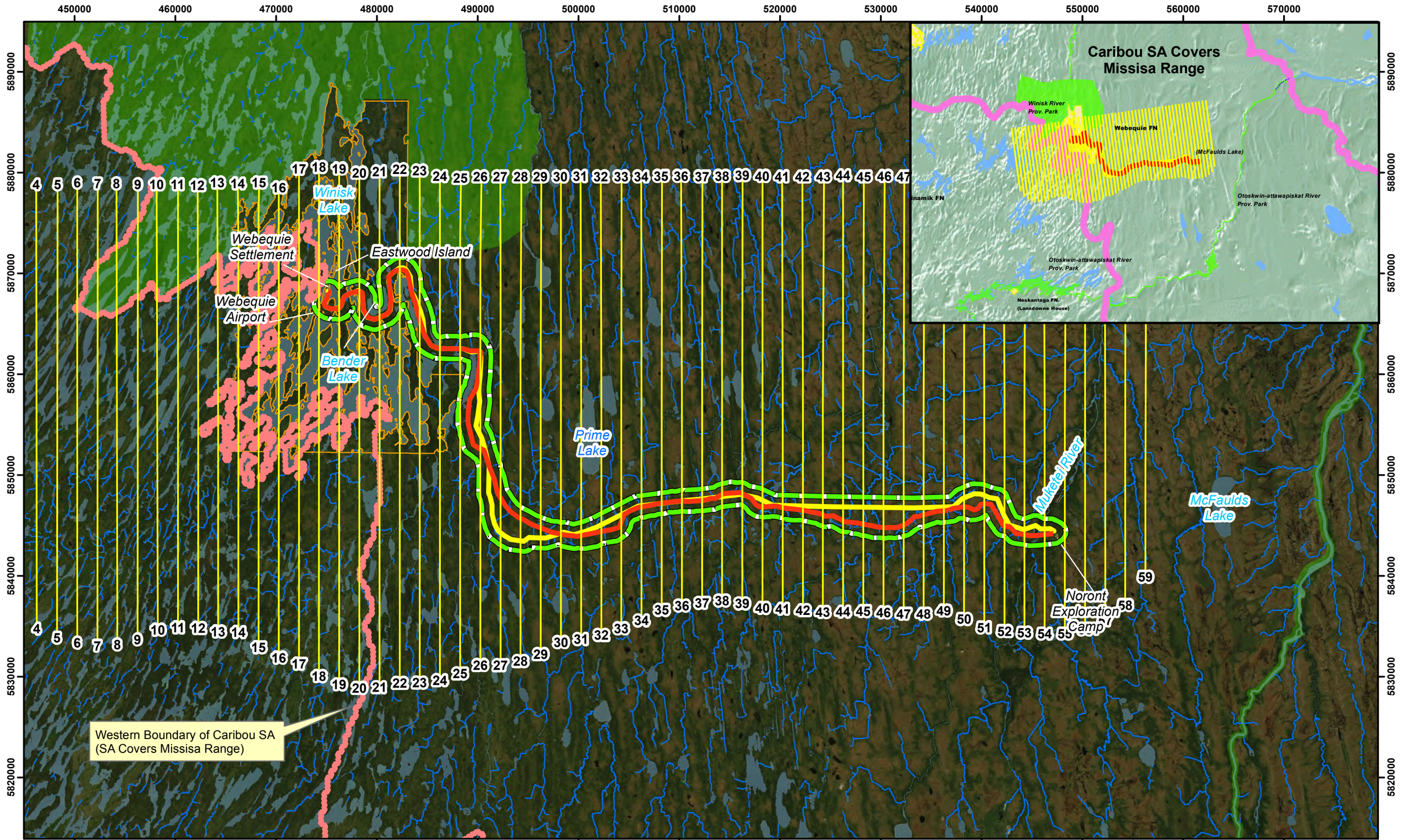
2.6.1.1. Survey Methodology

To the extent possible, the winter 2017 – 2018 aerial survey for Caribou was conducted according to the survey methodology for identifying and delineating woodland caribou winter habitat provided by the MNRF in their publication titled *Selected Wildlife and Habitat Features: Inventory Manual* (Ranta, 1998). This survey methodology for Caribou was also considered an appropriate preliminary survey method for identifying presence of Wolverine within the study areas. The resulting survey plan consisted of 59 transects oriented in the north-south direction, which varied in length between 37 and 51 km (refer to **Figure 5**). The survey totalled 2,666 km flown and 5,800 square kilometres covered across the Missisa and Ozhiski Caribou Ranges.

This survey plan was intended to provided survey coverage across all proposed alternative conceptual corridors for the WSR (at the time) and all functionally-relevant Caribou wintering areas (Category 1 habitat) that intersected those alternatives. While total coverage of the delineated study area was intentional and transects were positioned at regular intervals, and at orientations that maximize track visibility, the location of transects is considered random and independent of the particular landscape formations that are covered by each transect.

Secondary objectives for the survey included inventorying wildlife active in the winter, noting the presence and location of stick nests, and noting the location of other possible SWH habitat features, such as caves and habitats with bat maternity roost qualities, and other wildlife active in the winter, such as Gray Wolf (*Canis lupus*), Canada Lynx (*Lynx canadensis*), Fisher (*Martes pennanti*), American Marten (*Martes americana*), River Otter (*Lontra canadensis*), Red Fox (*Vulpes vulpes*), Snowshoe Hare (*Lepus americanus*), and birds of prey.

The aerial survey consisted of flying a grid of parallel transects oriented in a north-south direction, using a Bell 2016 Long Ranger helicopter. The standardized parallel transect spacing of 2 km was used, as suggested in the MNRF Protocol. Surveys were conducted by a three-person team experienced in aerial wildlife surveys to maximize detection of wildlife. The survey team was joined by Eric Jacob, a member of Webequie First Nation and local trapper throughout the entirety of the surveys. Eric's participation helped to further maximize detection of wildlife and provided local and traditional knowledge of wildlife occurrence and behaviour in the area.



Legend

- Caribou Transects 2018
- Optimal Geotechnical Route
- Community Preferred Route
- Caribou RSA (Covers Missisa Caribou Range)
- Local Study Area (LSA 1km From Alternative Footprints)
- Webequie First Nation Reserve
- Winisk River Provincial Park
- Waterbody
- Watercourse

WSR WEBEQUIE SUPPLY ROAD

0 5 10 Km

N

NAD 83
UTM Zone 16N

Webequie Supply Road

2018 Winter Caribou Aerial Survey Transects and Study Areas

Date: 2020/08/12	File Number: 649920	Sub Code: 0000
Figure Number: 5		Rev. 0

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The surveys took place between February 22, 2018 and February 28, 2018 to ensure deep snow conditions (>30 cm) and were conducted on consecutive days. Surveys were conducted during clear, bright weather conditions between 09:00 and 16:00 whenever possible in order to avoid long shadows and maximize visibility of wildlife and their tracks. If conditions changed to heavy snow, surveys were stopped and continued the following day. Survey flight was conducted at an altitude of 100 m to 200 m and at a speed of approximately 80-100 km/h. Prior to the survey, the survey transect grid was uploaded to the helicopter GPS system for efficient navigation while conducting the survey. A GPS track was continuously recorded during the survey on a handheld Garmin GPS unit to document the flight path. All wildlife observations made during the survey were recorded immediately on a data sheet and recorded data included date, time, transect number, UTM coordinates, species name, number of individuals, and habitat type. To the extent possible, caribou sex (male, female, unknown) and age (adult, yearling, calf) was determined, unless undue stress on the animals would result from the determination of these details. Other signs of Woodland Caribou or other wildlife presence were also recorded, including tracks and cratering. New tracks were distinguished from old tracks, and digital photographs of wildlife were taken whenever possible.

2.6.2. 2019 Winter Aerial Surveys for Caribou and Wolverine

2.6.2.1. Survey Methodology

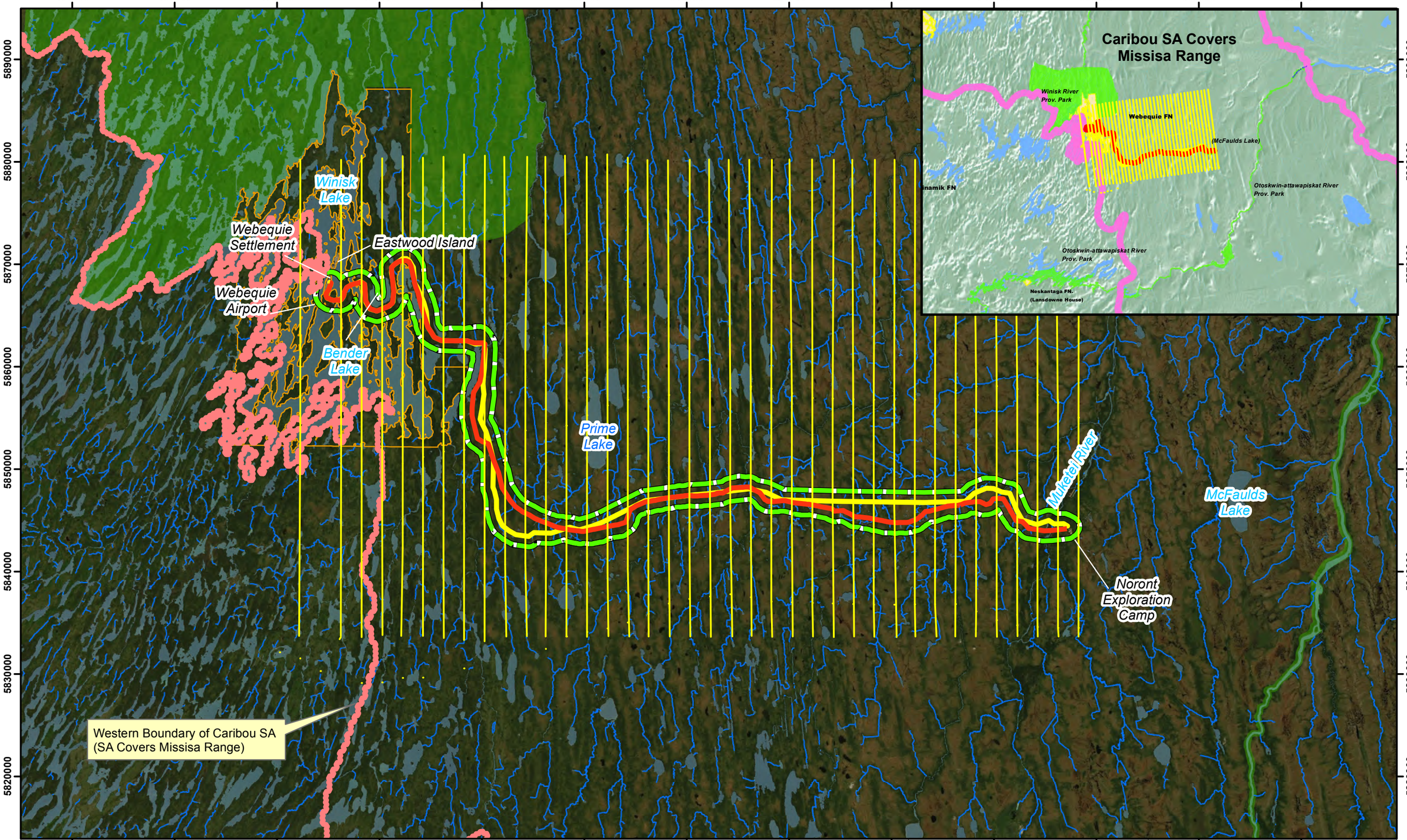
At the request of Nipigon District MNRF (Philip Wilson and Dave Barker; email and phone communication), a second aerial winter survey for Caribou and Wolverine was developed for the winter of 2019. Objectives for the 2019 survey were similar to those for the 2018 survey and included: inventory the winter presence of Caribou; identify particular habitat complexes that are being used as year-over-year for overwintering habitat by Caribou in proximity to the preliminary preferred corridor; and inventory the winter presence of Wolverine.

As a result of data collected during the 2018 winter aerial survey, it was decided that transects west of Webequie First Nation would be excluded, as this area had burned in a forest fire approximately 40 years ago and the forest cover has regenerated, but the habitat is currently not likely to support Caribou. No Caribou were observed in this area in 2018. In total, 39 transects were flown to cover the extent of the preliminary preferred corridor (107 km in length). Transects all measured 47 km in length and a total survey length of 1,833 km was flown (refer to **Figure 6**). Similar survey protocol as followed in 2018 were followed during the 2019 survey. Once again, the survey team was joined by Eric Jacob, a member of Webequie First Nation and local hunter and trapper.

2.6.3. Caribou Nursery Habitat Survey (2019)

2.6.3.1. Survey Methodology

Based on the recommendation of the Nipigon District MNRF (Philip Wilson, personal communication, 2019), nursery habitat surveys in 2019 were conducted according to methodology detailed in the MNRF publication *Selected Wildlife and Habitat Features: Inventory Manual* (Ranta, 1998). Habitat descriptions provided in the *General Habitat Description for the Forest-dwelling Woodland Caribou (Rangifer tarandus caribou)* (2013) were also used to narrow down areas to be searched.



Legend

- 2019 Caribou Transects
- Optimal Geotechnical Route
- Community Preferred Route
- Caribou RSA (Covers Missisa Caribou Range)
- Local Study Area (LSA 1km From Alternative Footprints)
- Webequie First Nation Reserve
- Winisk River Provincial Park
- Waterbody
- Watercourse

WSR WEBEQUIE SUPPLY ROAD

0 5 10 Km

N

NAD 83
UTM Zone 16N

Webequie Supply Road

2019 Winter Caribou Aerial Survey Transects and Study Areas

Date: 2020/08/12	File Number: 649920	Sub Code: 0000
Figure Number: 6		Rev. 0

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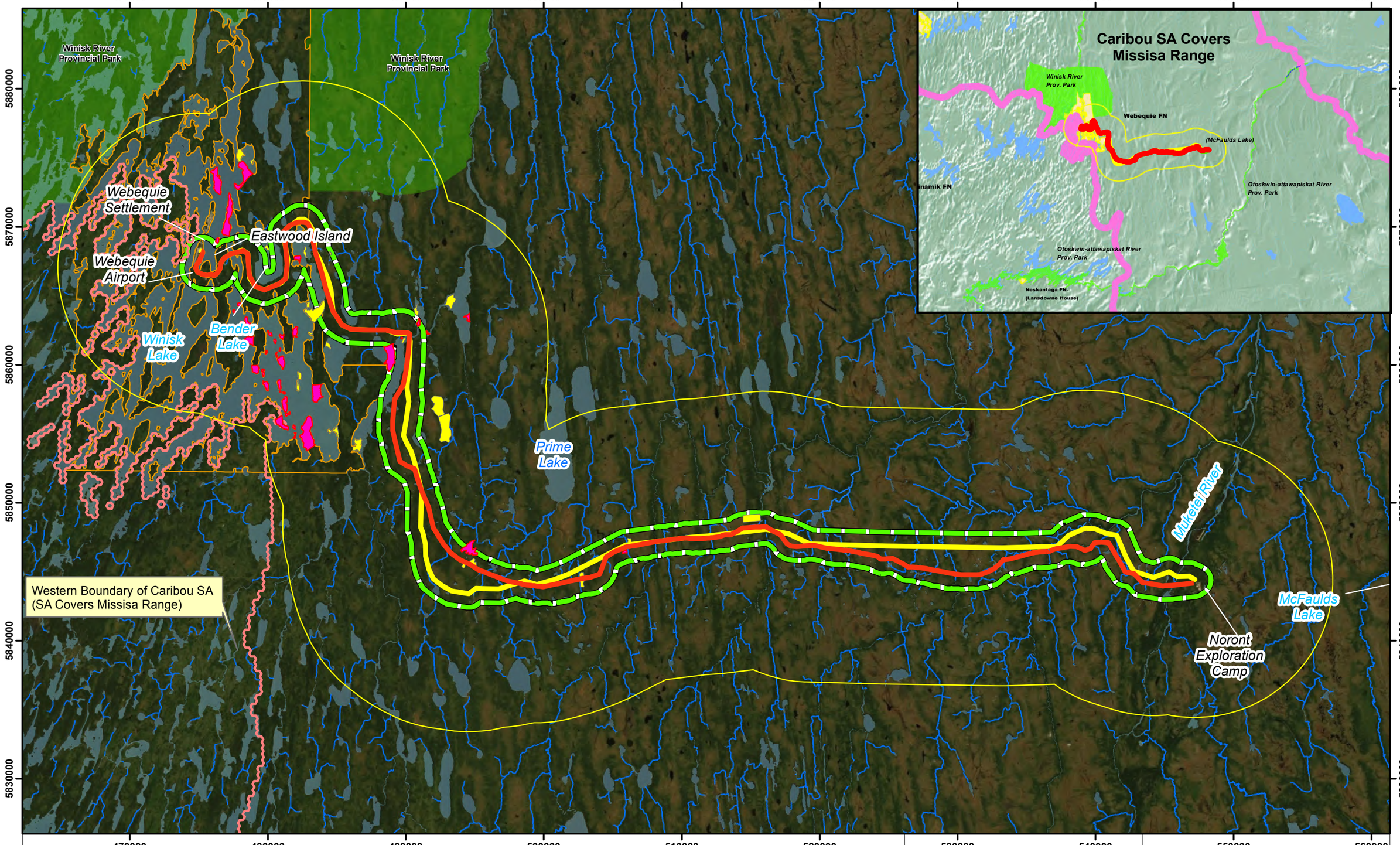
According to Ranta (1998), nursery habitat survey methods consist of searching beaches, low-lying areas, and areas inland for signs of caribou presence, including: tracks; shed antlers; pellet groups; beds; and signs of browsing. Attempts are to be made to distinguish adult tracks from those of calves, as well as age of pellets (winter vs fresh), and to note, when possible, signs of winter use of lichens (e.g., *Cladina* sp.). Data recorded includes: date; time; surveyor names; UTM coordinates; transect number (if applicable); species name; number of individuals; habitat type; and type of observation (sign of presence). During transect surveys, tracks are followed, to the extent possible, off transect in search of pellet groups. To the extent possible, wildlife observed is identified to sex (male, female, unknown) and age (adult, yearling, calf) unless undue stress on the animals could result from the determination of these details. Other signs of wildlife presence should also be recorded.

In 2019, caribou nursery habitat surveys were conducted between June 12 and June 17 and between July 2 and July 9, 2019. According to MNRF survey protocol, calving surveys should be conducted after calves have dropped, but before nursery areas are vacated. The suggested survey window is June 15 to August 15. In total, 74 candidate habitats were surveyed within 10 km of project alternatives (refer to **Figure 7**). Despite the completion of a desktop analysis for candidate sites to include in this survey, field-fit was required to account for site accessibility. Landforms that were most recognizable as candidate calving or nursery habitats, such as islands and peninsulas, were prioritized for survey. Candidate habitat features were not selected randomly; rather candidate sites were systematically assessed according to accessibility and proximity to the Project corridor and as many sites were sampled as possible. Candidate nursery habitats that were within, or closer to, the footprint of the proposed preliminary preferred corridor was also prioritized for survey. In many instances, islands could not be accessed due to tall vegetation creating an overall lack of landing sites, narrow shorelines, and uneven ground. A total of 18 sites were surveyed on foot, while 56 were surveyed by helicopter only. Field biologists were joined by two members of the Webequie First Nation, Eric Jacob and Vincent Jacob, both of whom are local hunters and are knowledgeable in ungulate tracking and sign.

Consultation with MECP in February 2020 concluded that ground and aerial surveys for evidence of Caribou nursery habitat was not an effective means of assessing this habitat type within the peatland landscape that dominates the project area. Initiation of Caribou collaring has been proposed for the winter of 2020/2021.



Legend

- Searched on Foot and by Helicopter
- Searched By Helicopter
- Optimal Geotechnical Route
- Community Preferred Route
- 10 Km Search Area
- Local Study Area (LSA 1km From Alternative Footprints)
- Caribou RSA (Covers Missisa Caribou Range)
- Webequie First Nation Res
- Winisk River Provincial Par
- Waterbody
- Watercourse

WSR WEBEQUIE SUPPLY ROAD

0 5 10 Km

N

NAD 83
UTM Zone 16N

Webequie Supply Road

2019 Caribou Nursery Habitat Sites Surveyed

Date: 2020/08/12	File Number: 649920	Sub Code: 0000
Figure Number: 7		Rev. 0

Document Path: I:\E&W\Projects\661910 - Webequie First Nation Supply Rd\40_Execution\45_GIS_Dwgs\MXD\Workplans\20200811_WSR_2018Caribou_Calving_Fig_7.mxd

2.6.4. Caribou Collaring and Satellite Telemetry

2.6.4.1. Survey Methodology

As a result of a meeting on February 28, 2020 to address Caribou and Wolverine field effort, MECP Species at Risk Branch staff indicated that aerial surveys conducted between 2018 and 2019 are sufficient to inform baseline conditions in the development of the EA, when combined with a Caribou Collaring Study (CCS). As such, MECP has requested the initiation of a CCS for the WSR project. At this time the collaring program is in development, but discussion with MECP indicates that the CCS will entail the deployment of 30 collars, supplied with drop-offs to reduce subject stress, onto 30 adult female Caribou within the project area for the purpose of informing the characterization of baseline conditions for Caribou at the sub-range scale and the assessment of impacts. A sample of 30 collars is similar to other collaring programs conducted for industry in Ontario (e.g., Detour Gold Project). Prior to collar deployment, approval from the Animal Care Committee and a Wildlife Scientific Collectors Permit under the *Fish and Wildlife Conservation Act, 1997* will be required. A Section 17(2)(b) Species at Risk permit under the Ontario *Endangered Species Act,* 2007 will be required prior to undertaking a CCS. If capture is to take place on Federal Lands a Federal *Species at Risk Act* permit may also be required.

Once the study has been approved, a scouting (using helicopter or fixed-wing aircraft) survey will be completed by SNC biologist to locate canididate individuals for collaring. As of the development of this Study Plan, a CCS Study Area of 10 km beyond centreline of the preliminary proposed corridor which encompass the route alternatives within the corridor is proposed by MECP. In the event that 30 adult females cannot be located within this study area, the search area would be expanded to the extent necessary to locate 30 suitable animals with particular focus on areas of greatest Caribou density and fidelity determined through previous baseline studies.

Healthy, adult female caribou will be captured by a specialized wildlife capture team using a net gun from a helicopter. MECP has requested maintaining a minimum sample size of 30 adult female Caribou throughout the study. Captured Caribou would be fitted with satellite GPS collars that transmit data fixes wirelessly. Collars would be deployed in mid-winter (mid-late February) to avoid disturbance to cow Caribou during late pregnancy. In addition to collar deployment, blood samples will be taken from each captured Caribou to assess pregnancy status (using blood serum for PSPB), and population genetics. Additionally, pellets (for assessment of parasites and/or potential genetic analysis) and hair (for potential genetic analysis and/or assessment of chronic stress using cortisol levels) would be collected for each animal and provided to MNRF's Science and Research Branch for storage and/or genetic analysis. Assessment of molar wear would be conducted to determine age.

MECP had determined that a study duration of seven (7) to ten (10) years will be necessary to appropriately characterize the effects of Project Caribou. The final determination of the duration of the recommended CCS will ultimately be influenced by the duration of the Project, including EA, necessary permitting and construction. Stages of the study would include:

1) Baseline Condition and Effects Assessment (EA): Years 1 and 2 (Feb. 2021 – Feb. 2023) will inform the characterization of baseline conditions and predict effects in the EA. Additional years may be needed should the EA process be delayed.
2) Provincial ESA Impact Assessment (ESA)*: Years 1, 2 and 3 (Feb. 2021 – Feb. 2024) are recommended to inform the impact assessment required during the provincial ESA authorization process. Impact assessment referred to here is a component of the ESA authorization process and

does not refer to the federal Impact Assessment impact assessment referred to here is a component of the ESA authorization process and does not refer to the federal Impact Assessment.

3) Compliance and Effects Monitoring (EA and ESA): Years 4, 5 and 6 (Feb. 2024 – Feb. 2027) will to inform compliance and effects monitoring as required by the EA and inform effectiveness monitoring of mitigation measures which may be necessary conditions of an ESA authorization, should one be required.

4) Overall Benefit/Beneficial Actions and related Effectiveness Monitoring (ESA): Years 7, 8, 9 and 10 (Feb. 2027 – Feb. 2031) may be considered as a potential component of overall benefit or beneficial actions for caribou; which may be necessary as a condition of an ESA authorization.

Data gathered from collared Caribou can be used to inform many aspects of Caribou occurrence, demographics and behaviour across the PF, LSA and RSA. Data of particular interest for the purpose of determining impacts to Caribou by the Project would include (but not limited to):

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

Collars would be programmed to record eight (8) location fixes per day (i.e., one location every three hours) (Walker *et al* 2020; DeMars *et al* 2013).. Upon receipt of a mortality signal, arrangements will be made immediately to deploy a Caribou team member to the location indicated by the collar to retrieve the collar and perform a necropsy to determine cause of death. The detection of a mortality signal does not necessarily indicate a mortality, thus continued monitoring of collar signals will occur to ensure no further movement is indicated. Collars often break or fall off the animal and at times there is not enough evidence to determine whether the animal died or not. Mortality may result from predation, an accident, natural causes (e.g., disease, starvation, orphaned), or unknown causes. Cause of death can be difficult to determine, especially if the carcassed has been scavenged. Focus of the necropsy will be to determine whether the death was natural (i.e starvation or malnutrition), an accident (i.e. caught in ice), predation, due to hunting, or inconclusive. Upon arrival at the collar location, an inspection of the area and Caribou remains present will be conducted to collect evidence of the cause of death. Site inspections will be conducted in accordance with a guidance checklist used by MNRF. Inspection of the site of mortality will also follow guidance provided in *Approaches to Field Investigations of Cause-Specific Mortality in Mule Deer (Odocoileus hemionus;* CPW, 2016) or similar. Digital photos will be taken as evidence and to support the conclusion (or lack thereof) for cause of death. Detailed analysis by a veterinarian or pathologist using organ biopsy, tissue samples, or parasites is not planned at this stage. Following mortality events, additonal collaring will be completed during subsequent winters to maintain the minimum sample size of 20 collared females.

The details of the CCS will be continually refined and implemented through consultation with, and following the advice of, MECP, Environment and Climate Change Canada (ECCC), and MNRF. In doing so, it will be determined how the CCS will contribute most effectively to: a) enable an efficient approach to project planning and preparation of applications for any necessary *Endangered Species Act* authorizations; and b) inform the monitoring framework developed during the EA process.

As part of the EA monitoring framework, additional winter aerial surveys may be required during project construction, operation and maintenance phases to assess the effectiveness of mitigation actions taken to avoid or minimize adverse effects to Caribou. MECP has proposed winter aerial surveys every three (3) years to determine any changes in caribou numbers and distribution. The extent, frequency, and methodology of any future aerial surveys shall be developed and implemented through consultation with, and following the advice of, MECP, Environment and Climate Change Canada (ECCC), and MNRF. Aerial surveys will be complementary to the Caribou collaring program and planning and preparation will take into account necessary *Endangered Species Act* authorizations; and inform the monitoring framework developed during the EA process.

2.6.5. Acoustic Envrionment and Sensory Disturbance Study

MECP has indicated the need to monitor sensory disturbance effects on Caribou movements and behaviour. Study of ambient sound levels and the proposed effects assessment for noise and vibration are presented in the Acoustic Study Plan.

Existing background ambient sound levels at representative NSAs within the Webequie First Nation community and along the proposed WSR route will be determined through ambient noise level measurements. For this project, a minimum of two receptor locations will be selected:

- One, within the community, at the western terminus of the proposed WSR route; and
- One, at a distance of a few kilometres along the proposed route (away from the community), which will be used as representative of conditions along the corridor.

The community monitor at the western terminus will include noise from community activities (industrial and commercial noise, traffic noise, and airport noise). The second monitor will be sufficiently removed from these sources that it will capture ambient background sound levels in the outlying/bush area, dominated by the sounds of nature and removed from man-made noises.

A third monitor location may be selected along the main supply road corridor, if required, once initial identification of noise-sensitive receptors is complete and the proposed site outside of the WFN community is deemed not to be reasonably representative of conditions along the remainder of the corridor.

Measurements will be conducted with the Larson-Davis NMS044 Outdoor Noise Monitoring System, which incorporates LD831 Sound Level Meters equipped with portable power supplies and environmental protection kits.

Future noise levels from the WSR roadway and from the Webequie Airport will be determined through noise modelling and acoustics experts will provide noise contour maps (isopleths of equal noise levels) to Project biologists to determine areas and species that may be adversely affected by noise.

Details regarding sensory monitoring will be defined during the development of a Project Caribou or SAR Monitoring Plan and ESA Overall Benefit Application for Caribou, if applicable, as this currently exceeds the scope of this Study Plan.

2.6.6. Wolverine Occupancy Study

In their review of natural heritage data collected to date, MECP has determined that baseline Wolverine data collected during 2018 and 2019 winter aerial surveys is insufficient to inform the effects of the Project on Wolverine within the PF, LSA, and RSA. MECP has recommended that additional indicators be included in the assessment for this species, including:

- Spatial and temporal distribution,
- Abundance,
- Den site selection and use, and
- Harvest.

In order to inform the assessment of the additional indicators proposed by MECP, a Wolverine Occupancy Study of 2 winters in duration is proposed that will be initiated in Januaryof 2021 and terminate in May 2022.

2.6.6.1. Study Approach

A variety of sampling methods can be used to detect and study Wolverine. Sampling methods are described in great detail in "*Surveying and Monitoring Wolverines in Ontario and Other Lowland, Boreal Forest Habitats: Recommendations and Protocols*" (Koen *et al*., 2008). Sampling methods for Wolverine include:

- Trapping records;
- Aerial snow tracking;
- Ground snow tracking;
- Hair snares;
- Remote cameras;
- Scat collection;
- Live trapping; and
- Radio telemetry.

SNC-Lavalin conducted aerial survey transects in 2018 and 2019, which confirmed Wolverine presence and provided insights to extent of which Wolverine is distributed in proximity to the WSR Study Areas. While aerial snow tracking surveys can be used to determine presence, probability occurrence, relative abundance, and abundance. This survey type typically provides a snapshot of abundance, which provides limited insight unless repeated.

Mark-recapture survey techniques can be effective for determining Wolverine abundance and density. Live trapping for GPS collaring is a high-yield study method that may yield a high pay-off for determining habitat features and homerange used by wolverine via GPS locates. However, this study option is invasive, expensive, time-consuming, and requires extensive experience with trapping and wildlife handling (Koen *et al*. 2008). Trapping Wolverines is notoriously difficult and the uncertainty of obtaining a captured animal, coupled with the great effort required to check traps daily across the remote study area make this study type unfeasible in the short-term. Dawson *et al*. (submitted) reported 0.83 wolverine captures per 100 trap nights in northern Ontario.

Mark-recapture study may also be conducted using hair snares and remote cameras. Hair snares are a commonly-used, low-cost technique for collecting species and genetic data for Wolverines. Camera traps, when deployed using bait and set up with care and intention, are an effective means of detecting secretive species and can also provide a great deal of data on the individuals captured. Integrated camera trap and hair snare sampling provides a means of sampling Wolverine presence through the collection of DNA via hair follicle samples and photos. This integrated sampling type is adequate to collect data that will inform Wolverine temporal distribution, abundance, density, population demographics (sex ratios), and potentially the presence of lactating females (an indication of nearby denning) or even kits. This study type can be initiated in a relatively short time span to collect baseline data and the results may be used to inform future studies, if desired, such as GPS collaring. Integrated camera trap/hair snare sampling has been utilized extensively for Wolverine population studies across North American (Awan and Boulanger, 2016; Fisher, 2004; Magoun *et al*., 2013) as well as for assessing impacts of linear development on Wolverine (Clavenger and Barrueto, 2014). As such, a Wolverine Occupancy Study consisting of integrated camera traps/hair snare sampling is proposed to augment baseline data collection for Wolverine for the WSR Project. This sampling program and its methodologies is subject to approval by applicable regulatory agencies (i.e. MECP, MNRF, and ECCC).

2.6.6.2. Site Selection and Sample Size

The TISG indicates that a "Local Study Area for Wolverine shall include the Project Study Area plus a 10 km buffer in all directions". To align this description with the definition of an LSA in **Section 1.1.1** of this document, the Wolverine LSA will consist of the standard LSA (PF of the alternative routes plus 1km buffer), plus a 10 km buffer in all directions. When delineated in ArcGIS, this translates to an area of approximately 2525 km^2. The study will be limited to extent of the LSA in order to maintain a robust sampling station density. This aligns with the TISG stipulation that the PSA and LSA (as defined in the TISG for Wolverine) constitute the appropriate scale for the species. Due to the remote, low-fragmentednature of much of the Wolverine LSA, it is anticipated that sampling data can be extrapolated to much of the lands surrounding the LSA, especially east of Webequie. At present the RSA for Wolverine is proposal to extend 50km from either side of the LSA boundary.

Sampling protocols for hair snare and trail camera sampling described in Koen *et al*. (2008) suggests establishing a grid of 100 km^2 tessellating hexagon sampling units across the study area and systematically placing one sampling stations per 100 km^2 sampling unit. A sample unit area of 100 km^2 represents the accepted minimum home range area for female wolverines (Koen *et al*., 2008). COSEWIC (2014) gives home range sizes of 50 – 400 km^2 for females and 230 - 1580 km^2 for males; however average female home range in Greater Yellowstone National Park was calculated at 754 km^2 and male home ranges in Ontario can be as large as 4109 km^2 (Dawson *et al*. 2010;). A study by Dawson et al. (2010) near Red Lake Ontario found a home range size of 428 km^2 for females and 2563 km^2 for males between December and October. The Ontario Boreal Wolverine Project (OBWP) has used 100-km^2 hexagons as the basis for sampling units for both wildlife camera and aerial surveys (OBWP unpublished in Koen *et al*. 2008; Ray *et al*. 2018). Members of the OWBP (unpublished) used remote cameras to photograph and identify individual wolverines by pelage patterns. For this study, one or two camera stations were set up within each of 20 100-km2 hexagons across a 2,000 km^2 Study Area in northern Ontario. When a grid of sampling units is applied over the Wolverine LSA using ArcGIS software, approximately complete 13 sample units overlap the study area. A study area of 25 complete sampling units (totalling 2500 km^2) centered over the Woverine LSA is proposed. One integrated sampling station will be installed per unit. Site selection and sampling size for this study will be finalized through consultation with regulatory agencies. Stations separation by a minimum of 3 linear km apart has been used in other studies to reduce the probability of pseudoreplication (Hurlbert, 1984; Fisher 2004).

Protocols suggested by Koen *et al*. (2008) allow for trap positioning with each sampling unit that maximizes the likelihood that sampling stations will be visited by a Wolverine. This approach was taken during remote camera studies undertaken by members of the Ontario Boreal Wolverine Project (unpublished in Koen *et al*. 2008). The majority of Wolverine tracks recorded during aerial surveys in 2018 and 2019 were observed along or in proximity to a watercourse. This may have been biased towards observer tendencies to search watercourses more closely for wildlife and their tracks; however, watercourses are commonly-used winter corridors for mesopredators. Koen *et al*. (2008) noted that the Ontario Boreal Wolverine Project had greater success detecting wolverines in coniferous riparian corridors left behind following logging which appeared to funnel wolverines through the landscape, making detection more probable. Woods *et al*. (1999) notes that, at a local scale, riparian sites should be targeted for sampling. Camera setup in locations that maximized the probability of detection within grid cells, such as along high-travel routes, has oalso been utilized for and Snow Leopard (*Panthera uncia*) and Coyote (*Canis latrans*; (Jackson *et al*. 2006, Larrucea *et al*. 2007).

A study of Wolverine home range size and denning habitat in lowland boreal forest in Ontario, near Red Lake found a den among large boulders and downed trees (Dawson et al., 2010), which is similar to dens described for this species in montane ecosystems. A subsample of sampling stations may be positioned in proximity to boulder complexes and areas of downed trees, which may be critical features of wolverine dens in lowland boreal forests. The WSR Project occurs at the confluence of Ecoregions 2E and 2W and falls within the peripheral range of Wolverine in Ontario (Koen *et al*., 2008). To date, Wolverine denning requirements in this area has not been studied adequately to properly assess denning habitat (Ray, 2020 personal communication). As such, attempting to sample within candidate denning areas is not a viable objective for this study.

Each sampling station will be visited every 4 – 6 weeks. Each collection period will be considered a survey repeat. A minimum of three survey repeats are anticipated per winter.

2.6.6.3. Survey Methodology

The Wolverine Occupancy Study would be initiated in early winter (January) of 2020/2021 in order to take advantage of frozen conditions, which would improve ease of access by helicopter and/or snow machine to remote sampling sites. Helicopter landing areas in proximity to sampling sites may be cleared at this time to allow for easier access across each season for the duration of the study. Study initiation in winter may also result in greater access to bait carcasses, which may be sources from local trappers and hunters. Study duration will be determined in consultation with regulatory agencies. It is recommended that, for the purposes of baseline/preconstruction data collection, sampling occurs over at least two winters (2020/2021 and 2021/22) and at least between January and May of each winter. Wolverines do not shed hair easily until late spring, thus Wolverine hair is not expected to be collected until late winter (mid-late February; Magoun *et al*. 2007). Nonetheless, earlier deployment of integrated run pole structures will hopefully allow Wolverines to find and become comfortable with the structures. Annual monitoring should, at minimum, continue until the snow has melted from the study area, ending the use of any den sites present.

2.6.6.3.1. Hair Snares

Hair snares require a Wolverine to squeeze or climb past the hair snare to access a bait, typically part of a beaver, hare, or ungulate carcass. In doing so, hair may be grabbed passively by the hair snare, which has barbs or combs present. Hair samples from hair snares may contain follicles, which provide DNA. Genetic analysis can identify the species (via mitochondrial DNA; Schwartz and Monfort 2008) samples and genetic ‘fingerprints’ can be detected that identify individuals (using microsatellite analysis of nDNA; Mowat *et al*. 2003; Fisher, 2004). Site access aside, hair trapping can yield low-cost and high-return data on distribution,

relative abundance, and home range estimates (Fisher, 2004). Detection of known individuals through genetic analysis of hair follicles collected at multiple sample sites can act as a mark-recapture survey. A variety of hair snare designs have been used by others to study Wolverine, including (but not limited to) hair-corrals (Mowat, 2001), tree-trunk traps (Fisher, 2003) and run-pole designs (Magoun *et a*l., 2011 and 2013). The study team is opting to use a run pole structure at sample sites. Run pole design will follow or be slightly modified from that presented in Magoun *et al*. (2011). This sampling technique may provide the greatest amount of data and make best use of the effort required to access remote locations across the WSR study area. Barbed wire will be wrapped around the base of each tree where the run pole is anchored. Either alligator clips or paired wire brushes will be used to grab and/or comb hair from Wolverines that climb the run pole structure to inspect the bait.

Each sampling station will be visited every 4 – 6 weeks to examine the wrapped barbed wire and run pole hair snares at each site. Collectors will wear latex gloves to remove hair samples and will deposit samples into transparent resealable bags for each site. Bags will be labelled with the station ID, date of collection, and name of collector and the bag will be sealed. Once hair has been removed from the hair snares, a blow torch will be used to cleanse the barbs prior to future hair collection. The bait at each sampling station will be replaced during each visit. Samples will be screened for the presence of hair follicles and only samples containing follicles will be sent for genetic analysis to TrentUniversity.

2.6.6.4. Camera Traps

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

An additional advantage to pairing camera traps with hair snares is to inform non-detection. Non-detection at a given sampling site does not mean that the site was not visited if hair was not sampled. Camera traps will be positioned as to capture as many identifying features as possible for any animal accessing a baited hair snare. The study team is opting to deploy Reconyx Hyperfire 2 remote cameras. Reconyx is a high-quality, trusted camera brand that prioritizes high photo resolution. Reconyx cameras are known to operate well in very cold environments and have very efficient battery use. As such, this camera selection will optimize performance in the WSR study area where cameras cannot be easily accessed and where winter temperatures are very cold. Two cameras will be deployed at each sampling station. One camera will directly face the front of the run pole to capture the chest and underside of Wolverines inspecting the bait. A second camera will be installed at an angle that captures wildlife movement around the run pole, in the event that Wolverines visit the station, but do not climb the run pole or are not captured by the other camera. All cameras will be set to record date, time, station ID and temperature along the bottom of each frame.

Run pole design is described above. The station ID will be labelled on the front and side of each run pole to ensure proper station categorization. Each sampling station will be visited 4 – 6 weeks to check the remote cameras, replace SD cards and batteries, ensure proper camera functioning, and replace the bait. Upon collection, photos collected at each station will be screened for Wolverine presence. For each Wolverine detected, details will be recorded including ID number, chest blaze pattern, sex, height (a ruler will be affixed the front of the run pole to measure animal height), age (if possible).

2.6.6.5. Data Summary and Modelling

Capture-recapture methods involve an initial marking period, followed by several recapture sessions (repeats). Datasets generated will include the capture history for each individual (a series of ones and zeros indicating whether the individual was detected or not detected, respectively, for each sampling session), and the number of "new captures" during each recapture occasion as compared to the number of "recaptures".

The Program CAPTURE (Otis *et al*. 1978) is used extensively to estimate the population abundance of closed populations from remote camera surveys (e.g. Karanth 1995, Karanth and Nichols 1998, Henschel and Ray 2003, Silver *et al*. 2004, Jackson *et al*. 2006) and hair snare surveys (Mowat and Strobeck 2000, Waits and Leberg 2000, Boulanger *et al*. 2004). This software produces an abundance estimate, standard error and 95% confidence intervals on the estimate, and capture probabilities using capture histories. The assumption of population closure can also be tested using CAPTURE.

Population density estimates, can only be made if an estimate of the area sampled (effective study area) is available. If possible, effective study area size will be estimated using the mean maximum distance moved (MMDM) technique (Karanth and Nichols, 1998). Using this technique, the area surveyed is equal to a polygon around the outermost trap locations plus a boundary strip around the perimeter of the trap-grid, since animals residing outside of the grid are also available to be trapped. MMDM is estimated using data from animals that are trapped more than once at different traps. The width of the boundary strip is one-half of the MMDM between recaptures across individuals. Adjustments to these analysis techniques may be refined, based on input from regulator agencies and other experts.

If sufficient Wolverine data is collected, data will be used to develop likelihood of occurrence/occupancy modelling. Explanatory (i.e. covariate) data collected at each Wolverine sampling station as well as through the vegetation sampling programs will be used to refine and spatial modelling as to adequately represent the spatial and temporal sources of variation. When possible, model data will be used to develop predictive maps on species distribution within the LSA and RSA. These maps will be also used to predict population responses to the development of the project and inform future monitoring requirements.

2.6.7. Bat Hibernaculum and Maternity Habitat Screening

The Project lies within the 2W Ecoregion, for which no MNRF Significant Wildlife Habitat Technical Guide has been developed. However, based on the proximity of the Project to Ecoregions 3E, and 3W to the south, the two bat SWH types that are recognized for Ecoregions 3E and 3W: maternity colonies or maternity roosting habitat and hibernacula (MNRF, 2015; MNRF, 2017).

2.6.7.1. Bat Hibernacula Screening

A review of secondary source information, including the NHIC and Ministry of Energy, Northern Development and Mines (ENDM) Abandoned Mine Information System (AMIS, ENDM, 2016) was undertaken to identify natural and man-made features along the proposed route that may provide bat hibernaculum habitat. A reconnaissance helicopter flight along the preliminary proposed corridor for the Project was flown on May 27 and 28, 2019, which further assessed locations where bat hibernacula might occur.

To date, no indication of features supporting bat hibernacula within the PF or LSA for the WSR has been found.

2.6.7.2. Bat Maternity Habitat Screening

Discussion of field methods for SAR with MECP in July 2019 concluded that no ground surveys for bat maternity roosts are required for the Project.

During the spring and early summer, most Ontario bat species rely on forest habitat that supports a healthy density of large-diameter cavity trees. Females form maternity colonies in tree cavities that provide a warm, humid microclimate that optimizes gestation and postnatal growth of offspring (Kunz and Anthony, 1982).

According to the provincial guidance document for assessing bat maternity roost habitat, *Bat Survey Protocol for Treed Habitats* (MNRF, 2017), a bat habitat suitability assessment should be conducted to identify forest habitat capable of hosting bat maternity roosts Little Brown Myotis (and Northern Myotis) establish maternity roosts in treed areas consisting of deciduous, coniferous or mixed tree species. For these bats that roost under bark or within cracks, hollows or crevices, tree species is important only as it relates to its structural attributes. Any coniferous, deciduous or mixed wooded ecosite, including treed swamps, that includes trees at least 10 cm DBH may be considered suitable maternity roost habitat. Ecological Land Classification (ELC) is an effective tool for identifying potential maternity roost habitats. As Little Brown Myotis and Northern Myotis are known to form maternity roosts in forests and swamps, the following ELC communities should be used to identify potential maternity roost habitat:

- Deciduous Forests (FOD);
- Mixedwood Forests (FOM);
- Coniferous Forests (FOC);
- Deciduous Swamp (SWD);
- Mixedwood Swamps (SWM); and,
- Coniferous Swamps (SWC).

In the Boreal ecozone of Ontario the following ELC codes apply:

- G/B015-019 - Very Shallow: Dry to Fresh Mixedwood/hardwood;
- G/B023-028 - Very Shallow: Humid Conifer/Mixedwood;
- G/B039-043 - Dry, Sandy Hardwood/Mixedwood;
- G/B054-059 - Dry to Fresh: Coarse Mixedwood/Hardwood;
- G/B069-076 - Moist, Coarse Mixedwood/Hardwood;
- G/B087-092 - Fresh, Clayey Mixedwood/hardwood;
- B103-108 - Fresh, Silty to Fine Loamy Mixedwood/Hardwood;
- B118-125 - Moist, Fine Mixedwood/Hardwood; and,
- B130-133 – Swamps.

To determine existing vegetation communities that support bat maternity roost habitat present, and Ontario Land Information wetland and Far north Landcover vegetation community data across the PF was screened, using ArcGIS software. Forest composition of the PSA is presented in **Table 2**.

Table 2: Area and Percentage of Project Study Area Covered by Forest Ecosites

Original Ecosite Types	Area (ha)	Percentage of Study Area
Original Ecosite Types	Area (ha)	Percentage of Study Area
Conifer Forest	13249.72	8.50%
Conifer Swamp	10352.96	6.70%
Deciduous Forest	31.54	<0.1%
Deciduous Swamp	6	<0.1%
Developed/Disturbed	134.11	0.10%
Lowland Conifer Forest	89.33	0.10%
Mixed Forest	242.27	0.20%
Mixed Swamp	54.37	<0.1%
Swamp	0.38	<0.1%
Treed Bog	29090.05	18.70%
Treed Fen	15811.92	10.20%
Grand Total	69062.65	44.50%

For the purpose of identifying the highest quality forest tracts that may provide the highest likelihood of use, screening for older, more mature tracts (>80 years old) of deciduous forest, or mixed forest was undertaken. Tracts of forest meeting these criteria were selected for acoustic detection studies in 2019. SWH Criteria Schedules for Ecoregions 3E and 3W decribes attributes for significant wildlife habitat types in Ontario. Bat Maternity Roost Habitat SWH criteria includes mature (dominant trees > 80yrs old) deciduous or mixed forest stands >10/ha with large diameter (>25cm dbh) trees. Female Bats prefer wildlife trees (snags) in early stages of decay (MNRF 2017). Trembling Aspen is a tree species commonly found within the project area and may provide suitable maternity roosting habitat by way of woodpecker holes in old trees suffering from heart-rot (Parsons *et al*., 2003; Psyllakis and Brigham, 2006). The mean height of a mature aspen tree (age 70) is 21 m, with an average diameter at breast height (DBH) of 30 cm (Peterson and Peterson 1992). Psyllakis and Brigham (2006) found that trembling aspen more typically than other large-diameter species contained groups of roosting Myotis bats and that mature stands with large diameter trembling aspen, with long vertical cracks, in stands with fewer stems per hectare were of conservation importance. In lieu of conducting ground assessment of maternity roost habitat, this screening approach was supported by MECP bat specialist Michelle Karam (personal communication, July 2019). Screening for age showed that all appropriate ecosite classes within the RSA were, in fact, over 80 years old. All larger-diameter cavity trees were used to identify highest quality forest tracts to select acoustic detection locations for acoustic monitoring; and the EA will consider all potential maternity roosting habitat as defined using the ELC communities.

A reconnaissance helicopter flight along the proposed preferred alternative for the Project was flown on May 27 and 28, 2019, which provided further visual assessment and confirmation of locations where mature deciduous and mixed forest with trees and snags of DBH greater than 25 cm occurred.

The results of this screening further informed positioning of acoustic detection surveys that were conducted in 2019 to determine the presence and diversity of bats present within the PF. Acoustic detection surveys are described in **Section 2.6.8**.

470000 480000 490000 500000 510000 520000 530000 540000 550000

5890000 5880000 5870000 5860000 5850000 5840000

Winisk River Provincial Park

Winisk Lake

Webequie Settlement

Eastwood Island

Webequie Airport

Bender Lake

Prime Lake

Muketei River

McFaulds Lake

Noront Exploration Camp

Legend

- Optimal Geotechnical Route
- Community Preferred Route
- Candidate Bat Maternity Roost Habitat
- Local Study Area (LSA 1km From Alternative Footprints)
- Regional Study Area (RSA 5km From Alternative LSA's)
- Webequie First Nation Reserve
- Waterbody
- Winisk River Provincial Park
- Watercourse

WSR WEBEQUIE SUPPLY ROAD

0 5 10 Km

N

NAD 83
UTM Zone 16N

Webequie Supply Road
Candidate Bat Maternity Roost Habitat

Date: 2020/11/27	File Number: 649920	Sub Code: 0000
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2.6.8. Bat Acoustic Surveys

2.6.8.1. Survey Methodology

Acoustic surveys for bats were conducted according to the methodology outlined in the MNRF guidance document *Bat Survey Protocol for Treed Habitats* (2017). In 2019, acoustic surveys were conducted at four survey stations (BAT1 to BAT4; refer to **Figure 9)** along the preliminary proposed corridor for the WSR, of which three (3) were positioned in close proximity to candidate maternity roost habitats. The background information review (using aerial photography and land cover data) and aerial reconnaissance concluded that four (4) stands of deciduous/mixed forest within the PF and LSA were of sufficient age and structural quality to support high quality bat maternity roost habitat (refer to **Figure 8:** High Quality Potential Bat Maternity Roost Habitat). Of these, only three (3) could be accessed safely by field staff via helicopter drop-off. The fourth detector was positioned along a river with the intention of detecting passing bats that might use this feature as movement corridor. Overall, the primary objective of this first year of study was to determine the presence and diversity of bats within the PF and LSA.

Upon deployment, the following details were recorded for each detector:

- Detector make and model;
- Microphone model used;
- Location of detectors;
- Height of microphones;
- Orientation of microphones;
- Special housing that may affect microphone sensitivity (e.g., wind screen, cones, weatherproofing, etc.);
- Mounting method (e.g., meteorological tower, pole, etc.);
- Device specific settings (e.g., gain/sensitivity, TBC, etc.);
- Recording mode (i.e., full spectrum or zero-crossing); and,
- A summary of any issues with equipment failure, and a description of procedures used to ensure equipment was operational during deployment (including ensuring microphone sensitivity remains within an acceptable range).

Acoustic detection surveys were conducted between June 12, 2019 and July 5, 2019, for a total of 85 recording nights. Acoustic recordings were collected concurrently at multiple locations at a time, using acoustic recording units (ARU, Song Meter SM4BAT [Wildlife Acoustics Inc.]) full-spectrum, ultrasonic recording devices. Each detector was paired with a Wildlife Acoustics SMM-U2 ultrasonic, omnidirectional microphone using a 3 m microphone cord. Each ARU setup was installed on site using available materials (dead woody debris) to raise the microphone higher than 2.5 m above the ground. ARU's were located in open areas along linear habitat features, such as watercourse and clearing edges, in proximity to deciduous ecosites with trees of large DBH. Microphones were positioned approximately 10 m from the forest edge to make recordings in a low-clutter environment and, thus, maximizing the clarity and quality of recorded echolocation calls for more accurate species identification. Each ARU was left to passively record bat activity for at least ten (10) consecutive nights of low wind and without precipitation. ARU schedules were set to record 30 minutes before sunset until 30 minutes after sunrise.

470000 480000 490000 500000 510000 520000 530000 540000 550000

5890000 5880000 5870000 5860000 5850000 5840000

Winisk Lake
Webequie Settlement
Eastwood Island
Webequie Airport
BAT 2
BAT6
Bender Lake
BAT 1
BAT5
BAT7
Prime Lake
BAT8
BAT10
BAT4
Mukeitel River
BAT 3
McFaulds Lake
BAT9
Noront Exploration Camp

470000 480000 490000 500000 510000 520000 530000 540000 550000

Legend

- 2019/2020 Bat Detector Locations
- 2020 Bat Detector Locations
- Optimal Geotechnical Route
- Community Preferred Route
- Local Study Area (LSA 1km From Alternative Footprints)
- Regional Study Area (RSA 5km From Alternative LSA's)
- Webequie First Nation Reserve
- Waterbody
- Watercourse
- Winisk River Provincial Park

WSR WEBEQUIE SUPPLY ROAD

0 5 10 Km

N

NAD 83
UTM Zone 16N

Webequie Supply Road

Bat Detector Locations

Date: 2020/11/26	File Number: 649920	Sub Code: 0000
Figure Number: 9		Rev. 0

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Bat recordings were analysed using the acoustic analysis program Kaleidoscope Pro 5.1.9 (Kaleidoscope, Wildlife Acoustics). The automated analysis tool in Kaleidoscope was used to distinguish noise files from files containing potential bat echolocations (i.e., bat passes). Ambient noise files were automatically removed from the acoustic detection dataset for each of the four ARU's and were manually checked for potential false-negatives. Upon removal of ambient noise files from the dataset, two methods were used to identify the species or species group of each recording file.

Bat recordings were first run through the auto-identification function in Kaleidoscope, which auto-identified each recording by comparing the acoustic pulses to a known reference library and by identifying species-specific characteristics of each pulse (i.e., frequency, slope, duration as well as automatically identifying bat passes to species, when possible). Filtered echolocation files were analysed using Kaleidoscope's auto-identification algorithm in conjunction with the Bats of North America 5.1.9 classifier for Ontario, Canada and narrowed down to reflect any bat species which may conceivably occur in proximity to the Project Footprint. These species included: Big Brown Bat (*Eptesicus fuscus*), Silver-haired Bat (*Lasionycteris noctivagans*), Hoary Bat (*Lasiurus cinereus*), Eastern Red Bat (*Lasiurus borealis*), Little Brown Myotis, and Northern Myotis. A balanced program setting (i.e., "0 - Balanced") was used to set strict criteria for diagnostic characteristics of expected bat species and the quality of recorded bat echolocations. This classifier setting was applied to all echolocation data.

Once auto-identification was completed, 100% of data was examined by a qualified biologist experienced in the analysis of bat acoustics and trained in the use of Kaleidoscope software. Select files were vetted through comparison of call parameters to North American acoustic identification keys (i.e., O'Farrell *et al*., 1999; O'Farrell and Gannon, 1999; Britzke and Murray, 2000). Species groupings and criteria for manual identification in zero-crossing format are provided in **Table 3.**

At the highest level, Ontario bat species can be assigned to one of two main groupings based on the frequency characteristics of their echolocation pulses (calls). In the context of the study area, low frequency species include Big Brown Bat, Silver-haired Bat, and Hoary Bat. High frequency species include Little Brown Myotis, Northern Myotis, and Eastern Red Bat. All four Ontario bat SAR are included in the high frequency grouping. Recordings of Myotis bats can be particularly difficult to differentiate from one another. Little Brown Myotis and Northern Myotis can display similar and overlapping echolocation characteristics within the 40-50 kHz range. Other parameters of echolocation pulses, such as characteristic pulse frequency and minimum change in slope, can help to further differentiate between these species. However, characteristics of these parameters can vary according to the amount of environmental "clutter" in the surrounding landscape. Such clutter is greater in forested landscapes, compared to open water, wetland, meadows and other open landscapes.

A total of four (4) bat species were recorded during the 2019 acoustic survey:

- Hoary Bat
- Big-brown Bat
- Silver-haired Bat
- Little Brown Bat

Table 3: Bat Identification Categories and Defining Call Parameters

Category	Species	Fmin (kHz)	Fc (kHz)	Sc (OPS)	Additional Notes
Hoary Bat	› Hoary Bat	~20	Not specified	Not specified	Pulses lack diagnostic characteristics for species determination as big brown bat or silver-haired bat. Random or irregular pattern in call sequence.
Big Brown Bat/ Silver-haired Bat	› Big Brown › Silver-haired Bat	>30	21-32	11-135	Fragmented low frequency pulses; calls are poor quality or sequence is short and/or ambiguous.
Low Frequency Bat	› Hoary Bat › Big Brown › Silver-haired Bat	<30	<35	Not specified	Fragmented low frequency pulses; calls are poor quality or sequence is short and/or ambiguous.
Eastern Red Bat	› Eastern Red Bat	≥35 and <45	Not specified	Not specified	Varied Fmin. Pulses may have an upturned tail.
Little Brown Myotis	› Little Brown Myotis	~40	36 - 46.5	<100	Passes of Fc 36-46.5 kHz and Sc <100 OPS with two or more quality search phase pulses having a minimum change in slope <40 OPS.
Northern Myotis	› Northern Myotis	~40	Not specified	Not specified	Steep Sc and Fmax at or greater to 100 kHz.
Myotis Species	› Long-eared Bat › Northern Myotis	≥30	Not specified	Not specified	Fragmented high frequency pulses; calls are poor quality, or sequence is short and/or ambiguous. Call displays general characteristics of a Myotis species.
High Frequency Bat	› All high frequency species	≥30	Not specified	Not specified	Fragmented high frequency pulses; calls are poor quality or sequence is short and/or ambiguous and cannot be attributed with certainty to Myotis.

2.6.8.2. 2020 Bat Acoustic Surveys

Acoustic surveys for bats will continue in 2020 to augment data collection and account for annual and seasonal variation in bat activity, sample a wider breath of locations, further define potential travel corridors, and provide data to assess dispersion and migration patterns. Survey methodology followed in 2019 will be utilised during 2020 surveys. The four (4) sampling stations surveyed in 2019 will be resampled in 2020 for at least ten (10) suitable nights and an additional six (6) survey locations will be added in 2020 to augment existing information on local bat occurrence; increase the likelihood of encountering Little Brown Myotis and Northern Myotis; and sample possible movement corridors (i.e. watercourses) that link areas of highest maternity roosting potential.

2.6.9. 2019 Breeding Bird Point Counts

2.6.9.1. Survey Methodology

Prior to executing the breeding bird surveys, a thorough review of background data will be conducted to provide a preliminary identification of potential significant habitat within the LSA. A focused consultation with relevant Agencies, and FN community will also be conducted to help prioritize point count location parameters, and when possible a Webequie community member will accompany surveyors to provide community input to the survey process (See **Section 3.2**).

Inventories for migratory and year-round resident bird species that are expected to nest within the project area will be conducted using principles of the Forest Bird Monitoring Program as well as the Ontario Breeding Bird Atlas survey protocols. These protocols are described in the MNRF's publication Wildlife Monitoring Programs and Inventory Techniques (Konze and McLaren, 1997), the Ontario Breeding Bird Atlas Participants Guide (OBBA, 2001) and generally in Appendix 1 of the TISG. These protocols are generally accepted to be the standard required to provide a high detection probability for all bird species and will serve to supply the data required to support the modelling of species density and distribution described in **Section 2.5**. Surveys will be conducted between half an hour prior to sunrise and 5 hours after sunrise. Data collected will include:

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

Both protocols utilize a point count survey type, in which a surveyor knowledgeable in conducts a stationary count of all birds seen and heard over a given time period. Each sample location will be surveyed by a qualified biologist skilled in visual and aural identification of Ontario bird species. They will use a standardized 10-minute point count recording each species encountered at 1- minute intervals with distance estimates recorded between 0-50m, 50-100m and >100m. Notes related to land cover within 100m of each sample centroid, will also be taken in order to confirm the land cover class assigned to the vegetation unit during the vegetation program. The vegetation classifications will be adjusted if necessary and the resulting vegetation mapping will be used to provide areal coverage and percentage of each habitat classification for each site for use as inputs to the representative habitat modelling process. The

majority of birds that nest within habitats that overlap the Project footprint can be adequately sampled using this survey type.

Point count surveys are to be completed during the bird breeding period, between June 1 and July 10. Surveys will be conducted from one half hour before sunrise until five (5) hours after sunrise. **Figures 10 and 11** show the location of the point counts that were conducted during the 2019 breeding bird survey program.

In 2019, breeding bird point counts were conducted at 113 pre-determined stations (in 2019), positioned in 11 locations within the LSA, and encompassing six (6) distinct habitat types, including:

- Deciduous Forest;
- Coniferous Forest;
- Disturbed Forest;
- Mixed Forest;
- Treed Wetland (swamp, treed bog/fen); and
- Open Wetland (bog/fen, marsh).

It should be noted that two (2) sample points occurred in deciduous forest units, which accounts for less than 1% of the habitat found within the LSA. As a result, these points were combined with the Mixed Forest accounting for further analysis. Efforts were made to position at least ten (10) survey points in each of these habitat types in order to generate adequate species lists and provide for increased survey coverage to detect SAR that may use that habitat type. This stratified approach ensured that the survey data accurately reflected the species composition within each habitat type, and the study areas as a whole. Overall, the number of point count stations proposed for each habitat type was somewhat proportionate to the coverage of the study areas by each habitat type (refer to **Table 4**).

2.6.9.2. Point Count Selection

In 2019, point counts were grouped in arrays of 8 to 11 points that representatively span the length of the proposed linear corridor. Arrays conducted in 2019 were positioned within 1 km of the centreline of the proposed preferred corridor. The position of arrays is primarily dependant on reasonable accessibility by helicopters (i.e. adjacent to open landing spots such as rivers, open wetlands, shoreline fens) and where surveyors can move between as many points as possible during the morning survey period to maximize survey effort. Point counts were positioned at least 300m apart in order to limit bird detection at multiple counts. To the extent possible, point counts were positioned such that the count encompassed a single vegetation community type; however, this was not always possible. In the instances were counts bordered multiple vegetation communities (e.g. riparian areas, lake shorelines), field staff indicated on the data sheet which vegetation community each bird was located.

470000 480000 490000 500000

5870000

5860000

Winisk

Winisk River Provincial Park

Eastwood Island

Webequie Settlement

Webequie Airport

Bender Lake

Prime Lake

Odobas Lake

Garrioch Lake

Plant Lake

Stockman Lake

Billinger Lake

Winisk Lake

Morrison Bay

1

2

3

4

5

Legend

- Breeding Bird Survey Locations
- Optimal Geotechnical Route
- Community Preferred Route
- Local Study Area (LSA 1km From Alternative Footprints)
- Regional Study Area (RSA 5km From Alternative LSA's)
- Webequie First Nation Reserve
- Waterbody
- Watercourse
- Winisk River Provincial Park

WSR WEBEQUIE SUPPLY ROAD

Km
1 0.5 0 1 2 3

N

NAD 83
UTM Zone 16N

Webequie Supply Road

Breeding Bird Survey Locations (Western SA)

Date: 2020/08/14	File Number: 649920	Sub Code: 0000
Figure Number: 10		Rev. 0

Document Path: I:\E&W\Projects\661910 - Webequie First Nation Supply Rd\40_Execution\45_GIS_Dwgs\MXD\Workplans\20200813_661910_WSR_BreedBird_West_Fig_10.mxd

510000 520000 530000 540000

5860000

5850000

5840000

Billinger Lake

Leaver Lake

Deugo Lake

Prime Lake

Ekwan River

Noront Exploration Camp

6 7 8 9 10 11

Legend

- Breeding Bird Survey Locations
- Optimal Geotechnical Route
- Community Preferred Route
- Local Study Area (LSA 1km From Alternative Footprints)
- Regional Study Area (RSA 5km From Alternative LSA's)
- Webequie First Nation Reserve
- Waterbody
- Watercourse
- Winisk River Provincial Park

WSR WEBEQUIE SUPPLY ROAD

10.50 1 2 3 Km

N

NAD 83
UTM Zone 16N

Webequie Supply Road

Breeding Bird Survey Locations (Eastern SA)

Date: 2020/08/14	File Number: 649920	Sub Code: 0000
Figure Number: 11		Rev. 0

Document Path: I:\E&W\Projects\661910 - Webequie First Nation Supply Rd\40_Execution\45_GIS_Dwgs\MXD\Workplans\20200813_661910_WSR_BreedBird_East_Fig_11.mxd

Data collected during each point count will include date, weather conditions (wind, temperature, cloud cover, and precipitation), start time, count station name, UTM location, species observed, number of individuals, distance from observer, time when first observed, habitat type, and breeding code. Distance from observer will be categorized as 0-50m, 50-100m, and >100m. Time when first observed will be recorded at one minute intervals. This design will achieve high detection probability as multiple point counts will be conducted per site and repeated within and across years (temporally comparable). Any incidental observations of non-target wildlife species or bird species observed between point counts were also recorded.

2.6.9.3. Sample Representation

To demonstrate whether the number of breeding bird count locations were representative of the habitat in the LSA, a chi-squared (χ^2) test was performed in Microsoft Excel® comparing the number of survey stations in each habitat type to the expected number of survey stations in each habitat type within the LSA. The expected number of survey stations in each habitat type was calculated based on the proportion of each habitat type within the LSA. Statistically significant differences (i.e. p-value < 0.05) indicate under- or over-sampling of a habitat type.

Table 4: Number of Expected and Actual Breeding Bird Survey Stations Within Each Habitat Type

Habitat Type	LSA (ha)	% of LSA	Actual Number of Survey Stations	Expected Number of Survey Stations	Chi-Square (χ^2) Test Result
Disturbed	179.71	0.6	2	1	2.18
Rock Barren	14.45	0.1	0	0	0.06
Conifer Forest	1542.69	5.6	44	6	225.16
Mixed Forest	192.44	0.7	15	1	256.72
Lake/River	2808.05	10.1	0	11	11.48
Open Wetland	2789.37	10.1	13	11	0.22
Treed Wetland	20107.91	72.5	39	82	22.72
Total	**27634.89**	**100.0**	**113**	**113**	**518.55**

The number of breeding bird survey stations that were surveyed was significantly different than the expected number of survey stations based on the proportion of habitat within the LSA (χ^2 = 518.55, p-value < 0.01). According to this test, the only habitat types that were adequately sampled and representative of the habitat in the LSA were disturbed habitat and open wetland (**Table 4**). Conifer and mixed forests were over-sampled, while treed wetland habitat was under-sampled. The expected number of survey stations for rock barren habitat was zero due to the habitat occupying less than 0.05% of the LSA. Lake and River habitats were not considered as functional habitat types for the majority of species sampled during point counts. Rather, vegetation communities along the shoreline of open water habitats could be classified according to the other major habitat types. Forest habitats were over-sampled due to capture the greater diversity of species as well as uncommon species that could be expected in these habitat types, as well as the diversity of habitat structures and age classes that could be found within these habitat types.

2.6.9.4. Data Summary and Reporting

Data collected during point count surveys were summarized to calculate the overall avian biodiversity present within the study area, diversity at each count station, the number of BCR priority species observed for Ontario Bird Conservation Regions 7 and 8 (Environment Canada, 2014) and North American Bird Conservation Region 8 (PIF, 2008), frequency of occurrence and abundance for each species across the PF and LSA scales , abundance for each species within each habitat type, and the locations of observed species of Special Concern or SAR. Species distribution and abundance modelling will be conducted as described in **Section 2.5**.

In 2019, Point count surveys conducted across the LSA in 2019 recorded a total of 83 species across 113 point count stations. This species total is comparable to several other studies conducted in the same general area. SAR recorded during point count surveys included Olive-sided Flycatcher (*Contopus cooperi*), Rusty Blackbird (*Euphagus carolinus*), Canada Warbler (*Cardellina canadensis*) and Evening Grosbeak (*Coccothraustes vespertinus*). Incidental observations of Barn Swallow (*Hirundo rustica*) and Bald Eagle (*Haliaeetus leucocephalus*) were made during this survey type. Olive-sided Flycatcher was recorded at 20.4% of point count stations (23 counts), indicating that this species is a common breeding species in the study area and that it has been readily detected. Rusty Blackbird was recorded at 3.5% (four counts) of point counts. This species was largely restricted to shrubby thicket and swampy coniferous riparian habitat along slow-moving watercourses. Canada Warbler and Evening Grosbeak were recorded at a single point count each. These species are generally at the extreme limits of their ranges and suitable forest habitat is limited. Both Canada Warbler and Evening Grosbeak are expected to be rare occurrences within the PF and LSA. Common Nighthawk (*Chordeiles minor*) was surprisingly absent during point count surveys; however, this species is expected to occur within suitable open or disturbed habitat types (refer to **Section 2.6.9.3**).

Data from seven 10 km x 10 km atlas squares that occur in close proximity to Winisk Lake and Webequie First Nation confirmed 85 recorded species including SAR species Bald Eagle, Bank Swallow (*Riparia riparia*), Barn Swallow, Common Nighthawk, Olive-sided Flycatcher, Rusty Blackbird, and Short-eared Owl (*Asio flammeus)*. In 2010, the Northeast Science and Information Section of the MNRF conducted studies in and near the RSA as part of their Far North Terrestrial Biodiversity (FNTB) study from early June to mid-July (Phoenix, 2013). A total of 96 breeding bird species were detected, including three Special Concern SAR: Bald Eagle, Common Nighthawk and Olive-sided Flycatcher (Phoenix, 2013). Bird point count surveys were conducted in 2011 and 2012 in support of the Eagle's Nest Project EA. Of the five study areas where point counts were conducted, only those conducted at the mine site are considered close enough to be relevant to the current survey. For this study, a total of 48 plots were surveyed and only three major habitat types were present at the mine site. Three species at risk were found in the mine site area, including Common Nighthawk, Olive-sided Flycatcher and Rusty Blackbird.

Observations made during the 2019 field season indicate that cattail marsh is absent from the WSR LSA and that little to no extensive meadow marsh habitat occurs along the preliminary proposed corridor, with extensive peatlands representing the majority of wetland habitat. The absence of these habitat types limits the opportunity to survey for marsh-obligate species of Conservation Concern such as Least Bittern (*Ixobrychus exilis*), Yellow Rail (*Coturnicops noveboracensis*), Black Tern (*Chlidonias niger*), or Short-eared Owl, Open, graminoid wetlands present within the RSA are largely limited to the riparian zones bordering small watercourses, lake shore fens and open tamarack or spruce swamps.

2.6.10. 2020 Breeding Bird Point Counts

2.6.10.1. Survey Methodology

In 2020, it is proposed that the 113 point counts that were surveyed in 2019 (PF and LSA) be repeated in 2020, in order to gain two (2) years of temporal data at these locations. An additional approximately 20 new point counts are to be located within the LSA will be surveyed in 2020. In addition to survey points sampled within the LSA, approximately 50 new points will be distributed across lands scoped to be used as aggregate sources (typically within the RSA, relative to the PF) and approximately 100 new points will be positioned within the RSA. Additional arrays surveyed in 2020 will focus on: a) gaps in coverage within the LSA; b) across proposed laydown/aggregate areas/access; and c) representative habitats within the LSA and RSA.

Additional survey points will be located in the LSA and RSA where helicopter-accessible is permissible and to address gaps from the 2019 survey. All survey points in the LSA and RSA will be surveyed once in 2020 and will be representative of habitat types present; to ensure that estimates comparing within and across the LSA and RSA are unbiased and as precise as possible.

Point counts in 2020 will be conducted using the same 10-minute survey methodology as described for the 2019 surveys, as that survey followed a very similar protocol as that prescribed by IAAC.

2.6.10.2. Sample Representation

While it is endeavoured to conduct breeding bird study that adequately samples each vegetation community type (and thus bird habitat type), vegetation communities encountered in the field may not always match the anticipated sample community. As was completed for survey points visited in 2019, an analysis will be conducted post-hoc to compare the proportion of the proposed Project route that traverses each vegetation community type to the proportion of bird point counts conducted in each community type. The expected number of point counts in each community type will be calculated based on the proportion of each community type crossed by the centreline of the proposed Project route. The purpose will be to determine whether the sample of breeding bird point count locations is representative of habitats where the proposed Project route follows. This analysis will help determine whether any community types were significantly under-represented in the breeding bird density analysis (see below). This analysis will be conducted using the chi-squared test ($\chi 2$) in Microsoft Excel®. Significant statistical differences (i.e., p-value < 0.05) indicate under- or over-sampling of certain community types.

2.6.10.3. Paired Acoustic Surveys

Observers will also employ high quality portable acoustic recording (ARU) devices (i.e., with 360- degree recording in WAV format, selectable sampling rate, and adjustable microphone gain), mounted on a tripod. This survey type is suitable for sampling a representative species composition for the PF, LSA, and RSA including forest and bog/fen birds, as well as for locating most diurnal avian SAR that occur in the region.

Data recorded using ARUs during the morning breeding bird point counts will be used to aid in normalizing data recorded during these counts and data recorded by ARU only (see **Section 2.6.11**. Normalization methodology for will be developed through a review of primary literature and other available methodologies which are applicable to a boreal setting. A description of methodologies will be provided in the resulting Natural Heritage Report.

2.6.10.4. Data Summary and Reporting

Data collected during point count surveys will be summarized to calculate the overall avian biodiversity present within the study area, diversity at each count station, the number of BCR priority species observed for Ontario Bird Conservation Regions 7 and 8 (Environment Canada, 2014) and North American Bird Conservation Region 8 (PIF, 2008), frequency of occurrence and abundance for each species across the PF and LSA scales , abundance for each species within each habitat type, and the locations of observed species of Special Concern or SAR. Species distribution and abundance modelling will be conducted as described in **Section 2.5**. A sample coarse habitat model for Olive-side Flycatcher and Canada Warbler is presented in **Appendix C.**

2.6.11. Bird Acoustic Surveys

2.6.11.1. Survey Methodology

Acoustic recording units (ARUs) will be deployed to survey bird presence in 2020. Deployment of ARUs will be used to obtain data to support the abundance and distribution modelling process and capture temporal variations in bird species presence, abundance and distribution across a broad range of dates (including seasons) and times of day. ARUs will be placed at least 500m apart and will proportionately sample all habitat types present, as done with the point count surveys. Prior to executing the surveys, a thorough review of background data will be conducted to provide a preliminary identification of potential significant habitat within the LSA. A focused consultation with relevant federal/provincial agencies, Webequie community members and other Indigenous communities will also be conducted to help prioritize ARU deployment parameters and, whenever possible, a community member will accompany surveyors to provide community input to the survey process.

ARUs will also be used during the point count surveys and will be mounted on a tripod. Data will be recorded using 1- minute intervals within the 10-minute point count duration such that each individual bird is entered in the first minute interval in which it was detected. As done previously, estimated distances from observers to each bird will be recorded as: 0-50m, 50m-100m, and beyond 100m.

A total of 55 Song Meter SM4 Mini (Wildlife Acoustics Inc.) will be deployed for the purpose of data collection. ARUs will be deployed at 55 locations across representative habitats in April 2020 and will record until the batteries die or sound card is filled. Batteries and sound cards of all 50 detectors will be replaced in mid-late June of 2020. In mid-June, batteries and sound cards will be replaced at each detector and a maximum of 50% of the detectors will be moved to secondary supplemental locations and will actively record for the rest of the avian breeding season (late July), until the batteries or sound card capacity is exhausted. In total, approximately 75 survey locations will be sampled through the core avian breeding season through remote ARU use.

Once the breeding season has ended, ARUs will be left at their location to record during the fall migration period (August 1 through September 30, 2020) and during the winter (December 1, 2020 through to March 31, 2021) (i.e., collectively, Fall/Winter Recordings). Batteries will be replaced in late fall, in preparation for the winter recording period.

Recording schedule will adhere to protocols prescribed in the TISG. ARU deployments for breeding recordings will be programmed to record daily or every 2nd day, with a morning and an evening schedule. Recording will occur in two phases to avoid single recordings spanning two dates. Phase 1 will start at 00:00 (HH:MM), with a schedule of 3-minutes On and 12-minutes Off until 5 hours beyond local sunrise

(i.e., SR+5hr). Phase 2 will start 60 minutes before local sunset, with a schedule of 3-minutes On and 12-minutes Off until 23:56 (HH:MM). ARUs will be set to record using a sampling rate of 44.1kHz.

2.6.11.2. Cryptic Species

Aerial photograph interpretation, aerial flight across the RSA, and point count surveys conducted in 2019 did not identify suitable marshes within RSA that would provide suitable breeding habitat for wetland/marsh-obligate species such as Yellow Rail, Short-eared Owl, Black Tern, American Bittern (*Botaurus lentiginosus*), Sora (*Porzana carolina*), Virginia Rail (*Rallus limicola*), or Nelson's Sparrow (*Ammodramus nelson*). Suitable wetlands for these species may occur within the LSA and these will be investigated in field studies planned for 2020. ARU deployment described in **Section 2.6.11.1** will include open wetland, peatland, disturbed habitat, and mature forest where cryptic species such as marsh obligates, Common Nighthawk, and owls may occur. Each chosen ARU survey location will be surveyed according to the two-phase recording schedule outlined in **Section 2.6.11.1** and each detector will be left to record until the batteries or sound card memory is exhausted.

2.6.11.3. Data Summary and Reporting

Acoustic files will be analysed according to methodologies described in the TISG. Biologists skilled in identifying birds by sound and familiar with bird communities of the region sampled will conduct interpretation of acoustic files using the Wildtrax interface (https://www.wildtrax.ca/home). Each individual detected will be recorded as a data point and referenced to the first 1-minute interval it was detected. Prior to interpretation, acoustic files suitable for analysis will be identified Prior to interpretation, acoustic files suitable for analysis will be identified using Kaleidoscope Pro software by creating a usable reference bank. The reference bank will be generated by way of the cluster analysis tool within Kaleidoscope Pro and then manually examining spectrograms and listening to short segments of the file in order to provide species identities to each reference cluster and vet separate clusters that may include species that sound similar. Clusters subsequently used to autoidentify other recording data that has been collected. Files with substantial wind, rain or other noise (e.g., frogs) will be excluded.

From the set of suitable files in the Breeding Recordings, one (1) 3-minute segments will be selected per week from the Night period (midnight to 1 hour before sunrise), two (2) 3-minute segments per week for the Morning period (1 hour before to 5 hours after local sunrise), and one (1) 3-minute segment per week from the Dusk period (30 minutes before to 2 hours after local sunset). From the set of suitable files in the Fall/Winter recordings, three (3) 3-minute segments per week will be selected from the Morning period (1 hour before to 5 hours after local sunrise). Data analysis methods will be clearly described and transparent (e.g., annotated scripts), extract the maximum information from the data, and be appropriate for the data and protocols. Mobile ARU units will also be deployed during the execution of the surveys to allow for a correlation/comparison of results between the two data collection methods, as well as an analysis of an aggregation of the two data sets.

The results of the acoustic data analysis will then be incorporated into the abundance and Distribution modelling as described in **Section 2.5**. Data recorded using ARUs during the morning breeding bird point counts will be used to aid in normalizing data recorded during these counts and data recorded by ARU only. Normalization methodology for will be developed through a review of primary literature and other available methodologies which are applicable to a boreal setting. A description of methodologies will be provided in the resulting Natural Heritage Report.

2.6.12. Crepuscular Bird Surveys (Common Nighthawk)

2.6.12.1. 2020 Evening Surveys

Common Nighthawk is a crepuscular aerial insectivore and member of nightjar family Caprimulgidae. Nighthawk is listed as Threatened federally and as Special Concern provincially. No ground surveys for Common Nighthawk were conducted within the PF in 2019 or 2020 (due to COVID-19 pandemic restrictions within Wedequie First Nation). This species is known to nest in open habitats across Northern Ontario and it is assumed that this species is present wherever suitable habitat is present. However, completing surveys on foot is not possible across the majority of the preliminary proposed corridor during twilight hours.

Once approval is granted to access Webequie First Nation townsite lands, crepuscular surveys will be conducted at predetermined locations along accessible roads within Webequie First Nation and adjacent to suitable habitat for the target species. Surveys for this crepuscular species will follow survey methodology used by the Canadian Nightjar Survey methodology as no standardized protocol yet exists for Common Nighthawk in Ontario. Crepuscular surveys shall be undertaken in the evening between late May and early July, during periods of lunar illumination greater than 50%.. According to the Canadian Nightjar Survey methodology, nightjar surveys area to begin 30 prior to sunset and extend until 90 minutes after sunset. As per MECP directives, surveys will begin 60 minutes prior to sunset. Surveys will not be conducted in overcast, cold (<10 degrees Celsius), or rainy conditions. Counts will consist of six (6)-minute point counts. To the extent possible, survey stations will be located at least 500 m apart (rather than 1.6 km as in the standardized protocol).

Data will be collected using the standardized Canadian Nightjar Survey data form. Data collected will include date, weather conditions (lunar phase, wind, temperature, cloud cover, and precipitation), start time, count station name, UTM location, species observed, number of individuals, distance from observer, direction from observer, time period when first observed, habitat type, and breeding code. Each of the six (6) minutes of the survey will be considered a separate interval. Each individual observed will be recorded on the data sheet and the highest level of breeding evidence will be recorded during each of the six (6) intervals. Breeding codes include:

- Wing-boom (W): If the bird performed a territorial wing-boom in that one-minute interval (Common Nighthawks only).
- Call (C): If you heard the bird call during that one-minute interval.
- Visual (V): If you saw the bird but did not hear it during that one-minute interval.
- Not detected (N): If you did not detect the bird during that one-minute interval.

For each individual, distance from observer will be categorized as 0-100m and >100m.

Other crepuscular and nocturnal birds may be recorded during this survey, including owls, Wilson's Snipe (*Gallinago delicata*), and American Woodcock (*Scolopax minor*). Any incidental observations of non-target wildlife species will also be recorded.

Ground surveys for crepuscular birds will be paired with the use of ARUs, as described in **Section 2.6.11.1** for morning point count surveys.

2.6.12.2. Acoustic Surveys

ARU deployment described in **Section 2.6.11.1** will include coverage of open peatland and disturbed habitat preferred by Common Nighthawk Some open habitats will be included during the early May deployment of breeding bird ARUs, while other open habitats will be sampled starting in late June by ARUs that are moved from their original recording positions. Crepuscular birds will be sampled through deployment of ARUs across open habitats outside of the accessible zone within the Webequie First Nation unit the batteries of the ARUs are spent. Acoustic recording for crepuscular birds can be captured during the daily ARU recording periods defined within the TISG, which include 00:01am and 5 hours after sunrise, as well as between 30 minutes before sunset until 23:56. Each detector will be left to record until the batteries or sound card memory is exhausted. Data Summary and Modelling.

Data collected during crepuscular bird surveys and ARU deployments will be used to develop SDMs, in a similar manner as described for breeding bird survey point counts. A sample coarse habitat model for Common Nighthawk is presented in **Appendix C**. As described in **Section 2.5**, explanatory (i.e. covariate) data collected during each bird survey as well as through the vegetation sampling programs will refine spatial modelling as to adequately represent the spatial and temporal sources of variation.

The combination of these models will be used to identify key habitat factors for species of interest, where data is sufficient to validate the model (Milsom *et a*l. 2000, Morrison *et al*. 2006). When possible, model data will be used to develop predictive maps on species distribution and abundance. These maps will be also used to predict population responses to the development of the project and inform future monitoring requirements. to develop species abundance models, which will be used to quantify indices of abundance or density rather than occurrence.

2.6.13. Barn Swallow

Barn Swallow was identified during the background information review and has been observed incidentally within the Webequie townsite by SNC-Lavalin biologists. This species is well known for using anthropogenic structures such as barns, sheds, garages, bridges, and other outbuildings as nesting habitat; upon which they adhere a nesting constructed primarily of mud and grasses. Outside of anthropogenic settings, Barn Swallows will use cliffs as nesting sites. Across the far north of Ontario, Barn Swallow is typically only found within or in proximity to settlements, where structures providing suitable nesting substrates are found.

To date, bird field studies have focussed on species using the natural environs outside of the developed spaces of the Webequie townsite. Barn Swallow had not been detected during breeding bird point counts. To date, it is not expected that any structures readily providing habitat for this species are present along the proposed Project corridor. Targeted surveys for nesting sites for this species will be undertaken during the detailed design phase of the Project.

2.6.14. Raptor Nesting Data

2.6.14.1. Survey Methodology

Formal surveys for raptor nests have not been completed to date; however, extensive aerial surveys for Caribou and waterfowl have been completed across the PF, LSA and RSA. During these flight activities, particular attention was given to stick nest searches in the vicinity of rivers and lake shorelines, and unburned mature deciduous/conifer stands. The classification of nest type was or will be determined through a combination of staff knowledge, habitat type, stick and nest size, nest placement, and visual

raptor sightings, and photos when possible. If the nest type species was indiscernible, they were simply recorded these as stick nests. Typically, stick nests are most readily noted during leaf-off.

In 2018, a winter survey for caribou included flying 59 north-south transects ranging from oriented in the north-south direction, which varied in length between 37 and 51 km. The survey totalled 2,666 km flown. During this survey, 23 Bald Eagle nests were identified. Osprey (*Pandion haliaetus*) and unidentified stick nests were also recorded, and GPS locations were noted.

During the 2019 winter Caribou survey a total, 39 transects were flown to cover the extent the preliminary preferred corridor (107 km in length). Transects all measured 47 km in length and a total survey length of 1833 km was flown. During this survey, four (4) Bald Eagle nests were identified as well as one (1) Osprey nest and three (3) unidentified stick nests were recorded and GPS locations were noted.

In 2019, waterfowl migration and staging surveys surveyed all open waterbodies within 1km of the PF. Within the taiga landscape occupied by the Project, the tallest and most robust trees are typically situated in close proximity to watercourses and lakes. This coincides with the nesting preferences of most raptors (and Common Ravens which build many of the nests used by raptors) which inhabit the area, such as Bald Eagle, Osprey, Red-tailed Hawk (*Buteo jamaicensis*), Merlin (*Falco columbarius*), and Great Gray Owl (*Strix nebulosa*), which use tall, robust trees to support their stick nests, as well as any species which nests in cavities of trees of large diameter (e.g. American Kestrel (*Falco sparverius*), Barred Owl (*Strix varia*), Northern Hawk-Owl (*Surnia ulula*), Boreal Owl (*Aegolius funereus*).

Overall, upland forest communities are rare within the PF and have thus been targeted for ground breeding birds surveys. The majority of these habitat types are located in proximity to Winisk Lake and the Noront Esker Camp. While morning point counts are not preferred methods of surveying for owls, the transects walked while moving between survey points will provide opportunities to detect raptors and raptor nests present in these habitat features.

When observed, data recorded for each raptor nest will include GPS location, associated species (if possible), relative size and characteristics (if species cannot be determined), tree species used, description of surrounding vegetation community and structure.

2.6.14.2. Data Summary and Modelling

Bald Eagle and other raptor data nesting collected during aerial winter caribou and waterfowl surveys will be used to develop SDMs, in a similar manner as described for breeding bird survey point counts. A sample coarse habitat model for Bald Eagle is presented in **Appendix C**. As described in **Section 2.5**, explanatory (i.e. covariate) data collected during each bird survey as well as through the vegetation sampling programs will refine spatial modelling as to adequately represent the spatial and temporal sources of variation.

The combination of these models will be used to identify key habitat factors for species of interest, where data is sufficient to validate the model (Milsom *et a*l. 2000, Morrison *et al*. 2006). When possible, model data will be used to develop predictive maps on species distribution and abundance. These maps will be also used to predict population responses to the development of the project and inform future monitoring requirements. to develop species abundance models, which will be used to quantify indices of abundance or density rather than occurrence.

2.6.15. Spring Fish Spawning Survey Assessment

Lake Sturgeon (*Acipenser fulvescens)* are known to be present in the project area. Field survey methods will follow standard practices for fish and fish habitat surveys including relevant methods contained in the Ontario Stream Assessment Protocol (Stanfield, 2017) and those referenced in the Ministry of Transportation of Ontario (MTO) *Environmental Reference for Highway Design* (2013) and MTO *Environmental Guide for Fish and Fish Habitat* (2009). The Project Team will also consider the MNRF *Aquatic Ecosystem Assessments for Rivers* (Aquatic research Series 2013-6) when finalizing the design and carrying out the field surveys. The spring spawning surveys were conducted in July of 2020 to confirm the presence of Lake Sturgeon and the extent of spawning habitat. The information will be used to further inform the refinement and evaluation of the road corridor and supporting infrastructure alternatives, including watercourse crossing locations and methods.

Spring spawning survey locations will be chosen based on factors including:

- Known spawning habitat in waterbodies within the proposed corridor, gleaned from Traditional Knowledge of local hunters, trappers and fisherman, and will focus on Winisk Lake, Winisk River, Muketei River and the Ekwan River Tributary;
- Suitable spawning grounds, which are typically rocky areas in white water downstream of impassable falls and large, fast flowing riffles and shallow, rocky shoals in lakes;
- Aerial reconnaissance to help narrow down locations that are suitable for deployment of egg mats; and
- Accessibility.

Before conducting the spawning surveys, an aerial reconnaissance will be conducted of the survey locations that were chosen during the desktop exercise to determine accessibility by field crews, and if they are suitable spawning habitat.

The spawning surveys will consist of a visual assessment of suitable habitat conditions, as well as the deployment of artificial substrate egg mats in suitable habitat.

Artificial substrate egg mats will be used as a proxy to confirm spawning by Lake Sturgeon, since traditional spawning surveys cannot be conducted. The egg mats will be placed in suitable spawning habitat. The egg mats will consist of a rectangular steel frame (approximately 50 cm x 20 cm x 0.5 cm) wrapped with natural fibre furnace filter material (approximately 50 cm x 40 cm x 2.5 cm) and secured with four document clamps following the methods of Roseman *et al*. (2011). Three egg mats will be linked together, end to end, with approximately 3 m lengths of braided nylon rope forming one egg mat gang. An upstream and downstream anchor will be attached, with a floating line and buoy attached to the downstream anchor. The egg mats will be deployed for a period of 2-3 weeks in June 2020 in Lake Sturgeon spawning habitat.

Prior to surveys, spring spawning survey locations will be chosen based on factors including:

- Known spawning habitat in waterbodies within the preliminary proposed corridor gleaned from Traditional Knowledge and engagement and consultation with local Indigenous hunters, trappers and fisherman, with focus on Winisk Lake, Winisk River, Muketei River and the Ekwan River Tributary;
- Any known or recorded data on spawning available from the Ministry of Natural Resources and/or federal Department of Fisheries and Oceans;

- Survey stations will be located in the spawning grounds which are typically located in the rocky areas in white water downstream of impassable falls and large, fast flowing riffles and shallow, rocky shoals in lakes;
- An aerial reconnaissance will further narrow down locations that are suitable for deployment of egg mats; and,
- Accessibility.

Before conducting the spawning surveys, we will conduct an aerial reconnaissance (helicopter) of the survey locations that were chosen during the desktop exercise to determine accessibility by field crews and to confirm if they are suitable spawning habitat. Prior to conducting spawning surveys water temperatures will be monitored where feasible with the assistance of Webequie community members to effectively capture the optimal range of appropriate temperatures for spawning of the targeted species (e.g., 11.5°C to 16°C is preferred for Lake Sturgeon spawning). Water temperatures will be documented at the time of the spawning surveys.

Fish habitat sensitivity will be rated as rare, high, moderate, low, and no fish habitat based on the following attributes within the Ministry of Transportation of Ontario (MTO) Environmental Guide for Fish and Fish Habitat (2009) and the MTO Interim Environmental Guide for Fisheries (2020):

- Species Sensitivity (sensitivity of species based on changes in environmental conditions);
- Species' Dependence on Habitat (use of habitat by fish species; some species might require specific habitat requirements for certain life processes, whereas others may be able to use a wide range of habitats for the same life history functions);
- Rarity (the relative strength of a species and prevalence of a certain type of habitat);
- Habitat Resiliency (the ability of a certain aquatic habitat to recover from changes related to the thermal regime, physical characteristics, and flow regime).

2.7. Eskers, Wetlands, and Peatlands

The federal TISG identifies eskers, wetlands, and peatlands as key habitats for SAR occurring in proximity to the Project. These key habitats types will be considered as valued components in the EA process and are listed in **Section 2.8** as Criteria. The distribution, areas, and characteristics of each key habitat type will be determined through a thorough review of background data, field botanical inventories; and consultation with MECP, MNRF, ECCC and Indigenous communities. The approach to vegetation community characterization is described in the Vegetation Study Plan.

Table 4 provides the area (ha) and percent coverage for major habitat types within the LSA. In doing so, **Table 4** provides a coarse estimate of the extent for each key habitat type. In the context of the PF, LSA, and RSA, wetlands and peatlands are ubiquitous. Mossy ground cover and organic soils are present across most, if not all, wetland types. Open and treed wetlands comprise approximately 82.6 % of the LSA, while lakes and rivers comprise an additional 10.1 % of the LSA.

Wetlands, including peatlands, provide habitat of some type for the majority SAR that occur in proximity to the Project. With respect to SAR occurring in proximity to the Project, habitat features that are likely to occur across wetlands and peatlands include:

- Bat foraging and movement corridor habitat;
- Caribou calving, travel corridors, and winter use habitats;
- Wolverine travel corridors;
- Barn Swallow foraging habitat; and,
- Bird SAR breeding habitat:
  - Peatlands (Olive-sided Flycatcher, Rusty Blackbird, Common Nighthawk);
  - Wetlands (Olive-sided Flycatcher, Rusty Blackbird, Common Nighthawk, Yellow Rail, Short-eared Owl).

Given the SAR habitat types present in wetlands, surveys that target this habitat type either wholly or as part of a stratified survey design include:

- Bat acoustic monitoring;
- Caribou calving/nursery habitat,
- Winter aerial surveys for Caribou and Wolverine;
- Breeding bird point count surveys; and,
- Breeding bird acoustic surveys.

Eskers consist of long, winding ridges of stratified sand and gravel and are the result of glaciation. Within the project areas, eskers provide well-draining substrate that is suitable for the growth of upland deciduous, mixed, and conifer forest. Overall, uplands forested habitats are considered limited or rare within the PF, LSA, and RSA and comprise approximately 1735 ha or 6.3 % of the LSA. With respect to SAR occurring in proximity to the Project, habitat features that are likely to occur across eskers include:

- Bat maternity roost habitat;
- Caribou winter use areas;
- Canada Warbler and Evening Grosbeak nesting habitat; and,
- Bald Eagle nesting and perching habitat.

Given the SAR habitat types present in wetlands, surveys that target this habitat type either wholly or as part of a stratified survey design include:

- Bat acoustic monitoring;
- Winter aerial surveys for Caribou and Wolverine;
- Breeding bird point count surveys; and,
- Breeding bird acoustic surveys.

Each study type described in **Section 2.6** provides details of the habitat types or study area coverage surveyed.

2.8. Criteria and Indicators

Criteria are components of the environment that are considered to have economic, social, biological, conservation, aesthetic or cultural value (Beanlands and Duinker, 1983). The assessment will focus on valued components, and applicable specific criteria, that have physical, biological, social, economic or health importance to the public, Indigenous groups, federal and provincial authorities and interested parties, and have the potential for change as a result of the Project. Valued components have been

identified in the federal TISG and by the Project Team and are, in part, based on what Indigenous communities and groups, the public and stakeholders identify as valuable to them in the EA process to date. The list of valued components identified to date include the following:

- Geology, Terrain and Soils;
- Surface Water;
- Groundwater;
- Air Quality;
- Climate Change;
- Noise;
- Vegetation and Wetlands;
- Fish and Fish Habitat;
- **Federal or Provincial Species at Risk** (subject of this Study Plan);
- Wildlife, including migratory birds;
- Archaeological Resources;
- Cultural Heritage Resources;
- Socio-economic Environment;
- Aboriginal Land and Resource Use;
- Visual/Aesthetic Environment;
- Human Health; and
- Aboriginal and Treaty Rights and Interests.

The list of valued components will be informed, validated and finalized through the engagement and consultation process, including those to whom these concerns are important and the reasons why, such as environmental, cultural, spiritual, historical, health, social, economic and their relation to the exercise of Aboriginal and Treaty rights.

The list of identified valued components and associated criteria will be validated and finalized by the Project Team through a variety of means and consideration of factors that include, but are not limited to the following:

- Engagement with Indigenous communities and groups and the extent to which the valued component is linked to the interests or exercise of Aboriginal and Treaty rights of Indigenous peoples;
- Stakeholder engagement, including discussions with interest holders, and government authorities;
- Presence, abundance and distribution within, or relevance to, the area associated with the Project;
- Extent to which the effects (real or perceived) of the Project and related activities have the potential to interact with the valued component;
- Species conservation status or concern;
- Umbrella or keystone species with potential to represent a broad range of potential effects;
- Uniqueness or rarity in the study area;
- Likelihood of an indirect effect on an associated criterion (i.e., a link exists between the affected criterion and another criterion, such as water quality affecting fish habitat);
- Ecological, social and economic value to Indigenous communities, municipalities, stakeholders, government authorities, and the public; and
- Traditional, cultural and heritage importance to Indigenous peoples.

Based on the TISG, input from MECP and ECCC, and the results of fieldwork and desktop review completed to date, the following species have been identified as criteria for assessing the effects of the Project on Species at Risk:

- Bald Eagle;
- Barn Swallow;
- Bank Swallow;
- Canada Warbler;
- Common Nighthawk;
- Evening Grosbeak;
- Rusty Blackbird;
- Olive-sided Flycatcher;
- Yellow Rail;
- Wolverine;
- Caribou (Boreal population, Missisa Range);
- Caribou (Eastern Migratory population);
- Little Brown Myotis; and
- Lake Sturgeon.

Additionally, key habitats associated with SAR will be considered valued components, including:

- Eskers and similar geological features;
- Wetlands; and
- Peatlands.

In order to evaluate the effects of the WSR, each criterion will have one or more indicators that will identify how the potential environmental effects will be measured. The indicators for each criterion that will be used to aid in the effects assessment include but are not limited to those in the following table.

Table 5: Criteria, Indicators, and Their Rational for Selection

Criterion	Indicators	Rationale for Selection of Indicators	Data Source
Federal or Provincial Species at Risk (SAR): • **Wolverine** • **Caribou (Boreal population, Missisa Range)** • **Caribou (Eastern Migratory population)** • **Bald Eagle**	**Changes to:** • **Habitat availability (i.e., quantity (ha) and quality)** • **Habitat distribution (i.e., configuration and connectivity)**	Federally (*Species at Risk Act*) or provincially (*Endangered Species Act, 2007*) listed species that are afforded protection Important for continued ecological function and diversity of boreal ecosystems	• Indigenous consultation and Indigenous Knowledge • MNRF • NHIC • Committee on the Status of Endangered Wildlife in Canada (COSEWIC) • Species at Risk in Ontario (SARO) list

Criterion	Indicators	Rationale for Selection of Indicators	Data Source
• **Barn Swallow** • **Bank Swallow** • **Canada Warbler** • **Evening Grosbeak** • **Common Nighthawk** • **Rusty blackbird** • **Olive-sided Flycatcher** • **Wolverine** • **Little brown Myotis** • **Lake Sturgeon**	• **Survival and reproduction (direct/indirect effects; disturbance; predation)**	Potential for short- and long-term effects on SAR or their habitat	• Committee on the Status of Species at Risk in Ontario (COSSARO) • Endangered Species Act, 2007 • Desktop studies • Field studies
	• **Abundance and Distribution**	Changes to abundance based on: direct changes to the population	
	• **Species Richness**	Changes to diversity based on: direct changes to the species presence within project footprint and LSA	
	• **Relative Overlap**	Presence of species in multiple habitats	
	• **Species Habitat Specificity**	Habitat specificity and changes to populations based on: direct changes to availability of specific habitat types	
	• **Predation/Habitat usage (other wildlife)**	Increased predator access and habitat utilization by new species to specific areas resulting in potential changes to populations due to increased hunting access, increased raptor and mammal predation, introduction of new species competition for available resources	

Criterion	Indicators	Rationale for Selection of Indicators	Data Source
	Cultural Significance or Importance	Potential changes to cultural interaction with and usage of bird resources within the project area	
Wolverine	**Spatial and temporal distribution** **Abundance** **Den site selection and use** **Harvest**	These additional indicators have been requested in consultation with MECP	• Indigenous consultation and Indigenous Knowledge, particularly trappers • MNRF (including records of incidental harvest within the last 10 years) • Desktop studies • Consultation with academic Wolverine experts

Chosen indicators are based those recommended for non-Caribou SAR criteria in a guidance memo from MECP (Nikki Boucher, July 2019). Expanded indicators have been provided by MECP for Caribou, as per the aforementioned guidance memo. A table outlining these indicators is provided in **Appendix B**. In general, indicators will reflect potential changes to species (survival and reproduction), habitat availability (i.e., quantity and quality) and habitat distribution (i.e., configuration and connectivity).

2.9. Effects Assessment Approach

The approach for the assessment has been developed to satisfy regulatory requirements under the *Environmental Assessment Act* and is based on the MECP *Code of Practice: Preparing and Reviewing Terms of Reference for Environmental Assessments in Ontario* (MOECC, 2014), and the Terms of Reference for the Project that is currently pending approval from the MECP. The approach for the assessment has also been developed to meet the requirements of the federal TISG and specifically Section 13 – Effects Assessment. The approach has also taken into consideration the Ministry of Natural Resources and Forestry (MNRF) Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects (MNRF, 2003).

2.9.1. Consideration and Evaluation of Alternatives

The EA process requires that two types of project alternatives be considered: “alternatives to” the Undertaking (i.e., functionally different ways of addressing an identified problem or opportunity to arrive at the preferred planning solution) and “alternative methods” of carrying out the Undertaking (options for implementing the preferred planning solution). The consideration and evaluation of alternatives to the Undertaking were documented in the federal Impact Assessment Detailed Project Description (November 2019) and the provincial Environmental Assessment draft Terms of Reference (September 2019) and

concluded that developing a new all-season road between Webequie and the McFaulds Lake area is the preferred alternative. It is not proposed that this analysis and conclusion be re-examined as part of the EA process, but it will be documented in the EAR/IS. Therefore, in keeping with the focussed approach, the preferred planning alternative (developing a new all-season road) has been carried forward to the initial consideration of alternative methods of carrying out the Undertaking.

The consideration of alternative methods will focus on the supply road conceptual alternatives within the proposed preliminary corridor, as identified in the Detailed Project Description (November 2019) and the draft Terms of Reference (September 2019). These alternatives include the Webequie First Nation community's preferred route for the supply road along the centreline of an approximately 2 km wide preliminary preferred corridor and the optimal geotechnical route within the same corridor (Refer to **Figure 2**). In addition, the following alternative methods related to supportive infrastructure and the preferred supply route will be examined.

- Alternative sites for temporary and/or permanent aggregate extraction pits and production facilities needed for construction and operation of the road, including access roads to these sites;
- Alternative sites for supportive infrastructure (i.e., temporary laydown and storage areas, and construction camps, including access roads to these areas);
- Watercourse crossing structure types (i.e., culverts, bridges), span length, lifecycle, and construction staging methods at waterbody crossings;
- Road attributes, including roadbed foundation; horizontal alignment, vertical alignment (elevation/profile), and adjustments to the cross-section and right-of-way (ROW) width of the corridor.

The assessment of alternatives will include environmental, socio-economic, cultural and technical factors, using criteria and indicators for the comparative analysis. This will also include specific consideration of community based Indigenous land and resource uses (e.g., fishing, hunting) and cultural (e.g., built, sacred or spiritual sites) criteria of value to Indigenous communities within the broader factors. As noted previously, the criteria and indicators will be developed in detail as part of the EA through input from the engagement and consultation activities with Indigenous communities, the public and stakeholders. Both a quantitative and/or qualitative assessment of alternatives for each criterion will be conducted to allow for a comparison of the advantages and disadvantages and selection of a preliminary recommended route for the WSR and the sites/access routes for supportive infrastructure.

2.9.2. Assessment of Net Effects

A step-wise process will be used to assess the environmental effects of the Project in a systematic and transparent manner once the relevant project elements and activities and their interactions, assessment boundaries, and relevant environmental criteria and indicators are identified and finalized through the engagement and consultation process. The net effects assessment method will include the following primary steps:

- Identification of potential environmental effects;
- Identification of technically and economically feasible impact management measures;
- Prediction of net effects following implementation of impact management measures; and
- Evaluation of the predicted net effects (i.e., describe and determine the magnitude, duration, extent, frequency, and significance of the predicted net effects).

2.9.2.1. Identification of Potential Environmental Effects

The net effects assessment will consider the potential interactions between the project components and activities and the criteria within the identified spatial boundaries and phases of the Project (i.e., construction and operation). Potential effects of the Project on valued components will be determined by comparing baseline conditions to those expected to result from the construction and operation and maintenance of the Project. Potential effects will be described for each assessment criterion, including an indication of whether they are expected to be direct (i.e., as a result of a project component or activity affecting a valued component), or indirect (i.e., as a result of a change to one valued component affecting another valued component). Relevant project works and activities will be analysed individually to determine if there is a plausible pathway for an effect on valued components.

The assessment of potential effects to SAR will include the characterization of baseline conditions in the project study area using both publicly available information on a regional scale and data obtained in the field or via desktop review on a local scale or site-specific basis. As potential effects from the development of the supply road and supportive infrastructure could affect SAR and SAR habitat within the defined study areas, we will also assess specific potential effects that could have lingering detrimental effects to SAR, such as increased human access, injury or mortality, physical alteration of waterbodies or channel morphology and spills.

Effects to Species at Risk as a result of the Project will consider the specific items contained in Section 15.4 of the TISG.

2.9.2.2. Identification of Impact Management Measures

Once potential effects are identified, technically and economically feasible impact management measures (or “mitigation measures”) to avoid and minimize potential adverse effects will be identified for each phase of the Project. Design considerations and impact management measures for Species at Risk will be identified to offset or eliminate potential adverse effects (e.g., construction timing constraints) and will be described in the EAR/IS. Refinements to these measures may also be made in the future detail design phase of the Project. Impact management measures will be developed for the Project based on:

- Knowledge and experience of the Project Team with linear infrastructure developments;
- Industry best management practices and applicable agency requirements and guidance; and
- Measures identified by Indigenous communities, the public and stakeholders through feedback received as part of the engagement and consultation program.

It is understood that impact management measures are not always fully effective; therefore, WFN will identify a compliance monitoring and effects monitoring program as part of the EA for implementation during the project phases (refer to **Section 2.9.2.6**).

2.9.2.3. Prediction of Net Effects

A net effect, or the alternative term residual effect, is considered an environmental (biophysical), social, economic or health effect from the Project and its related activities that is predicted to remain after the implementation of impact management measures. A potential effect is considered to occur where anticipated future conditions resulting from the Project differ from the conditions otherwise expected from natural change without the Project. In some situations, the recommended impact management measures will eliminate a potential adverse effect, while in other situations impact management measures may reduce, but not eliminate the effect. Impact management measures may also enhance positive effects. A potential effect that will be eliminated, or considered unlikely after impact management measures, will be

identified as not resulting in a net effect (i.e., no net effect) and will not be considered further in the net effects assessment. An effect that may remain after the application of impact management measures will be identified as a net effect and will be further considered in the effects assessment. Positive effects will also be considered further in the effects assessment, including means of enhancing benefits of the Project. Neutral changes will not be carried forward for the characterization of net effects, but where identified will be characterized in terms of the confidence in the predictions and the likelihood of the effect.

2.9.2.4. Characterizing the Net Effects

The characterization of net effects will provide the foundation for determining the significance of incremental and cumulative effects from the Project for each assessment criterion. The objective of the method is to identify and predict net adverse and positive effects that have sufficient magnitude, duration, and geographic extent to cause fundamental changes to the self-sustainability or ecological function of a valued component and, therefore, result in significant combined effects.

Using the aquatic environment as an example, the magnitude of the potential effect will be qualitatively assessed by inferring the anticipated changes relative to baseline conditions using the identified preliminary criteria species and indicators related to habitat availability, distribution and abundance. Where appropriate, the magnitude of potential effects to Species at Risk will be quantitatively evaluated based on the proportion of the catchment area for a given waterbody that is expected to be disturbed or influenced by a specific project activity. In general, the magnitude is the intensity of the effect or a measure of the degree of change from existing conditions and will be defined by each discipline assessment. If a significant effect is identified, the contribution of the Project to the combined effect will be described. The assessment of significance of the net effects of the Project on Species at Risk and other valued components will be informed by the interaction between significance factors (as defined below), in addition to those concerns raised by Indigenous groups, interested agencies, and individuals during the consultation and engagement for the EA. Therefore, predicted net effects, where identified, will be described in terms of the following significance factors (MNRF, 2003), with integration of the assessment methodology identified in the federal TISG, as required.

- **Direction** – The direction of change in effect relative to the current value, state or condition, described in terms of Positive, Neutral, or Negative.
- **Magnitude** - The measure of the degree of change from existing (baseline) conditions predicted to occur in the criterion.
- **Geographic Extent** - The spatial extent of which an effect is expected to occur/can be detected and described in terms of the PF, LSA and RSA.
- **Severity** - The level of damage to the valued component from the effect that can reasonably be expected; typically measured as the degree of destruction or degradation within the spatial area of the PF, LSA and RSA. Severity would be characterized as: Extreme; Serious, Moderate or Slight.
- **Duration/Reversibility** - Duration is the period of time over which the effect will be present between the start and end of an activity or stressor, plus the time required for the effect to be reversed. Duration and reversibility are functions of the length of time a valued component is exposed to activities. Reversibility is an indicator of the degree to which potential effects can be reversed and the valued component restored at a future predicted time. For effects that are permanent, the effect is deemed to be irreversible. Duration/Reversibility would be characterized for each adverse effect as: Short-Term (0- 5 years), Medium-Term (6-20 years), Long-Term (21 to 100 years) or Permanent (>100 years).

- **Frequency** – Is the rate of occurrence of an effect over the duration of the Project, including any seasonal or annual considerations. Frequency would be characterized as: Infrequent; Frequent or Continuous.
- **Probability or Likelihood of Occurrence** – Is a measure of the probability or likelihood an activity will result in an environmental effect. Probability or likelihood of occurrence would be characterized as: Unlikely, Possible; Probable and Certain.

The definitions and description of the above factors will be described in detail in the EAR/IS. An effort will be made to express expected changes quantitatively/numerically. For example, the magnitude (intensity) of the effect may be expressed in absolute (e.g., changes to available Caribou habitat – hectares) or percentage values above (or below) baseline conditions or a guideline value (e.g. surface water quality). Additionally, the definition of effect levels may vary from one valued component or criterion to another, recognizing that the units and range of measurement are distinct for each. Lastly, effects may impact communities, Indigenous groups and stakeholders in different ways, including through a gender-based lens (refer to **Section 2.9.3**) and they may respond differently to them. Therefore, determining and characterizing effects will be based largely on the level of concern expressed through engagement with the Indigenous groups and community members.

2.9.2.5. Assessment of Significance

MNRF's Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects (MNRF 2003) require the assessment of significance of environmental effects and provides guidance for assessing the significance of potential environmental effects under individual criteria, for a project as a whole, and for alternatives.

In addition to the Class EA guidance, the determination of significance of net effects and cumulative effects from the Project and other previous, existing, and reasonably foreseeable developments will generally follow the guidelines and principles of the *Draft Technical Guidance Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under the Canadian Environmental Assessment Act* (CEA Agency, 2017) and the *Operational Policy Statement: Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under the Canadian Environmental Assessment Act*, 2012 (CEA Agency, 2015).

In general, the assessment of significance of net effects will be applied to each valued component for which net effects are predicted, and net adverse effects or positive effects will be classified as significant or not significant (i.e., binary response). Additional details on the application of biophysical, cultural, socio-economic and health criteria and definitions that would describe "significant" and "not significant" will be provided in the EAR/IS.

2.9.2.6. Identification of a Monitoring Framework

Webequie First Nation will develop a monitoring framework during the EA process for each project phase (construction and operation and maintenance). The two primary types of monitoring to be developed will include:

- Compliance monitoring; and
- Effects monitoring.

The compliance monitoring will assess and evaluate whether the Project has been constructed, implemented and/or operated in accordance with commitments made during the EA process, and any

conditions of the federal IA and provincial EA approvals and other approvals required to implement the Project.

The effects monitoring will be designed to verify the prediction of the effects assessment, and to verity the effectiveness of the impact management measures. This would include construction and operational monitoring that would identify actual effects, assess the effectiveness of the measures to minimize or eliminate adverse effects, and evaluate the need for any additional action to ensure that environmental commitments and obligations are fulfilled and mitigation measures are effective.

2.9.3. Gender Based Analysis Plus (GBA+)

Information and data collected will be disaggregated by diverse subgroups (women, youth, elders, etc.), as part of applying a Gender Based Analysis Plus (GBA+) lens. For Species at Risk, the baseline information will focus on species hunted/trapped/angled and consumed and will be obtained through such methods as socio-economic and health surveys (using Survey Monkey), key informant interviews with community members who hunt/trap/fish (gender, youth, elders), desktop research and Indigenous Knowledge where provided. This will include qualitative and quantitative data that help to characterize and describe the importance of SAR of cultural significance to Indigenous communities through a GBA+ lens, including, where feasible, the data disaggregated by sex, age, and other identity factors. Through Survey Monkey the data will be filtered and disaggregated based on the demographic questions answered (i.e., gender, age, Indigenous community membership, etc.).

The Project Team will work with the Indigenous communities to identify the appropriate participants for each of the subgroups that are willing to contribute to the baseline data collection through surveys and key informant interviews. The Project Team will tailor how they engage with these groups based on community protocols (i.e., it is expected that elders would prefer in-person dialogue and will require a community translator, versus youth, who would participate in online survey).

3. Consideration of Input from the Public and Indigenous Peoples

3.1. Public Participation

EA study participants as identified in the Agency *Public Participation Plan* dated February 24, 2020 for the WSR Project will be engaged and consulted. The Public Participation Plan was developed by the Agency to set out proposed opportunities for participation during the impact assessment process for Agency-led activities. The proponent, or its subject matter experts, may participate in activities as requested by the Agency.

The ToR provides a plan for engaging and consulting government ministries and agencies, the public and stakeholders based on EA study milestones similar to those for Indigenous communities.

All identified affected and/or interested stakeholders and members of the public will be notified at the EA study milestones. The public and stakeholders will have the opportunity to attend two (2) open house sessions that will be held in the City of Thunder Bay, focussing on:

1. Project and EA process overview; baseline data collection; spatial and temporal boundaries for assessment; criteria and indicators; and identification and preliminary evaluation of alternatives; and
2. Presentation of the selected preferred alternatives/the Project, including potential effects, mitigation, net effects and their significance and follow-up monitoring.

The open houses will include display materials and handouts containing information on the Project, the EA study process, known existing environmental conditions, the results of studies that have been conducted to date; the development and evaluation of alternatives, including the rationale for use of criteria and indicators; the project schedule; and the results of the consultation program. The Webequie Project Team will be available to receive and respond to questions and have an open dialogue regarding the EA process. Written comments may be prepared and left at the open house venue or sent to the Project Team within a specified period following the event.

The public and stakeholders will be notified regarding the commencement of the EA and submission of the Draft and Final EAR/IS. The EAR/IS will be available for review on the Project Website, and at municipal offices or nearby public libraries in:

- City of Thunder Bay
- Municipality of Greenstone
- Township of Pickle Lake
- City of Timmins
- Municipality of Sioux Lookout

In summary, the methods and activities for engagement and consultation with the public will include:

- Notification letters;
- Public notices and newspaper advertising at key EA milestones – Notice of Commencement; Notice of Open Houses; Notices for Draft and Final EAR/IS;
- Open houses;
- Communication materials for use at meetings such as slide decks, project fact sheets, handouts, etc.;
- Project Website; and
- Opportunities to review and provide comments on the Draft and Final EAR/IS.

All comments received from the public engagement and consultation activities will be tracked (i.e., Record of Consultation) and considered by the Project Team with the objective that the public be provided meaningful opportunities to participate, including in meaningful discussions in the EA process.

3.2. Indigenous Engagement and Consultation

3.2.1. Communities to be Included in the Assessment

The assessment of the Species at Risk component will include the 22 identified Indigenous communities that are to be consulted as part of the EA process, as shown in **Table 6** below. These communities have been identified by the MECP and Agency as communities whose established or asserted Aboriginal and/or Treaty rights may be adversely affected by the Project and/or may have interests in the project. Communities marked with an asterisk are those whose Aboriginal and Treaty rights may be affected by the Project.

The table also includes those communities that have been identified by Webequie First Nation based on Elders' guiding principles and Webequie's Three-Tier approach to Indigenous consultation and engagement. WFN identified communities and assessed them based on the following criteria:

- Geographically closer to the project area than others;
- Known to have traditionally used some of the potentially affected lands in the past, or currently;
- Downstream of the Project and may experience impacts as a result of effects to waterways;
- Considered to have closer familial/clan connections to the members of WFN; and/or
- Have been involved in all-season road planning in the Region, either directly with the WFN, or in consideration of all-season road planning that the WFN has been involved with in recent years.

Based on these factors, the communities identified by WFN will be offered the deepest or intensive consultation/engagement.

Table 6: Indigenous Communities to be Consulted

Indigenous Community	Identified by WFN	Identified by MECP	Identified by IAAC
Webequie First Nation	✓	✓*	✓*
Aroland First Nation		✓*	✓*
Attawapiskat First Nation	✓	✓*	✓*
Constance Lake First Nation		✓*	✓
Eabametoong First Nation	✓	✓	✓*
Fort Albany First Nation		✓*	✓*

Indigenous Community	Identified by WFN	Identified by MECP	Identified by IAAC
Ginoogaming First Nation		✓	✓
Kasabonika First Nation	✓	✓*	✓*
Kaschechewan First Nation		✓*	
Kitchenuhmaykoosib Inninuwug		✓*	✓
Kingfisher Lake First Nation		✓*	
Long Lake #58 First Nation		✓	✓
Marten Falls First Nation	✓	✓*	✓*
Mishkeegogamang First Nation		✓	
Neskantaga First Nation	✓	✓*	✓*
Nibinamik First Nation	✓	✓*	✓*
North Caribou Lake First Nation		✓	
Wapekeka First Nation		✓*	
Wawakapewin First Nation		✓*	
Weenusk (Peawanuck) First Nation	✓	✓*	✓*
Wunnumin Lake First Nation		✓*	
Métis Nation of Ontario – Region 2		✓	

3.2.2. Approach and Methods

The Project Team will consult and engage with Indigenous communities throughout the assessment process, and specifically the aquatic component with focus on those species for consumption or where use may have Indigenous cultural, social or economic importance. It is also the Project Team's objective that the EA captures Indigenous Knowledge and any issues, concerns or other information being provided by Indigenous communities accurately and appropriately. As such, Indigenous communities will have the opportunity to provide input and feedback during the following steps of the EA and more specifically the assessment of the aquatic environment as outlined in this Study Plan:

- Provide input to defining the Species at Risk study areas or spatial boundaries for the purposes of the baseline data collection and effects assessment;
- Provide input on the criteria and indicators, such as criteria Species at Risk and metrics to measure changes to baseline Species at Risk conditions as a result of the Project;
- Provide input on methods and types of baseline data and information to be collected, including opportunity to provide Indigenous Knowledge;
- Validate how baseline information is captured and used in the EA;
- Provide input on the effects assessment methodology, including alternatives;
- Discuss potential effects based on predicted changes to SAR and SAR habitat availability, distribution and abundance; and
- Provide input to identify mitigation measures and any follow-up monitoring programs during the construction and/or operation phases of the Project, including predicted overall net effects and significance, including those that may interfere with the exercise of rights of Indigenous peoples.

A variety of activities and materials will be used to provide information and receive input from Indigenous communities during the EA process. These are outlined and detailed in the provincial ToR which includes the mechanisms, activities and events that are planned for various stages throughout the EA process

and will be used at milestone points to ensure optimal engagement with Indigenous communities. In summary this includes the following:

- Notification letters sent by registered mail to all of the identified Indigenous communities and groups (i.e., Tribal Councils) informing them at key milestones (e.g., Commencement of provincial EA; Submission Draft EAR/IS and Submission of Final EAR/IS);
- Community visits throughout for those communities identified by IACC and MECP whose established or asserted Aboriginal and/or treaty rights may be adversely affected by the Project;
- Meetings (2) with off-reserve community members of the 22 Indigenous communities to be consulted as part of the EA;
- Information meetings with Métis Nation of Ontario;
- Engagement with Tribal Councils and Nishnawbe Aski Nation, with meetings held upon request;
- Communication materials for use at meetings, such as slide decks, project fact sheets, handouts, etc., including, where requested, translation to native language;
- Audio and visual products for those Indigenous communities that have the capability; community meetings and presentations will be live-streamed through local community media to allow for a wider audience to participate in the meetings;
- Use of surveys (e.g., “Survey Monkey”) or focused community-based meetings to obtain information (e.g., socio-economic, human health, etc.) and identify concerns from Indigenous people;
- Project Website (www.supplyroad.ca) for the public to review project related information and documents, including informative video tutorials (e.g., EA studies); and
- Project Newsletter letters.

Engagement with Indigenous groups has been undertaken as part of the ToR phase and included components of the Study Plan (e.g., baseline studies for valued components, spatial and temporal boundaries, criteria and indicators, EA alternatives, etc.) and will continue as part of the planned EA engagement activities for the Project.

All outreach efforts and consultation activities will be recorded as part of the Record of Consultation to allow for validation by the Agency and the MECP. The EAR/IS will describe how input from Indigenous communities and public was incorporated into the Species at Risk assessment and other valued components.

3.2.3. Indigenous Knowledge

Through engagement activities, the Project Team will also collect Indigenous Knowledge relevant to the WSR study area and specific valued components, where available, from the 16 Indigenous communities identified by Ontario and the 10 Indigenous communities identified by the Agency. Indigenous Knowledge will assist in describing existing conditions (e.g., characterizing the study area, natural environment conditions, social and economic conditions, cultural characteristics, community characteristics, past and current land uses and other values of importance. Indigenous Knowledge will be used to assist in developing mitigation measures, monitoring commitments and accommodation measures, where necessary. The Project Team will document efforts to obtain Indigenous Knowledge. It is recognized that each community may have its own protocols and procedures to be followed in transferring Indigenous Knowledge to outside parties such as WFN and the Project Team. The Project Team will ensure that related protocols are respected and will work with each community to understand how the information will be transferred, securely stored, and applied. Additionally, the Project Team will ensure that the

Indigenous Knowledge provided will be protected and kept confidential. The Project Team will seek guidance from the community as to how the information will be used and published.

As Indigenous Knowledge is holistic it can provide insights related to interrelationships between the natural, social, cultural, and economic environments, community health and well-being, Indigenous governance and resource use. Therefore, Indigenous Knowledge, where provided, will be included in all of aspects of the technical assessments of potential impacts of the Project on Indigenous peoples, or, given is holistic nature, may be presented in one section of the EAR/IS. It will also be considered in technical sections or chapters of the documents (e.g., baseline data on Species at Risk will include baseline information gathered through collection of Indigenous Knowledge). It is recognized that it is important to capture the context in which Indigenous groups provide their Indigenous Knowledge and to convey it in a culturally appropriate manner. Indigenous Knowledge will only be incorporated in the EAR/IS where written consent has been granted.

3.2.4. Aboriginal and Treaty Rights

The Webequie Project Team will be engaging with Indigenous communities regarding potential impacts of the Project on the exercise of rights, and where possible, the project's interference with the exercise of rights. Potential effects to be considered will include both adverse and positive effects on the current use of land and resources for traditional purposes, physical and cultural heritage, and environmental, health, social and economic conditions of Indigenous peoples impacted by the Project. For example, this will include such effects as reductions in the quantity and quality of resources available for harvesting (e.g., species of cultural importance, including traditional and medicinal plants; or interference with the current and future availability and quality of country foods (traditional foods). Webequie First Nation and the Project Team will discuss with Indigenous communities their views on how best to reflect and capture impacts on the exercise of rights in the EAR/IS. Should impacts on the exercise of Aboriginal and Treaty rights be identified, Webequie First Nation and the Project Team will work with Indigenous communities to determine appropriate mitigation measures to reduce or eliminate such impacts. Where no mitigation measures are proposed or mitigation is not possible, the Project Team will identify the adverse impacts or interference to the exercise of Aboriginal and Treaty rights and this will be described (e.g., level of severity) and documented in the EAR/IS. Webequie First Nation and the Project Team will advise Ontario and the Government of Canada on concerns Indigenous communities may have in relation to their exercise of Aboriginal and Treaty rights and whether their concerns cannot be addressed or mitigated by the Project Team.

4. Contribution to Sustainability

4.1. Overarching Approach

As recognized in the Agency's current guides to considering how a project will contribute to sustainability, it is not until baseline information has been collected and the potential effects of the Project are assessed that a full understanding or determination of the project's contribution(s) can be achieved/made. However, information and data requirements for sustainability have been considered from the outset of the WSR Project for planning purposes. In the absence of the potential effects assessment, this section outlines the general approach to determining sustainability contributions for this valued component.

The approach is based on the goal of providing a broad or holistic description of the project's potential positive and negative effects, including the interactions among those effects and the long-term consequences of the effects. In the context of the IAA requirements, sustainability means "the ability to protect the environment, contribute to the social and economic well-being of the people of Canada and preserve their health in a manner that benefits present and future generations", with the aim of "protecting the components of the environment and the health, social and economic conditions that are within the legislative authority of Parliament from adverse effects caused by a designated project", recognizing that the Minister's or the Governor in Council's public interest determination must include sustainability as one of five factors to be considered in rendering a final decision.

The approach also considers the level of effort required to assess a project's contribution to sustainability to be scalable, depending on the phase of the process and the context of the project, and can/will be adjusted/scoped as the impact assessment proceeds. For example, effects on future generations requires temporal scoping (i.e., consideration of next generation to "seventh generation"), based on expectations as to how many generations it will take for effects to become fully apparent, including return to VC baseline conditions; resilience of the VC; and whether a VC is expected to recover from effects.

As part of the public participation and Indigenous peoples engagement programs described in **Section 3.2.2**, the Project Team has (and will continue to) facilitate early identification of values and issues to better inform the assessment of the project's contribution to sustainability; and identify VCs that should be carried forward into that assessment, scoping related criteria and indicators to reflect the project context. As part of sustainability considerations, this information has also been used (with regard to which VCs are considered most important to Webequie First Nation) to identify alternative means of carrying out the Project and select alternatives to be carried forward for an assessment of sustainability contributions. Ultimately, with the appropriate input from the engagement and consultation program, the sustainability assessment will culminate with the development of commitments to ensuring the sustainability of Indigenous livelihood, traditional use, culture and well-being.

In identifying and scoping key VCs for sustainability contributions, the Project Team will consider VCs that:

- could experience long-term effects, including how those effects could change over time, and how they could affect future generations;
- may interact with other VCs;

- may interact with potential effects of the designated project; and/or
- may interact with project activities.

4.2. Assessment of Contribution to Sustainability

During preparation of the Impact Statement, the four (4) Sustainability Principles identified in the Agency's guides and the TISG will be applied as follows:

Principle 1 - Consider the interconnectedness and interdependence of human-ecological systems

A systems approach will be used to determine/express VC interconnectedness. The degree of interconnectedness within systems and/or subsystems may vary greatly (may be characterized as very intricate and tight/direct, or quite loose and indirect). The focus will be on those aspects that are most important to communities, the social-ecological system and to the context of a project. All interactions, pathways and connections among effects to the environment, and to health, economic and social conditions will be described, as will how these interactions may change over time. The Project Team will ensure that the description of systems and the direct and indirect relationships are guided by input from Indigenous Knowledge. It is expected that a graphic with simple pictorial images will be developed to visually represent the connections between human and ecological systems to facilitate comprehension and encourage input/feedback.

Principle 2 - Consider the well-being of present and future generations

The long-term effects on the well-being of present and future generations will be assessed. To conduct an analysis on future generations, the Project Team will first determine the potential long-term effects on well-being. This will entail consideration of the elements of environmental, health, social and economic well-being, across a spectrum of VCs, that communities identified as being valuable to them. In the context of subject VC (aquatic environment), well-being could include community cohesion, protection of the environment, culture, stress, or livelihoods. Available Comprehensive Community Plans (CCP) will be consulted to determine whether sustainability is a CCP central theme. How the environmental, health, social and economic effects on well-being could change over time will also be assessed, as information permits. Although effects on future generations could include effects beyond the lifecycle of a project, this is not expected to be major consideration for the WSR Project, as no expected decommissioning or abandonment timeframe has been identified. With respect to temporal scoping, there is still a need to determine what the "future generation" is (i.e., how far into the future the project effects will be considered). Predicted potential effects on future generations will be assessed based on the supporting data or uncertainty; any uncertainty will be documented.

Principle 3 - Maximize overall positive benefits and minimize adverse effects of the designated project

The Impact Statement will include a consideration of ways to maximize the positive benefits of the Project and consider mitigation measures that are technically and economically feasible and would mitigate any adverse effects of the Project. Sustainability considerations will include: whether additional mitigation measures are required; have additional benefits been identified and, if so, how can they be maximized; does the direction of the impact (i.e., positive or negative) shift between different groups and sub-populations; are there particular strengths or vulnerabilities in the potentially affected communities that

may influence impacts; do the impacts cause regional inequities; and do the near term benefits come at the expense of disadvantages for future generations.

Principle 4 - Apply the precautionary principle and consider uncertainty and risk of irreversible harm

The precautionary principle states that "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation". All uncertainties and assumptions underpinning an analysis will be described. A precautionary approach will be applied in cases where there is risk of irreversible harm (irreversible harm refers to project-related effects from which a VC is not expected to recover; reversibility is influenced by the resilience of the VC). Taking such a conservative approach may include setting out worst-case scenarios for decision-makers to consider, particularly when there is uncertainty about the significance or irreversibility of potential effects. As appropriate, the precautionary approach may be extended to commitments regarding the project's design (to prevent adverse effects, prevent pollution, deal with unplanned events) and the development of monitoring and follow-up programs to verify effects predictions, or gauge the effectiveness of mitigation measures. Uncertainty may be characterized quantitatively (e.g., description of confidence levels of modelled predictions) or qualitatively (e.g., through descriptors such as "high", "medium", and "low"). Qualitative descriptions of uncertainty will explain how the level of uncertainty was determined, identify sources of uncertainty and data gaps, and describe where and how professional judgment was used.

5. Schedule

The following field studies are currently planned for 2020 and 2021:

- Bat Acoustic Surveys (June-July 2020);
- Breeding Bird Point Count Surveys (June and July 2020);
- Acoustic Bird Sampling (Spring, Summer, Fall, and Winter 2020; May-December 2020 and January – March 2021);
- Crepuscular Bird Surveys (May to July 2020);
- Spring Spawning Surveys (May 2020); and
- Caribou Collaring (February – March 2021); and
- Wolverine Occupancy Study Year 1 (January – May 2021)

6. Reporting

The baseline SAR and habitat data will be collected in the spring, summer and fall of 2020 and will be compiled into a Natural Environment Existing Conditions Report that will include data from the 2019 baseline studies. The overall baseline report is tentatively scheduled to be completed by December 2020. The results of winter acoustic survey for birds will be compiled and submitted as an addendum to the Natural Environment Existing Conditions Report.

In the winter of 2021, a Caribou Collaring Study and a Wolverine Occupancy Study will be initiated to gain additional insight in the use of the study areas by these species and gather supplementary data about the regional distribution, abundance, habitat use, and biology of these species. Upon study initiation, a memorandum will be generated to describe the deployment of collars on at least 20 adult female caribou. A summary technical report describing the findings of year one (1) of both studies will be compiled in 2022.

7. Closure

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Appendix A

Species at Risk Status, Habitat Characteristics, and Preliminary Presence/Absence Determination

Appendix A: Species at Risk Status, Habitat Characteristics, and Preliminary Presence/Absence Determination.

Species		COSEWIC[1]	SARA[2]	ESA[3]	S-RANK[4]	Information Source[5]	Observed During Field Studies	Habitat Requirements[6]	Potential Habitat in Local Study Area	Rationale
Scientific Name	Common Name									
Puma concolor couguar	Eastern Cougar	Data Deficient	No Status (Schedule 1)	Endangered	SU	Atlas of the Mammals of Ontario	No	The Cougar or Mountain Lion lives in northern remote undisturbed forests where there is little human activity. However, few cougar sightings have been confirmed in recent decades. Forested habitats must support plenty of White-tailed Deer (*Odocoileus virginianus*) and other prey species for cougars.	No	The habitat within the Study Area is considered too wet for cougars.
Myotis lucifugus	Little Brown Myotis	Endangered	Endangered (Schedule 1)	Endangered	S3	Layng et al. 2019, IAAC	Yes	Caves, quarries, tunnels, hollow trees, buildings, attics, barns, wetlands, forest edges	Yes	This species was recorded during bat acoustic surveys conducted in 2019.
Myotis septentrionalis	Northern Myotis	Endangered	Endangered (Schedule 1)	Endangered	S3	MECP, IAAC	No	Caves, quarries, tunnels, hollow trees, buildings, attics, barns, wetlands, forest edges	Unlikely	The Project likely occurs beyond the northern range boundary for this species.
Gulo gulo	Wolverine	Special Concern	Special Concern (Schedule 1)	Threatened	S2S3	Atlas of the Mammals of Ontario	Yes	Wolverine occupy many habitat types in the far north of Ontario. Individuals can have ranges of up to 3500 km^2 and dens are built in snow drifts, under logs and boulders (Ontario Wolverine Recovery Team, 2013).	Yes	Records from the 2013 Ontario Recovery Strategy for Wolverine identified this species near Pickle Lake through aerial survey records and observations or reported tracks.
Rangifer tarandus	Caribou (Boreal population)	Threatened	Threatened (Schedule 1)	Threatened	S4	SARO	Yes/Likely	Caribou require large undisturbed areas of old and mature conifer upland forest and lowlands dominated by jack pine and/or black spruce. They are also found in bogs and fens. Only the boreal population of caribou is listed as a species at risk in Ontario.	Yes	Ontario Species at Risk mapping indicates that caribou distributions are located within the Study Area

Species		COSEWIC[1]	SARA[2]	ESA[3]	S-RANK[4]	Information Source[5]	Observed During Field Studies	Habitat Requirements[6]	Potential Habitat in Local Study Area	Rationale
Scientific Name	Common Name									
Rangifer tarandus	Caribou (Eastern migratory population)	Endangered	Special Concern (Schedule 1)	Special Concern	S4	SARO	Yes/Likely	Caribou require large undisturbed areas of old and mature conifer upland forest and lowlands dominated by jack pine and/or black spruce. They are also found in bogs and fens. Only the boreal population of caribou is listed as a species at risk in Ontario.	Yes	Ontario Species at Risk mapping indicates that caribou distributions are located within the Study Area
Haliaeetus leucocephalus	Bald Eagle	Not at Risk	No Status (Schedule 1)	Special Concern	S2N, S4B	OBBA	Yes	Prefer to nest in large trees almost always near a major lake or river where they do most of their hunting.	Yes	OBBA records indicate that this species has been found breeding within the Study Area.
Hirundo rustica	Barn Swallow	Threatened	Threatened (Schedule 1)	Threatened	S4B	iNaturalist, eBird	Yes	Prefer open habitat for foraging: grassy fields, pastures, ROWs, agriculture crops, and wetlands. Post-European settlement: Nest in human structures including barns, garages, houses, bridges, and culverts. Barn swallows generally reuse nests from year to year and are therefore sensitive to the removal of nesting structures.	Yes	iNaturalist records indicate this species has been breeding in the Webequie portion of the Study Area over the past few years.
Riparia riparia	Bank Swallow	Threatened	Threatened (Schedule 1)	Threatened	S4B	eBird MECP	No	Sand, clay, or gravel river banks or steep riverbank cliffs, lakeshore bluffs, gravel pits, road-cuts, grassland or cultivated fields close to water.	No	This species is not currently known to breed in the Study Area.
Chliodonias niger	Black Tern	Not at Risk	No Status	Special Concern	S3B	NORONT, IAAC	No	Shallow freshwater marshes (> 20 ha.) with cattails and emergent vegetation interspersed with open water. Smaller wetlands with the same features are also used.	No	This species is not currently known to breed in the Study Area.

Species		COSEWIC[1]	SARA[2]	ESA[3]	S-RANK[4]	Information Source[5]	Observed During Field Studies	Habitat Requirements[6]	Potential Habitat in Local Study Area	Rationale
Scientific Name	Common Name									
Cardellina canadensis	Canada Warbler	Threatened	Threatened (Schedule 1)	Special Concern	S4B	OBBA	No	The Canada Warbler is found in a variety of forest types, but it is most abundant in wet, mixed deciduous-coniferous forests with a well-developed shrub layer (COSEWIC, 2008). Nests are generally placed on or near the ground on mossy logs or roots, along stream banks or on hummocks. Less commonly, Canada Warblers are also found in riparian shrub forests on slopes and ravines, old-growth forests with canopy openings and a high density of shrubs and in stands regenerating after disturbances, such as forest fires or logging (COSEWIC, 2008).	No	Suitable habitat is very limited and is unlikely to occur. Suitable harwood and mixed forest, shrub foress, and valley slope habitat for this species is lacking across the Study Area.
Chordeiles minor	Common Nighthawk	Special Concern	Threatened (Schedule 1)	Special Concern	S4B	OBBA	No	Open ground; clearings in dense forests; peat bogs; ploughed fields; gravel beaches or barren areas with rocky soils; open s; flat gravel roofs.	Yes	OBBA records indicate that this species has been found breeding within the Study Area.
Contopus virens	Eastern Wood-pewee	Special Concern	Special Concern (Schedule 1)	Special Concern	S4B	NORONT	No	Mostly associated with the mid-canopy layer of forest clearings and edges of deciduous and mixed forests; preferred habitats are intermediate-age forest stands and mature stands with little understory vegetation.	No	This species is not currently known to breed in the Study Area. Suitable hardwood forest habitat for this species is lacking across the Study Area.
Coccothraustes vespertinus	Evening Grosbeak	Special Concern	Special Concern (Schedule 1)	Special Concern	S4B	OBBA	Yes	This species breeds in secondary growth and mature mixed forests (Peck and James 1987); however, habitat selection is likely influenced by food availability, rather than habitat structure. Presence is most likely base on the presence of Spruce Budworm, a primary food source for this species.	Yes	This species was recorded during breeding bird count surveys conducted in 2019.

Species		COSEWIC[1]	SARA[2]	ESA[3]	S-RANK[4]	Information Source[5]	Observed During Field Studies	Habitat Requirements[6]	Potential Habitat in Local Study Area	Rationale
Scientific Name	Common Name									
Contopus cooperi	Olive-sided Flycatcher	Special Concern	Threatened (Schedule 1)	Special Concern	S4B	OBBA	Yes	Semi-open, conifer forest, prefers spruce, Jack Pine, and Balsam Fir; near pond, lake, or river; treed wetlands for nesting; burns with dead trees for perching.	Yes	OBBA records indicate that this species has been found breeding within the Study Area.
Falco peregrinus anatum/tundrius	Peregrine Falcon	Not at Risk	Special Concern (Schedule 1)	Special Concern	S3B	OBBA	No	Nests on cliff ledges or crevices, preferably 50 to 200 m in height, but sometimes on the ledges of tall buildings or bridges, always near good foraging areas.	No	This species is not currently known to breed in the Study Area. Suitable cliff habitat is absent from the Proejct Area. This species may pass over the Project during migration.
Euphagus carolinus	Rusty Blackbird	Special Concern	Special Concern (Schedule 1)	Special Concern	S4B	OBBA	Yes	Openings in coniferous woodlands bordering bodies of water; tree-bordered marshes, beaver ponds, muskegs, bogs, fens or wooded swamps, stream borders with alder, willow, wooded islands on lakes.	Yes	This species was recorded during breeding bird count surveys conducted in 2019.
Asio flammeus	Short-eared Owl	Special Concern	Special Concern (Schedule 1)	Special Concern	S2N, S4B	OBBA	No	Resides in open habitats including arctic tundra, grasslands, peat bogs, marshes, sand-sage concentrations and old pastures. Preferred nesting sites are dense grasslands, as well as tundra with areas of small willows.	No	This species is not currently known to breed in the Study Area. Suitable marsh habitat is absent from the Project Area.
Coturnicops noveboracensis	Yellow Rail	Special Concern	Special Concern (Schedule 1)	Special Concern	S4B	OBBA	No	Large, freshwater or brackish grass and sedge marshes with dense vegetation including bulrushes, horsetails, grasses.	No	This species is not currently known to breed in the Study Area. Suitable marsh habitat is likely absent from the Project Area.

Species		COSEWIC[1]	SARA[2]	ESA[3]	S-RANK[4]	Information Source[5]	Observed During Field Studies	Habitat Requirements[6]	Potential Habitat in Local Study Area	Rationale
Scientific Name	Common Name									
Acipenser fulvescens	Lake Sturgeon (Southern Hudson Bay – James Bay populations)	Threatened	No Status	Special Concern	S4B	SARO	No	Lives almost exclusively in freshwater lakes and rivers with soft bottoms of mud, sand or gravel. Usually found at depths of 5-20 m. Spawn in relatively fast flowing water with gravel and boulder substrate usually below waterfalls, rapids or dams.	Yes	Noront EA recorded capturing Lake Sturgeon in the Muketei River. According to Indigenous knowledge, Lake Sturgeon used to be plentiful in Winisk Lake but populations have drastically declined due to overfishing.

[1] Committee on the Status of Endangered Wildlife in Canada (COSEWIC)
[2] Federal Species at Risk Act
[3] Species at Risk in Ontario List. (2014, August 11). Ministry of Natural Resources and Forestry. Retrieved September 12, 2014, from http://www.ontario.ca/environment-and-energy/species-risk-ontario-list
[4] Provincial Ranking
[5] Various sources

Status
No Status: Species has not been assessed under the Species at Risk Act.
Special Concern: Species that may become threatened or an endangered species because of a combination of biological characteristics and identified threats.
Threatened: Species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.
Endangered: Species that is facing imminent extirpation or extinction.

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Appendix B

Field Data Requirements and Data Collected to Date for Assessment and Evaluation of Caribou Criteria and Indicators

Appendix B: Field Data Requirements and Data Collected to Date for Assessment and Evaluation of Caribou Criteria and Indicators.

Criteria	Indicators	Information Source	Indication of Field Data Requirement to Inform Assessment	Field Data Collected to Date
Caribou	Range Condition	> Integrated Range Assessment Reports	> None	> N/A
(Habitat Protection)	Cumulative Disturbance at Range Level	> Ontario's Caribou Screening Tool > Integrated Range Assessment Reports	> None	> N/A
	Alignment with Existing or Proposed Disturbance	> Ontario's Caribou Screening Tool > Integrated Range Assessment Reports > Best Management Practices	> None	> N/A
	Habitat Amount and Arrangement	> Ontario's Caribou Screening Tool > Integrated Range Assessment Reports	> None > MECP suggests assessment based on "habitat statistics found in Ontario's Caribou Screening Tool"	> N/A
	Category 1: High Use Area – Nursery Areas Habitat directly impacted	> General Habitat Description (GHD) > GHD Mapping > LIO > Best Management Practices	> None > MECP suggests assessment based on GHD mapping and information available through LIO	> 2019 Calving/ Nursery Habitat Survey to confirm evidence of habitat use
	Category 1: High Use Area – Winter Use Areas directly impacted	> General Habitat Description (GHD) > GHD Mapping > LIO > Best Management Practices	> None > MECP suggests assessment based on GHD mapping	> 2018 and 2019 Winter Aerial Surveys
	Category 1: High Use Area – Travel Corridors directly impacted	> General Habitat Description (GHD) > GHD Mapping > Best Management Practices	> None > MECP suggests assessment based on GHD mapping	> N/A

Criteria	Indicators	Information Source	Indication of Field Data Requirement to Inform Assessment	Field Data Collected to Date
(Habitat Protection) cont'd	Category 2: Seasonal Ranges directly impacted	> General Habitat Description (GHD) > GHD Mapping > Best Management Practices	> None > MECP suggests assessment based on GHD mapping	> N/A
	Category 3: Remaining Areas in the Range impacted	> General Habitat Description (GHD) > GHD Mapping > Best Management Practices	> None > MECP suggests assessment based on GHD mapping	> 2018 and 2019 Winter Aerial Surveys > 2019 Calving/ Nursery Habitat Survey > Incidental observations
	Number of Category 1 Habitat (Nursery Areas, Winter Use Areas, Travel Corridors) found within 10 km of the proposal	> Ontario's Caribou Screening Tool > GHD Mapping > LIO > MECP	> None > MECP suggests assessment based on habitat areas identified/ delineated within GHD mapping	> 2018 and 2019 Winter Aerial Surveys > 2019 Calving/Nursery Habitat Survey
Caribou (Species Protection)	Incidental mortality due to anthropogenic impacts (e.g. vehicular collisions, increased hunting pressure)	> LIO (e.g. caribou occurrence data) > Project location mapping	> None	> Winter aerial surveys in 2018 and 2019 > Incidental observations

Criteria	Indicators	Information Source	Indication of Field Data Requirement to Inform Assessment	Field Data Collected to Date
Caribou (Species Protection)	Indirect mortality due to increase alternate prey sources (moose and deer) leading to increased predation (wolves, bears, etc.) and increased potential for spread of disease (e.g. brainworm)	> CEF > Caribou/Wolf/Moose Occupancy Model (Polley et al.) > LIO > Caribou Conservation Plan > Moose Aerial Inventory data	> None	> Winter aerial surveys in 2018 and 2019
	Indirect impacts due to sensory disturbance (e.g. light, sound, vibration, olfactory)	> LIO > General Habitat Description (GHD) > GHD mapping	> None	> N/A

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Appendix C

Sample Models for Habitat Suitability

Table 1: Sample Model for Moderate to High Suitability Bald Eagle Nesting Habitat in northern Ontario (Golder,)

Land Classification Scheme	Classification/Code	Parameters
Land Cover 2000	› Dense deciduous forest › Dense coniferous forest › Dense mixed forest	› Within 2.6 km of major waterbodies (i.e. greater than 300 ha); › Within 2.6 km of stream order 7 or higher watercourses using the Strahler method in the MNRF waterbody dataset
Forest Resource Inventory Ecosites[a]	NE03, NE06, NE07, NE10, NW16, NW18, NW19, NW23, NW24, NW26, NW27, C17, C18, C19, C21, C27, NW4	› Age structure greater than 80 years; › Within 2.6 km of major waterbodies (i.e. greater than 300 ha); › Within 2.6 km of Stream order 7 or higherwatercourses using the Strahler method in the MNRF waterbody dataset
LIO	Cliffs	› Within 2.6 km of major waterbodies (i.e. greater than 300 ha); › Within 2.6 km of Stream order 7 or higherwatercourses using the Strahler method in the MNRF waterbody dataset

[a] Ecosites (Racey *et* al, 1996)

Table 2: Sample Model for Moderate to High Suitability Canada Warbler Nesting in northern Ontario (Golder,)

	Code[a]	Parameters
Land Cover 2000	› Dense Mixed Forest › Treed Bog › Treed Fen › Regenerating Depleted Forest › Forest Depletion - Cuts › Forest Depletion - Burns › Riparian Areas	› All land cover types
	› Forest Stands (all ecosites)	› Forest Stands 6-30 years of age using year of origin attribute in the FRI dataset calibrated to 2020
	› Riparian Area (all ecosites)	
Forest Resource Inventory Ecosites[a]	C18, C19, C21, C**22,** C**31,** C**33,** NE05, NE06, NE08, NE09, NE11 NE12, NE13, NE14, NE15, NW16, NW17, NW19, NW23, NW28, NW29, NW30, NW32, NW34, NW35, NW36, NW37, NW40, NW44	› Forest Stands greater than 30 years of age using year of origin attribute in the FRI dataset calibrated to 2020

[a] Ecosites (Racey *et* al, 1996)

Table 3: Sample Model for Moderate to High Suitability Common Nighthawk Nesting Habitat in Northern Ontario (Golder,)

	Code[a]	Parameters
Land Cover 2000	› Bedrock › Sparse Forest › Forest Forest Depletion - Cuts › Forest Depletion - Burns › Forest regeneration depletion	› All land cover types
	› Dense deciduous forest › Dense coniferous forest › Dense mixed forest	› Edge areas that extend 50 m from one or more of the following cover types: › Water › Bedrock › Sparse Forest › Forest Forest Depletion - Cuts › Forest Depletion – Burns; and › Forest regeneration depletion
Forest Resource Inventory Ecosites[a]	› Forest Stands (polytype FOR)	› Pre-sapling stage. Ages 0-10 using year of origin attribute in the FRI dataset calibrated to 2020
	› Rock Barren (NW7)	
	C15, C18, C19, C20, C27, C29, NE01, NE02, NE03, NE06, NE07, NW13, NW16, NW19, NW28, NW29,	› Forest Stands 10-31 years of age using year of origin attribute in the FRI dataset calibrated to 2020
	› Forested Ecosites	› Edge areas that extend 50 m from one or more of the following areas: › Treed and open wetlands › Lakes, ponds and rivers › Burns 0-10 years old; and , › Upland ecosites and polytypes aged 0-10 years. › Aged 31 years and older using year of origin attribute in the FRI dataset calibrated to 2020

[a] Ecosites (Racey *et* al, 1996)

Table 4: Sample Model for Moderate to High Suitability Olive-sided Flycatcher Nesting Habitat in Northern Ontario (Golder,)

	Code[a]	Parameters
Land Cover 2000	› Dense coniferous forest › Dense mixed forest › Treed Bog › Treed Fen	› All land cover types
	› Coniferous forest › Mixed forest	› Edge areas that extend 50 m from one or more of the following cover types: › Water › Treed Fen › Treed Bog › Open Bog › Forest Forest Depletion – Cuts; and, › Forest Depletion - Burns
Forest Units	› BF1, BF-DOM, BfMx1, BfPur	› 60 years (onset age of mature forest)
	› COMX1, COMX2, ConMx MC1, MC2, OC,1, OCL, OCLow, PJ1, PjDee, PJM, PjMx1	› 70 years (onset age of mature forest)
	› CMX	› 80 years (onset age of mature forest)
Forest Resource Inventory Ecosites[a]	› Coniferous Forest › Mixed Forest	› 50 m in forest over 39 years of age using year of origin attribute in the FRI dataset calibrated to 2020 and, › Adjacent to wetlands and waterbodies
	› Burns	› Less than 25 years old
	› Cutblocks	› All

[a] Ecosites (Racey *et* al, 1996)