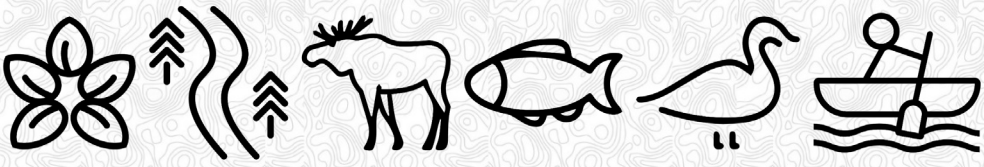
MARTEN FALLS FIRST NATION
ALL SEASON COMMUNITY ACCESS ROAD

FINAL

Birds Study Plan

May 2021



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Revision History

Rev #	Date	Revision Description
Draft	May 2020	Submitted “Study Plan – Wildlife DRAFT FOR DISCUSSION” to the Agency
Final	May 2021	Revised to address federal and provincial agency comments

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Acronyms

Agency, the ... Impact Assessment Agency of Canada
ARU ..... Autonomous Recording Unit
CAR ..... Community Access Road
CWS ..... Canadian Wildlife Service
EA ..... Environmental Assessment
ECCC ..... Environment and Climate Change Canada
ELC ..... Ecological Land Classification
ENDM ..... Ontario Ministry of Energy, Northern Development and Mines
ESA ..... *Endangered Species Act*, 2007
FNLC ..... Far North Land Cover
GIS ..... Geographic Information Systems
GRTS ..... Generalized Random Tessellation Stratified
IA ..... Impact Assessment
IAA ..... *Impact Assessment Act*
IS ..... Impact Statement
km ..... kilometre
LSA ..... Local Study Area
MECP ..... Ontario Ministry of the Environment, Conservation and Parks
MFFN ..... Marten Falls First Nation
MNRF ..... Ontario Ministry of Natural Resources and Forestry
OBBA ..... Ontario Breeding Bird Atlas
PDA ..... Project Development Area
RSA ..... Regional Study Area
SAR ..... Species at Risk
SARA ..... *Species at Risk Act*, 2002
SARO ..... Species at Risk in Ontario
SOCC ..... Species of Conservation Concern
TISG ..... Tailored Impact Statement Guidelines
ToR ..... Terms of Reference
VC ..... Valued Component

1. Introduction

The Proponent of the Community Access Road (CAR or the Project) is Marten Falls First Nation (MFFN), a remote First Nation community in northern Ontario located at the junction of the Albany and Ogoki rivers, approximately 430 kilometres (km) from Thunder Bay, Ontario. The MFFN community is proposing an all-season Community Access Road that will connect the MFFN community to Ontario's provincial highway network (Highway 643) to the south via the existing Painter Lake Road. MFFN, as the Proponent of the Project, has formed a MFFN CAR Project Team that includes MFFN CAR Community Member Advisors and MFFN CAR Project Consultants who act with input, guidance and direction from the MFFN Chief and Council.

This document outlines the Study Plan for Birds to support a coordinated Impact Assessment (IA) required for Project review by the Impact Assessment Agency of Canada (the Agency) under the federal *Impact Assessment Act* (IAA) and Environmental Assessment (EA) required for Project review by the Ontario Ministry of the Environment, Conservation and Parks (MECP) under the Ontario *Environmental Assessment Act*.

1.1 Federal and Provincial Terminology

The study plans have been prepared using federal terminology, however, the respective provincial terminology has been provided in **Table 1-1** for reference. The terms can be used interchangeably.

Table 1-1: Equivalent Federal and Provincial Terms

Provincial Term	Federal Term
Criteria	Valued Component (VC)
Impact Management Measure	Mitigation Measure
Net Effects	Residual Effects
Record of Consultation	Record of Engagement

For the purposes of this Study Plan, Species at Risk (SAR) and Species of Conservation Concern (SOCC) are defined as the following:

- **SAR:**
  - Any species listed under Schedule 1 of the federal *Species at Risk Act*, S.C. 2002, c. 29 (SARA) as Threatened, Endangered, or Extirpated; and/or

- Any species listed under the provincial *Endangered Species Act, 2007*, S.O. 2007, c. 6 (ESA) as Threatened, Endangered, or Extirpated.

- **SOCC:**
  - Any species listed under Schedule 1 of SARA as Special Concern;
  - Any species designated Threatened, Endangered, or Extirpated by the Committee on the Status of Endangered Wildlife in Canada (unless otherwise listed as SAR under SARA or the ESA);
  - Any species listed under the ESA as Special Concern (unless otherwise listed as SAR under SARA); and/or
  - Any species with a subnational rank (SRank[1]) of S1 – S3[2] as designated by the Natural Heritage Information Centre [Ministry of Natural Resource and Forestry (MNRF 2019a)].

The *Provincial Policy Statement, 2020* (PPS) protects Significant Wildlife Habitat in Ontario. Significant Wildlife Habitat is defined in the *Natural Heritage Reference Manual* (Ontario Ministry of Natural Resources and Forestry [MNRF], 2010a) as the following:

- Habitats of seasonal concentrations of animals
  - areas where animals occur in relatively high densities for the species at specific periods in their life cycles and/or in particular seasons; and
  - seasonal concentration areas, which tend to be localized and relatively small in relation to the area of habitat used at other times of the year.
- Rare vegetation communities or specialized habitat for wildlife
  - rare vegetation communities include:
    - areas that contain a provincially rare vegetation community; and
    - areas that contain a vegetation community that is rare within the planning area.
  - specialized wildlife habitats include:
    - areas that support wildlife species that have highly specific habitat requirements;

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1. *A Subnational rank or SRank is a conservation status of a species or plant community within Ontario considering factors such as abundance, distribution, population trends and threats.*
2. *S1 **Critically Imperiled** — Critically imperilled in Ontario. Species with S-ranks of S1 usually have 5 or fewer occurrences in the province or very few remaining individuals. Such species are often especially vulnerable to extirpation.*
   *S2 **Imperiled** — in Ontario. Such species usually have between 6-20 occurrences in the province or have many individuals in fewer occurrences. These species are often susceptible to extirpation.*
   *S3 **Vulnerable** — in Ontario. Such species usually have between 21-100 occurrences in the province. They may also have fewer occurrences but have a large number of individuals in some populations. These species may be susceptible to large-scale disturbances.*

  - areas with exceptionally high species diversity or community diversity; and
  - areas that provide habitat that greatly enhances species' survival.

- Habitat of SOCC
  - includes the habitat of species that are rare or substantially declining, or have a high percentage of their global population in Ontario;
  - includes Special Concern species identified under the ESA on the Species at Risk in Ontario (SARO) List (MECP 2020), which were formally referred to as "vulnerable" in the Significant Wildlife Habitat Technical Guide (MNRF 2000);
  - species identified as nationally Endangered or Threatened by COSEWIC, which are not protected in regulation under Ontario's ESA; and
  - excludes habitats of Endangered and Threatened species covered under PPS policy 2.1.3(a).
- Animal movement corridors
  - habitats that link two or more wildlife habitats that are critical to the maintenance of a population of a particular species or group of species; and
  - habitats with a key ecological function to enable wildlife to move, with minimum mortality, between areas of Significant Wildlife Habitat or core natural areas.

1.2 Project Study Plans

This Study Plan is one of a group of study plans created for the Project. **Table 1-2** includes the study plans for each environmental[3] discipline currently planned for the Project and the VCs covered by the study plans where applicable. The following factors were considered when selecting VCs:

- VC presence in the Study Area;
- the extent to which the VC is linked to the interests or exercise of Aboriginal and Treaty Rights of Indigenous peoples, and whether an Indigenous group has requested the VC;
- the extent to which the effects (real or perceived) of the Project and related activities have the potential to interact with the VC;
- the extent to which the VC may be under cumulative stress from other past, existing or future undertakings in combination with other human activities and natural processes;

3. *The use of the term environment in this document is inclusive of the components of the environment that are included in the Ontario Environmental Assessment Act definition, which includes a general description of the social, cultural, built and natural environments.*

- the extent to which the VC is linked to federal, provincial, territorial or municipal government priorities (e.g., legislation, programs, policies);
- the extent to which the VC is being addressed through any ongoing or completed regional assessment processes;
- the possibility that adverse or positive effects on the VC would be of particular concern to Indigenous groups, the public, or federal, provincial, territorial, municipal or Indigenous governments; and
- whether the potential effects of the Project on the VC can be measured and/or monitored or would be better ascertained through the analysis of a proxy VC.

Table 1-2: Project Study Plans and Valued Components

Environmental Discipline	Study Plan Name	Valued Component(s)
Aboriginal and Treaty Rights and Interests	■ Aboriginal and Treaty Rights and Interests Study Plan	■ Indigenous Current Use of Lands and Resources for Traditional Purposes ■ Cultural Continuity (ability to practice and transmit cultural traditions)
Atmospheric Environment	■ Atmospheric Environment and Greenhouse Gases Study Plan	■ Air Quality ■ Greenhouse Gas Emissions
Climate Change	■ Climate Adaptation and Resiliency Study Plan	■ Climate Change
Acoustic and Vibration Environment	■ Acoustic and Vibration Environment Study Plan	■ Noise ■ Vibration
Physiography, Geology, Terrain and Soils	■ Physiography, Terrain and Soils Study Plan	■ Physiography, Terrain and Soils
Surface Water	■ Surface Water Study Plan	■ Surface Water
Groundwater and Geochemistry	■ Groundwater and Geochemistry Study Plan	■ Groundwater
Vegetation	■ Vegetation Study Plan	■ Wetland and Riparian Ecosystems ■ Upland Ecosystems ■ Designated Areas (Areas of Natural and Scientific Interest, Environmentally Significant Areas, Significant Woodlands, Critical Landform / Vegetation Associations) ■ Traditional Use Plants and SAR Plant Populations (including species with special conservation status or rarity in the province)
	■ Peatlands Study Plan	■ Peatland Ecosystems (bogs and fens)

Environmental Discipline	Study Plan Name	Valued Component(s)
Wildlife	■ Wildlife Study Plan	■ Bats (including SAR-bats such as: Little Brown Myotis [*Myotis lucifugus*], Northern Myotis [*Myotis septentrionalis*] and Tricolored Bat [*Perimyotis subflavus*]) ■ Fur Bearers (proxy VC[4] American Marten [*Martes americana*], Beaver [*Castor canadensis*] and Wolverine [*Gulo gulo*]) ■ Amphibians and Reptiles ■ Pollinating Insects
	■ Ungulates (Moose and Caribou) Study Plan	■ Moose (*Alces alces*) ■ Caribou, boreal population (*Rangifer tarandus*)
	■ Birds Study Plan	■ Forest Birds (proxy VC of Red-eyed Vireo [*Vireo olivaceus*] for deciduous forest, Ovenbird [*Seirus aurocapilla*] for mixedwood forest, Dark-eyed Junco [*Junco hyemalis*] for coniferous forest and disturbed forest ■ Raptors (proxy VC of Osprey [*Pandion haliaetus*] for diurnal raptors and Boreal Owl [*Aegolius funereus*] for nocturnal raptors ■ Shorebirds (proxy VC of Wilson's Snipe [*Gallingo delicata*]) ■ Waterfowl (proxy VC of Mallard [*Anas platyrhynchos*]) ■ Bog / Fen Birds and Other Wetland Birds (proxy VC of Palm Warbler [*Setophaga palmarum*] for bogs, Common Yellowthroat [*Geothlypis trichas*] for fens; and Northern Waterthrush [*Parkesia noveboracensis*] for swamps). ■ SAR birds: Canada Warbler (*Cardellina canadensis*), Chimney Swift (*Chaetura pelagica*), Common Nighthawk (*Chordeiles minor*), Eastern Whip-poor-will (*Antrostomus vociferous*), Eastern Wood-Pewee (*Contopus virens*), Evening Grosbeak (*Coccothraustes vespertinus*), Olive-sided Flycatcher (*Contopus cooperi*), Bald Eagle (*Haliaeetus leucocephalus)*, Peregrine Falcon (*Falco peregrinus*), Short-eared Owl (*Asio flammeus)*, Bank Swallow (*Riparia riparia*), Barn Swallow (*Hirundo rustica*), Black Tern (*Childonias niger*), Rusty Blackbird (*Euphagus carolinus*), Yellow Rail (*Coturnicops noveboracensis*)
Fish and Fish Habitat	■ Fish and Fish Habitat Study Plan	■ Lake Sturgeon (*Acipenser fulvescens*) ■ Walleye (*Sander vitreus*) ■ Brook Trout (*Salvelinus fontinalis*) ■ Northern Pike (*Esox lucius*) ■ Lake Whitefish (*Coregonus clupeaformis*) ■ Chain Pickerel (*Esox niger*) ■ Yellow Perch (*Perca flavescens*) ■ Cisco (*Coregonus artedii*) ■ Burbot (*Lota lota*)

4. A proxy VC is used when looking at the effects of one species that represents many others.

Environmental Discipline	Study Plan Name	Valued Component(s)
		■ Longnose Sucker (*Catostomus catostomus*) ■ White Sucker (*Catostomus commersonii*) ■ Forage / Prey Species (including species such as Lake Chub [*Couesius plumbeus*]) ■ Lower Trophic Organisms (e.g., benthic invertebrates)
Social	■ Social Study Plan	■ Housing and Accommodation ■ Community Service and Infrastructure ■ Transportation ■ Community Well-being ■ Populations and Demographics
Economy	■ Economic Study Plan	■ Regional Economy ■ Labour Force and Employment ■ Government Finances
Land and Resource Use	■ Land and Resource Use Study Plan	■ Land Use Compatibility ■ Parks and Protected Areas ■ Extractive Industry ■ Forestry Industry ■ Energy and Linear Infrastructure ■ Recreation and Tourism
Human Health and Community Safety	■ Human Health and Community Safety Study Plan	■ Public Safety ■ Public Health ■ Diet ■ Environmental Factors Influencing Health
Visual Aesthetics	■ Visual Aesthetics Study Plan	■ Visual Contrast / Character ■ Visibility ■ Visual Sensitivity
Archaeological and Cultural Heritage	■ Cultural Heritage Study Plan	■ Archaeological Sites and Resources ■ Built Heritage Resources and Cultural Heritage Landscapes

It should be noted that while there is not a consultation study plan, the Project has developed the *Consultation and Engagement Plan to Support the Environmental Assessment / Impact Statement* (AECOM 2020a) (referred to as the Impact Statement [IS] / EA Consultation Plan).

2. Purpose and Objectives

The key objectives of conducting an IA / EA are to describe the existing environment, gather sufficient information to predict Project-related effects (positive and negative, direct and indirect) of the Project and alternatives on the environment, determine measures needed to avoid or minimize adverse Project effects, and enhance beneficial Project effects where feasible, and to undertake consultation and engagement throughout.

The purpose of this Study Plan is to explain:

- The geographic extent of Project areas for birds and specific species associated with the direct and indirect effects of the Project works;
- A baseline[5] study methodology that will result in a comprehensive description of the existing environment potentially impacted by the Project;
- How efficient and transparent data management and analysis will be undertaken;
- Effects assessment scoping inputs specific to birds that will allow for potential effects of the Project on the existing environment to be appropriately assessed in the IS / EA Report; and
- How the Study Plan aligns with federal and provincial requirements and guidance, including the Agency's Tailored Impact Statement Guidelines (TISG; the Agency 2020a), dated February 24, 2020, for this Project and applicable provincial agency comments on the Draft Terms of Reference (ToR)[6] (AECOM 2019).

As required by the IAA and referenced in TISG Section 7.3 (the Agency 2020a), work plans will also be developed for disciplines as required. It is anticipated the work plans will include further details on how to action the study plans; for example, they would contain such information as location of sampling sites, scheduling, and sequencing.

For the purposes of establishing appropriate context, the Study Plan begins with background and relevant information on:

- Study plan related discussions with the Agency, the MECP and applicable agencies to date (**Section 3**);

5. *Baseline refers to the current conditions of the environment potentially impacted by the Project. Baseline conditions serve as a reference against which changes due the Project are measured.*
6. *If necessary, the Study Plan will be updated to reflect the approved ToR if approval is obtained.*

- The approach to Project consultation and engagement (**Section 4**);
- How Indigenous Knowledge will be collected and used in the IA / EA (**Section 5**); and
- The spatial and temporal boundaries that will be used for the IA / EA (**Section 6**).

2.1 Approach to Handling Confidential Information

2.1.1 Indigenous Knowledge

Permission from the Indigenous community will be sought before including Indigenous Knowledge in the IS / EA Report, regardless of the source of the Indigenous Knowledge. Sensitive and / or confidential information will be specifically collected through the Indigenous Knowledge Program to inform the IS / EA Report, and its use and publication will be governed by Indigenous community-specific Indigenous Knowledge Sharing Agreements. Sensitive and / or confidential information collected through Indigenous Knowledge Sharing Agreements will be protected from public or third-party disclosure and will be established between the Proponent and Indigenous communities participating in the Indigenous Knowledge Program prior to the sharing and use of any sensitive information. Instances where Indigenous Knowledge sharing has taken place during consultation activities (e.g., meetings) will be recorded in the Record of Consultation and Engagement, including where Indigenous Knowledge was incorporated into Project decisions and into the IS / EA Report (i.e., specifics will not be included in the Record of Consultation and Engagement given the potential sensitivity and / or confidentiality of the information shared).

2.1.2 Species at Risk

Sensitive information related to SAR, such as those provided by the MECP or by the MNRF, will be presented in materials in accordance with the applicable Sensitive Data Licence Agreements applicable to this Project.

3. Study Plan Technical Discussions

To facilitate the development of satisfactory study plans and eventually a satisfactory IS / EA Report, MFFN previously submitted draft study plans in an effort to hold technical discussions with the Agency, the MECP and applicable agencies. A summary of technical discussions and correspondence held to date on this Study Plan has been provided in **Table 3-1** below.

Table 3-1: Study Plan Technical Discussions

Attendees / Responsible Party	Correspondence	Discussion Point(s)	Solution
■ **MFFN CAR Project Team** ■ **MECP** ■ **MNRF** ■ **Ontario Ministry of Energy, Northern Development and Mines (ENDM)** ■ **The Agency, Environment and Climate Change Canada (ECCC)**	■ Technical discussion to review the MECP comments on the Draft Wildlife Study Plan.	■ **11-September-2020:** A discussion to review comments and clarification questions received, including editorial comments, additional information requirements regarding the study plan, assessment and desktop analysis.	■ More details of the previous studies and existing information that were used to steer and inform this study plan have been included in the study plan and in **Appendix C.** ■ Following this meeting, it was decided that a new Study Plan would be developed to focus only on Birds (i.e., Birds were removed from the updated Wildlife Study Plan).
■ **MFFN CAR Project Team** ■ **MECP** ■ **ENDM** ■ **The Agency** ■ **ECCC**	■ Technical discussion regarding bird study design and modelling techniques.	■ **16-October-2020:** A discussion to review comments and hold a technical discussion pertaining to the breeding bird study design, modelling, and data collection logistics.	■ Follow-up meeting with ECCC arranged to discuss detailed conversations about modelling and simulations in a MFFN CAR Bird Technical (working group) discussion.
■ **MFFN CAR Project Team** ■ **The Agency** ■ **ECCC**	■ Technical discussion regarding bird study design and modelling techniques.	■ **04-December-2020:** MFFN CAR Bird Technical (working group) discussion. ECCC explanation of wanting to compare the bias and representativity of the existing breeding bird data compared to the TISG benchmark study design, how to use the existing data to see if more sampling is needed through modelling, and comparing study design options to fill the data gaps using simulations.	■ Provide a PowerPoint presentation for a follow-up meeting showing details of what was mentioned in the discussion points.
■ **MFFN CAR Project Team** ■ **The Agency** ■ **ECCC**	■ Technical discussion regarding bird study design and modelling techniques.	■ **2021-February-01**: A discussion about breeding bird study design bias and representativity described in the Power Point presentation.	■ Breeding bird study design bias and representativity summarized in **Section 7.2.1.1.2** and in more detail in **Appendix C**.

4. IS / EA Report Consultation and Engagement Process

4.1 Interested Persons and Government Agencies

The Proponent will provide Project notices and advise of opportunities for consultation and engagement with interested persons[7] which includes, at a minimum, members of the public outlined in the *Public Participation Plan for the Marten Falls Community Access Road Project Impact Assessment* (the Agency 2020b) (referred to as the Public Participation Plan). This will include the opportunity to provide input on the existing environment, VCs, effects assessment methods, effects assessment results, and mitigation and follow-up program measures as applicable. A variety of activities will be offered so that members of the public are informed of the IS / EA Report as it progresses and are aware of the opportunities and means to provide their input. The study plans have recognized public and agency input received on the Project to date. Government agencies and interested persons will have the opportunity to comment on components of the study plans throughout the IS / EA Report consultation and engagement process. The Project's approach to handling confidential and sensitive information is outlined in **Section 2.1**.

4.2 Indigenous Communities

The Proponent will provide Project notices and opportunities for consultation and engagement with Indigenous communities identified in **Table 4-1**, which is inclusive of all Indigenous communities identified in the *Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment* (the Agency 2020c) (referred to as the Indigenous Engagement and Partnership Plan).

Indigenous communities will be provided the opportunity to be involved at critical decision-making points throughout the IS / EA Report so that the Proponent can consider and incorporate, where appropriate Indigenous Knowledge and Indigenous land and resource use information into the Project as it pertains to the existing environment, VCs, effects assessment methods, effects assessment results, and mitigation and follow-up program measures. A variety of activities will be offered so that Indigenous communities are informed of the IS / EA Report as it progresses and are aware of the opportunities, means and timelines to

7. *Interested persons, as defined in the IS / EA Consultation Plan, are individuals and groups (e.g., associations, non-governmental organizations, industry and academia) who could have an interest in the Project, including but not limited to communities in the region, those with commercial interests (e.g., forestry, trappers, outfitters, other mineral tenure holders in the area) and recreational users or those with recreational interest (e.g., campers, hunters and environmental groups).*

provide their input. The study plans have recognized Indigenous community input received on the Project to date. Indigenous communities will have the opportunity to comment on components of the study plans throughout the IS / EA Report consultation and engagement process.

Table 4-1: Identified Neighbouring Indigenous Communities, including their Provincial Territorial Organizations and / or Tribal Council Affiliations

Tribal Council Affiliation	Indigenous Community or Organization
Matawa First Nations Management *(Nishnawbe Aski Nation)*	■ **Marten Falls First Nation** (Proponent and potentially affected Indigenous community) ■ Aroland First Nation ■ Constance Lake First Nation ■ Eabametoong First Nation ■ Ginoogaming First Nation ■ Neskantaga First Nation ■ Nibinamik First Nation ■ Webequie First Nation
Matawa First Nations Management and the Union of Ontario Indians / Nishnawbe Aski Nation	■ Long Lake #58 First Nation**
Mushkegowuk Council *(Nishnawbe Aski Nation)*	■ Attawapiskat First Nation ■ Fort Albany First Nation ■ Kashechewan First Nation
Shibogama First Nations Council *(Nishnawbe Aski Nation)*	■ Kasabonika Lake First Nation ■ Kingfisher Lake First Nation ■ Wapekeka First Nation ■ Wawakapewin First Nation ■ Wunnumin Lake First Nation
Independent First Nations Alliance *(Nishnawbe Aski Nation)*	■ Kitchenuhmaykoosib Inninuwug First Nation
Independent First Nations *(Nishnawbe Aski Nation)*	■ Mishkeegogamang First Nation ■ Weenusk First Nation
Nokiiwin Tribal Council	■ Animbiigoo Zaagi'igan Anishinaabek First Nation*
Métis Nation of Ontario	■ Métis Nation of Ontario; Region 2*
Independent Métis Nation	■ Red Sky Independent Métis Nation*

*Notes: * Indigenous communities or organizations identified by the MECP who should be consulted on the basis that they may be interested in the Community Access Road.*
*** The MECP indicated in a letter to MFFN that Long Lake #58 First Nation was moved from interest-based to rights-based.*

4.3 Consideration of Identity and Gender-Based Analysis Plus in Engagement

To fulfill requirements of the IAA, the Consultation and Engagement Program will consider a diverse range of perspectives from interested persons and interested Indigenous communities and their members identified in the Agency's Indigenous Engagement and Partnership Plan and the Public Participation Plan. This will include at a minimum providing ongoing opportunities for engagement to:

- **Neighbouring Indigenous communities, including relevant subpopulations:**
  - Women;
  - Youth; and
  - Elders.
- **Non-Indigenous communities including:**
  - Women;
  - Youth; and
  - Activity-based subgroups (e.g., recreationalists, snowmobilers, tourism establishment operators).

The Proponent will also consult and engage with other subpopulations identified by communities during consultation and engagement. The information from these activities and any additional identity groups identified by communities through consultation and engagement will be considered by applicable environmental disciplines for the purposes of data collection and considering disproportionate effects.

During consultation and engagement, these aforementioned groups will be consulted and engaged with on targeted input**.** Specialized knowledge will be gathered through other disciplines such as Social, Economic, Land and Resource Use and Aboriginal and Treaty Rights and Interests. The Socio-economic Data Collection Program is expected to include targeted interviews, focus groups, questionnaires and other niche tools to gather information from diverse populations to resolve gaps in socio-economic secondary data. These diverse populations include the aforementioned identity groups, which are also referenced in the IS / EA Consultation Plan, and those identified by communities during consultation and engagement. The importance of soliciting inputs and perspectives from diverse subgroups has also been factored into the Indigenous Knowledge Program and associated materials (see **Section 5**).

When feedback is received from interested persons and Indigenous communities, issues, comments and questions will be tracked, which is consistent with the process described in the IS / EA Consultation Plan. Specific to Gender-Based Analysis Plus objectives, this will include efforts to engage with diverse populations. It is expected this will include activities specific to subgroups and tabulation of consultation and engagement participation with respect to identity factors. This will provide summary statistics to demonstrate the diversity achieved in consultation and engagement.

5. Consideration of Indigenous Knowledge in the IS / EA Report

The following provides a general description of how Indigenous Knowledge will be considered in the IA / EA process. The extent to which Indigenous Knowledge is considered by each specific VC will vary depending on the nature of the VC, the potential for Project effects on the VC and whether Indigenous knowledge that relates to a VC is provided / obtained. As such, not all aspects of the general approach described below may apply to all VCs / study plans.

There are two concurrent and complementary avenues for Indigenous communities and groups to be engaged with and provide input on the Project: the Indigenous Knowledge Program and the Consultation and Engagement Program. Both programs serve to support the collection of Indigenous perspectives, values, and input on the Project, including Aboriginal and Treaty Rights and how they may be impacted by the Project, to be integrated throughout the IA / EA process. However, the Indigenous Knowledge Program specifically aims to solicit and incorporate information that is considered sensitive and may have confidentiality requirements, including Indigenous Knowledge and information on Indigenous land and resource use. Indigenous Knowledge Sharing Agreements will be established between the Proponent and Indigenous communities participating in the Indigenous Knowledge Program prior to the sharing and use of any sensitive information.

All Indigenous communities and groups identified by the MECP and the Agency through the Indigenous Engagement and Partnership Plan have the opportunity to participate in the Indigenous Knowledge Program. The Indigenous Knowledge Program provides interested Indigenous communities an opportunity to: share existing Indigenous Knowledge and information on Indigenous land and resource use and cultural values that may be relevant to the Project, and / or complete Project-specific studies to collect and share Indigenous Knowledge and information on Indigenous land and resource use and cultural values. The Indigenous Knowledge Program includes opportunities for Indigenous communities and groups to meet with the Proponent to discuss the program, ask questions, and share concerns and interests. In support of this, the Proponent has created an Indigenous Knowledge Program Guidance Document (the Guidance Document) that provides:

- An overview of the Indigenous Knowledge Program and information on how Indigenous Knowledge, Indigenous land and resource use and cultural values and practices can be collected and / or shared;

- Information on how Indigenous Knowledge and information on Indigenous land and resource use and cultural values and practices may be used in the planning and design processes; and
- A suite of guidance materials that were developed based on the information requirements of both the federal and provincial assessment processes, including: question guides to support the collection of information on historical and current community context; Indigenous Knowledge that may be relevant to the various technical disciplines; information on Indigenous land and resource use, cultural values and practices and associated spatial data, and perspective on potential Project-related effects and associated mitigation and / or enhancement measures.

The Guidance Document will also support participating Indigenous communities in providing Project-specific information in a manner that facilitates meaningful incorporation into the IS / EA Report.

The IS / EA Consultation Plan outlines the process for obtaining information and feedback about the Project from Indigenous communities (i.e., the Consultation and Engagement Program). All Indigenous communities identified by the MECP and the Agency have the opportunity to participate in the Consultation and Engagement Program through community-specific meetings, Public Information Centres, web conferences, and other formats. All Indigenous communities identified by the MECP and the Agency will be provided information related to the Project and invited to participate at various points throughout the IA / EA process.

There are also opportunities for technical teams to engage with Indigenous communities to solicit perspectives and information relevant to the Project, including information related to collection of existing information and the development of the IS / EA Report. The Proponent also invites feedback and inputs throughout the Project via the Project website and ongoing communications with the Proponent.

The Indigenous Knowledge and Consultation and Engagement programs are designed to be complementary and provide multiple opportunities for communities to offer feedback and information, including perspectives on Aboriginal and Treaty Rights and interests and how these may be impacted by the proposed Project. Relevant information collected through both the Indigenous Knowledge and Consultation and Engagement programs, including potential effect pathways on Aboriginal and Treaty Rights and interests, will be shared with each of the relevant disciplines throughout the IA / EA to: guide and inform VCs; support characterization of the existing environment; identify the potential effects of the Project on VCs; help identify mitigation measures and potential monitoring programs; and ultimately guide Project planning. The nature of how the Indigenous Knowledge becomes integrated into the IS / EA Report will be dictated by the specific information provided by each Indigenous community and the parameters set out in the Indigenous Knowledge Sharing Agreements. A description of how Indigenous Knowledge was considered in the IA / EA and in each of the technical discipline areas will be included in the IS / EA Report.

It is also important to note that information collected through the various activities (e.g., field studies and programs, effects assessments) of each discipline area (e.g., wildlife, vegetation, cultural heritage) will be shared with the Indigenous Knowledge Program leads. This will support the establishment of the existing environment and the effects assessment for the Aboriginal and Treaty Rights and Interests environmental discipline, as well as the identification of potential mitigation measures and monitoring programs, given the interrelated nature of Indigenous peoples and other environmental disciplines.

The Proponent will strive to respectfully collaborate with Indigenous communities on how Indigenous Knowledge and information on Indigenous land and resource use and cultural values will become part of the IS / EA Report, and how potential effects to Aboriginal and Treaty Rights and interests will be assessed. It is expected that measures to support this may include but are not limited to: engaging Indigenous communities to solicit information on Indigenous Knowledge and Indigenous land and resource use and cultural values to inform baseline conditions, providing Indigenous communities with draft sections of the IS / EA Report to illustrate how Indigenous Knowledge and information on Indigenous land and resource use and cultural values has been integrated and to confirm it has been presented appropriately, and completing collaborative working sessions with Indigenous communities for the effects assessment on Aboriginal and Treaty Rights and Interests. Further information on how potential effects on Indigenous rights will be assessed is provided in the Aboriginal and Treaty Rights and Interests Study Plan.

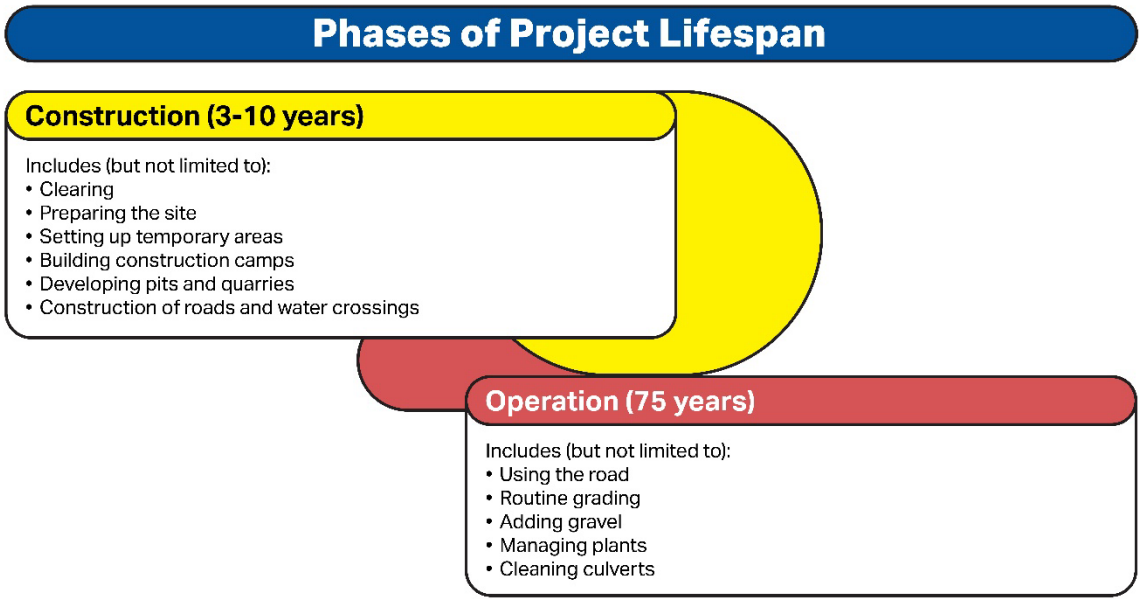
6. Assessment Boundaries

6.1 Temporal Boundaries: Project Phases

Project phases, which are temporal boundaries, are developed to establish the timeframes within which potential effects of the Project will be considered in the IS / EA Report. The Project is planned to occur in two phases, which are briefly described below and shown in **Figure 6-1**.

- **Construction Phase:**
  The time from start of construction, including site preparation activities, to the start of operations and maintenance of the CAR. Decommissioning of construction works is included in the construction phase. The construction phase is anticipated to take approximately 3 to 10 years to complete
- **Operations and Maintenance Phase:**
  The operations and maintenance phase starts once construction activities are complete and lasts for the life of the Project. The operations and maintenance phase of the Project is considered to be 75 years based on the expected timeline for when major refurbishment of road components (e.g., bridges), is anticipated.

Figure 6-1: Project Schedule



There are currently no plans to decommission the CAR as there is no expected / known end date for its need. Therefore, future suspension, decommissioning and eventual abandonment of the CAR will not be considered in the IS / EA Report. It will be considered if and when a decommissioning or abandonment application is made for the road.

In determining the temporal boundaries, in particular the long operations and maintenance phase, consideration was given to the long-term effects on the well-being of present and future generations (Sustainability Principle #2[8]). The final temporal boundaries to be used in the IS / EA Report will be based on regulatory agency guidance, professional judgement and input received through the Project consultation process.

6.2 Spatial Boundaries: Study Areas

6.2.1 General Information

Study areas identify the geographic extents within which potential effects of the Project are likely to occur and will be considered in the IS / EA Report. The existing conditions and potential effects are documented for three study areas selected for the Project:

- **Project Development Area (PDA)**: area of direct disturbance;
- **Local Study Area (LSA)**: the area where most of the direct effects of the Project are likely to occur; and
- **Regional Study Area (RSA)**: the area where indirect effects of the Project are likely to occur.

The PDA encompasses the 100 metre (m) wide CAR right-of-way (ROW), temporary construction access roads, work areas, worker camps, and pits, quarries and associated access roads. The preliminary LSA currently being considered within the scope of the ongoing provincial regulatory review process generally includes the area within 2.5 km of the centreline of Alternative 1 and Alternative 4. The preliminary study area generally allows for the documentation of existing conditions and prediction of potential environmental effects for the Project. A 5 km wide study area also allows for route refinements during development of Project design (e.g., adjustment of the alignment to avoid sensitive features).

8. *Sustainability Principles #2 is one of four sustainability principles included in Section 25 of the Project's TISG as further elaborated on Section 9.7.*

The specific location of Project components, including the roadway, quarries, pits and temporary infrastructure, are not yet known and will be included in the IS / EA Report. While most of the Project components are expected to be located within the preliminary 5 km wide study area, benefits (e.g., reduced environmental disturbance, avoidance of sensitive features, technical considerations, concerns received through consultation) for locating Project components on lands outside of the 5 km wide study area may become known during the IA / EA process. If the need to locate Project components outside the 5 km wide study area is determined to be required or of benefit to the Project, the study area would be adjusted.

The study area for each environmental discipline may vary from the above-described general study area based on the potential for the Project to directly or indirectly affect each environmental discipline; therefore, discipline-specific LSAs and RSAs have been defined for the Project. In defining the final LSAs and RSAs, each environmental discipline will consider:

- Location and other characteristics of the environmental discipline relative to the Project;
- The anticipated extent of the potential Project effects;
- Federal, provincial, regional, and local government administrative boundaries;
- Indigenous groups listed in **Table 4-1**;
- 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.

The study areas included in this document are preliminary, covering the extent to which readily available information suggests the Project may have noticeable effects on the environment. The size, nature and location of past, present and reasonably foreseeable projects will be taken into consideration in the development of the cumulative effects assessment study area(s). The appropriate study area(s) to assess cumulative effects are dependent on the VCs predicted to have direct residual adverse effects as a result of the Project, and therefore, cannot be defined until the IS / EA Report has sufficiently advanced.

6.2.2 Bird Study Areas

For the Bird VC, spatial boundaries were defined using an ecosystem-centred approach for the LSA and RSA, as certain ecological features are more likely to be affected than others. The LSA was defined to consider the range of land cover types in its spatial extent, the spatial distribution of these land cover types,

and the rate of change in land cover composition with increasing distance from the PDA. This approach results in an LSA that allows for the documentation of existing conditions and prediction of potential environmental effects for the Project to the RSA.

LSA boundaries for the Bird VC were defined following the methods outlined in Section 7.4.1 of the TISG (the Agency 2020a). Land cover within the limits of the PDA was first calculated using the Ontario Far North Land Cover (FNLC; MNRF 2014a). Buffers were applied to the limits of the PDA in increments of 100 m, continuing to 15 km, and the percentage of each of the major land cover types within each increment was calculated. The rate of change between successive buffers was then calculated to determine the maximum calculated rate of change across all buffer increments. The first buffer increment was calculated using the percent difference between the PDA and that buffer increment (100 m). Once the maximum calculated rate of change for each land cover type was calculated, the LSA boundary was defined as the buffer width that was the maximum of:

- 500 m from the PDA boundary, or
- the buffer increment where
  - All major land cover types have a rate of change in land cover composition of less than or equal to 5% of the maximum rate of change, and
  - The increment is beyond (i.e., further away from the PDA) where the maximum rate of change is found.

Using the methods outlined above it was found that the LSA boundary should extend to 2.8 km from the limits of the PDA. We have rounded the LSA to 3 km on either side of centreline to capture the 100 m PDA. This LSA exceeds setback buffers of possible bird species in the Study Areas (Environment Canada 2009).

A similar approach was employed to define the boundary of the RSA using the calculated percent cover within the LSA (3 km) as a starting point. The result of this exercise suggested that the RSA boundary should extend 10.7 km from the limits of the PDA. As such we have included an RSA of 11 km from centreline.

This approach is intended to: lead to LSA boundaries that represent land covers found within the PDA; RSA boundaries that represent the land cover that comprises both the PDA and LSA (especially rarer habitats); represent the rapid land cover change that occurs along the edges of these features; and represent a portion of the broader landscape matrix (**Table 6-1**).

Table 6-1: Land Cover in the Study Areas

Study Area	PDA[a]		LSA[b]		RSA[c]	
Land Cover	**Area (ha)**	**% of Total Area**	**Area (ha)**	**% of Total Area**	**Area (ha)**	**% of Total Area**
Coniferous Treed	562.0	16.0	21,150.7	11.2	66,760.5	11.4
Coniferous / Thicket Swamp	1,021.3	29.1	51,019.3	26.4	157,263.0	26.8
Deciduous Treed	79.3	2.3	2,892.5	1.5	9,541.9	1.6
Disturbance – Non and Sparse Woody/2012 Fire	374.1	10.6	16,313.1	8.4	45,810.7	7.8
Disturbance – Treed and/or Shrub/Sparse Treed	340.5	9.7	14,136.0	7.3	34,663.4	5.9
Mixed Treed	188.3	5.4	7,387.6	3.8	22,767.1	3.9
Treed / Open Bog	351.9	10.0	34,159.5	17.8	108,446.0	18.5
Treed / Open Fen	549.0	15.6	35,251.0	18.3	107,498.7	18.3
Total	**3,466.4**	**98.7**	**182,309.7**	**94.7[b]**	**552,751.3**	**94.1[c]**

Notes: Land cover types include those that represent key habitats for Bird VCs, including SAR. The balance of cover types not included in the above table are as follows:

a. Bedrock accounts for 0.1%
Clear Open Water accounts for 1.4%
b. Freshwater, Marsh, Bedrock, Turbid Water and Community / Infrastructure account for less than 0.1%
Clear Open Water accounts for 5.3%
c. Freshwater, Marsh, Bedrock, Turbid Water and Community / Infrastructure account for less than 0.1%
Clear Open Water accounts for 5.9%
0.5% of the RSA is not covered by the FNLC dataset

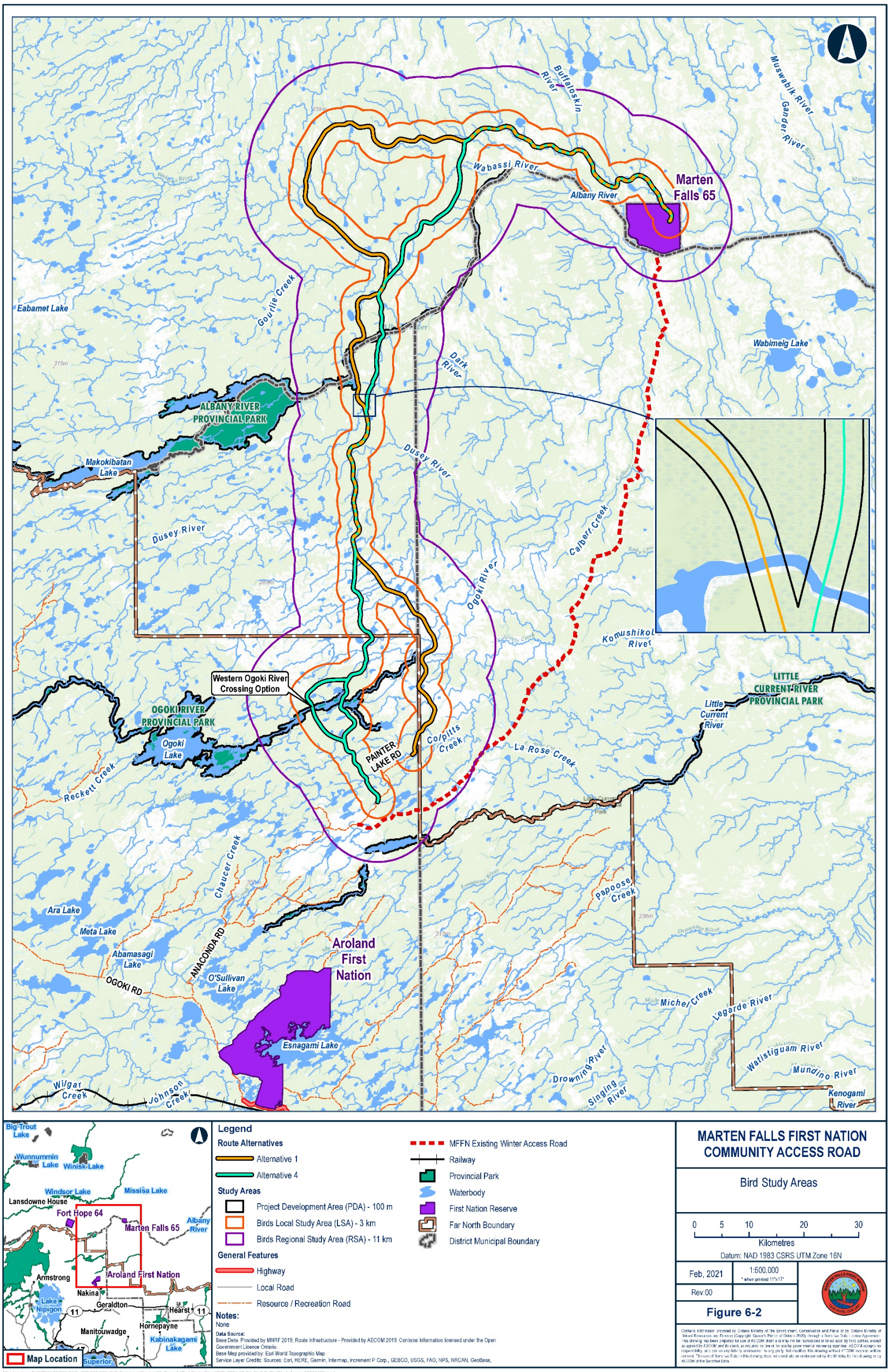
As further detailed in **Section 4**, the Proponent will continue to provide opportunities for neighbouring Indigenous communities and interested persons to provide input and inform the effects assessment, including the LSAs and RSAs.

The LSA and RSA boundaries for Birds are defined in **Table 6-2** and shown on **Figure 6-2**.

Table 6-2: Birds Study Areas

Study Area	Geographic Extent	Rationale
LSA	■ 3 km buffer from centreline for all Birds.	■ Area where direct effects of the Project are likely to occur. Considers the range of land cover types in its spatial extent, the spatial distribution of these land cover types, and the rate of change in land cover composition with increasing distance from the PDA.
RSA	■ 11 km buffer from centreline.	■ Using a boundary of 11 km will allow for assessment of indirect effects of the Project on the broader landscape, while remaining representative of the land cover types found within the Project Area.

Figure 6-2: Birds Local and Regional Study Areas



7. Baseline Study Design

7.1 Desktop Assessment

A desktop review of existing information sources for birds will be completed to identify information gaps that will need to be addressed through further study. A preliminary list of applicable information sources has been included in **Appendix A** and reflects federal and provincial guidance received to date. Data sources are relevant in spatial and temporal coverage to the Project and are suitable as baseline information for northern areas where there are no roads. This Study Plan focuses on the additional studies that are anticipated to be required to gather information beyond what is currently available through existing information sources, including those as described in Section 7.2 'Sources of baseline information' in the Agency's TISG for this Project (the Agency 2020a).

7.2 Study Methods

The following study methods have been designed to address elements of the TISG required for field investigations the Agency 2020a). This includes implementing best practices, incorporating Indigenous Knowledge and implementing survey protocols that may be identified for critical habitats under the Schedule of Studies as outlined in various SAR recovery strategies that exist for species protected under SARA (Environment Canada 2015a, b; Environment Canada 2016a, b; ECCC 2018), provincial recovery strategies (MECP 2019a, MECP 2019b, Ontario Peregrine Falcon Recovery Team 2010, Heagy *et al.* 2014), government response statements (MNRF 2010b, MNRF 2014b, MNRF 2017a, MNRF 2019b, MNRF 2019c), and General Habitat Descriptions (MNRF 2013a, MNRF 2015a, MNRF 2017b, MNRF 2018).

Table 7-1 lists the migratory and non-migratory Bird VCs based on the Section 8.9 of the TISG (the Agency 2020a), including a number of SAR listed under Schedule 1 of SARA and provincially listed SAR under the ESA.

For each Bird VC group, at least one representative species was selected as a proxy VC based on habitat association (multiple species if represented by several land covers), expected abundance or behaviour (i.e., diurnal or nocturnal). The SAR VC includes the key habitats associated with each proxy VC SAR species, and its critical habitat as applicable.

Table 7-1: Bird Valued Components

Bird VC	Proxy VC		COSEWIC Status	SARA Schedule 1 Status	ESA Status
	Common Name	Scientific Name			
Forest Birds	Red-eyed Vireo (deciduous forest)	*Vireo olivaceus*	-	-	-
	Ovenbird (mixedwood forest)	*Seiurus aurocapilla*	-	-	-
	Dark-eyed Junco (coniferous forest and disturbed [forestry or fire] forest)	*Junco hyemalis*	-	-	-
Raptors	Osprey (diurnal raptor)	*Pandion haliaetus*	-	-	-
	Boreal Owl (nocturnal raptor)	*Aegolius funereus*	Not at Risk	Not on Schedule 1	-
Bog / Fen Birds and Other Wetland Birds	Palm Warbler (bog)	*Setophaga palmarum*	-	-	-
	Common Yellowthroat (fen)	*Geothlypis trichas*	-	-	-
	Northern Waterthrush (swamp)	*Parkesia noveboracensis*	-	-	-
	Sora (marsh)	*Porzana carolina*	-	-	-
Waterfowl	Mallard	*Anas platyrhynchos*	-	-	-
Shorebirds	Wilson's Snipe	*Gallinago delicata*	-	-	-
Species at Risk (SAR)	Canada Warbler	*Cardellina canadensis*	Special Concern	Threatened	Special Concern
	Chimney Swift	*Chaetura pelagica*	Threatened	Threatened	Threatened
	Common Nighthawk	*Chordeiles minor*	Special Concern	Threatened	Special Concern
	Eastern Whip-poor-will	*Antrostomus vociferus*	Threatened	Threatened	Threatened
	Eastern Wood-pewee	*Contopus virens*	Special Concern	Special Concern	Special Concern
	Evening Grosbeak	*Coccothraustes vespertinus*	Special Concern	Special Concern	Special Concern
	Olive-sided Flycatcher	*Contopus cooperi*	Special Concern	Threatened	Special Concern
	Bald Eagle	*Haliaeetus leucocephalus*	Not at Risk	Not on Schedule 1	Special Concern
	Peregrine Falcon	*Falco peregrinus*	Not at Risk	Special Concern	Special Concern
	Short-eared Owl	*Asio flammeus*	Special Concern	Special Concern	Special Concern
	Bank Swallow	*Riparia*	Threatened	Threatened	Threatened
	Barn Swallow	*Hirundo rustica*	Threatened	Threatened	Threatened
	Black Tern	*Chlidonias niger*	Not at Risk	Not on Schedule 1	Special Concern
	Rusty Blackbird	*Euphagus carolinus*	Special Concern	Special Concern	Special Concern
	Yellow Rail	*Cotornicops noveboracensis*	Special Concern	Special Concern	Special Concern

Two fen specialists (i.e., LeConte's Sparrow – *Ammospiza leconteii* and Sedge Wren – *Cistothorus platensis*) were examined as proxy VCs for fen birds. Preliminary data indicates that there are insufficient observations of these fen specialists for future modelling. Although Common Yellowthroat is not a fen specialist, it is common in a variety of wet areas including fens (Guzy and Ritchison 1999) and had sufficient data for preliminary modelling (**Appendix C**).

7.2.1 Field Surveys

Bird indicator data will be collected using a combination of methods including point count surveys, autonomous recording units (ARUs), marsh bird call playback surveys, species-specific surveys, and aerial surveys. As a requirement of the TISG, the following sections describe survey methods to collect indicator data to account for temporal sources of variation including within a 24-hour daily cycle, within and among seasons (e.g., spring migration, breeding season, late summer / fall migration, and late winter), and among years (two years) (the Agency 2020a).

One year of bird indicator data has already been collected by point count surveys (2018-2019), ARU surveys of Eastern whip-poor-will (2019), marsh bird call playback surveys (2018), and aerial raptor nest surveys (2018) with sample sizes provided in the following subsections where appropriate. Results of these bird surveys will be provided in a separate baseline report.

Information described below is related to future field studies.

7.2.1.1 Breeding Bird Point Count

Breeding bird point count surveys will primarily target Bird VCs in the Forest Birds and Bog / Fen and Other Wetland Birds groups due to the abundance of forest, bog, fen and other wetland habitats in the LSA (94.7%). The objective of breeding bird point count surveys is to determine the presence, distribution, abundance, and density of breeding birds.

7.2.1.1.1 Study Design

The breeding bird point count study design was developed through discussions with ECCC / Canadian Wildlife Service (CWS), in particular Russ Weeber (Head, Terrestrial Assessment Unit, CWS). The study design takes into consideration limited site accessibility combined with a Project that is expected to impact less common geologic features (i.e., eskers) and associated land cover types in greater proportion to their availability. Oversampling of less common land cover types was planned due to the Project's expected bias towards these land cover types as shown in **Table 6-1**.

Breeding bird point count stations were selected using a Generalized Random Tessellation Stratified (GRTS) study design which allows for spatial coverage of the entire survey area (Stevens and Olsen 2004). GRTS incorporates stratification, unequal probabilities for habitat types, and oversampling. An advantage of GRTS is that survey stations can be added dynamically to sample if pre-selected survey stations are discovered to be non-target or inaccessible while maintaining a spatially well-balanced sample.

A GRTS survey design was established using the R Package ‘s survey’ (Kincaid and Olsen 2011). Samples were stratified by land cover categories of the FNLC data set (MNRF 2014a) as well as recently burned areas from the Fire Disturbance Area data set. Sample allocation was based on the proportions of each habitat type within the LSA. Land cover categories with similar characteristics were combined if a land cover type comprised less than 1% of the total LSA because allocation of sufficient samples in these rare land cover types was not feasible. Treed bog was combined with open bog, and treed fen was combined with open fen, following the rationale of ECCC that “treed” is a continuum, rather than a discrete characteristic of these wetlands (Zooetica 2018)

Land cover types (representing Bird VCs key habitats) were given unequal probabilities (i.e., weighted values) using three qualitative values based on their importance to breeding bird species in the region. ECCC recommended a general and defensible ranking of High, Medium and Low species richness for each habitat type. Deciduous and mixedwood forests were classified as high species richness; coniferous, second-growth / regenerating, and burned / disturbed forests were classified as medium species richness; and swamp, bog, and fen were classified as low species richness. These qualitative rankings were converted into values of 3 = high; 2 = medium; and 1 = low; for GRTS sampling.

In addition to FNLC categories, riparian habitats were distinguished amongst the FNLC spatial data because many bird species utilize the riparian areas of wooded habitats. Riparian habitat was designated by establishing a 100 m buffer surrounding each water body using the Ontario Hydro Network 1:100,000 watercourse and waterbody data sets (Ontario GeoHub 2021), within each “forest“ category of the FNLC spatial data. These riparian habits were given the same unequal probability as the associated non-riparian forest habitats. Samples were allocated in proportion to the total area of each forest habitat that was classified as riparian.

Three additional constraints were applied to the point count selection procedures: 1) minimum of 200 m between points to avoid double counting birds; 2) minimum of 100 m from existing human-made features (e.g., settlements, corridors) that may influence results; and 3) contiguous habitat within 100 m point count radius where possible to allow for analysis of bird-habitat relationships and habitat-dependent density calculations. GRTS was able to enforce the first criterion, but not the latter two. The TISG requirement for edge-associated species also needed to be considered (the Agency 2020a). However, randomized sampling of GRTS resulted in selection of some points near habitat edges; therefore, data collected at these sites can be included in the analysis of bird species and edge habitats.

Breeding bird point counts were conducted from June 5 to June 14, 2018 and June 28 to July 7, 2018 at 101 survey stations within the LSA (Zoetica 2018a). Breeding bird point counts were conducted at 70 survey stations from June 13 to June 17, 2019 to fill data gaps and minor realignments (Golder 2019). The

allocation of breeding bird survey stations within each land cover type (riparian habitats excluded in the table) are shown in **Table 7-2.** Due to safety concerns from helicopter pilots or limited time, 101 of the 171 survey stations were visited at least twice as per CWS (2008) guidelines for a total of 273 site visits. Breeding bird survey stations are spatially distributed across the full extent of the current LSA with the exception of a 20.7-km route option added in August 2020 (**Figure 7-1**).

Table 7-2: Breeding Bird Sampling in the LSA[9] (2018-2019)

Land Cover Type*	Area (hectares [ha])	% of Total Area	CWS Rank	No. Survey Stations Visited 1x	No. Survey Stations Visited 2x	Total Survey Stations	% of Total Survey Stations
Coniferous Treed	21,142.3	10.9	2	13	17	30	17.5
Coniferous / Thicket Swamp	50,938.8	26.4	1	15	15	30	17.5
Deciduous Treed	2,878.1	1.5	3	2	4	6	3.5
Disturbance - Non and Sparse Woody / 2012 Fire	16,288.3	8.4	2	9	15	24	14.0
Disturbance - Treed and/or Shrub / Sparse Treed	14,071.0	7.3	2	3	12	15	8.8
Mixed Treed	7,359.0	3.8	3	3	13*	16	9.4
Treed / Open Bog	34,149.0	17.7	1	12	12	24	14.0
Treed / Open Fen	35,095.0	18.2	1	13	13	26	15.2
Total	**182,309.7**	**94.7**	-	70	101	171	-

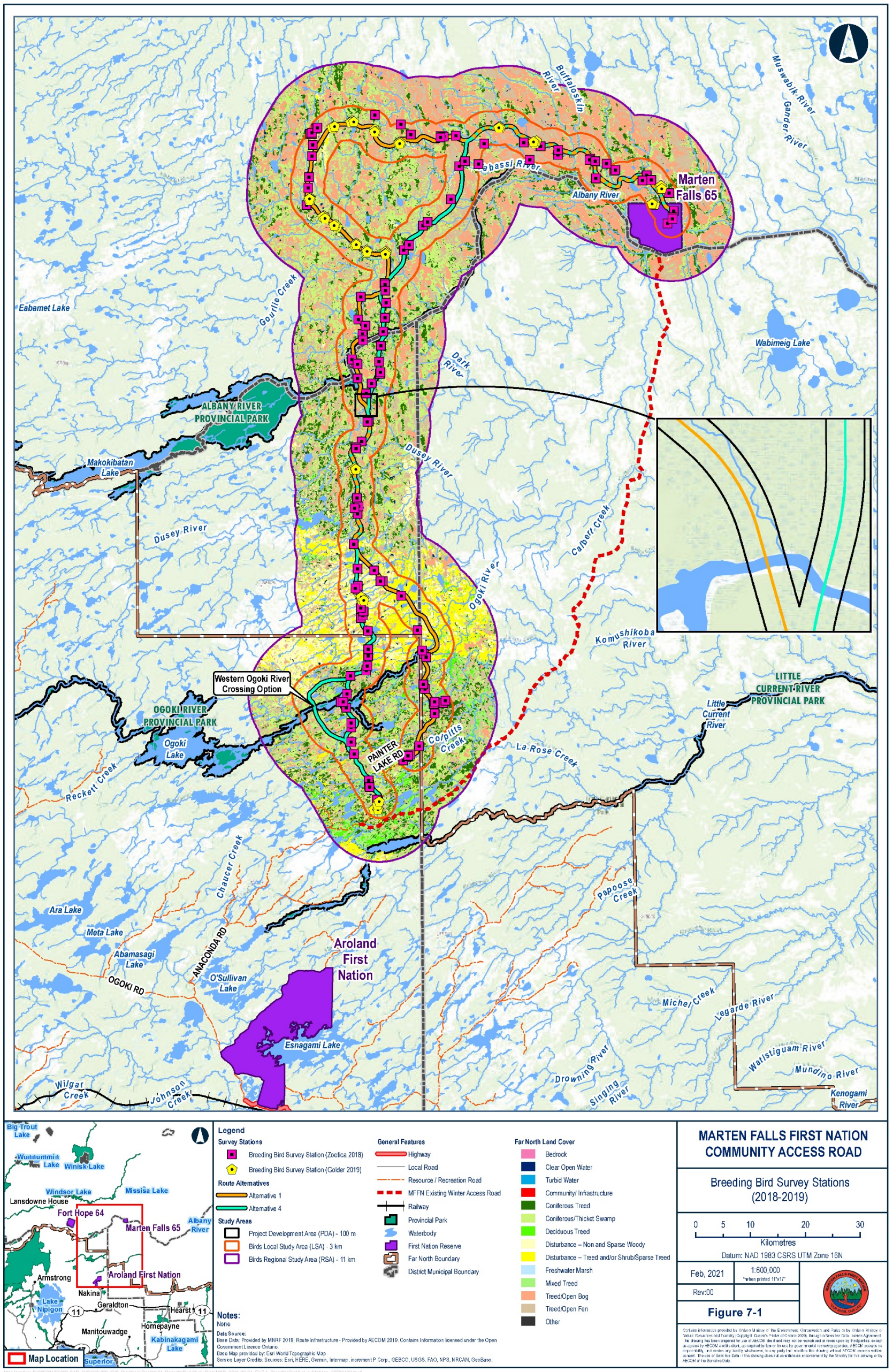
Notes: Land cover types include those that represent key habitats for Bird VCs, including SAR.
One survey station (in mixed tree land cover type) was visited three times.

7.2.1.1.2 Study Design Bias and Representativity

As per Section 8.9 of the TISG (the Agency 2020a), simulations were conducted using simple models with point count data (Zoetica 2018a, Golder, 2019) to determine the “optimal” breeding bird sample size to fill any data gaps while reducing variances and producing non-biased estimates representing all land cover types (**Appendix C**). Three options were tested for filling any data gaps: (1) using the existing GRTS study design for additional sampling (60% using existing survey stations and 40% new survey stations); (2) using a simple random study design for additional sampling; and (3) using the TISG benchmark study design for additional sampling (the Agency 2020a).

9. *Zooetica (2018) LSA 0.5 from centreline for breeding birds, 2 km from centre line for raptors; Golder (2019) LSA 2.5 km from centreline for breeding birds*

Figure 7-1: Breeding Birds Survey Stations (2018-2019)



The bird species models for the existing 273 site visits selected with the GRTS study design shows initial signs of decreasing variance (**Appendix C**). The mean and variance in the TISG benchmark study design is stable at a fairly low number of site visits (**Appendix C**). The variance in the other study design options stabilize by 573 site visits (**Appendix C**). This indicates that 300 additional site visits (two site visits at 150 survey stations) on top of the 273 site visits already completed (Zoetica 2018b, Golder 2019), is a reasonable "optimal" sample size that stabilizes the precision of model estimates and minimizes bias relative to the TISG benchmark study design. The GRTS study design is the preferable option for selecting additional survey stations based on the lower variance and mean bias by 573 site visits for SAR such as Canada Warbler and Olive-sided Flycatcher (**Appendix C**)

The GRTS study design was compared with the TISG benchmark study design for habitat and covariate representativity. As expected, the GRTS study design oversampled deciduous treed and mixed tree forest and undersampled coniferous / thicket swamp, treed / open bog and treed / open fen compared to the TISG benchmark study design (**Appendix C**). This is an acceptable level of representativity given that the TISG recommends oversampling land cover types associated with eskers (the Agency 2020a). Furthermore, covariate representativity was adequately achieved for 20 of 50 model simulations for the additional 150 survey stations selected using the GRTS study design.

GRTS will be used to select additional survey stations to fill data gaps and provide increased sampling of cover types that will be disproportionally affected by the Project (**Appendix C**). Following Section 8.9 of the TISG (the Agency 2020a), the GRTS study design will allocate 60% of surveys stations (90) to point count surveys and 40% of survey stations (60) to autonomous recording units (ARU). The allocation of survey stations between point counts and ARUs by land cover will be described in further detail in the Work Plan.

7.2.1.1.3 Survey Protocol

Breeding bird point count surveys will be conducted at each station, separated by a minimum distance of 200 m where possible, twice during the breeding bird season (June 1 through July 10 in the Northern Ontario Ecozone; June 1 through July 17 in Hudson Bay Lowlands Ecozone), and 10 days apart. Observers skilled in Northern Ontario bird identification by sight and sound will be used for breeding bird point counts.

Point counts will be modified from standard breeding bird programs such as the Forest Bird Monitoring Program Survey Instructions (CWS 2008) and the Atlas of the Breeding Birds of Ontario (Cadman *et al*. 2007). Point counts will begin as soon as possible after sunrise (because of safety issues with flying helicopters in low light conditions, manned pre-dawn surveys are not possible) and will end no later than 11:00 AM. Each visual and auditory observation will be recorded during a standardized 10-minute point count, recording each individual bird in the first minute interval which it was detected. Estimated distances

to each bird will be recorded as: 0 m to 50 m, 50 m to 100 m, and beyond 100 m. Birds flying over the station and/or greater than 100 m from the station centre will be categorized as incidental observations. Surveys will only be completed with little or no precipitation and when wind is calm or less than four on the Beaufort Scale.

Surveyors of breeding birds may be subject to biases in bird recognition and identification depending on skill level and hearing ability. To minimize bias, and as indicated previously, observers skilled in Northern Ontario bird identification by sight and sound will be used for breeding bird point counts. Furthermore, bias will be further minimized by recording bird vocalizations during point counts using a high-quality portable recording device (Zoom H2n digital handheld recorder or equivalent) mounted on a tripod. Observer and recorder data will be compared for surveyor bias as described in **Section 8**.

7.2.1.2 Autonomous Recording Unit (ARU)

ARUs will be deployed to collect avian data to complement breeding bird point count, marsh bird call playback, and species-specific surveys during the breeding bird season and will be the sole source of avian data collected during migration (spring and fall) and winter. ARUs will complement traditional point counts by providing more frequent data collection which will be valuable in detecting rare species.

The objective of the ARU surveys is to determine the presence, distribution, and abundance of birds in the Forest Bird, Raptors, and Bog / Fen and Other Wetland Birds VC groups by season and among years . Density will not be determined because ARUs are unlimited distance point counts which make it problematic to estimate density (Yip *et al.* 2017).

7.2.1.2.1 Study Design

ARU survey station selection for the breeding season will follow the study design described for point counts in **Section 7.2.1.1.1.** Based on Section 8.9 of the TISG (the Agency 2020a), ARUs will be deployed at approximately 40% of the proposed 150 breeding bird survey stations during the breeding season. To inform estimates of site use by birds among seasons, a subset of approximately 50% of the ARUs will be programmed to record data during spring migration, fall migration, and winter (the Agency 2020a).

During migration, ARU survey station selection will emphasize potential migration corridors along watercourses and ridges (including eskers). A subset of ARU survey stations during migration and all ARU survey stations during winter will be deployed in the land cover types described in **Section 7.2.1.1.1** to provide information about migration stopover or overwintering. ARUs will be spaced at least 800 m apart to avoid double counting based on the detection distances recorded for a suite of 24 bird species (Yip *et al.* 2017).

7.2.1.2.2 Survey Protocol

ARUs will be programmed during the breeding bird season from June 1 through July 10 (Northern Ontario Ecozone) or July 17 (Hudson Bay Lowlands Ecozone) to collect data every second day during two phases. Each phase is programmed to target bird species that vocalize during different times of the 24-hour daily cycle:

- Phase one will start at midnight with a schedule of 3-minutes ON and 12-minutes OFF until five hours after local sunrise.
- Phase two will start 30-minutes before local sunset with a schedule of three-minutes ON and 12-minutes OFF until midnight.

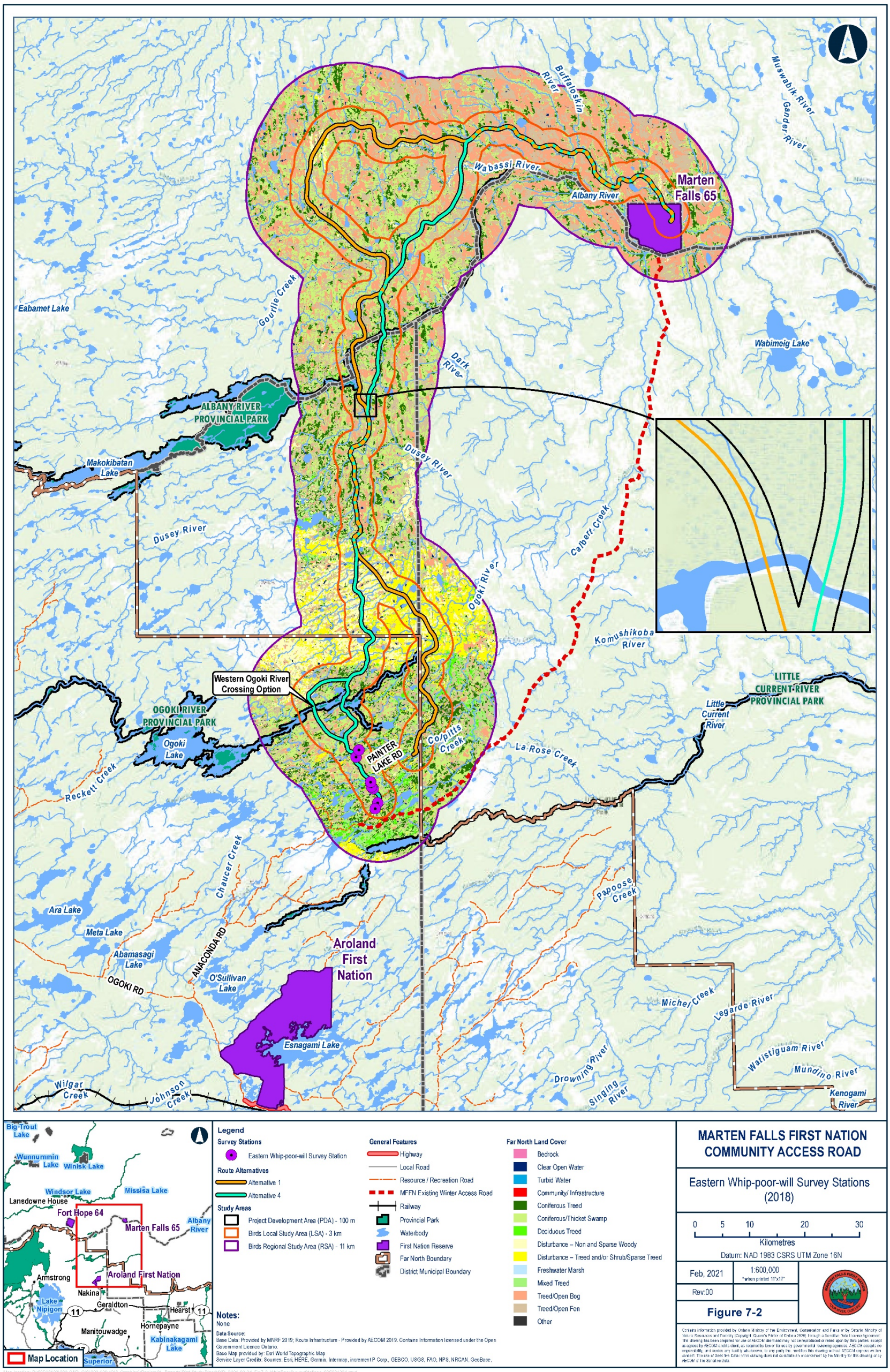
A three-minute data segment was selected instead of a standardized 10-minute point count (CWS 2008) because shorter data segments allow new species to be detected more rapidly for the equivalent sampling effort (Bayne *et al.* 2017). ARUs will be relocated to new locations during the middle of the breeding bird season to provide better spatial replication in the LSA (Bayne *et al.* 2017). ARUs will be set to record using a sampling rate of 44.1 kilohertz (kHz).

ARUs will be programmed to record data during Phase one through spring migration (April 15 to May 31; Ontario Breeding Bird Atlas [OBBA] 2020), fall migration (August 1 through September 30), and either early winter (December 1 to December 31) or late winter (March 1 to March 31). ARUs deployed for spring migration and the breeding season will also record data during Phase two because it overlaps the recommended period for standardized owl surveys (OBBA 2002). Avian vocalization is expected to be reduced during fall migration, but frequent sampling will provide evidence of species absence which suggests possible departure times. Winter sampling is limited due to ARU design limitations related to temperature extremes.

ARUs will be the sole source of data collection for bird SAR (Common Nighthawk, Eastern Whip-poor-will, Short-eared Owl, and Yellow Rail) requiring species-specific surveys at dusk or during the evening due to safety concerns. ARUs will be deployed in suitable habitat for each of these species as identified during the desktop review with the sample size per species to be provided in the work plan. Golder (2019) deployed eight ARUs targeting Eastern Whip-poor-will in suitable habitat within a 2.5 km buffer LSA (**Figure 7-2**). ARU deployment in future programs will target the same locations and will identify additional locations in the expanded 3.0 km buffer LSA based on a desktop review.

For bird SAR where ARUs are the sole source of data collection, survey windows and survey timing will be species-specific and located in suitable habitat as described in **Section 7.2.1.5.**

Figure 7-2: Eastern Whip-poor-will Survey Stations (2019)



7.2.1.2.3 ARU Data Collection

The sampling effort per ARU is described in **Table 7-3** for each season. The time of survey divides Phase one and Phase two of ARU programming into the Morning Period (1 hour before sunrise to 5 hours after sunrise), Dusk Period (30 minutes before sunset to 2 hours after sunset) and Night Period (midnight to 1 hour before sunrise). The sampling depth for several SAR most easily detected during the Dusk Period (Common Nighthawk, Eastern Whip-poor-will and Short-eared Owl) will be based on published detection probabilities. As a result, the Dusk and Night Periods have been combined to target owls (Raptor VC) from April 15 to July 17 which coincides with the peak period for targeted and non-targeted owl species (OBBA 2002).

Table 7-3: Sampling Effort Per ARU

Season	Survey Window	No. of Data Segments	Time of Survey	Bird VC
Spring Migration	■ April 15 – May 31*	30	■ Morning Period (15 segments); ■ Dusk and Night Period (15 segments)	■ Morning Period: All bird groups ■ Dusk and Night Period: nocturnal raptors (owls)
Breeding	■ June 1 – July 17	30	■ Morning Period (15 segments); ■ Dusk and Night Period (15 segments)	■ Morning Period: All bird groups ■ Dusk and Night Period: nocturnal raptors (owls)
Fall Migration	■ August 1 – September 30	27	■ Morning Period	■ All bird groups
Early Winter or Late Winter	■ December 1 – December 31 or March 1 – March 31	15	■ Morning Period	■ All bird groups

Source: OBBA 2020

The ARU data sampling effort will follow Section 8.9 of the TISG (the Agency 2020a) or be based on existing data if the sampling effort is greater. For instance, Zoetica's (2018a) species accumulation curve model determined that 15 data segments would detect most breeding bird species in the LSA and will be applied to the time of survey for spring migration, the breeding season, and winter.

Survey sampling effort for Common Nighthawk, Eastern Whip-poor-will, Short-eared Owl, and Yellow Rail will be based on a binomial expansion (Correia 2015) of published detection probabilities that provide at least a 95% certainty of estimating their population sizes:

$$Cumulative\ probability\ of\ detection\ (\geq 95\%) = 1 - (1 - p)^k$$

Where: p = probability of detection
k = sampling replicates

ARU data for Common Nighthawk, Eastern Whip-poor-will, Short-eared Owl, and Yellow Rail will be analyzed from species-specific time periods with the highest detection probability based on published literature. Detection of these species outside of specified time periods and during other analyses will be classified as incidental observations.

For Common Nighthawk, ARU data collection will be partially based on the *MNR Eastern Whip-poor-will (Caprimulgus vociferous) and Common Nighthawk (Chordeiles minor) Survey Protocol* (MNRF 2013b) which is designed for roadside surveys. ARU survey stations will be selected based on a desktop review of suitable Common Nighthawk habitat in open areas of the LSA with little or no ground vegetation such as logged or burned areas, forest clearings, rock barrens, peat bogs, and lakeshores (MECP 2019a). The number and location of survey stations will be provided at a later date. ARU data segments will be randomly selected from the last week of May to the first week of July. Data segments will be selected with no precipitation, calm or light winds (< 12 kilometres per hour [km/h]), and temperature above 10°C (MNRF 2014c). Common Nighthawk had a detection probability of 0.273 using ARUs during the period of sunset to one hour after sunset in Eastern Ontario (Vala *et al.* 2020). Binomial expansion applied to the detection probability of 0.273 indicates that analyzing ten data segments provides a 95.9% certainty of estimating the Common Nighthawk population size (**Table 7-4**).

Table 7-4: Sampling Effort Per ARU for Select SAR

Species	Survey Window	No. of Data Segments	Segment Length	Time of Survey
Common Nighthawk	May 23 – July 7	10	3-minutes	■ Sunset to one hour after sunset
Eastern Whip-poor Will	May 23 – July 7	8	3-minutes	■ Sunset to one hour after sunset
Short-eared Owl	May 15 – July 15	15	3-minutes	■ One hour before sunset to one hour after sunset
Yellow Rail	May 20 – July 5	3	1-minute	■ 2:00 AM

For Eastern Whip-poor-will, ARU data collection will be partially based on the *MNRF Draft Survey Protocol for Whip-poor-will (Caprimulgus vociferous) in Ontario* (MNRF 2014c) which is designed for roadside surveys. In 2019, Golder placed eight ARUs in suitable Eastern Whip-poor-will habitat in open woodlands or openings in mature deciduous, coniferous and mixedwood forest based on a desktop review of the LSA (MECP 2019b). Efforts will be made to randomly select data segments from the last week of May to the first week of July when the moon (greater than 50% illuminated) is above the horizon and the sky is clear or partly cloudy to maximize chances of detecting calling individuals (Cink *et al.* 2017). Data segments will be pre selected with no precipitation, calm or light winds (< 12 km/h), and temperature above 10°C (MNRF 2014c). Eastern Whip-poor-will had a detection probability of 0.332 using ARUs during the period of sunset to one hour after sunset in Eastern Ontario (Vala *et al*. 2020). As no protocol exists for using ARUs to detect Eastern Whip-poor-will, binomial expansion was applied to the detection probability of 0.332 which indicates

that analyzing eight data segments provides a 96.0% certainty of estimating the Eastern Whip-poor-will population size (**Table 7-4**). This is a conservatively high estimate of the number of data segments to be analyzed because Vala *et al.* (2020) only analyzed the first 5-minutes of a 10-minute segment. In 2019, three data segments per ARU were analyzed for Eastern Whip-poor-will and analysis of additional data segments is required to achieve greater than a 95% certainty of detection.

For Short-eared Owl, ARU data collection will be partially based on *Ontario Breeding Bird Atlas Standardized Owl Surveys* (2002) for the northern region, but without the use of call playback. ARUs will be placed in open areas in the LSA where Short-eared Owls are likely to vocalize or produce “wing-claps” during courtship displays over the nest territory (Holt 1992). The number and location of survey stations will be provided in the upcoming work plan. ARU data segments will be randomly selected from one hour before sunset to 30 minutes after sunset from May 15 to July 15 (10 weeks) with no precipitation and when winds are below 20 km/h. Information on detection probability is lacking for auditory surveys, but detection probability from visual surveys range from 0.300 to 0.400 (Calladine *et al.* 2008). Given that there is no information on the use of ARUs to detect this species, Zoetica’s (2018a) species accumulation curve model will be used to determine sampling effort. Approximately 15 data segments (three every two weeks) will be used to estimate the Short-eared Owl population. (**Table 7-4**).

For Yellow Rail, ARU data collection will be partially based on the Marsh Monitoring Program (BSC 2000). ARUs will be placed near suitable Yellow Rail habitat in the LSA including graminoid fens, the herbaceous vegetation of bogs, and floodplains of rivers and streams (COSEWIC 2001). The number and location of survey stations will be provided at a later date. ARU data segments will be randomly selected from the breeding season between May 20 and July 5. Data segments will have no precipitation and wind speeds below 20 km/h (as per BSC 2000). Unlike the Marsh Monitoring Program, a one-minute ARU data segment will be randomly selected at 2:00 AM where a detection probability of 0.630 for Yellow Rail was reported in Northern Alberta (Hedley *et al.* 2020). Binomial expansion applied to the detection probability of 0.630 indicates that analyzing three data segments provides a 95.2% certainty of estimating the Yellow Rail population size (**Table 7-4**).

Acoustic files collected by ARUs will be analyzed by skilled interpreters familiar with bird communities in the RSA. Acoustic files containing substantial environmental (wind, rain) or non-avian (e.g., frogs) noise will be excluded from the analysis.

7.2.1.3 Marsh Bird Call Playback Surveys

Marsh bird call playback surveys will target marsh birds in the Bog / Fen and Other Wetland Birds VC. The objective of marsh bird call playback surveys is to determine the presence, distribution, abundance, and density of breeding marsh birds.

Marsh habitats comprise less than 0.1% of the LSA. A total of 10 marsh bird call playback survey stations sampled by Zoetica (2018a) fall within the LSA (**Figure 7-3**). A desktop review and ground reconnaissance by Golder (2019) revealed no additional marsh habitat along within a 2.5 km buffer LSA. Marsh bird call playback surveys will be repeated at survey stations identified by Zoetica (2018a) to complete two years of data collection. Survey stations will be established at marshes identified through a desktop review in the 3 km buffer LSA for two years of data collection.

Surveys will be conducted twice during the breeding season between May 20 and July 5, no less than 10 days apart (BSC 2000). A 10-minute survey will be conducted at each identified station in accordance with the Marsh Monitoring Program (BSC 2000). Each survey includes a 5-minute sequence alternating between 30 seconds of broadcasted calls and 30 seconds of silence for each of the targeted species (Yellow Rail, Sora , Virginia Rail [*Rallus limicola*], American Bittern [*Botaurus lentiginosus*] and Pied-billed Grebe [*Podilymbus podiceps*]) to elicit calls from these typically elusive marsh bird species (BSC 2003). All birds of the targeted species detected within 100 m radius will be recorded for the survey. Flyovers and detections of targeted species greater than 100 m will be classified as incidental observations. Surveys will only be completed with little or no precipitation and during calm winds or wind less than four on the Beaufort Scale.

7.2.1.4 Species-specific Survey

Species-specific surveys will be conducted for breeding bird SAR. The objective of species-specific surveys is to determine the presence, distribution, abundance, and density of breeding bird SAR species.

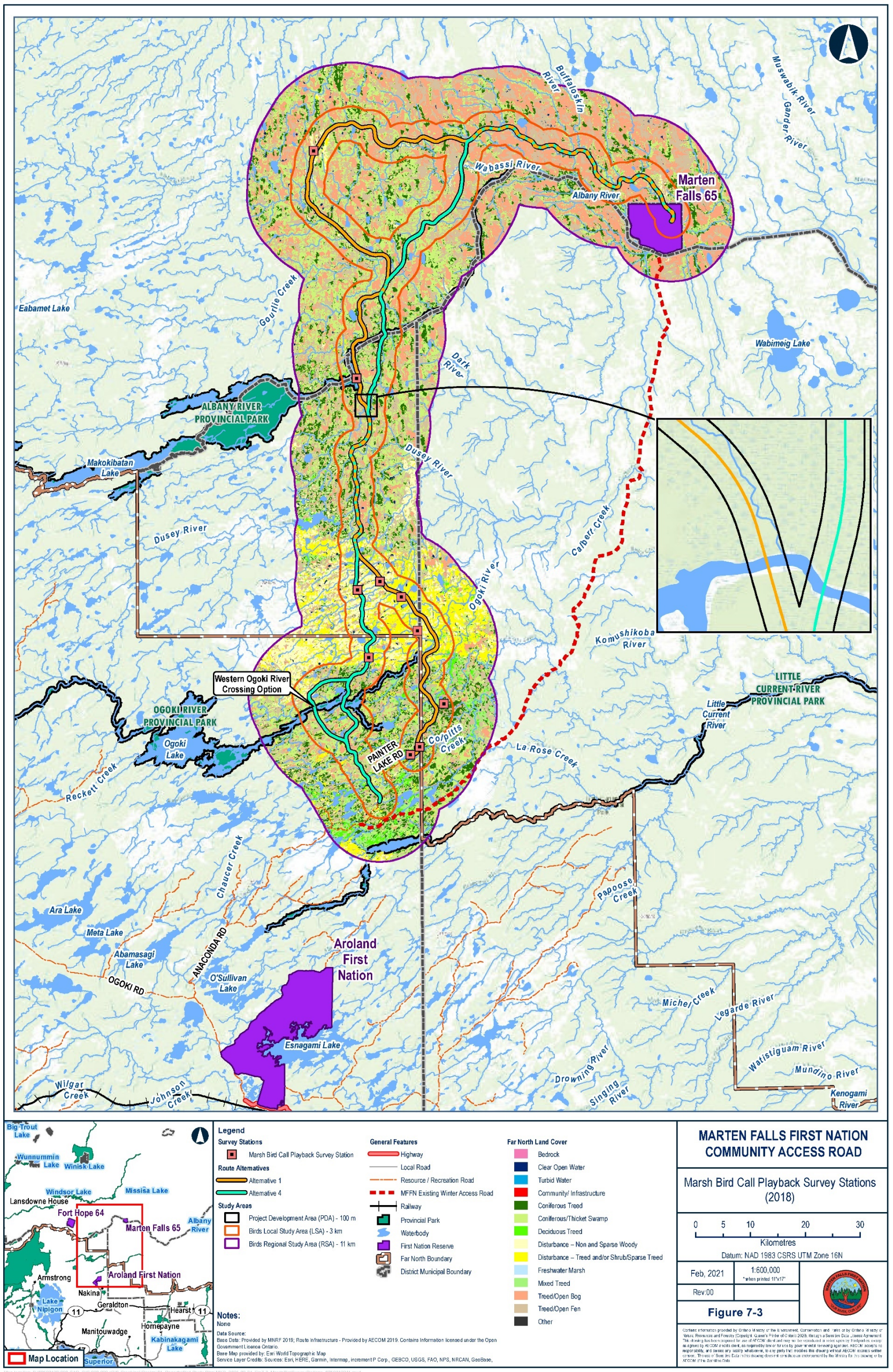
7.2.1.4.1 Desktop Review

Potential nesting habitat for Bank Swallow (i.e.., vertical riverbanks and bluffs), Barn Swallow (i.e. man-made structures), Chimney Swift (i.e.., hollow trees, tree cavities, caves) and Peregrine Falcon (i.e.., cliffs close to large bodies of water) will be identified through interpretation of aerial imagery where possible.

7.2.1.4.2 Field Surveys

Potential nesting habitat identified through desktop review as well as locations where Bank Swallow, Barn Swallow, Chimney Swift and Peregrine Falcon were will be searched for within the PDA and LSA in conjunction with vegetation and bat habitat identification surveys as described in the *VC-Vegetation Study Plan* and *VC-Wildlife Study Plan*. Golder (2019) identified no suitable nesting habitat for Barn Swallow or Bank Swallow within a 2.5-km buffer LSA based on a desktop review and aerial / ground reconnaissance. Future desktop review and aerial / ground reconnaissance in will expand the search area to the additional 20.7 km route option (including the 3 km buffer LSA).

Figure 7-3: Marsh Bird Call Playback Survey Stations (2018)



7.2.1.5 Aerial Surveys

Aerial surveys will be conducted to target the Waterfowl (spring stopover / staging, breeding pairs, broods, fall stopover / staging), Shorebirds (spring and fall stopover / staging), and Raptors (nesting) VC in the LSA (**Table 7-5**). The objective of this study is to estimate seasonal distribution (excluding Raptors), abundance and density among years for these Bird VCs.

Table 7-5: Sampling Effort for Aerial Bird Surveys

Season	Survey Window	No. of Surveys	Time of Survey	Bird VC		
				Raptors	Waterfowl	Shorebirds
Spring Migration	April 15 – May 31*	2	Anytime during the day	X	X	X
Breeding	June 1 – July 17	2	Anytime during the day	X	X	-
Fall Migration	August 1 – Sept. 30	2	Any time during the day	X	X	X

*Source: * OBBA 2020*

7.2.1.5.1 Desktop Review

A desktop review of aerial imagery will identify areas of suitable open habitats (e.g., wetlands and lakes) where waterfowl and shorebird may occur. Bald Eagle and Osprey may also nest in riparian habitat along the shoreline of wetlands and lakes. When surveying larger wetlands and lakes, the shoreline perimeter survey will be flown 100 m from the shore with parallel transects spaced 400 m apart across the basin. When surveying small and narrow basins, coverage is most efficient if the flight path is oriented parallel to the length of the basin. Unless basin orientation dictates otherwise, transects will be along an east-west axis to minimize glare from the sun for observers.

Aerial surveys will target raptors when moving among wetlands and lakes by following parallel transects in the LSA with the spacing between transects varying depending on tree density in forested habitat. Transect spacing may be as close as 400 m apart to allow for complete coverage of densely forested habitat, assuming a field of view of 200 m on either side of the aircraft. Transect spacing in treed fens may be as far as 1 km apart assuming a wide field of view of 500 m on either side of the aircraft due to low tree density.

7.2.1.5.2 Survey Protocol

Aerial surveys will be conducted in the LSA on two occasions during spring and fall to capture early to late migration of waterfowl and shorebirds and on two occasions during the breeding season for waterfowl and raptors (**Table 7-5**).

Potential stopover / staging areas will be examined by circling areas of suitable open habitats and counting the number of individual waterfowl and shorebirds, identified to lowest taxonomic level possible. Aerial surveys conducted during the breeding season will focus on identifying breeding pairs / broods and incubating adults of conspicuous waterfowl species (**Table 7-5**).

Zoetica (2018b) conducted aerial surveys to identify inactive stick nests during the late winter of 2018 with confirmation of nest activity during the spring and summer of 2018. All stick nests identified in 2018 and during planned spring migration aerial surveys will be verified during subsequent aerial and ground surveys to confirm breeding status. Raptor stick nests will be identified to species, where possible, based on nest and stick size if no raptors are found near the nest. The Universal Transverse Mercator (UTM) location of all waterfowl, shorebird, and raptors observations will be recorded to map their seasonal abundance and distribution by habitat type in the LSA.

Aerial surveys will be conducted using helicopters if possible, as they are generally preferable to fixed-wing aircraft given the lower flight speed and better outward visibility and thereby improved ability to detect birds (Ministry of Environment, Lands and Park Resources Inventory Branch 1999). Surveys will be consistent as possible with respect to altitude, time of day, flight speed, etc. and conducted during calm weather conditions (little to no precipitation and wind speeds less than four on the Beaufort Scale).

7.2.1.6 Habitat

Habitat data will be collected for breeding bird, marsh bird call playback, species-specific, ARU, and aerial surveys in order to develop models to predict the Project effects on Bird VCs as described in **Section 9.4**. Habitat within 100 m of the breeding bird, marsh bird call playback, species-specific survey, and ARU site centroids will be documented with photographs as described in Section 8.9 of the TISG (the Agency 2020a). Qualified individuals will review photographs to classify habitat by *Ecological Land Classification (ELC) Ecosite* (Banton *et al.* 2009) or *Canadian Wetland Classification Class* (National Wetlands Working Group 1997) as described under the *VC-Vegetation Study Plan* for modelling purposes. For aerial surveys, habitat data will be based on ELC ecosites or wetland classification modelled across the Study Areas. Fire history of survey sites will be determined using the MNRF FNLC database (MNRF 2014a) and Ontario's Provincial Satellite Derived Disturbance Mapping digital resource. Elevation of survey sites will be determined using Provincial Elevation Models (MNRF 2020a). Surficial geology of survey sites will be described using the KGS Group (2019) helicopter reconnaissance of surficial geology or other sources, where available.

For bird SAR where ARUs are the sole source of data collection for field safety concerns (Common Nighthawk, Eastern Whip-poor-will, Short-eared Owl, and Yellow Rail), standard ARU microphone arrays lack the ability to effectively triangulate location within habitat types. The territorial call of Eastern whip-poor-

will (Cink 2012 pers. comm.) and Common Nighthawk (Yip *et al.* 2019) can be heard from up to 500 m under good conditions, so the centre point of a breeding territory will be anywhere within 500 m of the survey station. For these two species, a desktop review of aerial imagery and/or aerial habitat reconnaissance will be conducted to characterize habitat. For Eastern whip-poor-will, this will follow *General Habitat Description of the Eastern Whip-poor-will (Caprimulgus vociferous)* (MNRF 2013a). For Short-eared Owl, the only reported distance for hearing a Short-eared Owl during a courtship display is at a minimum distance of 121 m for the “wing-clap” (Carson 1962). A desktop review and/or aerial habitat reconnaissance will be used to characterize the habitat within 620 m of this centre point based on 121 ha maximum reported territory size (Clark 1975). For Yellow Rail, a detection radius of 250 m will be used to identify the centre point of a breeding territory based on the detection distance used for Yellow Rail population modelling (Hedley *et al.* 2020). A desktop review and/or aerial habitat reconnaissance will be used to characterize the habitat within 250 m of this centre point based on a 19.8 ha maximum reported territory size (Robert 1996).

8. Data Management and Analysis

Data management including quality assurance / quality control (QA / QC) will be employed to minimize potential for data entry and analysis errors, prepare data sets for analysis and limit sensitive data distribution in accordance with established agreements.

Data collection in the field will be completed by field staff using a combination of electronic field forms and mapping software where possible. However, when digital data collection is not feasible, paper data sheets will be used as a back up. Data collected will be backed up daily and uploaded onto servers when the internet is accessible. Field data will be reviewed for quality control purposes before any analysis is conducted.

Differences in species detection are expected between point count and ARU data due to variable detection between landcover types, observers, weather, time of year, and species. Paired sampling data from breeding bird point counts and handheld recorders (a surrogate for ARUs) will be used to estimate statistical offsets for each species when there is sufficient data. These offsets will be used to calibrate count data by ARUs to correct for biases in ARU data relative to human observers following the methods of Van Wilgenburg *et al.* (2017) and Bombaci and Pejchar (2018).

Data from point count surveys, call playback surveys, ARUs, species-specific surveys, and aerial surveys will be summarized for 1) all birds, 2) each Bird VC, and 3) Bird Conservation Regional Priority Species (ECCC 2017) to show:

- frequency of occurrence and abundance (i.e., percentage of survey points) by season;
- abundance (i.e., breeding density in territories/ha except for ARU data) and percentage of observations in each habitat type; and
- distribution maps in the LSA showing areas of highest concentration.

Information on habitat requirements and key habitat areas for Bird VCs will be provided. Written descriptions and maps of ecozones, ecoregions, and ecodistricts will be provided as per Ontario's Ecological Land Classification, along with landscape features and sensitive or protected areas, and will be completed during desktop analysis and field habitat assessment.

8.1 Species at Risk

SAR data collected from desktop review, existing data and field studies will be used to describe the distribution and abundance of SAR within the PDA, LSA and RSA. Desktop studies will include published studies and recovery strategies that describe the regional importance of SAR. The most up to date recovery documents and species statuses will be consulted.

Mapping will be provided displaying the PDA and LSA for the Bird VCs in terms of their habitat. All SAR observations will be mapped within the PDA and LSA. Where critical habitat is noted to occur within the Study Areas, it will also be mapped. A summary of each SAR will provide distribution across survey sites at which they were detected and abundance in each habitat type where possible. A map showing the areas of highest concentrations or areas of use will be provided.

Baseline information will be used to evaluate impacts to SAR within the defined study areas through the effects assessment process. The effects assessment will describe how the general life history of SAR, including their critical habitat where defined, may be affected by the Project through potential direct, incidental, and cumulative adverse effects.

8.2 Geographic Information Systems (GIS)

Where baseline data are available in GIS format, this information will be provided to the Agency as electronic geospatial data files compliant with the Industrial Standards Organization (ISO) 19115 standard. This will support the Government of Canada's commitment to Open Science and Data and facilitate the sharing of information with the public through the Canadian Impact Assessment Registry Internet Site and the Government's Open Science and Data Platform. In addition, all baseline data available in GIS format will also be provided to the MECP's Species at Risk Branch and MNRF's Natural Heritage Information Centre as complete data sets from all surveys.

Complete data sets from all survey sites will be provided. They will be in the form of complete and quality assured relational databases, with precisely georeferenced site information, precise observation / visit information and with observations and measurements in un-summarized form. Documentation and digital files will be provided for all results of analyses that allow for a clear understanding of the methods and a replication of the results.

9. Effects Assessment

The following sections provide discipline-specific input and considerations as they pertain to the methodology for effects assessment. The Project is in the early stage of the IS / EA Report preparation and it is expected that the effects assessment methodology will be refined iteratively based on regulatory agency guidance, professional judgment and input received through the Project consultation and engagement process.

9.1 Project-Environment Interactions

The Project activities that may result in changes to the environment are described within the identified temporal and spatial boundaries. This includes identification of both direct and indirect changes by comparing the existing setting to the conditions anticipated to occur as a result of the Project. For each environmental discipline, the likely Project-environment interactions will be identified based on professional judgment, activities listed in TISG Section 3.2 (the Agency 2020a) as well as projects of similar magnitude and / or location.

A preliminary analysis of Project-environment interactions for the Birds VC is provided in **Table 9-1** and will be confirmed during the IA / EA process to identify the Project-environment interactions that are likely to have a potential effect, and to identify measures to avoid or minimize potential negative effects and enhance benefits.

Table 9-1: Project – Environment Interactions

Project Phases	Project Activities	Birds
Construction Phase	*Mobilization of Equipment and Supplies*	X
	Temporary Construction Staging Areas[1]	X
	Temporary Access Roads and Trails[1]	X
	Temporary Construction Camps[1]	X
	ROW Clearing and Grubbing	X
	Brush and Timber Disposal	X
	Pits and Quarries[1]	X
	Drilling / Blasting / Aggregate Production	X
	Road Construction (stripping, subgrade excavation, embankment fill placement, grading, ditching)	X
	Bridge and Culvert Installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	X
	Construction Site Restoration	X
Construction Phase: Decommissioning	*Pits and Quarries*	X
	Temporary Camps, Roads / Trails and Staging Areas	X

Project Phases	Project Activities	Birds
Operations Phase	*Road Usage*	**X**
	Maintenance[2]	**X**

Notes: 1. Includes construction and use of
2. Includes General Maintenance (e.g., grading, erosion control, quarrying, pits), Seasonal Maintenance (e.g., snow clearing, bridge and culvert maintenance), and Special Maintenance (e.g., slope failures, road settlement / break-up.).

9.2 Valued Components and Indicators

VCs are the environmental, health, social, economic or additional elements or conditions of the natural and human environment that may be impacted by a proposed project and are of concern or value to the public, Indigenous peoples, federal authorities and interested parties (the Agency 2020b). Indicators represent the resource, feature, or issue related to the VC that, if changed, may demonstrate an effect on the environment. The indicators and rationale for selection and measurement of potential effects to be used to assess and evaluate the alternative routes in the IS / EA Report are provided in **Table 9-2**. The table includes both quantitative and qualitative indicators. The final list of VCs and indicators to be used in the IS / EA Report will be based on regulatory agency guidance, professional judgement and input received through the Project consultation and engagement process.

The Bird VCs have been determined by taking an ecosystem approach that considers how the Project may affect the structure and functioning of biotic and abiotic components within the ecosystem (i.e., areas of Indigenous cultural importance, descriptions of ecosystem health and integrity, the presence of protected areas and critical habitat for SAR species) through consideration of the following factors listed in the TISG[10] (the Agency 2020a):

- VC presence in the study area;
- the extent to which the VC is linked to the interests or exercise of Aboriginal and Treaty Rights of Indigenous peoples, and whether an Indigenous group has requested the VC;
- the extent to which the effects (real or perceived) of the Project and related activities have the potential to interact with the VC;
- the extent to which the VC may be under cumulative stress from other past, existing or future undertakings in combination with other human activities and natural processes;

10. The TISG also states that information from ongoing and completed regional assessments in the proposed area of the Project should be used to inform VCs for the Project. In February 2020 a regional assessment of the Ring of Fire region commenced; however, it is not sufficiently advanced at this time to inform the Project VCs. The VCs will be consulted and engaged on early in the IA/ EA process and finalized taking into consideration the input received. Therefore, only information relevant to the Project that arises from the regional assessment of the Ring of Fire within an appropriate timeline will inform the VCs for the Project.

- the extent to which the VC is linked to federal, provincial, territorial or municipal government priorities (e.g., legislation, programs, policies);
- the possibility that adverse or positive effects on the VC would be of particular concern to Indigenous groups, the public, or federal, provincial, territorial, municipal or Indigenous governments; and
- whether the potential effects of the Project on the VC can be measured and / or monitored or would be better ascertained through the analysis of a proxy VC.

Inputs received to date from Indigenous communities, agencies and interested persons through the Consultation and Engagement Program, including inputs received on the Draft ToR, have also been used to inform the selection of the VCs and indicators for the Bird Discipline.

Table 9-2: Bird Indicators

Valued Component	Indicators	Rationale for Selection
Forest Birds	■ Species presence ■ Relative abundance (spatially and temporally) ■ Habitat availability and distribution (spatially and temporally) ■ Predator-prey dynamics	■ Cultural and social significance associated with this VC. ■ Functional role in the ecosystem and food web.
Raptors	■ Species presence ■ Relative abundance (spatially and temporally) ■ Habitat availability and distribution (spatially and temporally) ■ Predator-prey dynamics	■ Cultural and social significance associated with this VC. ■ Functional role in the ecosystem and food web.
Shorebirds	■ Species presence ■ Relative abundance (spatially and temporally) ■ Habitat availability and distribution (spatially and temporally) ■ Predator-prey dynamics	■ Cultural and social significance associated with this VC. ■ Functional role in the ecosystem and food web.
Waterfowl	■ Species presence ■ Relative abundance (spatially and temporally) ■ Survival and reproduction (population state) ■ Habitat availability and distribution (spatially and temporally) ■ Predator-prey dynamics	■ Cultural and social significance associated with this VC. ■ Functional role in the ecosystem and food web.
Bog / fen Birds and Other Wetland Birds	■ Species presence ■ Relative abundance (spatially and temporally) ■ Habitat availability and distribution (spatially and temporally) Predator-prey dynamics	■ Cultural and social significance associated with this VC. ■ Functional role in the ecosystem and food web.

Valued Component	Indicators	Rationale for Selection
SAR Birds *Canada Warbler, Chimney Swift, Common Nighthawk, Eastern Whip-poor-will, Eastern Wood-Pewee, Evening Grosbeak, Olive-sided Flycatcher, Bald Eagle, Peregrine Falcon, Short-eared Owl, Bank Swallow, Barn Swallow, Black Tern, Rusty Blackbird, Yellow Rail*	■ Species presence ■ Relative abundance (spatially and temporally) ■ Habitat availability and distribution (spatially and temporally) including critical habitat (where known), where defined for SAR ■ Predator-prey dynamics	■ SAR (both federally under SARA and provincially under the ESA). ■ Cultural and social significance associated with these VCs. ■ Functional role in the ecosystem and food web.

9.3 Indirect Effects

A direct effect occurs through the direct interaction of an activity with an environmental discipline. The Project-environment interactions currently anticipated, based upon preliminary analysis, to result in direct effects to Birds have been identified in **Table 9-1**. The potential direct effects resulting from the Project-environment interactions will be confirmed during the IA / EA process and will be based on input received through the Indigenous Knowledge Program and Consultation and Engagement Program, regulatory agency guidance, and professional judgement.

An indirect effect occurs when a change to one environmental discipline resulting from a Project activity causes a change to another environmental discipline (e.g., changes in groundwater could indirectly affect birds). **Table 9-3** provides a preliminary identification of how changes to Birds may result in indirect effects to other environmental disciplines.

Table 9-3: Potential Discipline Interactions

Discipline and Associated Valued Components	Aboriginal Treaty Rights and Interests	Atmospheric Environment	Acoustic Environment	Physiography, Geology, Terrain and Soils	Surface Water	Groundwater	Vegetation	Wildlife (Birds)	Fish and Fish Habitat	Social	Economy	Land and Resource Use	Human Health and Community Safety	Visual Aesthetics	Archaeological and Cultural Heritage
Birds ■ **Forest Birds** ■ **Raptors** ■ **Shorebirds** ■ **Waterfowl** ■ **Bog / Fen Birds and Other Wetland Birds** ■ **SAR Birds:** *Canada Warbler, Chimney Swift, Common Nighthawk, Eastern Whip-poor-will, Eastern Wood Pewee, Evening Grosbeak, Olive-sided Flycatcher, Bald Eagle, Peregrine Falcon, Short-eared Owl, Bank Swallow, Barn Swallow, Black Tern, Rusty Blackbird, Yellow Rail*	X	X	X	X	X	X	X		X	X	X	X	X	-	-

Notes: X = Potential pathway for indirect effect as a result of the Project.
- = No pathway for indirect effect is anticipated as a result of the Project.

9.4 Methods for Predicting Future Conditions

With respect to quantitative models and predictions, the IS / EA Report must detail the model assumptions, parameters, the quality of the data and the degree of certainty of the predictions obtained.

A variety of modelling approaches suggested in Section 8.9 of the TISG (the Agency 2020a) were explored to explain the spatial and temporal patterns for each Bird VC as a function of environmental variables to predict future conditions. These include Boosted Regression Trees, Generalized Additive Models (GAM), and Generalized Linear Models (Elith *et al*. 2008). Preliminary modelling using Generalized Linear Models are described in **Appendix C.** The following section explains the general approach to modelling.

9.4.1 Bird Habitat Model Development

Bird habitat models will be developed for proxy VCs in the Forest Birds, Raptors, Bog / Fen and Other Wetland Birds, Waterfowl, and Shorebirds VCs including SAR (**Table 7-1**) when there are sufficient survey data. Ontario's Provincial Satellite Derived Disturbance Mapping digital resource will be utilized to describe fire disturbed land cover for potentially affected habitats of the Forest Birds VC and Bog / Fen Birds and Other Wetland Birds VC.

Bird habitat models will be developed by first providing an account summarizing known preferences for biotic and abiotic variables for each bird species selected. Models will be developed to evaluate how these biotic and abiotic predictor variables best explain the spatial and temporal patterns of presence / absence, abundance, density and/or distribution of each species (**Table 9-4**). All model assumptions, predictor variables, data quality, and the degree of certainty of the predictions will be described. Bird habitat model predictions in the RSA will be compared with maps, data, and model predictions developed through the Boreal Avian Modelling Project (University of Alberta 2020), where possible.

Table 9-4: Model Variables

Dependent Variables	Independent Variables	
	Biotic	Abiotic
Presence / Absence, Abundance, Density, Distribution	■ Ecozone – Northern Ontario – Hudson Bay Lowlands ■ Land Cover – coniferous treed – coniferous / thicket swamp	■ Surficial Geology – organic deposits - in fen wetlands – organic deposit – in bog wetlands – fluvial deposits (recent) – fluvial deposits (abandoned) – marine beach and nearshore deposits

Dependent Variables	Independent Variables	
	Biotic	**Abiotic**
	– deciduous treed – disturbance – non and sparse woody – disturbance – treed and / or shrub / sparse treed – mixed treed – treed and open bog – treed and open fen ■ ELC ecosites (see Banton *et al*. 2009) ■ Wetland Class – bog (basin, blanket, collapse scar, domed, flat, lowland polygon, mound, palsa, peat mound, peat plateau, plateau, polygonal peat plateau, riparian, slope, string, veneer) – fen (basin, channel, collapse, scar, feather, horizontal, lowland polygon, palsa, riparian, slope, spring, string) – marsh (basin, hummock, lacustrine, riparian, slope, spring – swamp (discharge, flat, mineral-rise, raised peatland, riparian, slope) – shallow water (basin, lacustrine, riparian) ■ Habitat arrangement and connectivity – core area – shape – proximity / isolation – contrast – contagion / interspersion	– glaciolacustrine beach and nearshore deposits – glaciolacustrine basin deposits – glaciofluvial ice-contact deposits – till: massive to bedded diamicton, clayey silt to… – till: massive to bedded diamicton: sandy silt to… – till: massive to bedded diamicton, silty sandy to… – thin sediment over bedrock – bedrock ■ Provincial Digital Elevation Model (m) – local – aspect – surface roughness ■ Disturbance Type and Year (1985-2010) ■ Climatic variability – temperature (ºC) – cloud cover (%) – wind velocity (Beaufort scale) – thawing degree-days (for aerial tracking surveys) ■ Time – year – season (dummy variable: breeding season or non-breeding season – survey date – survey time ■ Other Effects – Observer ■ Location (UTM easting and northing)

9.4.1.1 Bird Species Accounts

For each bird species model, a summary will be provided of its geographic distribution, life requisites, and seasonal habitat requirements. This information will be summarized following a literature review of the species biology, including information on preferred biological and physical habitat features. Important habitat features may include certain preferred biotic variables, such as vegetation types that may provide forage and shelter and / or abiotic variables such as climatic conditions, surficial geology, elevation limitations, slope, or aspect preferences. Published studies that describe the regional importance, abundance and distribution of SAR, including critical habitat descriptions, recovery strategies and plans will also be used as available and referenced in the IA / EA.

9.4.1.2 Predictor Variables

Biotic variables for bird species models will be examined at larger spatial scales by ecozone, land cover, distance to stream, above ground biomass, dynamic habitat index, and habitat arrangement and connectivity **(Table 9-4**). Ecozones are included in models to explore differences in presence / absence, abundance and distribution between the Northern Ontario Ecozone and the Hudson Bay Lowlands. Land cover will describe bird habitat based on the MNRF FNLC database (MNRF 2014a) modified to describe fire disturbed habitats using Ontario's Provincial Satellite Derived Disturbance Mapping digital resource. Another indirect biotic variable is year of disturbance, as detected from changes in satellite datasets (CCFM 2020). Distance to stream has been found to be an important predictor for Canada Warbler presence and will be included as a general predictor variable (Ball *et al*. 2016). Aboveground biomass and dynamic habitat index using the Normalized Difference Vegetation Index (NDVI) will be explored for species-specific bird models (CCFM 2020). To examine the influence of habitat arrangement and connectivity in bird models, GIS measurements of landscape pattern metrics of fragmentation may include core area, shape, proximity / isolation, contrast, and contagion/interspersion (Wang *et al*. 2014).

Biotic variables for bird models will be examined at finer spatial scales by ELC ecosites or wetland class as described in the Vegetation Study Plan (**Table 9-4**). Vegetation characteristics of the ELC ecosites describe forest structural stage and canopy closure. Structural stage will be divided into multiple classes ranging from unvegetated to old growth forest which may be suitable for different species, depending on the season. Canopy closure will be measured in percent closure and can affect the distribution and relative abundance of understorey growth, which in turn affects habitat selection by birds. ELC ecosites also describe soil types which are strong drivers of vegetation community composition. Wetland class / form combinations can describe their "type" based on vegetation communities associated with them (National Wetlands Working Group 1997) and their importance as bird habitat.

Abiotic variables for Bird VCs will include surficial geology (KGS Group 2019) and elevation (m) based on the Provincial Digital Elevation Model (DEM) (MNRF 2020a) with calculations made for surface roughness (**Table 9-4**). Surface roughness is a degree of surface irregularity and is calculated by the largest inter-cell difference of a central pixel and its surrounding cell. The QGIS Roughness module was used to calculate surface roughness (QGIS Project 2021). Temporal patterns of climatic variability will be examined by year, specific seasons (i.e., all seasons, spring, summer, fall, winter, growing season), survey date (i.e., survey round date, ARU data segment date), and survey time (i.e., hour of day) especially in regard to weather data such as temperature (ºC), cloud cover, wind velocity (Beaufort scale); and moon phase (for Eastern Whip-poor-will).

9.4.1.3 Model Fit and Selection

Candidate models will be compared using metrics that represent model accuracy and will penalize models with a greater number of covariates, by utilizing Akaike's Information Criterion (AIC) (Akaike 1978). The best candidate models will be selected using step-wise model selection, and covariate adjustments will be made to the initial candidate models to maximize the amount of variance explained by the model, minimize the mean model bias, and minimize AIC. Leave-one-out cross-validation will be used to examine within-sample model bias relative to each covariate, which entails withholding one point and re-fitting the model on the rest of the observations, then repeating this process for each available observation (Allen 1974). By comparing the residuals (observed vs. predicted) of each of these model predictions from the leave-one-out cross-validation to each covariate, one may get a sense of the bias each covariate may be contributing to any model biases. Other models will be selected if model diagnostics such as deviance squared, Spearman Rho, and Chi-square are higher than a minimum AIC. All models will target 95% confidence intervals on estimates of presence / absence, abundance, and / or distribution.

The variance inflation factor (VIF) of models will be examined to quantify the multi-collinearity of all predictor variables (Longnecker and Ott 2004). If the VIF exceeds five (Longnecker and Ott 2004), multivariate analysis such as principal component analysis (PCA) will be used for linear models or non-metric multi-dimensional scaling (NMDS) for non-linear models to simplify the dataset by yielding fewer unrelated factors (McCune et al. 2002).

9.4.2 Predicted Effects of the Project

The direct, incidental and cumulative predicted positive and / or adverse effect of the Project on each Bird VC will be predicted using species-specific models based on anticipated changes to habitat availability, fragmentation, ground instability and species abundance with respect to anticipated activities during the Project construction and operations phases.

A Framework for the Scientific Assessment of Potential Project Impacts on Birds (Hanson *et al.* 2009*)* will be consulted to assist in analyzing predicted effects for all Bird VCs including non-linear, indirect, and synergistic responses to the Project where possible. Pre-construction baseline data will be used to calculate the following as summarized for select bird species in each Bird VC in **Section 8**:

- frequency of occurrence;
- abundance (density when possible);
- abundance (density when possible) in each habitat type; and
- a map showing distribution and areas of highest concentration.

Models will be used to extrapolate abundance (i.e., mean across years or density when possible) and distribution (i.e., mean across sites) at the PDA, LSA and RSA scale. The following individual effects on Bird VCs will be predicted using models and/or desktop review:

- Site preparation / vegetation removal;
- Air emission and dust;
- Deposit of harmful substances in waters;
- Changes to the aquatic flow regime and sediment load;
- Changes to geological features;
- Introduction of invasive species and spread of disease;
- Sensory disturbance;
- Increased predation opportunities;
- Disruption of bird migration corridors;
- Increased hunting, poaching and recreational resource use opportunities; and
- Site reclamation.

Models will be used to extrapolate abundance of select bird species in each Bird VC to the RSA scale based on habitat availability. Direct habitat loss for some Bird VCs is likely at the PDA scale; whereas, habitat fragmentation is likely at the LSA scale and possibly at the RSA scale. Models will be used to estimate the probability of select bird species in each Bird VC being present at each survey point post-construction in consideration of habitat loss and fragmentation. Any assumptions of displacement will be justified with scientific references and best management practices. Long- and short-term habitat changes and food sources of avifauna will be described and documented including changes in terms of the health, integrity and availability of habitats related to migratory and non-migratory birds.

The IA / EA will consider the resilience of Bird VCs and associated habitat to the effects of the Project. Ecological processes will be evaluated for potential susceptibility to adverse effects from the Project such as considerations for patterns and connectivity of habitat patches and continuation of key natural disturbance regimes. This evaluation will include the predicted impact of new habitat types such as clearings on SAR (i.e., Eastern Whip-poor-will and Common Nighthawk). The IA / EA will also consider potential adverse effects from the Project on hydrological processes associated with fen and bog complexes. More specifically, the IA / EA will examine how the Project may affect the flow of water through the transitional zone between the Ontario Shield and Hudson Bay / James Bay Lowlands and the resulting changes to land cover and vegetation associated with SAR habitat (e.g., Rusty Blackbird, Yellow Rail).

Potential direct, incidental, and cumulative adverse effects of the Project will be assessed for SAR including critical habitat where applicable (e.g., the effects of quarries built on or near eskers on SAR). For each SAR, a summary will be provided of survey results with detailed mapping of habitat, including important habitat features, for all lands including federal lands. Provincial, territorial or federal permits that may be required in relation to SAR will be described. Reasonable alternatives to the Project will be described to avoid potential effects on SAR and their habitat. Particular attention will be paid to critical habitat and habitat of species important to current use of lands and resources for traditional purposes such as breeding areas for birds. The IS / EA Report will describe all feasible measures to eliminate, avoid or minimize the effects of the Project on SAR and their habitats, including critical habitats. Critical timing windows (e.g., breeding), setback distances, or other restrictions that will be imposed or followed will be considered in assessing predicted effects on each Bird VC. The IS / EA Report will provide an account of how the Project and mitigation measures are consistent with the recovery strategy, action plan, or management plan for each SAR. The IS / EA Report will include a list of mitigation measures including offsetting and compensation as necessary that will be employed by the Project.

The residual effects that are likely to result from the Project after avoidance and minimization measures have been applied, including the extent, duration, and magnitude of the effects on birds will be described by:

- the number of individuals killed, harmed, harassed;
- the number of residences damaged or destroyed; and
- the area, biophysical attributes and location of habitat including critical habitat affected.

9.5 Mitigation and Enhancement Measures

Once potential effects have been identified, the effects assessment will explore technically and economically feasible mitigation measures to avoid or minimize the identified negative effects and enhancement measures to increase positive effects beyond those that are already inherent to the design. These measures will consist of industry-standard practices, federal and provincial standard specifications, regulator-mandated measures, best management practices, Indigenous and community recommendations and recommendations from industry and environmental professionals based on expertise, scientific publications, experience and judgement.

It is important that mitigation and enhancement measures are achievable, measurable and verifiable and monitored for compliance and effectiveness during all temporal phases as part of the Project follow-up monitoring plan. Required environmental monitoring will verify the potential environmental effects predicted in the IS / EA Report, evaluate the effectiveness of mitigation and enhancement measures, and identify the process the Proponent will follow if mitigation and enhancement measures are not effective.

9.5.1 TISG Section 20 Requirements

The TISG Section 20 requirements for birds are listed below (the Agency 2020a). The applicability of these requirements will be determined in the IA / EA.

- In relation to birds, mitigation measures should be developed in collaboration with federal authorities and included in the IS. In addition, the following mitigation measures should be considered by the Proponent.
  - To avoid harm to migratory birds, clearing and construction should be conducted outside of the core breeding period. Follow ECCC guidance for avoiding harm;
  - Refer to ECCC guidance for nesting periods; and
  - It should be noted that these dates cover the core period for nesting activity of migratory birds, reducing the risk of taking a nest or eggs of a migratory bird. This recommendation does not authorize the disturbance, destruction, or take of a migratory bird, its nest, or its eggs outside of these data ranges.
- Include measures to address sensory disturbance and the resulting functional loss of habitat.
- Identify measures to prevent and mitigate the risk of engaging in harmful, destructive or disruptive activities in key sensitive periods and locations (e.g., breeding bird season, migration and nesting) to migratory birds, their nests and eggs, in areas frequented by migratory birds.
- Identify measures to prevent and mitigate the risk of engaging in harmful, destructive or disruptive activities in key sensitive periods and locations (e.g., hunting season) to birds and bird habitat.
- Identify measures to avoid the deposit of substances harmful to migratory birds in water or areas frequented by migratory birds.
- In relation to birds, mitigation measures should be developed in collaboration with federal authorities and included in the IS. In addition, the following mitigation measures should be considered by the Proponent:
  - Specifically address mitigation of effects to eskers and related features rich in aggregate material, as these features are likely to be strongly impacted, to a degree much higher than their prevalence on the landscape.
  - Describe, at a landscape scale rather than a single assessment of multiple hectares, how these measures address this uncommon high value landcover for forest birds during migration and breeding; and
  - Describe the cumulate effects of development on this type of landscape;

- Provide best technically and economically feasible mitigation approaches to habitat mitigation that follow the hierarchy:
  - Avoid potential impact.
  - Minimize potential impact.
  - Provide biodiversity offsets to address any residual adverse environmental effects that cannot be avoided or sufficiently minimized; and
  - Provide justification for moving from one mitigation alternative to the next.
- Provide offsetting or compensation plans to address all residual effects to SAR, and their critical habitat, migratory birds, and/or wetland functions (if applicable) for review during IA process; the plans should:
  - Describe the baseline condition of the SAR, critical habitat, migratory birds and wetland functions potentially impacted by the Project;
  - Apply the mitigation hierarchy.
  - Identify and describe residual effects.
  - identify a compensation ratio with rationale, including how any policies or guidance provided by federal authorities, provincial authorities and Indigenous groups have been considered.
  - Identify the location and timing of implementation of compensation projects (where feasible);
  - identify and describe the success criteria.
  - Identify and detail non-habitat measures.
  - Describe how the proposed measures align with published provincial and federal recovery, management, or action plans and strategies for SAR;
  - Identify the parties responsible for implementation, including monitoring and review.
  - identify indicator species for setting compensation objectives. Identification should be based on baseline data, Bird Conservation Strategies, and other information where available (note: SAR should not be used as indicator species; compensation efforts need to be directed specifically to these species);
  - Describe the functions gained at the compensation site(s);
  - Provide evidence that functions can be replaced by the proposed offset activities.
  - Describe the process of selecting proposed compensation site(s) and associated baseline condition(s); and
  - Provide a description of the monitoring schedule and activities to be completed to monitor the success of compensation activities.

9.6 Residual Effects

Residual effects are the effects remaining after the application of mitigation measures. The IS / EA Report will describe in detail the potential adverse and positive residual effects in relation to each temporal phase of the Project (e.g., construction, operation). Residual effects will be described using criteria to quantify or qualify adverse and positive effects, taking into account any important contextual factors. The residual effects will therefore be described in terms of the direction, magnitude, geographic extent, duration, frequency, likelihood, and whether effects are reversible or irreversible[11]. Ecological and socio-economic context may also be relevant when describing a residual effect. Context relates to the existing setting, its level of disturbance and resilience to adverse effects. Context can also relate to timing as it applies to assessing the worst-case scenario (e.g., effect during breeding season for birds). Where appropriate, information regarding residual effects will be disaggregated by sex, gender, age and other community relevant identifying factors to identify disproportionate residual effects for diverse subgroups.

For magnitude, environmental discipline-specific definitions are required and are proposed below in **Table 9-5** and are based on professional judgment and applicable regulator guidance, where available.

Table 9-5: Birds Magnitude Definition

Magnitude Level	Definition	Rationale
Negligible	■ Small scope of effect and slight severity of effect to Bird VCs.	■ Birds and their habitat will be affected across 1-10% of their occurrence, distribution, relative abundance or habitat availability within the Study Area and are likely to be only slightly degraded in function or reduced in population by 1-10% within ten years or three generations.
Low	■ Restricted scope of effect and moderate severity of effect to Bird VCs.	■ Birds and their habitat will be affected across 11-30% of their population, distribution or availability within the Study Area and will likely be moderately degraded in function or reduced in population by 11-30% within ten years or three generations.
Medium	■ Large scope of effect and serious severity of effect to Bird VCs.	■ Birds and their habitat will be affected across 31-70% of their population, distribution or availability within the Study Area and will likely be seriously degraded in function or reduced in population by 31-70% within ten years or three generations.
High	■ Large to pervasive scope and high to extreme severity of effect to Bird VCs.	■ Birds and their habitat will be affected across all or most (71-100%) of their population, distribution or availability within the Study Area and will likely be destroyed or eliminated or reduced in population by 71-100% within ten years or three generations.

11. TISG Section 13.1 identifies additional effects characteristics for certain disciplines (e.g., wetlands, birds, terrestrial wildlife, species at risk). These additional effects characteristics are described in the respective discipline-specific study plans.

9.7 Consideration of Meeting Canada's Environmental Obligations

The environmental obligations assessment for the Project will be undertaken on the preferred alternative and will characterize the contribution of the Project to Canada's ability to meet its environmental obligations incorporating the requirements set out in Section 24 of the TISG (the Agency 2020a).

Federal environmental obligations identified for this Project include:

- Convention on Biological Diversity and Canada's supporting national framework (e.g., Canadian Biodiversity Strategy, Canada's Biodiversity Outcomes Framework, and current Biodiversity Goals and Targets for Canada); and legislation that supports how the implementation of Canada's biodiversity commitments including the *SARA (2002)*, and the *Canada Wildlife Act (1985)*, as well as supporting guidance.
  - Recovery Strategies and Action Plans developed under the *SARA* for all species potential affected by the Project
- The *Migratory Birds Convention Act* (1994) and supporting guidance on conservation objectives arising from Bird Conservation Region Strategies.

The IS / EA Report will describe:

- How the Project's effects (including contribution to cumulative effects) may contribute to Canada's ability to meet its obligations (e.g., related to biodiversity); and
- How the Project's effects (including contribution to cumulative effects) may hinder Canada's ability to meet its obligations.

Where the Project may contribute to Canada's ability to meet these obligations, the ISA / EA Report will describe plans and commitments to help to ensure that positive contributions are met. As well, where the Project may hinder Canada's ability to meet these obligations, the IS / EA Report will describe how the Project will first try to avoid and then to mitigate these potential effects, including management plans, risk assessment, and relevant follow-up and monitoring activities. The IS / EA Report will include expected indicators and data collection methods to support any of these plans.

In assessing whether the Project may contribute or hinder meeting these obligations, the IA / EA will also include how community and Indigenous Knowledge will be incorporated through consultations.

9.8 Consideration of Sustainability Principles

The following provides a generic description of how sustainability principles will be considered in the effects assessment. The extent to which sustainability principles apply to a specific VC will vary depending on the nature of the VC and the potential for Project effects on the VC.

The effects assessment approach for the Project has included the consideration of the sustainability principles outlined in the Project TISG and the Agency's guidance on sustainability. The sustainability principles that have been considered include:

1. Consider the interconnectedness and interdependence of human-ecological systems;
2. Consider the well-being of present and future generations;
3. Consider positive effects and reduce adverse effects of the Project; and
4. Apply the precautionary principle by considering uncertainty and risk of irreversible harm.

The interconnectedness and interdependence of human-ecological systems will be considered through the assessment of potential indirect effects of each alternative. An indirect effect occurs when a change to one environmental discipline resulting from a Project activity causes a change to another environmental discipline (e.g., changes in groundwater could indirectly affect birds). A preliminary assessment of indirect effects has been included in **Section 9.3**.

The well-being of present and future generations will be considered in the effects assessment through the application of the long-term operations phase temporal boundary of 75 years (**Section 6.1**) and through the effects characteristics description of duration and reversibility for each residual effect predicted.

The consideration of positive effects and reducing adverse effects of the Project is fundamental to the effects assessment methodology through the identification of mitigation measures to reduce potential adverse effects and the identification of the preferred alternative through the evaluation of advantages (e.g., positive effects) and disadvantages (e.g., adverse effects).

The effects assessment will apply the precautionary principle by clearly describing and documenting all uncertainties and assumptions underpinning the analysis and identifying information sources. The effects assessment will consider risk of irreversible harm through the effects characteristics description of reversibility for each residual effect predicted and will describe any uncertainty associated with the assessment of residual effects.

The scope of the sustainability assessment will be defined by issues of importance identified by Indigenous communities and interested persons through consultation and engagement activities, while also ensuring to be inclusive of the diversity of views expressed. The selection of VCs that will be the focus of the sustainability assessment will be aligned with the issues of importance identified by Indigenous communities and interested persons, as well as residual effects identified through the effects assessment process. The sustainability assessment will describe how the planning and design of the Project, in all phases including follow-up monitoring, considered the sustainability principles.

9.9 Consideration of Identity and Gender-Based Analysis Plus in Effects Assessment

The Proponent recognizes that communities and sub-populations within those communities may be impacted differently by the Project with respect to VCs and indicators. As such, the Project aims to collect baseline information for the purpose of assessing differential effects and establishing relevant mitigation measures, as further elaborated on in **Section 4.3**. Gender-Based Analysis Plus will not be limited to community feedback; when offered or discussed in secondary texts, additional sub-population information as is applicable to the relevant assessment will be incorporated.

9.10 Follow-up Programs

A follow-up program verifies the accuracy of the effects assessment and evaluates the effectiveness of mitigation measures. Identification of follow-up programs for the Project are not described in this Study Plan as the information needed to determine environmental monitoring requirements is dependent on the outcome of the effects assessment and consultation with Indigenous communities, agencies and interested persons. ESA or SARA permitting, if required for this project, may require commitments related to a follow-up program. Therefore, the Proponent will include information on follow-up programs, that address the requirements outlined in Section 26 of the TISG (the Agency 2020a), in the IS / EA Report and will identify the compliance and effects monitoring activities to be undertaken during all phases of the Project, as required.

10. Assumptions

Any assumption used in the effects assessment, for example the assumed average daily traffic on the CAR, will be clearly identified and a rationale provided in the IS / EA Report.

11. Concordance with Federal and Provincial Guidance

This section provides the best information currently available on how federal and provincial requirements identified for the Project to date will be addressed. The final concordance with federal and provincial requirements will be included in the IS / EA Report, and will be based on regulatory agency guidance, professional judgement and input received through the Project consultation and engagement process.

Table 11-1: Study Plan Federal Concordance – Conformance with Requirements

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
1	TISG Section 1.1, page 4	■ The Guidelines correspond to factors to be considered in the impact assessment. These factors are listed in subsection 22(1) of IAAC and prescribe that the impact assessment of a designated project must take into account any change to the designated project that may be caused by the environment;	■ The potential effects of the project on the environment and the potential effects of the environment on the Project will be assessed in accordance with applicable standards and guidance.	■ Section 9.1
2	TISG Section 2.3, pages 6-7	■ The description should focus on aspects of the Project and its setting that are important in order to understand the potential environmental, health, social and economic effects and impacts of the Project. The following information must be included and, where appropriate, located on map(s): – geographic co-ordinates (i.e., longitude/latitude using international standard representation in degrees, minutes, seconds) for the beginning and end points of the proposed road; – current land and/or aquatic uses within the study areas; – distance of the project components to any federal lands and the location of any federal lands within the study areas; – all waterbodies and their location on a map; – navigable waterways; – the environmental significance and value of the geographical setting in which the Project will take place and the study areas; – environmentally sensitive areas, such as national, provincial, territorial and regional parks, UNESCO World Heritage Sites, geological heritage sites, ecological reserves, ecologically and biologically sensitive areas, wetlands, and habitats of federally or provincially listed species at risk and other sensitive areas; – Dedicated Protected Areas and any other areas of ecological and social significance identified by the community during the community-based land use planning processes with the Province of Ontario (e.g., Enhanced Management Areas; see Section 6.1 for requirements related to confidentiality); – lands subject to conservation agreements; – current mineral development proposals, and areas of early and advanced mineral exploration in the study areas; – current areas of aggregate extraction; – description and locations of all potable drinking water sources (i.e., municipal or private), including spring water sources ; – description of local communities and Indigenous groups that is culturally relevant and gender sensitive; – if the information is not confidential, provide a description and location of Indigenous traditional territories and/or consultation areas, Treaty and/or Title lands, Indian Reserve lands, Indigenous harvesting regions (with permission of Indigenous groups), Métis settlements; and – culturally important features of the landscape.	■ The information requested will be provided in the IS / EA Report, if applicable.	■ No Reference, will be addressed in IS.
3	TISG Section 3.1, page 11	■ The Impact Statement must describe all project components including but not limited to: – borrow pits, gravel or aggregate pits and quarries (footprint, geographic location, ownership, and development plans including pit phases and lifespan), including their location in relation to upland habitats and the presence of rare, limited and/or significant habitat (e.g., federal, provincial, or Indigenous protected and conserved areas, ANSIs (Areas of Natural and Scientific Interest), Ramsar sites, critical habitat identified under the Species at Risk Act, etc.;	■ The information requested will be provided in the IS / EA Report, if applicable.	■ Section 6.2 ■ Section 8 ■ Section 9.4.2
4	TISG Section 5.1, page 22	■ Any proposed mitigation measures are to be clearly linked, to the extent possible, to valued components in the Impact Statement as well as to specific project components or activities, as well as comments raised during engagement activities	■ Once potential effects have been identified, the effects assessment will explore technically and economically feasible mitigation measures to avoid or minimize the identified negative effects and enhancement measures to increase positive effects.	■ Section 9.5
5	TISG Section 7.1, page 29	■ In describing the biophysical environment, the Impact Statement must take an ecosystem approach that considers how the Project may affect the structure and functioning of biotic and abiotic components with the ecosystem using scientific, community and Indigenous knowledge regarding ecosystem health and integrity, as applicable. The Impact Statement must provide a description of the indicators and measures used to determine ecosystem health and integrity, identified during early planning and reflected in the TISG. The presence of habitat (e.g., federal, provincial, or Indigenous protected areas, ANSIs, RAMSAR sites, critical habitat identified under the Species at Risk Act, etc.), such as but not limited to spawning shoals, aquatic vegetation or overwintering pools, potentially effected by the Project should be included in the description of the biophysical baseline conditions.	■ We will take an ecosystem approach that considers how the project may affect structure and functioning of biotic and abiotic ecosystem components and the potential residual effects as a result of these changes. This includes areas of indigenous cultural importance, descriptions of ecosystem health and integrity, the presence of protected areas and critical habitat for SAR species.	■ Section 9.2

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6	TISG Section 7.1, page 30	■ The Impact Statement must consider the resilience of relevant species populations, communities and associated habitats to the effects of the Project. Ecological processes should be evaluated for potential susceptibility to adverse effects from the Project. Considerations include patterns and connectivity of habitat patches; continuation of key natural disturbance regimes; structural complexity; hydrogeological or oceanographic patterns; nutrient cycling; abiotic-biotic and biotic interactions; population dynamics, genetic diversity, Indigenous knowledge relevant for the conservation and sustainable use of relevant species populations, communities and associated habitats.	■ The IA / EA will consider the resilience of relevant populations, communities and associated habitat to the effects of the Project. Ecological processes will be evaluated for potential susceptibility to adverse effects from the Project such as considerations for: patterns and connectivity of habitat patches, continuation of key natural disturbance regimes.	■ Section 9.4.2
7	TISG Section 7.1, page 30	■ The Impact Statement must establish appropriate study area boundaries to describe the baseline conditions. The study area boundaries need to encompass the spatial boundaries of the Project, including any associated project components or activities, and the anticipated boundaries of the Project effects, including all potentially impacted local communities, municipalities and Indigenous groups. Considerations in assigning appropriate study areas or boundaries would include, but not be limited to: – areas potentially effected by changes to water quality and quantity or changes in flow in the watershed and hydrologically connected waters; – areas potentially effected by airborne emissions or odours; – areas determined by dispersion and deposition modelling; – areas within the range of vision, light and sound and the locations and characteristics of the most sensitive receptors; – species habitat areas, usage timing and migratory patterns; – emergency planning and emergency response zones; – the geographic extent of local and regional services; – any impacted local communities, including municipalities; – all potentially impacted Indigenous groups; – areas of known Indigenous land, cultural, spiritual and resource use; and – existing effected infrastructure.	■ The Study Areas are defined and described in the Study Plan.	■ Section 6.2
8	TISG Section 7.1, page 30	■ If the baseline data have been extrapolated or otherwise manipulated to depict environmental, health, social and/or economic conditions within the study area, modelling methods must be described and must include assumptions, calculations of margins of error and other relevant statistical information. Models that are developed should be validated using field data from the appropriate local and regional study areas. Ensure baseline data are representative of project site conditions. If surrogate data from reference sites are used rather than site-specific surveys, the proponent should demonstrate that the data are representative of project site conditions.	■ We will include details on modelling methods and discuss confidence in using desktop and / or field studies when describing baseline conditions.	■ Section 7 ■ Section 8 ■ Section 9.4
9	TISG Section 7.1, page 31	■ Where baseline data are available in geographic information system (GIS) format, this information is to be provided to the Agency as electronic geospatial data file(s) compliant with the ISO 19115 standard19. This would support the Government of Canada's commitment to Open Science and Data and would facilitate the sharing of information with the public through the Canadian Impact Assessment Registry Internet Site and the Government's Open Science and Data Platform. The Agency intends to make the geospatial data files available to the public under the terms of the Open Government License – Canada20.	■ Data provided will meet ISO 19115 standards.	■ Section 8.2
10	TISG Section 7.2, page 32	■ The Impact Statement must provide detailed descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental, health, social and economic condition that is described, in order to corroborate the validity and accuracy of the baseline information collected.	■ Descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental condition will be provided in the IS / EA Report and are summarized in this Study Plan.	■ Section 7 ■ Appendix A
11	TISG Section 7.2, page 33	■ Data directly relevant to the area surrounding the Project are limited. With the exception of existing count data that have been collected within the regional study area, the use of existing information sources should be limited to the goals of estimating the species likely to occur in the study areas, and to identifying the potential timing of migration passage (for species that migrate through) or the general dates of breeding (for species that breed in the area).	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Section 7
12	TISG Section 7.2, page 33	■ Baseline data must be collected in a manner that enables reliable analysis, extrapolations and predictions. Resulting data should be suitable for analyses to estimate pre-project baseline conditions, derive predictions of impacts, and evaluate and compare post-project conditions and at scales of within and across the Project, Local and Regional Assessment areas. Modelling methods, error estimates and assumptions should be reported (as per section 7.1). Modelling and simulations should be used early in the planning phase to estimate the necessary sampling intensity and to quantitatively evaluate the effectiveness of design options. Ethical guidelines and relevant cultural protocols governing research, data collection and confidentiality must be adhered to.	■ We will include details on modelling methods and discuss confidence in using desktop and/or field studies when describing baseline conditions.	■ Section 7 ■ Section 9.4 ■ Appendix A

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13	TISG Section 7.2, page 33	■ If using existing data sources, the Impact Statement must provide justification to show that the data sources are relevant in spatial and temporal coverage to the Project. Some data sources may have good coverage in Southern Ontario or existing road networks but be unsuitable as a baseline for these northern areas where there are not roads.	■ Data sources are being reviewed for their appropriateness and are included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Section 7.1
14	TISG Section 7.2, page 33	■ With regard to field studies, survey work must be planned to include multiple sampling locations and multiple visits to each location to support all required assessment analyses. Existing data should be considered as a limited augmentation of this new data. See the “Establishing Baseline Conditions” (sections 8.5, 8.9, 8.10, 8.11) in this Tailored Impact Statement Guidelines for recommendations on survey design and methodology. Surveys and analyses should be conducted by qualified experts. Baseline data must be collected in a manner that enables reliable analysis, extrapolations and predictions. Resulting data should be suitable for analyses to estimate pre-project baseline conditions, derive predictions of impacts, and evaluate and compare post-project conditions and at scales of within and across the Project, Local and Regional Assessment areas. Modelling methods, error estimates and assumptions should be reported (as per section 7.1). Modelling and simulations should be used early in the planning phase to estimate the necessary sampling intensity and to quantitatively evaluate the effectiveness of design options. Ethical guidelines and relevant cultural protocols governing research, data collection and confidentiality must be adhered to.	■ Descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental condition will be provided in the IS /EA Report and are summarized in this Study Plan.	■ Section 7 ■ Section 9.4 ■ Appendix A
15	TISG Section 7.2, page 33	■ Consult the Species at Risk Public Registry for information on the list of species at risk and available recovery documents and reference the documents and dates consulted. Ensure the most up to date documents are used and species statuses are up to date23	■ The information requested will be provided in the IS / EA Report.	■ Section 8.1
16	TISG Section 7.2, pages 31-33	■ Information sources and data collection methods used for describing the baseline environmental, health, social and economic setting may consist of the following sources of information. For specific sources of baseline information, see Appendix 1. – Federal government (e.g., Environment and Climate Change Canada, Health Canada, Indigenous Services Canada, Statistics Canada, Women and Gender Equality Canada); – Ontario provincial government (e.g., Ministry of Environment, Conservation, and Parks, Ministry of Natural Resources and Forestry; – Bird Conservation Region plans21; – academic institutions; – field studies, including site-specific survey methods; – database searches, including: – federal, provincial, territorial, municipal and local data banks; – Breeding Bird Atlas - Ontario (2001-2005)22 – monitoring program databases protected areas, watershed or coastal management plans; – natural resource management plans; – species recovery and restoration plans; – field measurements to gather data on ambient or background levels for air, water, soil and sediment quality, light levels or acoustic environment (soundscape); – land cover data, including: • terrestrial ecosystem mapping products; • forest cover maps; • remote sensing resources; • important habitats and features to include: ○ water bodies, wetlands, watercourses; ○ riparian habitat; ○ river banks or other eroded habitats; ○ artificial water sources; ○ forest, tree patches, solitary trees (especially old decaying trees); ○ forest edges and tree rows; ○ ridges, including eskers; ○ caves and mines; ○ cliffs, rock outcrops, exposed bedrock, talus, and other karst topography; ○ buildings, bridges, and other anthropogenic features, including linear features;	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Section 7 ■ Appendix A

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		○ sources of artificial lighting attracting insects; ○ critical habitat; and ○ and any other habitat features known to be important in the area. – Published literature, such as peer reviewed journals, reports by think tanks, non-government organizations and government reports; – environmental assessment documentation, including monitoring reports, from prior projects in the area and similar projects outside the area; – regional studies, project assessments and strategic assessments; – renewable harvest data; – Indigenous knowledge, including oral histories and knowledge gathered by spending time on the land with knowledge holders; – community based monitoring and studies conducted by Indigenous communities; – expert, community, public and Indigenous engagement and consultation activities, including workshops, meetings, open houses, surveys; – qualitative information gathered from interviews, focus groups or observation; – census data; – baseline human health risk assessments; – community and regional economic profiles; – community well-being studies; and – statistical surveys, as applicable.		
17	TISG Section 7.3, page 34	■ The list of valued components must be informed, validated and finalized through engagement with the public, Indigenous groups, lifecycle regulators, jurisdictions, federal authorities, and other interested parties. The Impact Statement must describe valued components, processes, and interactions that are identified to be of concern or that the Agency considers likely to be impacted by the Project and are included in the Guidelines.	■ A summary of the consultation plan for Indigenous communities, government agencies, and interested persons has been provided in **Section 4** of the Study Plan; further details can be found in the IS / EA Consultation Plan included as Appendix B of the ToR. Specific consultation and engagement activities and schedules are currently in development and will be shared with the MECP and the Agency once available.	■ Section 4
18	TISG Section 7.3, page 35	■ The valued components must be described in sufficient detail to allow the reviewer to understand their importance and to assess the potential adverse and positive environmental, health, social and economic effects and impacts arising from the Project activities.	■ The EA/IS will include detailed descriptions of the VCs and the rationale for their inclusion to describe their importance and the predicted residual effects (adverse and positive) as a result of the Project.	■ Table 1-2 ■ Table 2-1 ■ Section 9
19	TISG Section 7.3, page 35	■ For each of the valued components that will be assessed in the Impact Statement, the proponent must create a study plan and a work plan to be validated by the Agency. Upon receipt of a study plan, the Agency may request that the proponent present and discuss the study plan at technical meetings, which will be scheduled during the impact statement phase.	■ The Study Plan meets this requirement. A summary of the Technical discussions with agencies have been summarized in **Section 3** of the Study Plan.	■ Section 3
20	TISG Section 7.3, pages 34-35	■ In selecting a valued component to be included, the following factors should be considered: – valued component presence in the study area; – the extent to which the valued component is linked to the interests or exercise of Aboriginal and Treaty rights of Indigenous peoples, and whether an Indigenous group has requested the valued component; – the extent to which the effects (real or perceived) of the Project and related activities have the potential to interact with the valued component; – the extent to which the valued component may be under cumulative stress from other past, existing or future undertakings in combination with other human activities and natural processes; – the extent to which the valued component is linked to federal, provincial, territorial or municipal government priorities (e.g., legislation, programs, policies); – the extent to which the valued component is being addressed through any ongoing or completed regional assessment processes; – the possibility that adverse or positive effects on the valued component would be of particular concern to Indigenous groups, the public, or federal, provincial, territorial, municipal or Indigenous governments; and – whether the potential effects of the Project on the valued component can be measured and/or monitored or would be better ascertained through the analysis of a proxy valued component.	■ The IS / EA Report will include detailed descriptions of the VCs and the rationale for their inclusion to describe their importance and the predicted residual effects (adverse and positive) as a result of the Project.	■ Section 1.2

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21	TISG Section 7.4.1, pages 35-36	■ The Impact Statement must describe the spatial boundaries, including project, local and regional study areas, for each valued component included in assessing the potential adverse and positive environmental, health, social and economic effects of the Project and provide a rationale for each boundary. Spatial boundaries are defined taking into account the appropriate scale and spatial extent of potential effects and impacts of the Project; community knowledge and Indigenous knowledge; current or traditional land and resource use by Indigenous groups; exercise of Aboriginal and Treaty rights of Indigenous peoples, including cultural and spiritual practices; and physical, ecological, technical, social, health, economic and cultural considerations. The size, nature and location of past, present and foreseeable future projects and activities are factors that should be included in the definition of spatial boundaries. It should be noted that in some cases, spatial boundaries might extend to areas outside of Canada. These transboundary spatial boundaries should be identified where transboundary effects are expected.	■ The Study Areas are defined and described in the Study Plan. ■ A summary of the consultation plan for Indigenous communities, government agencies, and interested persons has been provided in Section 4 of the Study Plan; further details can be found in the IS / EA Consultation Plan included as Appendix B of the ToR. Specific consultation and engagement activities and schedules are currently in development and will be shared with the MECP and the Agency once available.	■ Section 4 ■ Section 6.2
22	TISG Section 7.4.1, page 36	■ For biophysical valued components, spatial boundaries should be defined using an ecosystem-centred approach for the project study area, local study area, and regional study area, as wetlands and eskers are features that are likely to be most effected. Ecoregion boundaries or their derivatives should not be used since the Project occurs on, near and across ecoregion boundaries. See Technical Guidance for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012 for more guidance on determining spatial boundaries. Delineate spatial boundaries (i.e., regional study area, local study area, and project study area) to meet the following objectives: a. range of land cover types should be representative of the defined spatial extent; b. the spatial pattern of the land cover types should be well distributed across the defined spatial extent (e.g., revise if one or more land cover types is concentrated in one sub-area and uncommon in other parts of the area); and c. low to moderate rate of change in the prevalence of one or more land cover types with increasing distance from the (i.e., to use land cover patterns to constrain the distances within which comparisons should be made).	■ The Study Areas are defined and described in the Study Plan.	■ Table 6-1
23	TISG Section 7.4.1, page 36	■ For valued components establish three study area spatial boundaries to assess impacts to each valued component: 1) Project Study Area: defined as the project footprint for each alternative route; " 2) Local Study Area: defined for each valued component – see below; 3) Regional Study Area: defined for each valued component – see below ■ Provide a rationale for boundaries of the project study area, local study area, and regional study area for each valued component and indicate how the above objectives were met in establishing the boundaries.	■ The Study Areas are defined and described in the Study Plan.	■ Section 6.2
24	TISG Section 7.4.1, page 37	■ For Habitat valued components: The spatial extent of the habitat and the habitat functions should influence the determination of an appropriate local study area and regional study area, considering objectives a-c above. The local study area should be at a minimum: project study area plus a 500-metre buffer. For habitat valued components potentially affected by the Project, a land cover analysis should be conducted to determine if a 500-metre buffer appropriately reflects ecological boundaries.	■ The Study Areas are defined and described in the Study Plan.	■ Table 6-1
25	TISG Section 7.4.1, page 37	■ For Species valued components: The local study area should correspond to the project study area plus a buffer defined with objectives a-c above. Use simulation modelling to help define a buffer that captures objectives a-c for each species or species group.	■ The Study Areas are defined and described in the Study Plan.	■ Section 6.2 ■ Table 6-1
26	TISG Section 7.4.2, page 37	■ The temporal boundaries of the impact assessment span all phases of the Project determined to be within the impact assessment. If potential effects are predicted after project decommissioning or abandonment, this should be taken into consideration in defining specific boundaries. In order to assess a project's contribution to sustainability, consideration should be given to the long-term effects on the well-being of present and future generations. When defining temporal boundaries, the proponent should consider how elements of environmental, health, social and economic well-being that local communities, including municipalities, and Indigenous groups identify as being valuable could change over time.	■ The Study Areas are defined and described in the Study Plan. ■ A summary of the consultation plan for Indigenous communities, government agencies, and interested persons has been provided in **Section 4** of the Study Plan; further details can be found in the IS / EA Consultation Plan included as Appendix B of the ToR. Specific consultation and engagement activities and schedules are currently in development and will be shared with the MECP and the Agency once available.	■ Section 4 ■ Section 6 ■ Table 9-1 ■ Section 9.7
27	TISG Section 8.5, page 42	■ The Impact Statement must provide data files of mapped features depicting natural areas and wildlife presence within, and use of, the study area;	■ The information requested will be provided in the IS / EA Report.	■ Section 8 ■ Section 9.4.2

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28	TISG Section 8.5, pages 43-44	■ This assessment should be quantitative and include the collection of site-specific baseline information on wetland functions, including: – Surveys to assess for the presence, abundance, density, and distribution of migratory birds and federally listed species at risk, provincially listed species at risk, and species assessed by COSEWIC as at-risk in relation to potentially effected wetlands and associated riparian areas. Surveys should meet appropriate standards (see sections 8.9, 8.10, and 8.11), be species or bird group specific as appropriate, and be conducted during the appropriate times of the year as specified in section 8.9-8.11 of this document. Surveys for species at risk should assess species individually where possible (typically, an indicator approach is not appropriate for species at risk). Surveys should not be limited to species or groups of species that are wetland-obligate, but rather should include any species known to use wetland habitats as part of its lifecycle. Data should be sufficiently robust to identify which wetland classes are important to which species (and for how many). – The spatial location and a description of the biological characteristics of each potentially effected wetland and the ecological services and functions (hydrology, biochemical cycling, habitat, and climate) they provide. The functions assessment should be as specific as possible to the biological characteristics of the wetland and to the ecological services and functions it provides. – A supporting rationale and detailed description of the methods used in completing the wetland functions assessment, including sampling design.	■ The study will be designed in such a way as to be able to describe the distribution and abundance of birds in relation to the Study Areas but in particular SAR birds. Data collected will generally be consistent with methods employed by Zoetica (2018a and 2018b) and Golder (2019) for Forest Birds, Bog / Fen Birds, and Other Wetland birds Criteria. Aerial surveys will be used to document Raptors, Shorebirds, and Waterfowl and their habitat. ■ Details on wetland functions assessments are provided in the Vegetation Study Plan.	■ Section 7.2.2 ■ Section 8 ■ Vegetation VC Study Plan
29	TISG Section 8.9, page 49	■ The following groups of migratory and non-migratory birds should be considered as valued components: – forest birds; – raptors; – shorebirds; – waterfowl; and – bog/fen birds, and other wetland birds.	■ The Bird VCs include the migratory and non-migratory birds identified.	■ Table 1-2 ■ Section 7.2
30	TISG Section 8.9, page 49	■ The Impact Statement must:-describe biodiversity of bird species and their habitats that are found or are likely to be found in the study area, including identification of Bird Conservation Regions and Bird Conservation Region strategies. Possible information sources include, but are not limited to: wildlife experts/naturalists, Canadian Conservation Data Centres, Bird Conservation Region strategies, E-Bird, Breeding Bird Atlases, Environment and Climate Change Canada's guidance on Bird Surveys (see Appendix 1);	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Section 8
31	TISG Section 8.9, page 50	■ Survey protocol planning should include modelling and simulations to estimate sampling requirements, and analysis to evaluate resulting design options: – collect field data over at least two years. The goal of collecting data over multiple years is to improve the understanding of natural variability in populations. Two years of sampling is suggested as a minimum. As the number of sampling years increases so does the understanding of natural variability;	■ Data for birds are to be collected to account for temporal sources of variation including among years (two years minimum), within and among seasons, and within a 24-hour daily cycle. ■ Data (desktop and field-based) will be collected to represent temporal sources of species variation (i.e., among years, among seasons, and within 24-hour periods). Sampling effort will be determined through the use of modelling and simulations.	■ Section 7.2 ■ Section 7.2.2
32	TISG Section 8.9, page 50	■ Key habitat associated with species at risk should be considered valued components, including eskers and similar geologic features, wetlands and peatlands;	■ Key habitat for SAR will be described in the IA / EA and will be considered valued components.	■ Section 7.2 ■ Section 9.4
33	TISG Section 8.9, page 50	■ Sample size must be planned to support evaluation of the project study area within the context of the local study area and regional study area. Appropriate design of surveys will need to consider multiple survey locations in order to represent the habitat heterogeneity of the regional study area, and to yield multiple survey locations per land cover or habitat class, without requiring aggregation of habitat classes post-hoc;	■ Sample size will be planned to support evaluation of the Project within the context of the LSA and RSA. Study designs will implement multiple survey locations to cover multiple habitat classes and land cover types.	■ Section 7.2.2
34	TISG Section 8.9, page 50	■ The Impact Statement must collect bird data to adequately represent the following temporal sources of variation: – among years; – within and among seasons (e.g., spring migration, breeding, fall migration, overwintering); and – within the 24-hour daily cycle.	■ The study plan includes point counts, ARUs, call playback, and aerial surveys to collect bird data among years, within and among seasons (spring migration, breeding, fall migration, early winter), and within the 24-hour daily cycle.	■ Section 7.2

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35	TISG Section 8.9, page 50	■ The Impact Statement must collect explanatory (i.e., covariate) data necessary for modelling in such a way as to adequately represent the following spatial and temporal sources of variation: – spatial variation in: • land cover composition • soil type, geomorphology • hydrological processes, and • climatic conditions; and, – temporal, especially annual, variation in local weather inter- and intra-annual climatic variability.	■ A variety of modelling approaches will be explored to explain the spatial and temporal patterns for each Bird VC as a function of explanatory variables (biotic and abiotic) to predict future conditions.	■ Section 9.4
36	TISG Section 8.9, page 50	■ The Impact Statement must collect data in a manner that enables reliable extrapolations in space (i.e., at minimum to Project, local and regional study areas) and in time (i.e., across years): · design surveys so that they represent the spatial and temporal targets of modelling and extrapolations, and to produce scientifically defensible predictions of impacts and estimates of mitigation effectiveness. Survey designs should be sensitive enough to detect and quantify the impacts at the spatial and temporal scales identified above (i.e., project study area, local study area, and regional study area), any departures from predictions, and the effectiveness of mitigations. Justify the selection of modelling techniques based on current and recent scientific literature;	■ Data will be collected in ways that enable reliable extrapolations in space and in time. Surveys will be designed to represent the spatial and temporal targets of modelling and extrapolations. Justification of modelling approaches taken will be supported by current scientific literature.	■ Section 7.2 ■ Section 9.4.2
37	TISG Section 8.9, page 51	■ Provide documentation and digital files for results of analyses that allow for a clear understanding of the methods and a replication of the results (raw scripts or workflows are preferred in place of descriptive documentation);	■ The information requested will be provided in the IS / EA Report. ■ Data provided will meet ISO 19115 standards.	■ Section 8.2
38	TISG Section 8.9, page 51	■ Simulation modelling should be used to assess bias and precision between project study area, local study area, and regional study area to ensure the estimates are useful for comparison. Field surveys should occur within the regional study area since there are few existing sources of data that effectively describe regional bird populations in areas, including this area, that are distant from road networks.	■ Simulation modelling was conducted using preliminary point count data collected in the PDA and LSA. An "optimal" sample size was selected for additional sampling where the precision of model estimates is stabilized and minimizes bias relative the TISG benchmark study design. Given that a land cover analysis was conducted to demonstrate that the Local Study Area and Regional Study Area have similar representativity, bird models will be used to predict presence/absence, distribution, abundance, and density in the Regional Study Area.	■ Section 7.2.2 ■ Section 9.4
39	TISG Section 8.9, page 51	– at minimum, the combined information from existing data and field surveys needs to be detailed enough to describe the distribution and abundance of all bird species in relation to the study areas;	■ The data obtained from existing field studies and proposed field surveys will provide detail about the distribution and abundance of multiple species of birds, proxy VCs to represent bird groups described in the TISG, and bird species at risk VCs.	■ Section 7.2.2 ■ Section 8
40	TISG Section 8.9, page 51	– rare species require more survey effort to detect than common species, and species rarity should be accounted for in survey design by increasing the number and duration of surveys; and	■ Rare species will be accounted for in the statistical analysis recognizing that they may be more difficult to detect.	■ Section 7.2.2
41	TISG Section 8.9, page 51	■ Sampling effort per unit area - field survey effort should be most intensive within the project study area. The level of effort per unit area may be similar or somewhat less within the remainder of the local study area but should be scaled to the likelihood that project effects will impact birds within that zone. Efforts outside the project study area should be carefully designed to ensure that estimates comparing within and across the project study area, local study area and regional study area are unbiased and as precise as possible;	■ Survey design sampling effort will be most intense within the PDA. Efforts outside the PDA will be carefully implemented to remove biases when comparing areas from within the PDA.	■ Section 7.2.2.1 ■ Section 9.4.1
42	TISG Section 8.9, page 51	■ Submit complete data sets from all survey sites. These should be in the form of complete and quality assured relational databases, with precisely georeferenced site information, precise observation/visit information and with observations and measurements in un-summarized form. Databases and GIS files should be accompanied by detailed metadata that meets ISO 19115 standards;	■ The information requested will be provided in the IS / EA Report. ■ Data provided will meet ISO 19115 standards.	■ Section 8.2
43	TISG Section 8.9, page 51	■ The Impact Statement must provide raw survey data and analysis results for 1) all birds, 2) each valued component, and 3) Bird Conservation Region Priority Species showing the species ranked according to:o frequency of occurrence,o abundance,o abundance in each habitat type, ando map showing areas of highest concentrations of species.	■ The information requested will be provided in the IA / EA Report.Data provided will meet ISO 19115 standards.	■ Section 8

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44	TISG Section 8.9, page 53	■ Point Count Transects: Each site should be sampled by human observers using a standardized 10-minute point count. To enable observer: recorder comparisons, observers should also record the survey visit using a high quality portable recording device (i.e., with 360- degree recording in WAV format, selectable sampling rate, and adjustable microphone gain), mounted on a tripod. Observers should be skilled in bird identification by sight and sound and should use 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. Estimated distances from observers to each bird should be recorded as: 0-5 0 m, 50 m-100 m, and beyond 100 m.	■ Surveyors of breeding birds may be subject to biases in bird recognition and identification depending on skill level and hearing ability. Only observers skilled in bird identification by sight and sound will be used for breeding bird surveys. Furthermore, additional bias will be removed by recording all bird vocalizations during breeding bird surveys using a high-quality portable recording device mounted on a tripod. Observer and recorder data will be compared for further analysis.	■ Section 7.2.2.1.3
45	TISG Section 8.9, page 53	■ Regarding “Geomatics and habitat typing”: – Each site visited at any time between the dates of June 10 and August 30 should be photographically documented with 13 photos. 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 finally, one photo with arm extended straight up (i.e., vertically). Photos should be interpreted by qualified individuals as precisely as possible according to one or each of the classification schemes: – Ontario Ministry of Natural Resources and Forestry’s Boreal Ecosites, Wetland Ecosystem Classification for Northern Ontario (W-type), Forest Ecosystem Classification for Northern Ontario (V-type), and NRCan’s Canadian National Vegetation Classification (vegetation association).	■ Breeding bird, marsh bird call playback, species-specific survey, bird ARU site centroids will be documented with photographs as described in the TISG. Qualified individuals will review photographs to classify habitat by Ecological Land Classification (ELC) Ecosite (Banton 2009) or Canadian Wetland Classification Class (NWWG 1997) as described under the Vegetation Study Plan for modelling purposes.	■ Section 7.2.2.6 ■ Vegetation VC Study Plan
46	TISG Section 8.9, page 54	■ Data analysis methods should be clearly described and transparent (e.g., annotated scripts), extract the maximum information from the data, and be appropriate for the data and protocols: 1. Generalized linear mixed models or suitable alternatives (e.g., boosted regression trees, generalized additive models, or models developed under a Bayesian framework) may be suitable approaches for analyzing data obtained from the described design and for addressing a goal of predicting patterns beyond the sites and times sampled; 2. Analysis of ARU and point count data should account for differences in the survey methods (e.g., ability to detect, visit/sample timing and frequency). Offsets may be used to help account for variation in detection ability. Consider expert guidance on the proper use of offsets in modelling. Detection rates are unlikely to remain constant between visits so, if occupancy modelling is used it should be well justified.	■ The information requested will be provided in the IS / EA Report. ■ Data provided will meet ISO 19115 standards.	■ Section 3 ■ Section 8 ■ Section 9.4
47	TISG Section 8.9, page 54	■ All candidate survey sites should be attributed to a 100 m buffer around site centroid, areal coverage and percentage of each land cover class be assigned to sites, and these values used as inputs to evaluations of retrospectivity and options for design modifications.	■ Habitat within 100 m of the survey site centroid will be classified by ELC Ecosite or Canadian Wetland Classification Class as described under the Vegetation Study Plan for modelling purposes.	■ Section 7.2.2.6 ■ Vegetation Study Plan
48	TISG Section 8.9, page 54	■ Use the Ontario Ministry of Natural Resources and Forestry’s Far North Land cover (version 1.4 or later, as available) and augmentation with fire history, digital elevation models, surficial geology and other data sources; and	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Section 7.2.2.1.1 ■ Section 7.2.2.6 ■ Section 9.4.1
49	TISG Section 8.9, page 55	■ Provide detailed descriptions of bird habitat that includes at a minimum, characterization of biophysical conditions with regard to ecoregion, Bird Conservation Region, and with respect to the conditions of boundary regions. The Project crosses and is in close proximity to ecoregion and Bird Conservation Region boundaries. Since the project study area is at the edges of the ecoregions and Bird Conservation Regions, habitat patterns are likely to reflect these border characteristics, with one of the outcomes being that habitat types common elsewhere in the ecoregion may be relatively uncommon and potentially more ecologically important in the border region. Surveys need to be detailed enough within the local study area and regional study area to put the project study area into context of these wider areas: – mixed wood forest landcover and other upland vegetation types may be particularly important for many forest associated birds, supporting birds during migration, breeding and through the winter. Eskers and related features are uncommon and potentially ecologically important elements of the landscape and are likely to be disproportionately affected by these projects. River riparian corridors are another relatively uncommon feature with adjacent mixed wood forest; and – should there be some displacement of nesting birds, baseline data should provide evidence that there is enough equivalent habitat for birds to be displaced to and that the vegetation being removed (e.g., eskers) is not unique to the project study area.	■ Detailed descriptions of the habitat within the context of the LSA and RSA will be provided as described under the Vegetation Study Plan and will examine the potential displacement of birds.	■ Section 7.2.2.6 ■ Vegetation Study Plan

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		– to the conditions of boundary regions. The Project crosses and is in close proximity to ecoregion and Bird Conservation Region boundaries. Since the project study area is at the edges of the ecoregions and Bird Conservation Regions, habitat patterns are likely to reflect these border characteristics, with one of the outcomes being that habitat types common elsewhere in the ecoregion may be relatively uncommon and potentially more ecologically important in the border region. Surveys need to be detailed enough within the local study area and regional study area to put the project study area into context of these wider areas:		
50	TISG Section 8.9, page 55	■ Biodiversity metrics for each valued component should include: – distribution in space; – frequency of occurrence; – patterns of occurrence and abundance in time; – abundance and, if possible, density; and – associated habitat type(s) and strength of associations.	■ Biodiversity metrics for the Bird VC will consider: – frequency of occurrence and abundance (i.e., percentage of survey points) by season; – abundance (i.e., breeding density in territories / ha) and percentage of observations in each habitat type; and – distribution maps in the LSA showing areas of highest concentration.	■ Section 8
51	TISG Section 8.9, page 55	■ Identify the biodiversity metrics, biotic and abiotic indicators that are used to characterize the baseline avifauna biodiversity and discuss the rationale for their selection:o species communities should not be collapsed into diversity metrics or the focus narrowed to indicator species. Species identity, distribution, abundance and where possible estimates of breeding status should be the primary targets of quantification.o biodiversity metrics for each valued component should include:· distribution in space;· frequency of occurrence;· patterns of occurrence and abundance in time;· abundance and, if possible, density; and· associated habitat type(s) and strength of associations.	■ The VCs have been determined by taking an ecosystem approach that considers how the Project may affect the structure and functioning of biotic and abiotic components within the ecosystem. Metrics as well as biotic and abiotic indicators that are used to characterise the baseline biodiversity for birds will be identified and discussed as part of the rationale for their selection.o Biodiversity metrics for the Birds VC will consider: – frequency of occurrence and abundance (i.e., percentage of survey points) by season; – abundance (i.e., breeding density in territories / ha) and percentage of observations in each habitat type; and – distribution maps in the LSA showing areas of highest concentration.	■ Section 8 ■ Section 9.2
52	TISG Section 8.9, pages 55-57	■ • Provide estimates of the abundance and distribution, and information on the life history of migratory and non-migratory birds (including, but not limited to, waterfowl, raptors, shorebirds, marine birds, marsh birds and other land birds) in the study area. Estimates may be based on existing information, or additional surveys, as appropriate, to provide current data sufficient for reliable estimates. In doing so: – " generate measures of abundance and distribution using spatially balanced, randomly selected sample locations. Sampling should include edges and transitions between habitat types and should not be focused exclusively within homogeneous patches of a given habitat type: • use simulation modelling prior to sampling to ensure coverage is broad enough to estimate and account for detection error as well as provide unbiased estimates of abundance and distributions; and • sampling within temporal boundaries should be spatially and temporally balanced so that all spatial areas receive comparable temporal coverage. " – "Provide estimates of confidence or error for all estimates of abundance and distribution. Estimates should be defined (e.g., mean across years, mean across sites, modelled prediction) and, if appropriate, confidence or other intervals should be defined (e.g., 95% confidence intervals, credible intervals). Use of hypothesis testing p - values is generally not appropriate in this context and their use should be justified; " – "whenever estimating densities for species, consider observer-induced detection error for comparisons among counts (e.g., between, before and after surveys, or between effected and un-effected sites) to be valid. When accounting for detection error the method used should account for variable detection between landcover types, observers, weather, time of year, species, as well as random variation between visits. Simulation methods can help determine if a specific method is appropriate for a given survey design and analysis. Care should be taken to avoid affecting the reliability of abundance estimates; – a spatially dispersed stratified random sampling approach should be used to maximize efficiency. Sample sites should be selected with a randomization procedure that accounts for the project design footprint. To select specific sampling sites, care should be taken to ensure sites	■ The abundance and distribution of forest birds and bog / fen / other wetland birds will be described over time during spring and fall migration. The abundance and distribution of waterfowl and shorebirds (including species / guilds) will be calculated. The timing of migration and changes in composition of the waterfowl and shorebird communities will be described using maps and tables. For raptors, the abundance and distribution of nest sites will be summarized using maps and tables. Simulations and models will be used to determine appropriate sampling effort. Details regarding simulation / model parameters are presented in this Study Plan. ■ All criteria used to choose plot locations will be included in the impact statement. For ground investigations, a GIS function that will consider both access (i.e., proximity to existing helipad locations) and the need to survey all vegetation community types present within the Study Area will be employed with minimal to no bias.	■ Section 7.2 ■ Section 9.4

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		are spatially distributed across the area of interest and coverage is obtained across habitat types. Site locations should be randomly selected using an approach that avoids implicit bias in site selection; – provide a justification on the approach chosen. If necessary to constrain or adjust site selection based on access limitations, simulation modelling should provide evidence that this sampling strategy has not resulted in the introduction of bias. Survey vegetation features of concern in a manner that is not disproportionate to other types. Avoid bias in estimates of abundance and impair extrapolation and statistical inference; and – include all criteria used to choose plot locations in the Impact Statement.		
53	TISG Section 8.9, page 57	■ Identify areas of concentration of migratory birds, including sites used for migration, staging, breeding, feeding and resting. The following must be considered when identifying areas of concentration of migratory birds: – migratory bird concentrations can vary within year and between years. It is therefore important to survey across the project study area, local study area, and regional study area both temporally and spatially; · – migratory bird counts can vary strongly between years and so survey length must be able to estimate the variation accurately; and – migratory bird counts are dependent on length of stay as well as presence. ■ Attempt to estimate abundances across a migratory period should incorporate an estimate of inter and intra-annual trends and estimates of lengths of stay. Irruptive species may act in ways similar to migrants in terms of abundance. They may be absent from an area until conditions change (such as a mast event), during which time the habitat becomes vital to these species.	■ Aerial surveys will be conducted to collect data on raptors (nesting), waterfowl (spring stopover / staging, breeding pairs, broods, fall stopover / staging), and shorebirds (spring and fall stopover / staging) in the PDA and LSA. ■ Aerial surveys will be conducted along transects parallel to the proposed route spaced according to tree density and landscape on two occasions each during the spring and fall migration periods as well as the breeding bird window. ■ Data for the Bird VCs are to be collected to account for temporal sources of variation including among years (two years minimum), within and among seasons (e.g., spring migration, breeding season, late summer / fall migration and early winter season), and within a 24-hour daily cycle.	■ Section 7.2.2 ■ Section 7.2.2.5
54	TISG Section 8.9, page 57	– describe the use of (magnitude, timing) migratory and non-migratory birds as a source of country foods (traditional foods) or where use has Indigenous cultural importance (e.g., Canada Goose, Snow goose, Swans, Gyrfalcon, Loon, Peregrine Falcon, and duck species); and	■ This information will be collected as described in the Land and Resource Use Study Plan. ■ The historic and current use of birds as a source of country foods (traditional foods) and where use has Indigenous cultural importance will be described.	■ Section 4 ■ Land and Resource Use Plan
55	TISG Section 8.9, page 57	– identify any and all federal Species at Risk and/or Critical Habitat in the study area; sites that are likely to be sensitive locations and habitat for birds or environmentally significant areas. These include National Parks, Areas of Natural or Scientific Interest, Migratory Bird Sanctuaries or other priority areas or sanctuaries for birds, National Wildlife Areas or World Biosphere Reserves, offshore Marine Protected Areas and Ecologically and Biologically Significant Marine Areas.	■ The information requested will be provided in the IS / EA Report. ■ Data provided will meet ISO 19115 standards.	■ Table 2-1 ■ Table 7-1 ■ Section 9
56	TISG Section 8.9, page 57	– include all criteria used to choose plot locations in the Impact Statement.	■ The information requested will be provided in the IS / EA Report.	■ Section 7.2
57	TISG Section 8.9, page 57	– provide a characterization of habitat features found in the project area that are associated with the presence of those bird species that are likely to be effected, based on the best available existing information (e.g., land cover types, vegetation, aquatic elements), including habitat fragmentation. Classification should include local aerial and on-site photos;	■ Habitat features in the project area associated with migratory bird species will be characterized by the best available information acquired from the study period.	■ Section 7.2.2.6
58	TISG Section 8.9, page 57	– provide an estimate of year-round bird use of the area (e.g., winter, spring migration, breeding season, fall migration), based on data from existing sources and surveys to provide current field data if required to generate reliable estimates. In each portion of the year, survey effort must account for differences in species movements including: winter usage of highly habitat reliant species and highly mobile species that will accurately characterize the use of a site;	■ Bird data will be collected to account for temporal sources of variation including among years (two years minimum), within and among seasons (e.g., spring migration, breeding season, late summer / fall migration and early winter season), and within a 24-hour daily cycle using both desktop resources and field surveys in order to get an accurate estimate of year-round bird use of an area	■ Section 7.2.1 ■ Section 7.2.2
59	TISG Section 8.9, page 57	– Provide written description and maps of ecozones, ecoregions, and ecodistricts as per Ontario or Canada's Ecological Landscape Classification;	■ The information requested will be provided in the IS / EA Report.	■ Section 8

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60	TISG Section 8.9, page 58	■ The description of bird species and their habitat in the study area may be based on existing sources, but supporting evidence is required that demonstrates that the data used are representative of the avifauna and habitats in the study area. Existing data must be supplemented by surveys, if required to produce a representative sample of the avifauna and habitats of the study area.	■ Descriptions of bird species and their habitat will be developed through desktop reviews, field investigations, and data analysis.	■ Section 7.2 ■ Section 7.2.2.6 ■ Section 8
61	TISG Section 8.9, page 58	■ Avian surveys should be designed based on a thorough review of the available scientific literature pertinent to the specific region, bird groups and anticipated effects. The Canadian Wildlife Service's Framework for the Scientific Assessment of Potential Project Impacts on Birds provides examples of project types and recommended techniques for assessing effects on migratory birds (see Appendix 1).	■ Descriptions of specific data sources, data collection, sampling, survey, and research protocols and methods followed for each baseline environmental condition will be provided in the IS / EA Report and are summarized in this Study Plan.	■ Section 7.2 ■ Appendix A
79	TISG Section 8.11, page 60	■ Collect species at risk 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.	■ Data (desktop and field-based) will be collected to represent temporal sources of species variation (i.e., among years, among seasons and within 24-hour periods).	■ Section 7
80	TISG Section 8.11, page 60	■ The Impact Statement must [identify] key habitat associated with species at risk should be considered valued components, including eskers and similar geologic features, wetlands and peatlands;	■ SAR and Significant Wildlife Habitat will be considered in the IS / EA Report.	■ Section 7 ■ Section 8
81	TISG Section 8.11, page 60	■ The Impact Statement must: – provide a list of all provincially listed protected species at risk and species assessed by the COSEWIC that have the status of extirpated, endangered, threatened or of special concern and that may be directly or indirectly effected by the Project. Use existing data and literature as well as surveys to provide current field data that reflects the natural inter-annual and seasonal variability;	■ The information requested will be provided in the IS / EA Report. ■ Data (desktop and field-based) will be collected to represent temporal sources of species variation (i.e., among years, among seasons and within 24-hour periods).	■ Section 2.1.2 ■ Table 2-1 ■ Section 8.1
82	TISG Section 8.11, page 60	■ Provide a list of all species at risk listed under Schedule 1 of the federal Species at Risk Act that may be directly or indirectly effected by the Project. Use existing data and literature as well as surveys to provide current field data that reflects the natural inter-annual and seasonal variability of each species. Species at risk which may inhabit the project area include: · – Lake sturgeon (Acipenser fulvescens); – Northern Myotis (Myotis septentrionali); – Little Brown Myotis (Myotis lucifugus); – Caribou (Rangifer tarandus; Provincial: Missisa, Nipigon, and Pagwachuan ranges; Federal: Far North range); – Rusty Blackbird (Euphagus carolinus); – Bank Swallow (Riparia riparia); – Barn Swallow (Hirundo rustica); – Canada Warbler (Cardellina canadensi); – Chimney Swift (Chaetura pelagica); – Common Nighthawk (Chordeiles mino); – Eastern Whip-poor-will (Antrostomus vociferu); – Evening Grosbeak (Coccothraustes vespertinus); – Olive-sided fly-catcher (Contopus cooperi); · – Peregrine Falcon (Falco peregrinus); · – Short-eared Owl (Asio flammeus); · – Yellow Rail (Coturnicops noveboracensis); and · – Wolverine (Gulo gulo);	■ The information requested will be provided in the IS / EA Report. ■ Data (desktop and field-based) will be collected to represent temporal sources of species variation (i.e., among years, among seasons and within 24-hour periods).	■ Section 2.1.2 ■ Section 8.1
83	TISG Section 8.11, page 61	■ Account for the fact that rare species will require more survey effort to detect, which should be reflected in survey design by increasing the number and duration of surveys: – collect field data over at least two years. The goal of collecting data over multiple years is to improve the understanding of natural variability in populations. Two years of sampling is being suggested as a minimum. As the number of sampling years increases so does the understanding of natural variability; – Sample size must be planned to support a robust evaluation of the project study area within the context of the local study area and regional study area;	■ The Study Plan meets this requirement. A summary of the Technical discussions with agencies have been summarized in **Section 3** of the Study Plan. Descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental condition will be provided in the IS / EA Report and are summarized in this Study Plan.	■ Section 7.2 ■ Section 8.1

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		– Design of surveys will need to consider multiple number of survey locations in order to represent the habitat heterogeneity of the regional study area, and to plan the number of survey locations per land cover or habitat class so that aggregation of habitat classes post-hoc is not required; – In terms of sampling effort per unit area, field survey effort should be most intensive within the project study area. The level of effort per unit area may be similar or somewhat less within the remainder of the local study area but should be scaled to the likelihood that project effects will impact species at risk within that zone. Efforts outside the project study area should be carefully designed to ensure that estimates comparing and across the project study area, local study area and regional study area are unbiased and precise; – A habitat-stratified random sampling approach should be used. Sample sites should be selected with a randomization procedure such as a GIS grid overlay; and – Where Critical Habitat has not been defined or has been partially identified, a Schedule of Studies may have been created to identify gaps in information for these species. The Schedule of Studies information should be referred to when implementing or assessing survey protocols, in order to provide necessary information for these species.		
84	TISG Section 8.11, page 61	■ Contain complete data sets from all survey sites. These should be in the form of complete and quality assured relational databases, with precisely georeferenced site information, precise observation/visit information and with observations and measurements in un-summarized form. Databases and GIS files should be accompanied by detailed metadata that meets ISO 19115 standards;	■ The information requested will be provided in the IS / EA Report. ■ Data provided will meet ISO 19115 standards.	■ Section 8.2
85	TISG Section 8.11, page 61	■ Ensure that, at minimum, the combined information from existing data and field surveys must be able to describe the distribution and abundance of species at risk in relation to the study areas;	■ The combined information from existing data and field surveys will describe the distribution and abundance of SAR in relation to the study areas.	■ Section 8.1
86	TISG Section 8.11, page 61	– provide documentation and digital files for all results of analyses that allow for a clear understanding of the methods and a replication of the results (raw scripts or workflows are preferred in place of descriptive documentation);	■ The information requested will be provided in the IS / EA Report.	■ Section 8.2
87	TISG Section 8.11, page 64	■ 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. ■ Data must be supplemented by surveys, as required;	■ The information requested will be provided in the IS / EA Report.	■ Section 7; Section 8.1
88	TISG Section 8.11, page 64	■ For the species identified: – provide any published studies that describe the regional importance, abundance and distribution of species at risk, including recovery strategies or plans; " – consult relevant published studies that describe suitable survey methodologies for caribou and wolverine based on winter track observations including but not limited to: • caribou resource selection probability functions describing the probability of resource use at the range scale (see Hornseth & Rempel 2016); • caribou, moose, and wolf occupancy models describing their distribution in the far north (see Poley et al. 2014); and • wolverine occupancy models describing the distribution of wolverine in the far north (see Ray et al. 2018). – 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. – data must be supplemented by surveys, as required; – survey protocols should optimize detectability and survey effort should provide for comprehensive coverage at the appropriate time of year (e.g., survey breeding habitat during breeding season, stopover habitat during migration); – survey protocols should provide a rationale for the scope of and the methodology used for surveys including design, sampling protocols and data manipulation; and – where using recognized standards, provide details of any modifications to the recommended methods and rationale for these modifications and indicate who was consulted in the development of the baseline surveys (e.g., federal/provincial wildlife experts, specialists and local Indigenous groups).	■ Descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental condition will be provided in the IS / EA Report and are summarized in this Study Plan.	■ Section 7; Section 8; Section 9.4.1.1

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89	TISG Section 8.11, page 65	■ Identify and map all species at risk, critical habitat, and residences on federal land within the project study area and local study area (provincial and/or local government authorities should be contacted to determine any additional data sources and survey methodologies)	■ The information requested will be provided in the IS / EA Report.	■ Section 8.1
90	TISG Section 8.11, page 65	■ - Provide information and/or mapping at an appropriate scale (The project study area and local study area, as defined above for each valued component, constitute the appropriate scale) for residences, seasonal movements, movement corridors, habitat requirements, key habitat areas, identified or proposed Critical Habitat and/or recovery habitat (where applicable). Describe the general life history of species at risk (e.g., breeding, foraging) that may occur in the project area, or be affected by the Project;	■ The information requested will be provided in the IS / EA Report.	■ Section 8.1 ■ Section 9.4.2
91	TISG Section 8.11, page 65	■ Survey protocols should optimize detectability and survey effort should provide for comprehensive coverage at the appropriate time of year (e.g., survey breeding habitat during breeding season, stopover habitat during migration);	■ Seasonal-specific survey protocols are described in **Section 7.2** and will be provided in the IS / EA Report.	■ Section 7.2
92	TISG Section 8.11, page 65	■ The project study area and local study area, as defined above for each valued component, constitutes the appropriate scale.	■ The Study Areas are defined and described in the Study Plan.	■ Table 6-1
93	TISG Section 8.11, page 65	■ Where using recognized standards, provide details of any modifications to the recommended methods and rationale for these modifications and indicate who was consulted in the development of the baseline surveys (e.g., federal/provincial wildlife experts, specialists and local Indigenous groups).	■ The information requested will be provided in the IS / EA Report.	■ Section 7.2
94	TISG Section 13, pages 80-83	■ This section of the TISG describes the methodology for the effects assessment, including definitions of scope, severity, and irreversibility.	■ The IS / EA Report will include a description of the methodology of the effects assessment including definitions as required.	■ Section 9
95	TISG Section 14.1, page 86	■ The IA must describe the locations and characteristics of the most sensitive receptors including species at risk and differential effects for sensitive receptors.	■ Data will be gathered as outlined in the Acoustic Environment Study Plan. Locations and characteristics of sensitive receptors as they pertain to Bird SAR are described in the Study Plan and will be addressed in the IS / EA Report.	■ Section 7.2 ■ Acoustic Environment VC Study Plan
96	TISG Section 14.3, Page 88	■ The Impact Statement must provide an overall description of changes related to landscape disturbance including fragmentation of habitats and project effects on areas of ground instability;	■ The direct, incidental, and cumulative predicted positive and / or adverse effects of the Project on the Birds VCs will be predicted based on anticipated changes to habitat availability, fragmentation, ground instability, and species abundance, as well as individual effects, to be provided in the IS / EA Report.	■ Section 9
97	TISG Section 14.3, page 89	■ Describe the methodology used to identify effects;	■ Methodology related to effects assessment has been provided in the Study Plan.	■ Section 9
98	TISG Section 15.2, page 92	■ Consult A Framework for the Scientific Assessment of Potential Project Impacts on Birds Appendix 2 and 3 for overview of potential impacts to birds from road projects; · analyze predicted effects for all birds, each valued component, and for Bird Conservation Region Priority Species and include relevant effects from Appendix 2 and 3. Include separate analyses for each project activity, component, and phase. Incorporate sources of error for all analyses to ensure final impacts estimates show the best available estimate of precision; · non-linear, indirect and synergistic responses to the project should be explicitly explored where reasonable; · any assumption of displacement should be justified with scientific references and surveys should provide evidence that there is available habitat to accommodate displacement under a range of population scenarios. For example, it should be clear that a growing population will not be limited by the habitat loss along the project study area	■ A Framework for the Scientific Assessment of Potential Project Impacts on Birds will be consulted to assist in analyzing predicted effects for all birds including non-linear, indirect, and synergistic responses where possible and applicable. Any assumptions of displacement will be justified with scientific references and BMPs.	■ Section 9.4.2
99	TISG Section 15.2, page 92	■ The Impact Statement must describe direct, incidental and cumulative predicted positive and/or adverse effects to migratory birds and non-migratory birds, including population level effects that could be caused by all project activities, including but not limited to: – site preparation/vegetation removal; – air emissions and dust; – deposit of harmful substances in waters that are frequented by migratory birds; – changes to the aquatic flow regime and sediment load; – sensory disturbance; – increased predation opportunities; – disruption of wildlife movement corridors; – increased poaching opportunities; and – site reclamation.	■ The direct, incidental, and cumulative predicted positive and/or adverse effects of the project on the Birds VC will be predicted based on anticipated changes to habitat availability, fragmentation, and species abundance, as well as individual effects, to be provided in the IS / EA Report.	■ Section 9

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100	TISG Section 15.2, page 93	■ The Impact Statement must describe the potential direct, incidental and cumulative adverse effects of the Project on migratory bird species (such as SARA-listed Yellow-Rail) who inhabit the project area during breeding season as well as during migration (as staging and stopover sites);	■ Effects to birds will consider potential direct, incidental, and cumulative adverse effects of the Project on SAR and, where applicable, its critical habitat.	■ Section 9
101	TISG Section 15.2, page 93	■ Consult the maps, data, and models developed through the Boreal Avian Modelling Project, and describe how these materials have been incorporated where relevant.	■ Maps, data, and models developed through the Boreal Avian Modelling Project will be consulted, where possible.	■ Section 9.4.1
102	TISG Section 15.2, page 93	■ The Impact Statement must describe the effects caused by the new habitat types created in the project area by clearing vegetation. The new habitats created may attract migratory birds, which were not present before (such as the Eastern Whip-poor-will or the Common Nighthawk). Describe how these species at risk may be impacted by the project.	■ The expressions of change to newly created habitat through the activities of the project will be described in the IS / EA Report.	■ Section 9.4.2
103	TISG Section 15.2, page 93	■ describe short term and long term changes to habitats and food sources of migratory and non-migratory birds (types of cover, ecological unit of the area in terms of quality, quantity, distribution and functions), with a distinction made between these two birds categories, including losses, structural changes and fragmentation of riparian habitat (aquatic grass beds, intertidal marshes), terrestrial environments (e.g., uplands, grasslands, forested, old growth, post fire) and wetlands frequented by birds. Describe changes in terms of the health, integrity, and availability of habitats. Important habitats to consider include eskers, (and similar upland features), forest, riparian, bog/fen/peatlands, other wetlands, and open water;	■ Long- and short-term habitat changes and food sources of birds will be described and documented in the IS / EA Report, including changes in terms of the health, integrity, and availability of habitats related to migratory and non-migratory birds.	■ Section 9.4.2
104	TISG Section 15.2, page 93	■ The Impact Statement must account for changes in detection pre- and post-project construction. For instance, roads allow for greater detection distances and therefore any estimates of abundance or presence need to account for differential detectability;	■ Changes in detectability will be accounted for in the IA / EA.	■ No Reference
105	TISG Section 15.2, page 93	■ The Impact Statement must describe the change in mortality risk, including as a result of collision of migratory birds with any project infrastructure, vessels and vehicles;	■ These were outlined as Indicators and Expressions of Change in the updated Study Plan. Additional information will be provided in the IS / EA Report.	■ Section 9.2
106	TISG Section 15.2, page 93	■ The Impact Statement must describe the changes to the bird-habitat relationships; the change in biodiversity, abundance, and density of the avian community that utilise the various habitat types or ecosystems;	■ Biodiversity metrics for the Birds VC will consider: – Distribution in space; – Frequency of occurrence; – Patterns of occurrence and abundance in time; – Abundance and, if possible, density; and – Associate habitat types and strength of associations	■ Section 9.4.2
107	TISG Section 15.2, page 93	■ The Impact Statement must ensure surveys cover temporal window that incorporates a variety of road usage by both diurnal and nocturnal species	■ Surveys are proposed to incorporate both diurnal and nocturnal species usage.	■ Section 7.2
108	TISG Section 15.2, page 94	■ The Impact Statement must account for indirect effects such as the increased movement of predators in the predictions of mortality effects;	■ This was outlined as an Indirect Effect in the updated Study Plan. Additional information will be provided in the IS / EA Report.	■ Section 9.3
109	TISG Section 15.2, page 94	■ The Impact Statement must describe the incidental effects caused by increased disturbance (e.g., sound, artificial light, presence of workers), relative abundance movements, considering the critical periods for the birds, including but not limited to breeding, migration and overwintering.	■ These were outlined as Indicators and Expressions of Change in the updated Study Plan. Additional information will be provided in the IS / EA Report.	■ Section 9.2
110	TISG Section 15.2, page 94	■ The Impact Statement must support any assumption of temporary displacement during construction and operation of the Project through evidence or through study and monitoring within the project study area.	■ Monitoring programs studying temporary displacement effect will be identified as part of the IS / EA Report, if applicable. Environmental monitoring, if required by regulatory approvals, will verify the potential environmental effects predicted in the IS / EA Report, evaluate the effectiveness of mitigation and enhancement measures, and identify the process the Proponent will follow if mitigation and enhancement measures are not effective. ■ Additional information will be provided in the IS / EA Report.	■ Section 9.5
111	TISG Section 15.4, page 100	– provide an account of how the project and mitigation measures are consistent with the recovery strategy, action plan, or management plan for the species.	■ Mitigation measures will be informed by best management practices, applicable resource management and / or recovery plan, Indigenous input, and industry standards.	■ Section 9.4.2

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
112	TISG Section 15.4, page 95	■ The Impact Statement must: – describe the potential direct, incidental and cumulative adverse effects of the project on species at risk listed under Schedule 1 of the Species at Risk Act and, where applicable, its critical habitat (including its extent, availability and presence of biophysical attributes); – analyses predicted effects for each species at risk. To fully understand the effects and/or benefits of one alternative versus another, all relevant metrics and evaluators for species at risk should be considered; – include separate analyses for each project activity, component, and phase; – consider potential effects to species at risk from bioaccumulation and biomagnification of contaminants of dust and other pollutants resulting from the project; and conduct post-construction surveys to verify predicted effects. – conduct post-construction surveys to verify predicted effects.	■ Effects to SAR will consider potential direct, incidental, and cumulative adverse effects of the Project on SAR and, where applicable, its critical habitatPredicted effects for each SAR will be analyzed and addressed in the IA / EA.Each project activity, component, and phase will be analyzed separately in the IA / EA. A thorough list of impact management measures including offsetting and compensation as necessary that will be employed by the Project will be included in the IS / EA Report.	■ Section 8.1 ■ Section 9.4.2 ■ Table 9-1
113	TISG Section 15.4, Page 95	– analyses predicted effects for each species at risk. To fully understand the effects and/or benefits of one alternative versus another, all relevant metrics and evaluators for species at risk should be considered;	■ Predicted effects for each SAR will be analyzed and addressed in the IA / EA.	■ Section 9.4.2
114	TISG Section 15.4, Page 95	– include separate analyses for each project activity, component, and phase;	■ Each project activity, component, and phase will be analyzed separately in the IA / EA.	■ Section 9.1
115	TISG Section 15.4, Page 95	– consider potential effects to species at risk from bioaccumulation and biomagnification of contaminants of dust and other pollutants resulting from the project; and conduct post-construction surveys to verify predicted effects.	■ All potential effects to SAR including from pollutants will be discussed, and follow-up programs such as post-construction monitoring will be included in the IA / EA.	■ Section 9.3 ■ Section 9.4.2
116	TISG Section 15.4, page 99	– demonstrate that avoidance and minimization measures will be applied for species at risk. Recovery Strategies will provide information such as Population and Distribution Objectives, and Strategic Direction for Recovery;	■ Mitigation measures will be informed by best management practices, applicable resource management and / or recovery plan, Indigenous input, and industry standards.	■ Section 8.1 ■ Section 9.4.2
117	TISG Section 15.4, page 99	– clearly identify the locations of federal lands/non-federal lands within the study area and differentiate between these land tenures in the presentation of information regarding all species at risk. For example, total habitat disturbance for boreal caribou should be presented at the range scale, but it should also be presented in a way that clearly indicates habitat disturbance specifically within federal lands;	■ The information requested will be provided in the IS / EA Report.	■ Section 9.4.2
118	TISG Section 15.4, page 99	– clearings created for the Project may create new habitat types thereby attracting Species at Risk which were not present before (such as the Eastern Whip-poor-will or the Common Nighthawk). Describe how new habitat types will impact species at risk in the project area	■ The IA / EA will consider the resilience of Bird VCs and associated habitat to the effects of the Project including the predicted impact of new habitat types such as clearings on SAR i.e., Eastern Whip-poor-will and Common Nighthawk.	■ Section 9.4.2
119	TISG Section 15.4, page 99	– describe all feasible measures that will be taken to avoid or lessen the impact of the Project on the species and its critical habitat;	■ Mitigation measures will be informed by best management practices, applicable resource management and/or recovery plan, Indigenous input, and industry standards.	■ Section 9.5 ■ Section 9.4.2
120	TISG Section 15.4, page 99	– describe all reasonable alternatives to the Project that would avoid the potential effects on species and their habitat, with particular attention to critical habitat, and important habitats such as upland habitat which is used as movement corridors by caribou, breeding areas for birds, and which contains roosting habitat for bats;	■ Reasonable alternatives to the Project will be described to avoid potential effects on SAR and their habitat, and will be included in the IS / EA Report.	■ Section 9.4.2
121	TISG Section 15.4, page 99	– Describe the area, biophysical attributes and location of habitat including critical habitat affected (e.g., destroyed, permanently altered, disrupted); describe all feasible measures that would be taken to eliminate the effects of the work or activity on species and their habitats, including critical habitat; and	■ The IA / EA will describe the biophysical attributes and locations of habitat, as well as all feasible measures to eliminate, avoid or minimize the effects of the Project on SAR and their habitats, including critical habitats.	■ Section 9.4.2
122	TISG Section 15.4, page 99	– describe the effects of construction pits and quarries on or near esker deposits on species at risk;	■ The effects of construction pits and quarries on or near esker deposits on SAR will be discussed in the IS / EA Report.	■ Section 9.4.2
123	TISG Section 15.4, page 99	– describe the potential adverse effects of the Project on species protected by provincial statutes and assessed by the COSEWIC as extirpated, endangered, threatened or of special concern (flora and fauna) and their habitat that are not currently listed under the Species at Risk Act;	■ Potential effects on species protected by provincial statutes and assessed by COSEWIC will be described along with those listed under SARA in the IS / EA Report	■ Table 2-1 ■ Section 9.4.2
124	TISG Section 15.4, page 99	– identify critical timing windows (e.g., denning, rutting, spawning, calving, breeding, roosting), setback distances, or other restrictions related to these species;	■ Critical timing windows (e.g., breeding), setback distances, or other restrictions that will be imposed or followed will be considered in assessing predicted effects.	■ Section 9.4.2

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
125	TISG Section 15.4, page 99	– identify provincial, territorial or federal permits or authorizations that may be required in relation to the species at risk;	■ Provincial or federal permits or authorizations in relation to SAR that may be required will be identified in the IS / EA Report.	■ Section 9.4.2
126	TISG Section 15.4, page 99	– provide survey results and detailed mapping of each species at risk and their habitat, including important habitat features, for all federal lands;	■ The information requested will be provided in the IS / EA Report.	■ Section 8 ■ Section 9.4.2
127	TISG Section 15.4, page 99	– describe the residual effects that are likely to result from the project after avoidance and minimization measures have been applied, including the extent, duration and magnitude of the effects on: • the number of individuals killed, harmed, harassed; and • the number of residences damaged or destroyed.	■ Residual effects will be described in terms of the magnitude, geographic extent, timing, duration, frequency, social and ecological context, likelihood, and whether effects are reversible or irreversible. They will be described by – the number of individuals killed, harmed, harassed, and – the number of residences damaged or destroyed; and – the area, biophysical attributes and location of habitat including critical habitat affected.	■ Section 9.4.2 ■ Section 9.6
128	TISG Section 17.6, Page 110	■ The Impact Statement must assess potential impacts to surrounding communities, including local Indigenous communities. The spatial and temporal boundaries for the assessment should be determined with the input from the community based on pre-contact in consideration of aspects that are relevant to the community's understanding of their culture. The Impact Statement must assess changes to: – culturally significant plants or wildlife.	■ This information will be collected as described in the Land and Resource Use Study Plan. ■ The historic and current use of ungulates as a source of country foods (traditional foods) and where use has Indigenous cultural importance will be described.	■ Section 9.5 ■ Land and Resource Use Study Plan
129	TISG Section 20, page 119-128	■ Section 20 of the TISG describes the requirements around mitigation and enhancement measures that must be considered in the Impact Statement.	■ Mitigation measures will be informed by best management practices, applicable resource management and/or recovery plan, Indigenous input, and industry standards.	■ Section 9.5
130	TISG Section 20, Page 119	■ In relation to birds, mitigation measures should be developed in collaboration with federal authorities and included in the Impact Statement. In addition, the following mitigation measures should be considered by the proponent: – to avoid harm to migratory birds, clearing and construction should be conducted outside of the core breeding period. Follow ECCC guidance for avoiding harm; • refer to ECCC guidance for nesting periods70; ■ It should be noted that these dates cover the core period for nesting activity of migratory birds, reducing the risk of taking a nest or eggs of a migratory bird. This recommendation does not authorize the disturbance, destruction, or take of a migratory bird, its nest, or its eggs outside of these date ranges.	■ Mitigation measures will be informed by best management practices, applicable resource management and/or recovery plan, Indigenous input, and industry standards.	■ Section 9.5
131	TISG Section 20, Page 123	■ in relation to Birds mitigation measures should be developed in collaboration with federal authorities and included in the Impact Statement. In addition, the following mitigation measures should be considered by the proponent: – specifically address mitigation of effects to eskers and related features rich in aggregate material, as these features are likely to be strongly impacted, to a degree much higher than their prevalence on the landscape. Describe, at a landscape scale rather than a single assessment of multiple hectares, how these measures address this uncommon high value landcover for forest birds during migration and breeding; – and at a minimum, the following mitigation should be applied:	■ Mitigation measures will be informed by best management practices, applicable resource management and/or recovery plan, Indigenous input, and industry standards.	■ Section 9.5
132	TISG Section 21, pages 129-130	■ Section 21 of the TISG describes the requirements and guidance associated with determining residual effects.	■ Residual effects will be assessed in the IA / EA.	■ Section 9.6
133	TISG Section 22, pages 131-133	■ Section 22 of the TISG describes the guidance around conducting cumulative effects assessment for the project.	■ Cumulative effects assessment will be conducted as part of the IA / EA.	■ Section 9
134	TISG Section 26, Page 141	■ Section 26 of the TISG includes a description of the considerations for developing a follow-up program for environmental, health, social or economic effects, as applicable.	■ Monitoring programs will be identified as part of the IA / EA.	■ Section 9.10

Table 11-2: Study Plan Provincial Concordance – Conformance with Requirements

ID#	Comment from Regulatory Agency	Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response	Study Plan Reference
1	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ For each potential impact to species at risk or their habitat, measures will have to be identified to first avoid any adverse effects and in cases where there are no practical or feasible alternatives, identify measures that minimize or mitigate the adverse effects. Such measures may be general, site-specific, or activity-specific in nature. For caribou, the province has developed Best Management Practices (BMPs) for some sectors to provide guidance to avoid, minimize or mitigate adverse effects to the species and their habitat. Where possible, it is always preferential to avoid, given that if any adverse impacts exist, the associated activities would require authorization under the ESA.	■ The IS / EA Report will identify suitable impact management measures to avoid, eliminate or minimize potential effects of the Project, including potential effects SAR.	■ Section 9
2	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ In addition to land use policy, any resource management direction for the study area including forest management plans and fisheries management plans/objectives should be reviewed and considered	■ Applicable resource management plans will be reviewed and considered in the IA / EA.	■ Appendix A
3	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ Refer to the MNRF's "Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (a.k.a. the Stand and Site Guide) for stand and site level direction that could be applied during planning and construction activities.	■ Mitigation measures will be informed by best management practices, applicable resource management and/or recovery plan, Indigenous input, and industry standards.	■ Draft ToR ■ Appendix A ■ Section 9
4	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ The proposed all-season road will enable access to areas that previously have been essentially inaccessible to mechanized travel except during the winter. The creation of new access can result in impacts on fish and wildlife populations (e.g., due to new or increased hunting pressure), "remoteness" and remote or "wilderness" recreation / tourism experiences, among other effects. The MNRF will consider the effects of creating new access when making decisions to issue authorizations under legislation administered by MNRF.	■ Effects to wildlife and fish populations from the creation of new access and recreational opportunities will be considered in the IA / EA. Additional information can be found in the Land and Resource Use Study Plan.	■ Section 9 ■ Land and Resource Use Study Plan
5	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ Project documentation will need to consider the direction within the Ogoki FMP regarding forestry activities, wildlife objectives and access, and address how the proposed project may impact those activities and objectives. There is also the need to consider the impacts to Kenogami Forest with respect to existing roads and the associated use management and responsibility.	■ Mitigation measures will be informed by best management practices, applicable resource management and / or recovery plan, Indigenous input, and industry standards.	■ Draft ToR ■ Appendix A ■ Section 9
6	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ There are likely a number of species that are considered provincially rare which occur within and adjacent to the proposed road corridor. The MNRF encourages using the best conservation measures available to protect these species.	■ Mitigation measures will be informed by best management practices, applicable resource management and / or recovery plan, Indigenous input, and industry standards.	■ Section 9
7	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ The project proposal and other documentation will need to identify these natural heritage features and fully consider potential impacts to and mitigation for the respective features.	■ Mitigation measures will be informed by best management practices, applicable resource management and / or recovery plan, Indigenous input, and industry standards.	■ Draft ToR
8	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ In the identification of alternative methods, the Environmental Assessment should document consideration of methods including an assessment of potential impacts to species at risk and their respective habitats and identify methods that can avoid or minimize potential impacts to individuals of the species and all categories or protected habitat to the extent possible.	■ The information requested will be provided in the IS / EA Report, if applicable.	■ Draft ToR
9	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ Study areas are missing and lack clarity – maps show study area for 4 routes even though only 2 (or 1?) routes are proposed to be assessed; no indication of local and regional study areas for each environmental component (e.g., groundwater, surface water, caribou, etc.).	■ The Study Areas are defined and described in the Study Plan.	■ Section 6
10	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ MECP recommends that the EA contain commitments to monitoring to verify the expected effects of the proposed undertaking on species at risk and their habitat and to determine if additional impact mitigation measures or adjustments to any measures are required. Monitoring methodology for these species and their habitat should be included in the monitoring plan developed as part of the EA. If impact management measures are proposed, monitoring of the effectiveness of these measures should be included in the monitoring plan. The monitoring plan should include steps the proponent will take if impact management measures are not effective (e.g., application of additional impact management measures, changing how and where the activity will be performed, etc.).	■ The IS / EA Report will include a monitoring framework for the Preferred Route to verify the prediction of effects and the effectiveness of the impact management measures implemented, including those related to SAR and their habitat. These plan(s) will identify the compliance and effects monitoring activities to be undertaken during all phases of the Project, as required.	■ Section 9

ID#	Comment from Regulatory Agency	Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response	Study Plan Reference
11	MECP	■ Email from Agni Papageorgiou & Sasha McLeod, Special Project Officer Environmental Assessment Services Section, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **#17 Section 8 Page 54** – Consultation on Assessment Methodology - MFFN acknowledges that the proposed methodology will be open to input during the draft ToR review, but also says a more detailed method will be presented in the EA. Page 47 indicates the effects assessment criteria will be developed during the EA. While it is appropriate to defer some detailed work planning to the EA phase, the ToR should include commitments for how technical reviewers, and other interested persons, will be consulted during the development of specific evaluation methodologies or technical work plans. It is strongly recommended that those opportunities for review occur prior to the completion of studies (e.g., prior to the submission of a draft or final EA document).It is not clear whether MFFN plans to consult on the more detailed methodology and criteria during the EA phase or if the ToR phase is the main opportunity to provide input. – Please indicate how consultation on the ToR has informed the preliminary criteria and indicators. Please clarify when MFFN will consult and provide opportunity for input on the detailed assessment method, including criteria and indicators (and work plans as MECP has proposed), with agencies, communities and stakeholders during the EA phase in order to finalize the methodologies before EA studies get advanced.	■ A summary of the consultation plan for Indigenous communities, government agencies, and interested persons has been provided in **Section 4** of the Study Plan; further details can be found in the IS / EA Consultation Plan included as Appendix B of the Proposed ToR. Specific consultation and engagement activities and schedules are currently in development and will be shared with the MECP and the Agency once available. ■ A summary of technical discussions with agencies can be found in the Study Plan.	■ Section 4 ■ Section 5
12	MECP	■ Email from Agni Papageorgiou & Sasha McLeod, Special Project Officer Environmental Assessment Services Section, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **#21 Section 10.2.4 Page 73 Technical Work Plans** – Page 73 states that MECP has indicated it will not be commenting on work plans associated with field work until the ToR is finalized. This statement does not reflect MECP's guidance to the project team. MECP's guidance, which is documented on page 69 of the RoC, is that the ToR is the mechanism to seek technical review of work plans and that discipline- specific work plans should be included with the ToR. As well, discussions that MECP has had with the project team to date are considered pre-consultation, since it is the ToR that sets out what work is to be done during the EA phase.Please revise the statement on page 73 to state: "MFFN provided MECP and MNRF work plans associated with field work planned during 2019 for review, however MECP advised this is considered-consultation and that discipline-specific work plans should be appended to the ToR to allow full technical review. "As the draft ToR did not include detailed discipline-specific work plans, the other option the ministry strongly recommends is to include commitments to develop work plans at the outset of the EA phase, including opportunities for technical review.	■ The Study Plan meets this requirement. A summary of the Technical discussions with agencies have been summarized in Section 3 of the Study Plan.	■ Section 3
13	MECP	■ Email from Agni Papageorgiou & Sasha McLeod, Special Project Officer Environmental, MECP Assessment Services Section, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **Assessment Methods** – For the most part, section 7.2 provides a description of potential environmental effects for each discipline. However this section also includes assessment methodologies for some subsections (7.2.1 and 7.2.2 AERMOD modelling, quantitative noise assessment) while the majority do not (7.2.3 – 12). The level of detail in the ToR about assessment methods should be consistent for all environmental components. – It is strongly recommended to include commitments to develop work plans at the outset of the EA phase, including opportunities for technical review by agencies and others. The work plans should include assessment methodology appropriate for each environmental component. The ToR could include a high level summary table for each environmental discipline listing data collection and assessment methods, with a commitment to develop the work plans at the outset of the EA phase to provide more details. Consider where the information about air and noise modelling is best placed.	■ The Study Plan meets this requirement. A summary of the Technical discussions with agencies have been summarized in Section 3 of the Study Plan.	■ Section 3
14	MECP	■ Email from Agni Papageorgiou & Sasha McLeod, Special Project Officer Environmental, MECP Assessment Services Section, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **#16 Section 8 Page 54** – Work Plans - Section 8 describes the approach that will be taken to evaluate alternative methods during the EA, including proposed criteria and indicators (presented in Appendix A). The information presented is high level and does not provide an opportunity for technical review of the methodologies that will be applied to evaluate those specific criteria and indicators. – It is strongly recommended to include commitments to develop work plans at the outset of the EA phase, including opportunities for technical review by agencies and others.	■ The Study Plan meets this requirement. A summary of the Technical discussions with agencies have been summarized in **Section 3** of the Study Plan.	■ Section 3

ID#	Comment from Regulatory Agency	Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response	Study Plan Reference
15	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ Recommendation to prevent delays should ESA authorization be required. It is strongly recommended that the project be planned, and the environmental assessment prepared, with the requirements of the Endangered Species Act, 2007 (ESA) in mind. This can potentially facilitate the authorization process under the ESA, where authorization is required. In order to inform any future ESA authorization requirements, reasonable route / project alternatives should be assessed for impacts to all species at risk and their respective habitats, and at least one avoidance alternative should be included. Please refer to the MECP "Avoidance Alternatives Form" for activities that may require an overall benefit permit under clause 17(2)(c) of the Endangered Species Act" and accompanying guide forreference. (http: / /www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryResults?Openform&SRT=T&MAX=5&ENV=WWE&STR=1&TAB=PROFILE&MIN=018&BRN=21&PRG=31)	■ The requirements of the ESA process were considered in the development of this Study Plan.	■ Section 7 ■ Section 9
16	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **s.7.1.4.9 / pg. 32** – Based on the information provided in this section, it is unclear what data collection has already been conducted versus what data collection will be conducted during the development of the EA for SAR. For example, it is unclear whether the information provided on page 32 for the Bat maternity Roost Monitoring and Bird Surveys have already occurred or are being planned. If they have already occurred, additional information on the methodology, survey extent, dates, etc. is required. Further, there is no mention of the 2018 Winter aerial caribou survey conducted by Zoetica, as mentioned in the Response to MFFN – Request for Information dated 2019-07-30, or any of the field work proposed in the Technical Memorandum provide to MECP on June 6, 2019 which outlined the planned breeding bird point count surveys, marsh bird call back surveys, bank swallow and barn swallow visual habitat assessments, Eastern Whip-poor-will surveys, Bat Maternity Roost Monitoring Surveys, Remote Camera Surveys, Vegetation Surveys, and Aerial Reconnaissance Survey. All previous field work related to SAR should be identified and summarized in the Draft ToR. This will assist in determining whether additional SAR surveys are required (i.e., to identify occupancy, distribution, etc.) Specifically for Caribou, Winter Aerial Surveys, Summer Calving Survey, Telemetry Studies and (to a more limited extent) Camera Trap Surveys each provide valuable information that can provide inform on baseline conditions and impacts. Refuge from predation is the ultimate factor influencing caribou distribution and habitat use in the Boreal forest. One of the key threats to caribou is habitat fragmentation due to development activities, particularly those that increase and / or introduce linear features to the landscape. These types of disturbances increase predator efficiency which may have a detrimental effect on caribou populations within the LSA and RSA. Understanding how caribou respond to habitat fragmentation and increased predator access will be an important aspect to assessing the impacts of the Project. Particularly, the deployment of radio satellite collars on caribou within proximity of the alternative corridors under consideration (e.g., LSA), that would enable tracking of caribou before / during / after construction, provides important baseline information and contributes towards assessing impacts of the Project on caribou habitat movement and habitat selection / use within proximity to new linear features. Update the draft ToR to clearly identify any data collection (i.e., surveys) for SAR that have already been conducted. In each case, provide survey methodology, dates, etc. Update the draft ToR to clearly identify any data collection that will be conducted for SAR during the development of the EA (i.e., data collection and monitoring work plan). Include a brief description of the data collection methodology that will be used. This should include details for surveys and methods MFFN is committing to carry out during the EA, including, but not limited to, the following: • Caribou (e.g., aerial / ground surveys, telemetry study, camera traps, etc.) • Wolverine (e.g., telemetry study, hair traps, camera traps, etc.) • Northern Myotis and Little Brown Myotis (e.g., bat hibernaculum screening, bat maternity roost habitat assessments, bat acoustic surveys, etc.) • Bank Swallow (e.g., nesting surveys, etc.) • Barn Swallow (e.g., nesting surveys, etc.) • Eastern Whip-poor-will (e.g., habitat assessments, breeding surveys, etc.)	■ Information about field studies conducted to date, as part of this program are summarized in the Study Plan.	■ Section 7

ID#	Comment from Regulatory Agency	Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response	Study Plan Reference
17	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ Additional information should be provided, in table format, for each SAR that have the potential to occur in the area of the Project, including, but not limited to: – Scientific name- Common name- Species Status under SARA (Federal)- Species Status under ESA (Provincial) – Conservation Ranking (i.e., N-Rank, S- Rank)- Information Source(s) used to identify potential occurrence within the area of the Project – Indication of whether a field survey(s) has been conducted already to identify species presence and, if so, whether or not it was observed – General list of habitat requirements – Indication of whether the required habitat exists within the Study Area (i.e., as per comment 5, should include Project Footprint, Local Study Area and Regional Study Area) Update the draft ToR to include additional information for each SAR that have the potential to occur in the area of the Project.	■ The information requested will be provided in the IS / EA Report.	■ No reference
18	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **s.7.1.4.7 pg 30 File surveys conducted in Spring"** – will the results from this be included in the ToR or in the EA? A Work plan should be committed to in the ToR for field work to be completed and where necessary should be designed to target specific Species at Risk. MECP would like to advise on survey methodology. This will make sure that the proponent does not apply efforts that are not required or likewise they will not miss aspects that will require repeated effort.	■ This Study Plan has been designed to target SAR and will be provided to the MECP for their review.	■ Section 7
19	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **s.7.1.4.9 / pg. 32** – Submit the acoustic monitoring design and data collected for review and further advice.	■ The information requested will be provided in the IS / EA Report.	■ Section 8.2
20	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **s.5.2.2 / pg. 13** – If ESA authorization is required, project details including location and extent of infrastructure (e.g., road, temporary access roads, laydown areas, etc.) will need to be identified prior to permitting to ensure complete assessment of impacts to SAR.	■ Study Plan **Section 6.2** indicates that the Project Development Area (PDA) encompasses the 100 m wide CAR right-of-way (ROW), temporary construction access roads, work areas, worker camps, and long-term aggregate sources and associated access roads. The specific location of Project components, including the roadway, quarries, borrow areas, aggregate source areas and temporary infrastructure, are not yet known and will be included in the IS / EA Report.	■ Section 6.2
21	MECP	■ Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist – Species at Risk Branch – Permissions & Compliance, Email from the Ministry of the Environment, Conservation and Parks with comments of the Draft ToR, received on 24-Jan-2020	■ **#7 s.7.1.1 / pg. 19** – The draft ToR limits the Study Area to only a 5 km width (2.5 km on either side of the ROW). This limited extent is inappropriate to assess the impacts to SAR that use broad landscapes, specifically Caribou (Boreal population) and Wolverine.Multiple spatial extents need to be considered as part of the Study Area (e.g., Project Footprint, Local Study Area, Regional Study Area) to appropriately consider and assess impacts of the Project to SAR.Update section 7.1.1 and Figure 6-1 in ToR to identify the Study Area at multiple spatial scales, including Project Footprint, Local Study Area and Regional Study Area. Update information provided in section 7 of ToR to reflect the updated Study Area in the Existing Environment and Potential Environmental Effects.	■ The Study Areas are defined and described in the Study Plan.	■ Section 6.2

ID#	Comment from Regulatory Agency	Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response	Study Plan Reference
22	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **#10 s.7.1.4.9 / pg. 31** – The Bank Swallow is not included in the list of Wildlife species that have the potential to occur in the area of the Project. We do note that it is identified under Bird Surveys on page 32. As a Threatened species, they receive both species and habitat protection under the ESA. There is potential for them to occur in the area of the Project, specifically along steep, sandy portions of the banks on the Albany or Ogoki Rivers. This species should be included in the list on page 31 of the draft ToR and the impacts of the Project should be assessed for this species. Update the draft ToR to include Bank Swallow in the list of Wildlife species in which the impacts of the Project will be assessed.	■ The Study Plan has been updated to indicate that the conclusion of no potential Barn Swallow or Bank Swallow habitat present in the LSA was based on desktop review and aerial / ground surveys. Additional results of previous surveys will be provided at a later date.	■ Table 2-1 ■ Table 7-1
23	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **#18 Table 7-4 / s. 7.2 / pg. 47 and s.7.2.9 / pg. 52** – Preliminary consideration of potential effects to SAR needs to be included, above and beyond those applicable to vegetation (s.7.2.6), wildlife (s.7.27) and fish and fish habitat (s.7.2.8). – Both Table 7-4 and s.7.2.9 are lacking any information specific to SAR (e.g., increased mortality risk to caribou resulting from predator efficiencies related to additional linear features, increase in predator/prey populations, etc.). – This should include a preliminary list of potential effects, in a table format, including, but not limited to, the following: • Project Component or Activity ○ Field surveys, staking, layout ○ Vegetation clearing and grubbing ○ Construction of supportive infrastructure (e.g., storage and laydown yards, temporary access roads, construction camps, aggregate extraction areas) ○ Construction of the road ○ Aggregate extraction and production ○ Emissions, discharge and waste ○ Operations and maintenance • Potential Effects • Mitigation Measures – Update the draft ToR to include additional information for preliminary potential effects of the Project components specific to SAR.	■ Impacts on SAR by individual project activities will be described in detail in the IS / EA Report.	■ Section 9.4.2
24	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ The Draft ToR indicates that MFFN provided MECP and MNRF work plans associated with field work planned during 2019 for review, but that the agencies indicated they will not be commenting on work plans until the ToR is finalized.As per comment ID#174, MECP SARB is seeking a data collection and monitoring work plan to be included in the ToR outlining the data collection methodology that will be conducted for SAR during the development of the EA to inform baseline and environmental effects to SAR. Update the draft ToR to clearly identify any data collection that will be conducted for SAR during the development of the EA (i.e., data collection and monitoring work plan). Include a brief description of the data collection methodology that will be used. This should include details for surveys and methods MFFN is committing to carry out during the EA, including, but not limited to, the following: – Caribou (e.g., aerial / ground surveys, telemetry study, camera traps, etc.) – Wolverine (e.g., telemetry study, hair traps, camera traps, etc.) – Northern Myotis and Little Brown Myotis (e.g., bat hibernaculum screening, bat maternity roost habitat assessments, bat acoustic surveys, etc.) – Bank Swallow (e.g., nesting surveys, etc.) – Barn Swallow (e.g., nesting surveys, etc.) – Eastern Whip-poor-will (e.g., habitat assessments, breeding surveys, etc.)	■ The updated Study Plan will be reviewed by relevant federal and provincial agencies.	■ No reference

ID#	Comment from Regulatory Agency	Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response	Study Plan Reference
25	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **#22 Appendix A – Ungulates – Wildlife – Potential Data Sources / pg. 2** – Additional published sources of information should be included for all SAR: • Policy Guidance on Harm and Harass under the Endangered Species Act (2014) • Categorizing and Protecting Habitat under the Endangered Species Act (2012) • Endangered Species Act Submission Standards for Activity Review and 17(2)(c) Overall Benefit Permits (2012) • Wolverine Government Response Statement (2016) • Wolverine Recovery Strategy (2013) • Little Brown Myotis, Northern Myotis and Tri-colored Bat in Ontario – Ontario Recovery Strategy Series (2019) – Update the draft ToR to include additional data sources.	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Appendix A
26	MECP	■ Email from Nikki Boucher, A/Species at Risk Specialist, Permissions and Compliance, Species at Risk Branch, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ We have carried out our review with a view to both the EA and future regulatory authorizations in order to provide you with information that will help enable an efficient approach to project planning and preparation of applications for any necessary Endangered Species Act (ESA) authorizations. Specifically, attention should be paid to the following requirements that form the basis of many of our ESA authorizations:· Minimize adverse effects – you must take reasonable steps to minimize the adverse effects of your activity on the species at risk and their habitat that are likely to be affected by your activity.o Ways to minimize adverse effects of your activity on species at risk & their habitat may include modifying the:* location of the activity* geographic scale of the potential effects* activity design (e.g., engineering and technological)§ timing of the activity* duration and frequency of the effects* approaches and timing for any site restoration or rehabilitation (such as doing progressive rehabilitation while other parts of the activity are still happening)* general operational protocols· Consider reasonable alternatives – you will need to show the Ministry of the Environment, Conservation and Parks that you have considered reasonable alternatives to your activity.o Alternative approaches to your activity include:* Changing the location of the activity* Using alternative methods, equipment or technical designs* Changing the timing of the activity to avoid times when the species is there or is most sensitive to disturbance* Changing the geographic scale, duration and/or frequency of the potential adverse effects* Adding or changing approaches and timing of site restoration or rehabilitation after the activity is doneo When considering reasonable alternatives to your activity, you must:* Consider at least one alternative that would completely avoid any adverse effects on species at risk* Identify alternatives that you considered but did not think were reasonable because of biological, technical, social or economic limitations§ Explain why the approach you have chosen is the best alternativeIn addition, should an Overall Benefit Permit be required for the project, as determined through MECP's review and assessment of all the project details, the following requirement would also need to be considered:· Achieve overall benefit – providing an overall benefit to a species means undertaking actions that contribute to improving the circumstances for the species. It must include more than steps to minimize adverse effects on the species or habitats.o Achieving an overall benefit to a species may involve providing the species with a range of benefits, such as:* increasing the number of individuals of the species living in the wild and capable of reproducing§ increasing the distribution of the species within its natural range§ increasing the viability or resilience of existing populations of the species§ slowing or reversing population declines by addressing key threats to the species' survival§ increasing the quality or amount of habitat for the specieso Activities such as filling information gaps, education and outreach may contribute to an overall benefit plan for a species at risk. However, alone they are unlikely to meet the overall benefit requirement.o Recovery strategies and government response statements, where available provide information that can be used to form plans to achieve an overall benefit for species at risk.	■ The requirements of the ESA process were considered in the development of this Study Plan.	■ Section 9
27	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ **13. Other Permits and Approvals Table 13-1 pg. 84** – As migratory birds are mentioned on page 30, Migratory Birds Convention Act should be included and listed under the jurisdiction of Environment and Climate Change Canada (ECCC). – Please confirm with ECCC for the additional listing in the table of the Migratory Birds Convention Act, and if migratory birds should be listed as an evaluation criterion.	■ The information requested will be provided in the IS / EA Report.	■ N/A

ID#	Comment from Regulatory Agency	Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response	Study Plan Reference
28	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ **Sec. 5.2 Pg.11** – The Western road corridor alternatives 1 & 4 were chosen to move forward to the EA from the Supplemental Information comparing several alternatives. One of the reasons for relocating away from the existing winter road corridor was access to higher ground (and aggregates). – The higher ground (rock knobs and aggregate) are limiting features in the Far North, and as such possibly provide unique benefits to fish and wildlife. It is recognized that the EA should address concerns related to construction of an all weather road in this northern wetland environment. That said locating the road in higher ground presents concerns related to the limited nature of these features in the northern environment. This is another angle that will need to be evaluated in the EA ie the limit of the higher ground and implications towards ecosystems (wildlife, fisheries, etc.).	■ The effects of disturbance or loss of these areas on birds and other environmental components will be considered as part of the IA / EA.	■ Draft ToR ■ Section 6.2 ■ Section 7.2
29	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ **Sec. 7.1.1 (pg. 19), Sec. 7.1.4 (pg. 22), Sec 10.2.4 (pg. 72),** – Appendix A ToR indicates that the study area is 2.5 km on each side of the centreline of each alternative route. Given the range of some of the wildlife species, the distance that some fish species will travel to spawn and the potential impacts on remote tourism operations. The study area described may not be adequate to assess the full range of impacts Please provide rationale for the study area. A data share agreement between the MFFN project team and the Crown is in place. This should be recognized in the ToR and included as a potential data source. Please describe how Crown provided data and data collected for the project will be used and shared amongst organizations. The ToR should recognize the Crown Data Share Agreement and include reference to it in the listing of potential data sources for the criteria and indicators alternatives evaluation.	■ The study areas are defined and described in the Study Plan.The data share agreement is recognized in **Appendix A** of the Study Plan.	■ Section 6 ■ Appendix A
30	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ **Sec. 7.1.4.9 Pg. 31** – It is recommended a more thorough review is conducted of species that have the potential to be impacted by the proposed undertaking that are listed as Special Concern on the Species at Risk list of Ontario as well as species that are currently only listed under the Species at Risk Act. For consideration in the EA.	■ The information requested will be provided in the IS / EA Report.	■ No reference
31	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ **Sec. 14 - References 85+ Additional resources from:** – Catalogue of natural resource scientific and technical publications. Search a list of the scientific and technical publications issued since 2004 see Catalogue-natural-resource-scientific-and-technical-publications – To request a publication issued by the Ministry of Natural Resources and Forestry, or if you have a question related to MNRF scientific and technical publications, please contact us by email with the title of the publication. For journal articles, please contact the journal publisher directly. – For MNRF climate change publications see MNRF_Climate_Change_Publications – Information about Ontario's species of conservation concern, plant communities, wildlife concentration areas and natural areas see https://www.ontario.ca/page/get-natural-heritage-information – Ontario Geohub https://geohub.lio.gov.on.ca/ provides spatial data and mapping applications such as OFAT (Ontario Flow Assessment Tool) that is used to better understand water flow in Ontario. https://www.ontario.ca/page/watershed-flow-assessment-tool – Some selected publications that may be of interest: • Wester, M.C. et al. 2018. The Ecosystems of Ontario, Part 2: Ecodistricts. Ontario Ministry of Natural Resources and Forestry, Science and Research Branch, Peterborough, ON. Science and Research Technical Report TR-26. 474 p. + appendices Catalogue-natural-resource-scientific-and-technical-publications • Ontario Ministry of Natural Resources and Forestry. 2019. Far North Information Knowledge Management Plan Progress Report 2008-2018. Ontario Ministry of Natural Resources and Forestry, Far North Branch, Peterborough, ON. 80p. contact: farnorthfeedback@ontario.ca • Riley, J. 2011. Wetlands of the Hudson Bay Lowland: An Ontario Overview. Nature Conservancy of Canada, Toronto ON 156 pp. ISBN 978-1-897386-27-9 link	■ Descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental condition will be provided in the IS / EA Report and are summarized in this Study Plan.	■ Section 7 ■ Appendix A

ID#	Comment from Regulatory Agency	Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response	Study Plan Reference
			• Marshall, T.R. and Jones, N.E. 2011. Aquatic ecosystems of the Far North of Ontario state of knowledge. Ontario Ministry of Natural Resources. 43 p.+ appends. ISBN 978-1-4435-6512-7 Catalogue-natural-resource-scientific-and-technical-publications • Metcalfe, R.A. et al., 2013. Aquatic Ecosystem Assessments for Rivers. Science and Research Branch, Ministry of Natural Resources, Peterborough, Ontario. 210 pp. Link		
32	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ **Appendix A Missing source information:** – MNRF Natural Heritage Reference Manual (NHRM), 2014. Please add MNRF Natural Heritage Reference Manual (2014) to the list of published sources of information for existing conditions. The Natural Heritage Reference Manual can be referenced in conjunction with the Significant Wildlife Habitat Technical Guide (SWHTG) 2000, which are not mandatory for the EA, but provide clear guidance. The NHRM outlines evaluation processes of habitat and other natural heritage features. The SWHTG offers guidance to evaluate and identify the significance of wildlife habitat. Appendix A 1 The EA should expand upon the criteria and indicators that are provided and develop indicators that can readily be quantified (e.g., number of water crossings required, number of wetlands, number of kms of wetlands to be crossed, or sensitive areas impacted). Appendix A of the ToR should be revised to include indicators for the proposed criteria that are quantitative in nature.	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report. Indicators have been identified based on background information, consultation with regulatory agencies, public and indigenous consultation.	■ Appendix A ■ Section 9
33	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ **Draft Criteria and Indicators for Alternatives Evaluation Appendix A** – Available resources to help inform the draft criteria and indicators include research publications and expert knowledge on topics such as stressor-effects pathways, cumulative effects, and associated environmental components and indicators. – Contacting researchers such as Rob Mackereth (MNRF) who has published research on these topics and related subjects is encouraged. – Rempel, R.S., et al. 2016. Support for development of a long term environmental monitoring strategy for the Ring of Fire area. Ontario Ministry of Natural Resources and Forestry, Science and Research Branch, Peterborough, ON. Science and Research Information Report IR-08. 34 p. + append. Catalogue-natural-resource-scientific-and-technical-publications – While no specifics are provided in this submission, MNRF welcomes a discussion with MECP and ENDM to explore what (if any) role this project could play in advancing baseline information and long-term environmental monitoring for the Ring of Fire in partnership with First Nations communities.	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Appendix A

Table 11-3: Study Plan Federal and Provincial Concordance – Requirement Deviations

ID #	Federal TISG Reference or Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response (Rationale for not meeting requirement)	Justification (for not complying with requirement including for example scientific research, precedence)	Proposed TISG Amendment
1	TISG Section 8.9, page 52	■ Design suggestions for Project Study Area and Local Study Area scales: Use a standardized design approach during survey planning. The resulting design details will serve as the basis to develop alternative designs, evaluate options for particular design details, and to identify potential efficiencies. The approaches and tools suggested elsewhere in this document (e.g., land cover analysis, data simulations) should be considered during the planning phase. The following should be considered as inputs to design planning and evaluation; – transects and sites: • transects should be spaced every 2 kilometres along the route, oriented perpendicular to the route, and with the mid-point of each transect located on the centreline of the route. A maximum length of 5 kilometres is likely suitable for sampling most habitat types, including those associated with eskers and similar linear features in alignment with the route. Transect lengths less than 5 kilometres may be suitable but should be justified with respect to an analysis of land cover that demonstrates no further change in land cover composition with increasing distance from the intersection of route and transect mid- point; • Survey sites along transect should be located as follows: 1 site on centreline of route, sites spaced every 250 meters up to 1 kilometre, then spaced every 500 meters to end of transect. A 5-kilometre transect should have 15 survey sites; • Every 100 kilometres of route should contain 50 transects. Of these, 20 transects should be sampled using Automated Acoustic Recorders (ARU) and 30 transects sampled by human observers (Point Count Transects); and	■ The use of transects is not a requirement, but a recommendation as outlined in the TISG. A GRTS study design was used for initial sampling in the PDA and LSA and is planned for additional sampling to maintain a standardized design. This selection was based on comparisons of data simulations with alternative study designs including the TISG recommended benchmark study design of transects. ■ The use of transects is not a requirement, but a recommendation as outlined in the TISG. A GRTS study design will be used for sample site selection with consideration of access and differences in habitat quality rather than the TISG recommendation of transects. The same ratio of ARUs to point counts will be applied to the bird study design as described in the TISG Section 8.9, Page 52.	■ A GRTS study design was used for initial sampling in the PDA and LSA following consultations with ECCC rather than the TISG recommended study design of transects. As outlined in the TISG, simulation modelling was used to provide evidence that this sampling strategy has not resulted in the introduction of bias. Model simulations of data collected during initial sampling determined an "optimal" sample size to fil data gaps while reducing variances and producing non-biased estimates representing all land cover types. The GRTS study design was the preferred option over a simple random study design and the TISG benchmark study design for selecting additional sampling based on the lower variance and mean bias at the "optimal" sample size. A land cover analysis was used in planning to expand the LSA to 6 km. ■ Study design will not implement point count survey sites along 5 km-long transects for the following reasons: – The number of survey point using this approach (estimated 2,500) goes beyond what is needed for precise and non-biased bird modelling as demonstrated in simulation modelling. Transects at this density are not reasonable / feasible given limited accessibility to the landscape (e.g., dense forest, blow down, water features, etc.) and for field staff health and safety considerations, – Evenly spaced transects conflicts with randomized selection of habitats or if specific (i.e., rare habitats are to be targeted). – A GRTS study design will be used for sample site selection with consideration of access and differences in habitat quality. Model simulations have been competed to demonstrate the optimal sampling to fill data gaps while reducing variances and producing non-biased estimates representing all land cover types.	■ Suggest revising this requirement to read: – 'design suggestions for Project Study Area and Local Study Area scales: Use a standardized design approach during survey planning. The resulting design details will serve as the basis to develop alternative designs, evaluate options for particular design details, and to identify potential efficiencies. The approaches and tools suggested elsewhere in this document (e.g., land cover analysis, data simulations) should be considered during the planning phase. The following suggested survey design should be considered as inputs to design planning and evaluation; – transects and sites: • transects should be spaced every 2 kilometres along the route, oriented perpendicular to the route, and with the mid-point of each transect located on the centreline of the route. A maximum length of 5 kilometres is likely suitable for sampling most habitat types, including those associated with eskers and similar linear features in alignment with the route. Transect lengths less than 5 kilometres may be suitable but should be justified with respect to an analysis of land cover that demonstrates no further change in land cover composition with increasing distance from the intersection of route and transect mid- point; • Survey sites along transect should be located as follows: 1 site on centreline of route, sites spaced every 250 meters up to 1 kilometre, then spaced every 500 meters to end of transect. A 5-kilometre transect should have 15 survey sites; • Every 100 kilometres of route should contain 50 transects. Of these, 20 transects should be sampled using Automated Acoustic Recorders (ARU) and 30 transects sampled by human observers (Point Count Transects); and

ID #	Federal TISG Reference or Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response (Rationale for not meeting requirement)	Justification (for not complying with requirement including for example scientific research, precedence)	Proposed TISG Amendment
			■ The use of transects is not a requirement, but a recommendation as outlined in the TISG. A GRTS study design will be used for sample site selection with consideration of access and differences in habitat quality. As outlined in the TISG, simulation modelling was used to provide evidence that this sampling strategy has not resulted in the introduction in bias. The same ratio of ARUs to point counts will be applied to the bird study design as described in the TISG Section 8.9, Page 52.	■ Study design will not implement point/ARU transects for the following reasons: – Transects are provided as a recommendation and not requirement, serving as a benchmark study design. A GRTS study design will be used for sample site selection with consideration of access and differences in habitat quality. As per the TISG, model simulations have been competed to demonstrate the optimal sampling for the GRTS study design to fill data gaps while reducing variances and producing non-biased estimates representing all land cover types.	
4	TISG Section 8.9, page 52	■ Project components other than the route itself should be sampled. Such components that are linear (e.g., access or service roads) should be surveyed using transects as above. Non-linear components (e.g., aggregate pits) should be surveyed using a grid of sites spaced 250 metres apart and be sufficient to cover the Project component, plus a maximum 3-kilometre buffer. As with transect lengths, modification of buffer width to a minimum of 500 metres may be justifiable if land cover analysis demonstrates no further change in land cover classification with increasing buffer width.	■ The requirement cannot be addressed at this time as:Project components other than the route itself are unknown. However, the PDA and LSA will be adjusted accordingly as the Project design progresses. The use of transects is not a requirement, but a recommendation as outlined in the TISG. A GRTS study design will be used for sample site selection with consideration of access and differences in habitat quality rather than the TISG recommendation of transects.	■ Study design will not implement point/ARU transects for the following reasons: – Transects are provided as a recommendation and not requirement, serving as a benchmark study design. A GRTS study design will be used for sample site selection with consideration of access and differences in habitat quality. As per the TISG, model simulations have been competed to demonstrate the optimal sampling for the GRTS study design to fill data gaps while reducing variances and producing non-biased estimates representing all land cover types.	■ Suggest revising this requirement to read: Project components other than the route itself should be sampled. Such components ~~that are linear (e.g., access or service roads)~~ should be sampled following a statistically robust survey design which is comparable to the suggested transect method ~~surveyed using the sample design described transects as above. Non-linear components (e.g., aggregate pits) should be surveyed using a grid of sites spaced 250 metres apart~~ and be sufficient to cover the Project component, plus a maximum 3-kilometre buffer. ~~As with transect lengths,~~ modification of buffer width to a minimum of 500 metres may be justifiable if land cover analysis demonstrates no further change in land cover classification with increasing buffer width.
5	TISG Section 8.9, pages 52-53	■ Regarding “bird sampling”: – 1. ARU Transects: Deployment of ARUs should be used to inform estimates of site use by birds across a broad range of dates (including seasons) and times of day. Since ARUs capture bird movements across dates and times, sampling on ARU Transects should be conducted on a subset of sites within transects. This subset should include the route centreline site, with the remaining sites at 500-metre spacing out to the transect endpoint: a) Within each sampling year, ARUs should be deployed at sites as long as possible, with a minimum period of May 1 through July 10 (Breeding Recordings). Use deployments that maximize full use of battery and sound card capacity;	■ ARUs will follow this protocol with the exception of a sampling period of June 1 to July 10 for more accurate breeding recordings in northern Ontario and a reduced sampling period either during early winter (December 1 to December 31) or late winter (March 1 to March 31) and not sampling within transects.	■ Due to minimum temperature limitations of ARUs, winter ARU deployment will be for one month at the beginning or end of the winter season as defined the TISG. ■ Study design will not implement point count survey sites along 5 km-long transects for the following reasons: – The number of survey point using this approach (estimated 2,500) goes beyond what is needed for precise and non-biased bird modelling as demonstrated in simulation modelling. Transects at this density are not reasonable / feasible given limited accessibility to the landscape (e.g., dense forest, blow down, water features, etc.) and for field staff health and safety considerations,	■ Suggest revising this requirement to read: – Regarding “bird sampling”: 1. ARU Placement: Deployment of ARUs should be used to inform estimates of site use by birds across a broad range of dates (including seasons) and times of day. Since ARUs capture bird movements across dates and times, sampling on ARU locations should be conducted on a subset of sites ~~within transects. This subset should include the route centreline site, with the remaining sites at 500-metre spacing out to the transect endpoint:~~ a) Within each sampling year, ARUs should be deployed at sites as long as possible, with a minimum period of June 1 through July 10 (Breeding Recordings). Use

ID #	Federal TISG Reference or Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response (Rationale for not meeting requirement)	Justification (for not complying with requirement including for example scientific research, precedence)	Proposed TISG Amendment
		b) A subset of at least 50% of the ARU sites should have ARUs deployed to align with periods during which sites are used by birds in fall migration (August 1 through September 30) and during the winter (December 1 though March 31) (i.e., collectively, Fall/Winter Recordings). These fall and winter sites may be a subset of either entire ARU transects or sites along transects but land cover analysis should be used to ensure the subset is an unbiased sample of the population of ARU sites; c) ARU deployments for Breeding Recordings should be programmed to record daily or every 2nd day, with a morning and an evening schedule. Recording should occur in two phases to avoid single recordings spanning two dates. Phase 1 would 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 would start 30 minutes before local sunset, with a schedule of 3-minutes On and 12-minutes Off until 23:56 (HH:MM); d) ARUs should be set to record using a sampling rate of 44.1 kHz. "		– Evenly spaced transects conflicts with randomized selection of habitats or if specific (i.e., rare habitats are to be targeted). – A GRTS study design will be used for sample site selection with consideration of access and differences in habitat quality. Model simulations have been competed to demonstrate the optimal sampling to fill data gaps while reducing variances and producing non-biased estimates representing all land cover types.	deployments that maximize full use of battery and sound card capacity; b) A subset of at least 50% of the ARU sites should have ARUs deployed to align with periods during which sites are used by birds in fall migration (August 1 through September 30) and during the winter (December 1 though March 31) (i.e., collectively, Fall/Winter Recordings). These fall and winter sites ~~may be a subset of either entire ARU transects or sites along transects but~~ should use statistical methods to ensure the subset is an unbiased sample of the population of ARU sites; c) ARU deployments for Breeding Recordings should be programmed to record daily or every 2nd day, with a morning and an evening schedule. Recording should occur in two phases to avoid single recordings spanning two dates. Phase 1 would 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 would start 30 minutes before local sunset, with a schedule of 3-minutes On and 12-minutes Off until 23:56 (HH:MM); d) ARUs should be set to record using a sampling rate of 44.1 kHz. "
6	TISG Section 8.9, page 54	■ Acoustic file and data analysis: – acoustic files should be analyzed by interpreters skilled in identifying birds by sound and familiar with bird communities of the region sampled. Interpretation of acoustic files should be done using the Wildtrax interface (https://www.wildtrax.ca/home), with each individual detected recorded as a data point and referenced to the first 1-minute interval it was detected: • Prior to interpretation, acoustic files suitable for analysis should be identified by examining spectrograms and listening to a short segment of the file. Files with substantial wind, rain or other noise (e.g., frogs) should be excluded.	■ The requirement to use a specific software for analysis should be removed as a requirement.	■ Acoustic storage and analysis software packages are continuously improved and updated. The technical team will select the best available software, appropriate for the analysis to be conducted, at the time when analysis is being conducted. The software used will be described in the IA/EA.	■ Suggest revising this requirement to read: – Acoustic file and data analysis: • acoustic files should be analyzed by interpreters skilled in identifying birds by sound and familiar with bird communities of the region sampled. Interpretation of acoustic files should be done using the Wildtrax interface (https://www.wildtrax.ca/home), or other suitable software with each individual detected recorded as a data point and referenced to the first 1-minute interval it was detected: ○ Prior to interpretation, acoustic files suitable for analysis should be identified by examining spectrograms and listening to a short segment of the file. Files with substantial wind, rain or other noise (e.g., frogs) should be excluded.

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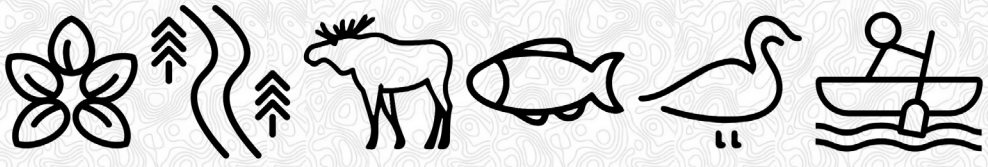
Zoetica Environmental Consulting Services (Zoetica), 2018b:
Marten Falls All Season Access Road Project Baseline Report: 2018 Raptor Nest Surveys. Prepared for Marten Falls First Nation, Ontario by Zoetica Wildlife Research Services Inc., B.C.

Appendix A

Preliminary List of Data Sources



Information requests and publicly available data (i.e., data banks and databases) from the following sources:

- Federal government (e.g., ECCC, Health Canada)
- Ontario provincial government (e.g., the MECP, the MNRF, the ENDM)
- Natural Heritage Information Centre Make-a-Map: Natural Heritage Areas and Rare Species Records (MNRF, 2020b)
- Crown Land Use Policy Atlas (MNRF 2005)
- Land Information Ontario base mapping data for ANSIs (Area of Natural or Scientific Interest) (MNRF 2020c),
- Ontario Land Cover Compilation V 2.0 (MNRF 2020d)
- Ontario's Provincial Satellite Derived Disturbance Mapping digital resource (Government of Ontario 2020)
- Ontario's FNLC Layer (MNRF 2014a) Ramsar Canada Sites (Ramsar Canada 2020)
- Significant Wildlife Habitat Criteria Schedules (Ecoregions 3E and 3W) (MNRF 2015b, MNRF 2017c)
- Local Governments (i.e., Municipalities of Greenstone and Thunder Bay, local First Nations (i.e., Indigenous Knowledge)
- Natural Resource Management Plans; Wetland guidance documents from other Canadian Provinces, and federal guidance documents [i.e. Far North Biodiversity Project (Ontario Biodiversity Council 2020); Forest Management Plans (Long Lake Forest Products Inc. 2008), Alberta Wetland Policy (Government of Alberta 2013); The Wetland Ecological Functions Assessment (Environment Canada 2008), The Wetland Network (2020)]
- Species Recovery and Restoration Plans
- Atlases (i.e., Ontario Breeding Bird Atlas [Cadman *et al.* 2007], iNaturalist [2020])

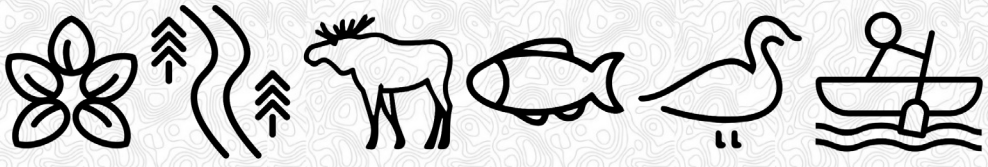
Other sources of data

- Academic institution and academic journal articles (i.e., Hedley *et al.* 2020; Vala *et al*. 2020; Yip *et al.* 2019)
- Field studies, including site-specific survey methods.

- Monitoring program databases protected areas, watershed or coastal management plans (i.e., Ring of Fire Baseline Environmental Monitoring Program [MECP 2019c]).
- Land cover data, including: terrestrial ecosystem mapping products, forest cover maps, remote sensing resources.
- Important habitats and features to include:
  - water bodies, wetlands, watercourses;
  - riparian habitat;
  - river banks or other eroded habitats;
  - artificial water sources;
  - forest, tree patches, solitary trees (especially old decaying trees);
  - forest edges and tree rows;
  - ridges, including eskers;
  - caves and mines;
  - cliffs, rock outcrops, exposed bedrock, talus, and other karst topography;
  - buildings, bridges, and other anthropogenic features, including linear features; artificial water sources;
  - forest, tree patches, solitary trees (especially old decaying trees);
  - forest edges and tree rows;
  - ridges, including eskers;
  - sources of artificial lighting attracting insects;
  - critical habitat; and
  - any other habitat features known to be important in the area.
- Published literature, such as peer reviewed journals, reports by think tanks, nongovernment organizations and government reports (e.g., COSEWIC Recovery Strategies).
- Environmental assessment documentation, including monitoring reports, from prior projects in the area and similar projects outside the area, regional studies, project assessments and strategic assessments.
- Renewable harvest data.

Appendix B

Agency Comments on the Draft Study Plan



Draft Study Plan Comments – Federal

Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Section Reference
GC	■ GC	■ Sections 5, 6, 7, 13, 19.2 and 25	■ In addition to the required actions detailed below, other required actions to be addressed in the update to this study plan are detailed in a separate table titled "2020-07-02 – IAAC to MFCAR - General Comments on MFCAR Draft Study Plans". The Agency has provided these other required actions to highlight common sections of the GUIDELINES where requirements were not met in the draft study plans submitted to the Agency. These additional actions must be addressed in the updated study plans.	■ We have reviewed the relevant comments and incorporated where appropriate. Please refer to the General Comments Table Response submitted separately to the Agency for specific responses.		■ Various Sections in Birds and Wildlife Study Plans
Editorial Comment	■ Section 4.1.2.1 2019 Golder Bat Surveys – "Wildlife Acoustics Song Meter SM4BAT FS acoustic monitors were deployed at 167 stations within the LSA in suitable habitats to record bat activity during the maternity roosting period (June 1 to June 30) to determine if SAR bats are present in these communities. The acoustic detectors were set to record from 30 minutes before sunset to 30 minutes after sunrise for a period of at least 10 days. The detectors were set up June 13-17, 2019 in the maternity roosting window and collected from September 2-4, 2019. One bat detector failed to function, and another bat detector was stolen, therefore data was collected from 15 stations."	■ Editorial Comment	■ Typo in either the number of units deployed (167) or the number from which data were collected (15)	■ Clarify the number of acoustic monitors deployed and from which monitors data were collected.	■ The Study Plan has been updated from 167 to 17.	■ Wildlife Study Plan: Section 7.2.1.2.2
WH-01	■ Section 3: Spatial Boundaries: Study Areas – "The LSA currently being considered for wildlife within the scope of the ongoing regulatory review process generally includes the area within 2.5 km of the centreline of Alternative 1 and alternative 4, with the exception of studies related to Wolverine (Gulo gulo) where 10 km beyond the PSA will be considered as per the TISG. The Study Area generally allows for	■ Section 7.4.1 – "Delineate spatial boundaries (i.e., regional study area, local study area, and project study area) to meet the following objectives: a. range of land cover types should be representative of the defined spatial extent; b. the spatial pattern of the land cover types should be well distributed across the defined spatial extent (e.g., revise if one or more land	■ It is unclear if the planned PSA, LSA, or RSA boundaries were defined with respect to items a-c in Section 7.4.1 of the Guidelines, including if simulation modelling was used. ■ Omission of project components other than the route itself are likely to provide an incomplete understanding of baseline conditions relating to the overall project. ■ LSA is defined to include PSA adjustments, but if PSA is adjusted, the LSA should also be adjusted to	■ Provide details to demonstrate that the planned PSA, LSA or RSA boundaries were defined with respect to the requirements described in Section 7.4.1 of the Guidelines. ■ Provide details to demonstrate that project components other than the route itself will be included in the PSA and consequently what areas are included in surveys discussed as relating to the PSA.	■ Study Plan **Section 6.2** indicates that the Project Development Area (PDA) encompasses the 100 metre-wide CAR right-of-way (ROW), temporary construction access roads, work areas, worker camps, and long-term aggregate sources and associated access roads. The specific location of Project components, including the roadway, pits and quarries, aggregate source areas and temporary infrastructure, are not yet	■ Birds and Wildlife Study Plans: Section 6.2

Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Section Reference
	the documentation of existing conditions and prediction of potential environmental effects for the Project. A 5 km wide Study Area also allows for route refinements during development of Project design (e.g., adjustment of the alignment to avoid sensitive features). – The PSA encompasses the 100 m wide CAR right-of-way, temporary construction" ■ Section 7: Concordance with federal and provincial guidance – "Project components other than the route itself are unknown at this time"	cover types is concentrated in one sub-area and uncommon in other parts of the area); and c. low to moderate rate of change in the prevalence of one or more land cover types with increasing distance from the (i.e., to use land cover patterns to constrain the distances within which comparisons should be made)….For Species valued components: The local study area should correspond to the project study area plus a buffer defined with objectives a-c above. Use simulation modeling to help define a buffer that captures objectives a-c for each species or species group." ■ Section 8.9 – "Project components other than the route itself should be sampled. Such components that are linear (e.g., access or service roads) should be surveyed using transects as above. Non-linear components (e.g., aggregate pits) should be surveyed using a grid of sites spaced 250 metres apart and be sufficient to cover the Project component, plus a maximum 3-kilometre buffer. As with transect lengths, modification of buffer width to a minimum of 500 metres may be justifiable if land cover analysis demonstrates no further change in land cover classification with increasing buffer width…. Design suggestions for Project Study Area and Local Study Area scales... Transect lengths less than 5 kilometres may be suitable but should be justified with respect to an analysis of land cover that demonstrates no further change in land cover composition with increasing distance from the intersection of route and transect mid- point."	encompass changes in expected direct effects from new PSA. PSA should encompass all potential project footprints and LSA expand beyond that. To assist with providing the information needed, an illustration is offered relating to land cover analysis to help define transect lengths. The following is an illustration of the land cover analysis referred to in this section of the Guidelines, for the purpose of defining study area boundaries in relation to the Esker VC. 1. Identify the eskers and similar geological features (e.g. moraines) potentially affected by the project. For those features, identify the land cover types that occur within the geologically defined esker (or moraine) polygon. 2. Identify the major land cover types by calculating, across all the individual eskers (and moraines) potentially affected by the project, the types of land cover that make up 80% or more of the surface area of these features. 3. For each esker (or moraine), determine the individual percentages of each of the major land cover types within the PSA on each esker (and moraine). 4. In increments (e.g. 100 metres) extend a buffer from the edge of the PSA to 15 kilometres from the edge of the PSA, and calculate the percentage of each of the major land cover types within each increment. 5. For each major land cover type, calculate the rate of change between successive buffer increments in land cover composition (i.e. the difference in percentages between a given buffer increment and the increment one step closer to the PSA boundary). For the first buffer increment, calculate the percent difference between the PSA and that buffer increment.		known and will be included in the IS / EA Report.	

Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Section Reference
			6. For each major land cover type, determine the maximum calculated rate of change across all buffer increments (i.e. 100 metres to 15 kilometres out from PSA boundary). 7. The LSA boundary for each esker or moraine would then be defined as the buffer width that is the maximum of: a. 500 metres from the PSA boundary, or b. the buffer increment where i. All major land cover types have a rate of change in land cover composition of less than or equal to 5% of the maximum rate of change found in (5), and ii. The increment is beyond (i.e. further away from the PSA) where the maximum rate of change found in (5). 8. This approach is intended to lead to LSA boundaries for eskers and similar geological features that include the esker-related land cover types, the rapid land cover change that occurs along the edges of these features, and a portion of the broader landscape matrix. An ecologically defined LSA should therefore serve as a useful reference for comparing patterns and survey results with the PSA and the RSA. ■ This approach could be used to define LSA boundaries for the Wetland VC and any other habitat VCs.			
WH-02	■ Section 4.1.1 Birds – "Bird surveys were performed for the purpose of the project in 2018 by Zoetica and in 2019 by Golder. A summary of their methods and results are included herein"	■ Section 7.2 – "With regard to field studies, survey work must be planned to include multiple sampling locations and multiple visits to each location to support all required assessment analyses. Existing data should be considered as a limited augmentation of this new data…. …. Baseline data must be collected in a manner that enables reliable analysis, extrapolations and predictions. Resulting data should be suitable for analyses to	■ The 2018, 2019 bird survey data were collected prior to the development to the TISG. The designs do not appear to be compliant with the Guidelines but, if used correctly, may be useful for the proponent in their efforts to develop a TISG-compliant design. More detail would be required to evaluate and provide advice about the use of those data. ECCC provided advice on early designs for these surveys that was consistent with the principles outlined in	■ Provide detail about the final 2018 and 2019 designs and how ECCC advice was incorporated, as well as results and analysis plans, and detailed plans for using those data to inform upcoming survey designs.	■ The Study Plan is updated to outline the 2018 and 2019 study designs in greater detail including coordination with ECCC. Sample sizes have been added where appropriate. Results have been incorporated into determining the sampling frequency for ARU use. Results will also be used for developing preliminary models that will be further refined with additional field data.	■ Birds Study Plan: Section 7.2.1.2

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		estimate pre-project baseline conditions, derive predictions of impacts, and evaluate and compare post-project conditions and at scales of within and across the Project, Local and Regional Assessment areas. Modelling methods, error estimates and assumptions should be reported (as per section 7.1). Modelling and simulations should be used early in the planning phase to estimate the necessary sampling intensity and to quantitatively evaluate the effectiveness of design options. – Ethical guidelines and relevant cultural protocols governing research, data collection and confidentiality must be adhered to. Baseline data must be collected in a manner that enables reliable analysis, extrapolations and predictions. Resulting data should be suitable for analyses to estimate pre-project baseline conditions, derive predictions of impacts, and evaluate and compare post-project conditions and at scales of within and across the Project, Local and Regional Assessment areas. – Modelling methods, error estimates and assumptions should be reported (as per section 7.1). Modelling and simulations should be used early in the planning phase to estimate the necessary sampling intensity and to quantitatively evaluate the effectiveness of design options."	the TISG, but did not receive revised plans. ■ The 2018 and 2019 surveys were conducted prior to development of the Guidelines. As such they should be treated as existing data for the IA. They can be of use (e.g. estimates of variance) in developing a bird focused survey design and assessing sample sizes. They can also be included in modelling of baseline conditions to help incorporate more than two years of surveys, so long as the limitations of the survey design are accounted for, in the analysis.			
WH-03	■ Section 4.2 Desktop Assessment – "The background review….as well as identifying potential rare, SAR and species of Indigenous importance that may be present within the Study Areas." ■ Section 4.3.4 Mammals – "The terrestrial mammals currently of importance to our study will be determined using SAR data, ecological composition of the Study Areas and Indigenous Knowledge provided from consultation."	■ Sections 6, 8.10, 15.3 – Section 6 • "The proponent must engage with all Indigenous groups that may be impacted by the Project. The Indigenous Engagement and Partnership Plan, issued by the Agency, is available to assist the proponent in further developing or refining their engagement strategy and supporting ongoing trust and relationship-building. In addition to	■ It is unclear what information about species of Indigenous importance will be collected through the desktop assessment and what will be collected through engagement. As per Section 6 of the Guidelines, the Agency expects the proponent to engage with, at a minimum, the Indigenous groups listed in the Indigenous Engagement and Partnership Plan.	■ Provide details to demonstrate that all of the Indigenous groups listed in the Indigenous Engagement and Partnership Plan will be engaged with and provided opportunities to provide input on current use of terrestrial wildlife as a source of country foods and where use or harvesting has Indigenous cultural importance. This includes incorporating into the plan where Indigenous groups will be provided with opportunities to:	■ A summary of the consultation plan for Indigenous communities, government agencies, and interested persons has been provided in **Section 4** of the Study Plan; further details can be found in the IS / EA Consultation Plan included as Appendix B of the Proposed ToR. Specific consultation and engagement activities and schedules are currently in development and will be shared with MECP and the Agency once available.	■ Wildlife and Birds Study Plans: Section 4.2 and Section 5.

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	■ Section 7 – "Documentation of the historic and current use of terrestrial wildlife resources will be identified as a source of country food or of cultural importance to indigenous peoples, including harvesting of fur bearing mammals…. – …potential adverse effects to species of indigenous significance and their habitat will be collected through desktop assessment and provided in the IA/EA."	the requirements set out in section 6.1, 6.2 and 6.3, the proponent must provide Indigenous groups with an opportunity to: provide Indigenous knowledge during baseline data collection; comment on the list of valued components and indicators…" – Section 8.10 • "describe the historic and current use of terrestrial wildlife as a source of country foods (traditional foods) or where use has Indigenous cultural importance (e.g., black bear, caribou, deer, moose, beaver, arctic fox, fisher, wolverine, rabbits, marten, muskrat, and otter)… …describe the use and harvesting of fur-bearing species and whether its harvesting has Indigenous cultural importance" – Section 15.3 • "describe the potential adverse effects of the Project on species noted as important to Indigenous groups and local communities and their habitat that are not currently listed under the Species at Risk Act or provincial statutes"		– provide Indigenous knowledge during baseline data collection; – comment on the list of valued components and indicators; – inform the effects assessment and review its conclusions; and – inform the development of mitigation measures and follow-up programs.		
WH-04	■ Section 4.1.2.1 2019 Golder Bat Surveys	■ Section 8.11 – "clearly describe methods used to define a bat "pass" and be consistent with the definition used for any comparison group. Provide a rationale for the chosen method; clearly describe methods used for acoustic identification, including any validation procedures used, criteria used for deciding on species classifications, and software used (including versions and settings);"	■ It is unclear what methods and rationale were used to define a bat pass in the 2019 Bat Surveys.	■ Provide details to demonstrate the methods used to define a bat "pass" during the 2019 Bat Surveys. Provide a rationale, as required in Section 8.11 of the Guidelines.	■ The Study Plan is updated to incorporate the 2019 bat surveys and the definition for a "bat pass" . Methods rationale will be provided in the IS / EA Report.	■ Wildlife Study Plan: Section 8.1
WH-05	■ Section 4.3 Study Methods	■ Section 8.11 – "survey protocols should provide a rationale for the scope of and the methodology used for surveys including design, sampling protocols and data manipulation"	■ Rationales are not always present or clear for all surveys in Section 4.3 of the study plan.	■ Provide details to ensure that survey protocols, design, methodology, sample size, and data manipulation are clearly explained and rationalized in terms of appropriateness and adequacy to address requirements of the Guidelines.	■ The Study Plan is updated to include details on survey protocols, design, methodology and data manipulations, which are explained and rationalized in terms of appropriateness and adequacy to address requirements of the Guidelines. Sample sizes have been added to the fur bearers.	■ Birds and Wildlife Study Plans: Section 7.2

Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Section Reference
WH-06	■ Section 4.3.1.1 Field Study Design – "Data collected will generally be consistent with methods employed by Golder (2019) for forest birds and bog / fen birds and other wetlands birds due to the abundance of such habitats… A point count survey location will be conducted within each vegetation community identified for Ground Investigations, within 1 km of helicopter landing pads. Note that pre-selected Ground Investigation locations may be revised based on site conditions observed during field investigations." – (Comment is relevant to several sections of 4.3.1.1 in the proponent's plan that relate to the intended sampling)	■ Section 8.9 – -Refer to original comment PDF from IAAC and TISG if more context is required – [Also Applicable or partly applicable to other sections of the Guidelines that refer to modeling and/or simulations, e.g. 7.1, 7.2, 7.4.1, 8.1, 8.2, 8.5, 8.11, 13.1, and 21]	■ Clarifications on the survey design advice and intended uses of modeling and simulations are offered. ■ Section 8.9 of the Guidelines describes and recommends tools and approaches for Design Planning, including developing and selecting a survey design from design options. ■ The intention of this section of the Guidelines for the Design Planning phase is to identify a series of principles that should be used to guide and evaluate survey design options; offer detailed design elements as inputs and as a starting point for developing alternative design options; and recommend modeling, using existing and/or simulated data to evaluate those design options against a series of criteria that would include the design principles. ■ An important element is that the proponent is uniquely able to include information and data specific to the project (e.g. detailed plans of road construction and routing, detailed imagery and existing proponent-collected data). Integrating this proponent-held information enables the proponent to develop design options (or scenarios) that incorporate detailed local information along with the Guidelines-derived design principles and tools. Departures from the offered design should be justified, explained in detail and should clearly demonstrate how the chosen design adheres to the design principles provided in the Guidelines. Detailed descriptions of design process and design outcomes (including maps, sample sizes overall and by landcover type) are required to understand and evaluate the design relative to the Guidelines. Following this approach should lead to a detailed platform for evaluating the sufficiency of the selected design, for communicating the rationale for choosing that design, and for	■ Submit an updated survey design in consideration of the project context and the instructions provided.	■ The Study Plan is updated to incorporate details on survey design and data analysis recommendations including simulation modelling per Section 8.8 of the TISG (the Agency 2020a).	■ Birds and Wildlife Study Plans: Section 8 and Section 9.4

Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Section Reference
			communications regarding clarifications, suggestions and recommendations. ■ Simulation modeling is the process of generating and analysing hypothetical data, often in the context or with the purpose of comparing with actual data. Evaluation of survey design options can benefit from a simulation modeling approach through comparison of the representativeness of a potential sampling design relative to more intensive design options. This is a broad and diverse field but a search in the ecological literature (e.g. with keywords power analysis) should produce relevant examples of approaches and methods. Survey results from the 2018 and 2019 preliminary data collection can be very useful to assess sample size sufficiency and guide simulations, so long as analysis and interpretations account for the limitations of these designs and surveys. ■ (NOTE: Detail provided is insufficient to fully understand the 2018, 2019 designs and results.) ■ Section 8.9 of the Guidelines describes and recommends tools and approaches for data analysis, including conducting analysis using the data, both pre-existing and those data collected during the bird (or other) surveys. ■ The intention of Section 8.9 of the Guidelines for data analysis is to guide data acquisition to ensure that the necessary quantitative data would be available to ensure appropriate analysis and reliable interpretations and ensure these covariates were included in the analysis of the collected bird (and perhaps other) survey data. ■ The purposes of these covariate data are to enable the evaluation of their influence on the bird (or other) survey results, and to quantify that influence and account for it in the extrapolation and results-interpretation stages. Doing so reduces the chance that			

Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Section Reference
			interpretations about the birds are made in error through a misunderstanding of the patterns and statistical results. ■ For example, if the esker sites A, B and C were surveyed on days with no wind and the peatland sites D, E and F on days with light wind and occasional rain (which may affect both detection and bird vocal behaviour), the lower bird species richness of sites D, E and F might be entirely (and mistakenly) attributed to habitat differences. Modeling that included wind and rain covariates would be more likely to differentiate these effects and lead to better extrapolations and interpretations of the data. Likewise, surveying in one or two years increases the risk having unexplained abundances in the baseline estimate. For example if surveys were conducted in a year that involved a 'masting' event, measured abundances of baseline conditions could be much higher than an average across several years. A similar event could occur if surveys were only conducted in a particularly cold or warm season, relative to the long-term average. ■ Resources and examples for the use of covariates in modelling are abundantly available through scientific journals and statistical texts. Examples of potential key words for searches include: hierarchical modeling, generalized linear (mixed) models, boosted regression trees, Bayesian modeling. Modelling should aim to generate predictive estimates of abundance (or density/occurrence if justified) across the LSA, PSA, and RSA and to provide predictive estimates with associated margins of error at scales that are justified at the scale and shape of the study areas. Total area may not be an appropriate measure of scale for linear projects that are small scale at any point, but stretch along a large area due to length. Modelling should be able to predict			

Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Section Reference
			local effects along the project as well as larger scale patterns along the length of the project. Useful predictions require data inputs from each of the study areas to which extrapolations will be made.			
WH-07	■ Section 4.3.1.1 Field Study Design – "Prior to field investigations and as part of study design, vegetation communities will be characterised (pre-typed) and delineated by GIS analysts and vegetation specialists through a desktop exercise for both the PSA and LSA. Following which, a representative subset of vegetation communities (upland, wetland and riparian) will be selected for field verification through a stratified random sampling technique…" – (Comments relevant to other text in the Design section of the plan)	■ Section 8.9 – Collect data in a manner that enables reliable extrapolations in space (i.e., at minimum to Project, local and regional study areas) and in time (i.e., across years):... • …design suggestions for Project Study Area and Local Study Area scales: Use a standardized design approach during survey planning. The resulting design details will serve as the basis to develop alternative designs, evaluate options for particular design details, and to identify potential efficiencies. The approaches and tools suggested elsewhere in this document (e.g., land cover analysis, data simulations) should be considered during the planning phase. The following should be considered as inputs to design planning and evaluation…" – (see list that follow in the Guidelines for all requirements)	■ Adding bird sampling to a design that was created for the purposes of a vegetation study is not likely to provide robust bird results as per the Guidelines. The planned bird survey design should be described in such a way as to enable an evaluation of the steps taken to create the design and clearly describe sample sizes and locations. ■ Design the study of birds using point count and ARU locations in a way that is not dependent on the study design for vegetation verification. The goals are different between the two and therefore sample sizes and distribution of samples will need to differ between the two studies. ■ A series of ground level photos at each site visited for bird surveys and Ecosite typing of each site visited for the bird surveys using the ground level photos is required, as per the requirements in Section 8.9 of the Guidelines. FNLC should be used as land cover input.	■ Provide details about the proposed bird survey design that includes the steps taken to determine the sample sizes and locations. Provide ground level photos and Ecosite typing at each site visited for bird surveys.	■ The Study Plan is updated to include a revised study design for birds that is independent of the Vegetation VC Study Plan and outlines the steps taken to determine sample size and survey locations. Habitat will be documented with photographs as described in the Guidelines and classified by ELC Ecosite or Canadian Wetland Classification Class as described under the Vegetation Study Plan for modelling purposes.	■ Birds and Wildlife Study Plans: Section 7.2 ■ Vegetation Study Plan
WH-08	■ Section 4.3.1.1 Field Study Design – "To reduce potential bias associated with selecting locations where access can be achieved by helicopter and for a robust subset of sites, a secondary analysis will be run to determine if any vegetation community types will be missed through this approach to assure all individual pre-typed vegetation communities are represented. Should additional sites require Ground Investigations, additional helipads may need to be cut. This approach will be used to assure that rare habitats and features receive adequate sampling that is not biased due to limited access."	■ Section 8.9 – "use simulation modelling prior to sampling to ensure coverage is broad enough to estimate and account for detection error as well as provide unbiased estimates of abundance and distributions."	■ It is unclear if simulation modelling has been used prior to sampling to ensure coverage is broad enough to provide unbiased estimate of abundance and distribution, as required in Section 8.9 of the Guidelines. Refer to comment WH-06 for further clarifications on the survey design advice and intended uses of modeling and simulations. Limiting bird sample locations to those easily accessible will likely lead to habitat biases in the sample.	■ Provide details about survey design and simulation modelling used to demonstrate how habitat bias will be avoided.	■ The Study Plan is updated to incorporate details on survey design and data analysis recommendations including simulation modelling and methods to avoid bias.	■ Birds and Wildlife Study Plans: Section 8 and Section 9.4 ■ Vegetation Study Plan

Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Section Reference
WH-09	■ Section 4.3.1.1 Field Study Design – "PSA Based on the anticipated size of the PSA (greater than 4000 hectares [ha]), the intent of the field program is to complete field verification on 15-25% of the vegetation communities within the PSA. This percentage represents a Survey Intensity Level 4 according to the Standard for Terrestrial Ecosystem Mapping in British Columbia (EWG 1998). Although these guidelines originate in British Columbia, a similar guideline to provide consistency across projects has not been developed for Ontario and therefore should be an acceptable approach. This sampling intensity is the survey intensity level recommended for most mapping and is appropriate for a Project of this size and represents a respectable compromise between costs and meaningful data collection."	■ Section 8.9 – [Also applicable or partly applicable to other sections of the TISG that refer to modeling and/or simulations, e.g. 7.1, 7.2, 7.4.1, 8.1, 8.2, 8.5, 8.11, 13.1, and 21]	■ The sampling intensity guideline referenced in the study plan (i.e. Standard for Terrestrial Ecosystem Mapping in British Columbia; EWG 1998) is for ecosystem or vegetation mapping at a 1:20000 to 1:50000 scale. This does not provide acceptable justification for sample size or distribution when it comes to collecting bird data and modelling bird abundances or distributions.	■ Provide details about survey design and simulation modelling used to demonstrate that the proposed sampling intensity will provide unbiased estimates of abundance and distributions, as per the requirements in Section 8.9 of the Guidelines.	■ The Study Plan is updated to incorporate details on survey design and describes methods proposed to avoid bias.	■ Birds and Wildlife Study Plans: Section 8 and Section 9.4 ■ Vegetation Study Plan
WH-10	■ Section 4.3.1.1 Field Study Design – "PSA & LSA Although every effort will be made to adhere to this sampling intensity, the Project is located in a remote part of Canada with limited access. Access to vast portions of the proposed CAR will only be available by air, therefore survey locations will be limited to where a helicopter is capable of landing (i.e., cut helicopter landing pads, grassy riparian areas)."	■ Section 8.9 – "If necessary to constrain or adjust site selection based on access limitations, simulation modelling should provide evidence that this sampling strategy has not resulted in the introduction of bias." – [Also applicable or partly applicable to other sections of the TISG that refer to modeling and/or simulations, e.g. 7.1, 7.2, 7.4.1, 8.1, 8.2, 8.5, 8.11, 13.1, and 21]	■ The study plan should designate, according to the design principles in the Guidelines, oversample locations to assist with situations of limited access. This will help reduce the potential for bias in the collected data, while still accommodating some degree of access limitation.	■ Provide details to demonstrate how the potential of bias will be reduced when issues related to limited access occur.	■ The Study Plan includes oversample locations selected using Generalized Random Tessellation Stratified (GRTS) to assist with situations of limited access.	■ Birds Study Plan: Section 7.2.2.1
WH-11	■ Section 4.3.1.1 Field Study Design – "RSA Baseline information for the RSA will need to be robust enough to support an assessment of indirect effects on vegetation. Considering the level of existing information on vegetation communities within the RSA (FNLC and FRI mapping), field investigations for vegetation will not be conducted within the broader RSA. Effects on vegetation with the RSA are not expected to be wide ranging and therefore effects can adequately be	■ Section 8.9 – "Efforts outside the project study area should be carefully designed to ensure that estimates comparing within and across the project study area, local study area and regional study area are unbiased and as precise as possible… – …sample size must be planned to support a robust evaluation of the project study area within the context of the local study area and regional study area… – "Simulation modelling should be used to assess bias and precision between	■ It is unclear how the text provided in Section 4.3.1.1 of the study plan is related to the bird survey. It is not clear what level of sampling will take place in RSA for wildlife VCs. The rationale provided is in relation to vegetation sampling. ■ The study plan does not indicate that bird surveys will be done in the RSA. More detail is needed to determine how the requirements of Section 8.9 will be met. ■ Sample sizes and designs must support evaluation of the three study area scales	■ Provide details to demonstrate how the text in Section 4.3.1.1 is relevant to the bird survey. ■ Provide detail to demonstrate how the requirement in Section 8.9 of the Guidelines regarding field surveys in the regional study area will be met. Detailed information is needed showing the intended sample size within each of the study area scales, along with estimates of the variability in expected metrics (e.g. species level abundance, species richness) within each of those scales.	■ A simulation was completed which indicates that the LSA is representative of the RSA based on the percentage composition of land cover types. ■ Results of simulation modelling using data collected in the LSA provides unbiased models for making predictions in the RSA. The Study Plan describes how models will used to extrapolate abundance of bird species in each Bird VC to the RSA scale based on habitat availability.	■ Birds Study Plan: Section 9.4.2

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	assessed using the existing and desktop derived information" ■ Section 7 Conformance with Federal and Provincial Guidance – "The requirement cannot be addressed as: • It should be sufficient to collect background data for the regional study area and extrapolate results from the project and local study area."	project study area, local study area, and regional study area to ensure the estimates are useful for comparison. Field surveys should occur within the regional study area since there are few existing sources of data that effectively describe regional bird populations in areas, including this area, that are distant from road networks."	(PSA, LSA, RSA), so detailed information is needed that shows intended sampling within each of these scales along with estimates of variability within each of those scales.			
WH-12	■ Section 4.3.1.1 Field Study Design – "Bird indicator are to be collected to account for temporal sources of variation including among years (two years minimum), within and among seasons (e.g., spring migration, breeding season, and late summer / fall migration), and within a 24-hour daily cycle." ■ Section 4.3.1.8 Data Collection – "During migration (spring and fall), three 3-minute segments per week will be randomly selected from the Morning Period (1 hour before sunrise to 5 hours after sunrise)."	■ Section 7.4.2 – "For valued components related to wetlands, eskers, birds, wildlife, and Species at Risk, define temporal boundaries in a manner that enables detection of all species that use the project study area, local study area, and regional study area throughout the year and between years, and to estimate their temporal pattern of use (e.g., breeding, or migrants stopping on northward and/or southward migration). Baseline data collection for all biophysical valued components is to be provided for a minimum of two years, unless specified otherwise. Temporal boundaries spanning more than one year will enable accounting for variation due to irregular events (e.g., masting events, storms on migration, late snowfalls)." ■ Section 8.9 – "collect bird data to adequately represent the following temporal sources of variation: • among years; • within and among seasons (e.g., spring migration, breeding, fall migration, overwintering); and • within the 24 hour daily cycle. – …collect field data over at least two years. The goal of collecting data over multiple years is to improve the understanding of natural variability in populations. Two years of sampling is suggested as a minimum. As the number of sampling years increases so does the understanding of natural variability;"	■ More information is needed to determine how the requirements in Sections 7.4.2 and 8.9 related to temporal sources of variation will be met. ■ It is unclear how the approach provided in Section 4.3.1.8 will account for the temporal sources of variation. Singing frequency may be less during spring migration than during the nesting phase. Singing frequency may be much less during fall migration but migrating mixed-species flocks do call regularly enough to be detected and identified by appropriate sampling of acoustic files and with skilled interpreters. Recordings may need to be evaluated to determine if planned sampling frequency is sufficient.	■ Provide specific detail, including methods and approaches, to demonstrate how these requirements related to temporal boundaries and collection of data required in the Guidelines will be achieved.	■ The Study Plan has been revised to include ARU deployment during spring migration (April 15-May 31), fall migration (August 1-September 30) and early winter (December 1-December 31) or late winter (March 1-31). Proposed winter sampling is reduced due to temperature limitations of ARU. ■ Planned sampling frequency and analysis proposed during spring and fall migration and early winter (i.e., three 3-minute segments randomly selected from the Morning Period per week) is in line with recommendations in section 8.9 of the Guidelines (page 54). ■ Specific locations and dates of ARU deployment will be provided at a later date.	■ Birds Study Plan: Section 7.2.2

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WH-13	■ Section 4.3.1.1 Field Study Design – "The location of survey sites is expected to be spatially uneven due to differences in habitat diversity across the RSA. Furthermore, the proposed routes are remote with limited access to important habitats and features. To reduce potential bias associated with selecting locations where access can be achieved by helicopter and for a robust subset of sites, a secondary analysis will be run to determine if any vegetation community types will be missed through this approach to assure all individual pre-typed vegetation communities are represented. Should additional sites require Ground Investigations, additional helipads may need to be cut. This approach will be used to assure that rare habitats and features receive adequate sampling that is not biased due to limited access."	■ Section 8.9 – "1. Within each sampling year, ARUs should be deployed at sites as long as possible, with a minimum period of May 1 through July 10 (Breeding Recordings). Use deployments that maximize full use of battery and sound card capacity; – 2. A subset of at least 50% of the ARU sites should have ARUs deployed to align with periods during which sites are used by birds in fall migration (August 1 through September 30) and during the winter (December 1 though March 31) (i.e., collectively, Fall/Winter Recordings). These fall and winter sites may be a subset of either entire ARU transects or sites along transects but land cover analysis should be used to ensure the subset is an unbiased sample of the population of ARU sites."	■ It is unclear if the requirements in Section 8.9 of the Guidelines will be met. More information is needed to identify the locations of ARU deployments and a detailed treatment of the location schedule.	■ Provide details to demonstrate an alignment with the Guidelines, including numbers of ARUs, specific dates of their deployment and re-deployment to new locations, and explanations of the rationale for the selected schedules.	■ The Study Plan has been revised to include ARU deployment during spring migration (April 15-May 31), fall migration (August 1-September 30) and early winter (December 1-December 31) or late winter (March 1-31). Proposed winter sampling is reduced due to temperature limitations of ARU. ■ Planned sampling frequency and analysis proposed during spring and fall migration and early winter (i.e., three 3-minute segments randomly selected from the Morning Period per week) is in line with recommendations in Section 8.9 of the TISG (the Agency 2020a). ■ Specific locations and dates of ARU deployment will be provided at a later date.	■ Birds Study Plan: Section 7.2.2
WH-14	■ Section 4.3.1.1 Field Study Design – "Bird indicator data will be collected within the following important habitats and features identified in the TISG: • Water bodies, wetlands, watercourses; • Riparian habitat; • Riverbanks of eroded habitats; • Artificial water sources; • Forest, forest patches, solitary trees (especially old decaying trees); • Forest edges and tree rows; • Ridges, including eskers; • Cliffs, rock outcrops, exposed bedrock, talus, and other karst topography; • Building, bridges, and other anthropogenic features; and • SAR critical habitat."	■ Section 7.2 – "Information sources and data collection methods used for describing the baseline environmental, health, social and economic setting may consist of the following sources of information. For specific sources of baseline information, see Appendix 1. – Important habitats and features to include: • water bodies, wetlands, watercourses; • riparian habitat; • river banks or other eroded habitats; • artificial water sources; • forest, tree patches, solitary trees (especially old decaying trees); • forest edges and tree rows; • ridges, including eskers; • caves and mines; • cliffs, rock outcrops, exposed bedrock, talus, and other karst topography; • buildings, bridges, and other anthropogenic features, including linear features; • sources of artificial lighting attracting insects;	■ Detail on proposed survey location selection is sufficient, but it does not align with the Guidelines. ■ This plan uses the list of important habitats and features in Section 7.2 of the Guidelines as an explanation of survey location selection, but that is not how the list was presented in the Guidelines. The Guidelines present this list with respect to potential sources of baseline information in general. It is not intended as a basis for sampling or a list of recommended features to survey for birds.	■ Provide details to demonstrate that the proposed survey design, including location selection and data collection, will meet the requirements in Section 8.9 of the Guidelines.	■ Important habitats described in Section 4.3.1.1 of the TISG (the Agency 2020a) have been integrated into the breeding bird study design using point counts and ARUs (forests, forest edges, ridges/eskers, riparian, watercourses) or through marshbird call playback (wetlands), species-specific surveys (river banks, cliffs, rock outcrops, exposed bedrock, talus, and other karst topography), and aerial surveys (wetlands, waterbodies, watercourses).	■ Birds Study Plan: Section 7.2.2.1 and Table 7.2.

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		• critical habitat; and • any other habitat features known to be important in the area."				
WH-15	■ Section 4.3.1.1 Field Study Design – "A point count survey location will be conducted within each vegetation community identified for Ground Investigations, within 1 km of helicopter landing pads. Note that pre-selected Ground Investigation locations may be revised based on site conditions observed during field investigation… Based on the anticipated size of the PSA (greater than 4000 hectares [ha]), the intent of the field program is to complete field verification on 15-25% of the vegetation communities within the PSA. This percentage represents a Survey Intensity Level 4 according to the Standard for Terrestrial Ecosystem Mapping in British Columbia (EWG 1998). Although these guidelines originate in British Columbia, a similar guideline to provide consistency across projects has not been developed for Ontario and therefore should be an acceptable approach. This sampling intensity is the survey intensity level recommended for most mapping and is appropriate for a Project of this size and represents a respectable compromise between costs and meaningful data collection. Ground Inspections and Visual Checks will be conducted in accordance with the survey intensity levels (EWG 1998) at a ratio of 25:75 respectively. Although every effort will be made to adhere to this sampling intensity, the Project is located in a remote part of Canada with limited access. Access to vast portions of the proposed CAR will only be available by air, therefore survey locations will be limited to where a helicopter is capable of landing (i.e., cut helicopter landing pads, grassy riparian areas)."	■ Section 7.2 – "Baseline data must be collected in a manner that enables reliable analysis, extrapolations and predictions. Resulting data should be suitable for analyses to estimate pre-project baseline conditions, derive predictions of impacts, and evaluate and compare post-project conditions and at scales of within and across the Project, Local and Regional Assessment areas. Modelling methods, error estimates and assumptions should be reported (as per section 7.1). Modelling and simulations should be used early in the planning phase to estimate the necessary sampling intensity and to quantitatively evaluate the effectiveness of design options."	■ Rationale is provided for this level of sampling in relation to mapping vegetation communities, but rationale is needed to indicate that this sampling intensity is adequate for each wildlife VC.	■ Provide detail to demonstrate how the requirements in Section 7.2 of the Guidelines will be integrated into survey design, including providing a rationale for the selected sample size for all surveys discussed in Section 4.3 of the study plan.	■ Simulation modelling using preliminary bird data was conducted to determine the total number of site visits required to adequately sample the various bird VCs and bird SAR VCs beyond the initial 2018-2019 field season. The upcoming work plan will provide a breakdown of the number of survey stations by land cover. The sample frequency and intensity for various bird SAR have been provided based on a beta diversity analysis / species accumulation curve using preliminary data or a binomial expansion of published detection probabilities. ■ The Study Plan is updated to provide detail on how the sampling locations for bat surveys are determined by habitat suitability in the desktop review. Wolverine aerial tracking survey transects are based on a modified protocol for aerial caribou surveys (MNRF 2018), due to the relatively low density of wolverine. Survey design for furbearer winter tracking, motion sensitive camera tracking, and wolverine hair snag trap surveys are described in the Study Plan.	■ Wildlife Study Plan: Section 7.2.1.2 and Section 7.2.3.2 ■ Birds Study Plan: 7.2.2.1 and 7.2.2.5

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WH-16	■ Section 4.3.1.2 – Breeding Bird Point Counts "Only observers skilled in bird identification by sight and sound will be used for breeding bird surveys. Furthermore, additional bias will be removed by recording all bird vocalizations during breeding bird surveys using a high-quality portable recording device mounted on a tripod. Observer and recorder data will be compared for further analysis."	■ Section 8.9 – "Observers should be skilled in bird identification by sight and sound, and should use 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. Estimated distances from observers to each bird should be recorded as: 0-50m, 50m-100m, and beyond 100m… acoustic files should be analysed by interpreters skilled in identifying birds by sound and familiar with bird communities of the region sampled. Interpretation of acoustic files should be done using the Wildtrax interface"	■ Observers should have skills in relation to northern Ontario birds since bird communities differ geographically and some species sing with regional dialects. ■ Recordings using the Zoom H2n digital recorder or equivalent in conjunction with observers is an appropriate approach.	■ Provide details to demonstrate that that the observers have skills specifically related to northern Ontario birds.	■ The Study Plan is updated to indicate that only observers skilled in Northern Ontario bird identification by sight and sound will be used for breeding bird point counts, and will capture bird calls using the Zoom H2n digital recorder to remove additional bias.	■ Birds Study Plan: Section 7.2.2.1
WH-17	■ Section 4.3.1.3 Marsh Bird Call Playback Surveys – "where suitable habitat is encountered during the breeding bird point counts"	■ Section 8.9 – "Collect data in a manner that enables reliable extrapolations in space (i.e., at minimum to Project, local and regional study areas) and in time (i.e., across years)…. – ….design suggestions for Project Study Area and Local Study Area scales: Use a standardized design approach during survey planning. The resulting design details will serve as the basis to develop alternative designs, evaluate options for particular design details, and to identify potential efficiencies. The approaches and tools suggested elsewhere in this document (e.g., land cover analysis, data simulations) should be considered during the planning phase. The following should be considered as inputs to design planning and evaluation…."	■ It is unclear how the requirements in Section 8.9 of the Guidelines related to survey design and sampling will be met.	■ Provide details to demonstrate how the survey design requirements in Section 8.9 of the Guidelines were integrated into the Marsh Bird Call Playback Surveys described in Section 4.3.1.3 of the study plan.	■ Marshes account for less than 0.1% of the LSA and will be examined separately from the breeding bird survey design due to their small numbers. To survey the largest number of marshes that can practicably be reached, a desktop review combined with aerial reconnaissance were used to identify suitable marsh habitat in proximity to breeding bird survey stations selected using the Generalized Random Tessellation Stratified Study Design. A total of 10 survey stations were identified. Efforts will be made to identify additional marsh bird call playback survey stations.	■ Birds Study Plan: Section 7.2.2.3

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WH-18	■ Section 4.3.1.8 Data Collection – "During the breeding season, one 3-minute segment per week will be randomly selected from the Night Period (midnight to 1 hour before sunrise), two 3-minute segments per week from the Morning Period (1 hour before sunrise to 5 hours after sunrise), and one 3-minute segment per week from the Dusk Period (30 minutes before sunrise to 2 hours after sunset)."	■ Section 7.2 – "The Impact Statement must provide detailed descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental, health, social and economic condition that is described, in order to corroborate the validity and accuracy of the baseline information collected." ■ Section 8.9 – "survey protocol planning should include modeling and simulations to estimate sampling requirements, and analysis to evaluate resulting design options:"	■ The information provided in Section 4.3.1.8 of the study plan does not align with the requirements in Sections 7.2 and 8.9 of the Guidelines. More information is needed to corroborate the validity and accuracy of the baseline information collected.	■ Provide detailed descriptions of the survey protocols and methods followed to demonstrate that the planned survey will enable modelling for reliable conclusions about breeding bird abundances. Provide anticipated sample sizes.	■ The Study Plan is updated to include details on survey protocols, design, methodology and data manipulations to address requirements of the Sections 7.2 and 8.9 of the TISG (the Agency 2020a). ■ Additional information regarding sampling dates and locations will be provided at a later date.	■ Birds Study Plan: Section 8 and Section 9.4
WH-19	■ Section 4.3.2.2 Acoustic Surveys – "Acoustic surveys will be designed to account for inter-annual and within-season variability in habitat use by taking place during multiple nights in the late spring, summer and fall seasons to capture bat dispersal and identify breeding and roosting habitats. Field surveys will be conducted over a minimum of two years to improve the understanding of natural variability in populations." ■ Section 4.3.2.3 Data Collection – "The acoustic surveys targeted for maternity roosting structures will be conducted using Wildlife Acoustic Song Meter SM4BAT monitors. ARUs will be programmed to record ultrasonic activity nightly beginning 30 minutes before sunset to 30 minutes after sunrise for at least 10 days during the maternity roosting period of June 1 to June 30. In addition to maternity roost surveys, any suspected bat hibernacula features documented during the background review or aerial reconnaissance exercises will require similar acoustic surveys. The potential hibernacula will be searched to identify all possible entrances and ARUs will be installed within 10 m of all openings	■ Section 8.11 – "to augment existing information sources and collect data able to robustly establish baseline conditions and assess impacts, undertake site-specific surveys to: • compile a species inventory (species present/not detected); • quantify baseline bat activity to evaluate relative use of different habitats or features in the project area and to help support and evaluate project siting decisions and impact predictions; • document baseline conditions within the project Area and Local Assessment Area to support study of impacts; • the following types of surveys are required: ○ acoustic surveys, ensure study design is statistically valid, conducted in spring, summer, and fall to capture dispersal and migration (travel corridors), breeding, and roosting…"	■ Section 4.3.2.2 indicates that acoustic surveys will take place in spring, summer, and fall; however Section 4.3.2.3 only provides information for surveys in June and potentially August, if suitable hibernacula habitat is discovered. ■ In addition, targeting survey locations to only suitable roosting and hibernacula habitat may not capture dispersal and travel corridors.	■ Clarify and provide rationale for how bat survey design meets the requirements in Section 8.11 of the Guidelines.	■ The bat study design includes a desktop habitat suitability exercise to locate and identify maternity roosts, foraging areas, dispersal and travel (migration) corridors and hibernacula. ■ This section has been revised to indicate that acoustic surveys will take place in spring (maternity) and fall (swarming). ■ As discussed during the technical discussion on September 11, 2020, methods for bat migration surveys are not currently described in Ontario's guidance document, so potential migration corridors will be identified solely through desktop analysis.	■ Wildlife Study Plan: Section 7.2.2.1

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	following the above stated procedures during the peak swarming period of August 1 to August 31. They will be programmed to commence recording at dusk for five hours for up to 10 nights from August 1 to August 31, or until evidence of bat presence is found, whichever occurs sooner."					
WH-20	■ 4.3.3 Amphibians and reptiles – "Through the course of the field program, any incidental amphibian and reptile encounters will be documented. – The distribution and location, abundance and population status, information on life cycles and movements and habitat requirements of species identified by these practises will be quantified wherever possible." ■ Section 4.3.4 Mammals – "Any mammal species that are likely to be directly or indirectly effected by the activities taking place within the PSA and LSA will be identified. The distribution and location, abundance and population status, information on life cycles and movements and habitat requirements of species identified will be quantified and recorded where possible."	■ Section 8.10 – "identify wildlife species, other than avian species, of ecological, economic or human importance (particularly to Indigenous peoples), within the study area (including moose, rabbit, beavers, otters, muskrat, and frogs), that are likely to be directly or indirectly effected and describe each species: biodiversity, distribution and location; abundance and population status; life cycle; seasonal ranges, migration and movements; habitat requirements; and sensitive periods (e.g., seasonal, diurnal and nocturnal). For the species identified above, describe and quantify the habitat type, including its: function; location; suitability; structure; diversity; relative use, natural inter-annual and seasonal variability, and; abundance as it existed before project construction"	■ It is unclear under what circumstances it would not be possible to provide the required information. ■ It is unclear how baseline data will be collected for amphibians and reptiles that will allow for comparison to the "Expression of Change" listed in Table 6-1 if only incidental observations are being documented. ■ It is unclear how the requirements in Section 8.10 will be met in relation to frogs if only incidental observations are being documented. ■ Additionally, biodiversity, seasonal ranges, migration, movements, sensitive periods and habitat type also need to be described, as per Section 8.10 of the Guidelines.	■ Provide detail to demonstrate that biodiversity, distribution and location; abundance and population status; life cycle; seasonal ranges, migration and movements; habitat requirements; sensitive periods (e.g., seasonal, diurnal and nocturnal) and habitat type will be described for wildlife species, other than avian species, of ecological, economic or human importance (particularly to Indigenous peoples), per Section 8.10 of the Guidelines. ■ Provide information regarding the methods and approaches used for each aspect of the requirement and each species.	■ Amphibian acoustic surveys are proposed as a systematic approach to collect data over space and time during the breeding and non-breeding season. Mammal data analysis methods have been updated to fit requirements of Section 8.10 of the TISG (the Agency 2020a).	■ Wildlife Study Plan: Section 7.2.2, Section 8.2, Section 7.2.3.2, and Section 8.3.
WH-21	■ Section 5.2 Birds – "The number of species detected by different methods at the same time and at the same point will be compared using a multiple regression statistical analysis, such as a Generalized Linear Mixed Model, with survey point ID defined as a subject and various survey methods as repeated measurements. We will compare the number of species detected during breeding bird point counts, breeding bird point counts corrected by a high-quality portable recording device, and ARU performed at the same time. In the model, we will include survey type (breeding bird point counts, breeding	■ Section 8.9 – "Identify the biodiversity metrics, biotic and abiotic indicators that are used to characterize the baseline avifauna biodiversity and discuss the rationale for their selection: • species communities should not be collapsed into diversity metrics or the focus narrowed to indicator species. – Species identity, distribution, abundance and where possible estimates of breeding status should be the primary targets of quantification. • biodiversity metrics for each valued component should include: ○ distribution in space; ○ frequency of occurrence;	■ The study plan does not align with the Guidelines. Differences in species detection based on sampling method should be incorporated directly into the species community modelling.	■ Provide detail to demonstrate how differences in species detection will be incorporated into the species community modelling, as required to be compliant with Section 8.9 of the Guidelines.	■ The Study Plan is updated to include paired sampling from breeding bird point counts and handheld recorders (a surrogate for ARUs) to estimate statistical offsets that correct biases in ARU data relative to human observers. These offsets will be used to calibrate count data by ARUs using the methods of Val Wilgenburg et al. (2017) and Bombaci and Pejchar (2018). For surveys with human observers only, the observer will be added as a covariate in modelling.	■ Wildlife Study Plan: Section 8.1 Birds Study Plan: Section 8

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	bird point counts corrected by a high-quality portable recording device, and ARU), observer, and habitat type. – …. Species diversity in each habitat type will be calculated using the Shannon-Weiner Diversity Index (Shannon and Weaver 1949) during spring migration, the breeding season, and fall migration."	○ patterns of occurrence and abundance in time; ○ abundance and, if possible, density; and ○ associated habitat type(s) and strength of associations."				
WH-22	■ Section 5.2 Birds – "Rare species will be accounted for in the statistical analysis recognizing that they may be more difficult to detect."	■ Section 8.9 – "rare species require more survey effort to detect than common species, and species rarity should be accounted for in survey design by increasing the number and duration of surveys"	■ The survey design must address sampling for rare species. An intention to account for rare species in the statistical analyses does not replace ensuring that sufficient data has been collected via the survey design to enable modeling their abundance and distribution.	■ Provide detail to demonstrate how species rarity has been accounted for in the survey design, as per the requirement in Section 8.9 of the Guidelines.	■ The Study Plan is updated to include two approaches for sampling for rare species in the study design for ARUs. The first is based on a beta diversity analysis / species accumulation curve of preliminary breeding bird data in 2018 which indicated that a sample size of 15 was sufficient to identify rare species. This is used as a general ARU sampling frequency per season (winter, spring migration, breeding, fall migration). The second is specific to rare species identified only through ARUs where scientific literature is available on species-specific detection rates using ARUs (Common Nighthawk, Eastern Whip-poor-will, Yellow Rail). A binomial expansion of these detection rates targeting a 95% cumulative probability of detection is used for these species.	■ Birds Study Plan: Section 7.2.2.
WH-23	■ Section 6.1 <u>Indicators and Expression of Change</u> – [Table 6-1. column Expression of Change]	■ Section 7.1 – "In describing the biophysical environment, the Impact Statement must take an ecosystem approach that considers how the Project may affect the structure and functioning of biotic and abiotic components with the ecosystem using scientific, community and Indigenous knowledge regarding ecosystem health and integrity, as applicable. The Impact Statement must provide a description of the indicators and measures used to determine ecosystem health and integrity, identified during early planning and reflected in the TISG. The presence of habitat, such as but not limited to spawning shoals, aquatic vegetation or	■ It is unclear whether these are potential mechanisms of change that will not be measured or whether these are responses that will be measured. If these are intended as measured responses, justification for these should be provided, explanations of why more common measures (e.g. relative abundance) are not being used, and detailed explanations of methods should be provided.	■ Provide details to clarify and justify the measures chosen for the expression of change and provide detailed explanations of the methods that will be used.	■ The Study Plan is updated to clearly show that the indicators have been selected and how they were selected. Expressions of change are quantifiable and measurable, and relative abundance has been added as expression of change.	■ Table 9-2

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		overwintering pools, potentially affected by the Project should be included in the description of the biophysical baseline conditions."				
WH-24	■ Section 6.1 Indicators and Expression of Change – "The indicators and rationale for selection and measurement of potential effects, to be used to assess and evaluate the alternative routes in the IA / EA are provided in Table 6-1. Breeding Birds (including SAR-olive-sided flycatcher, rusty blackbird and common nighthawk)"	■ Section 8.9 – "the following groups of migratory and non-migratory birds should be considered as valued components: forest birds; raptors; shorebirds; waterfowl; and bog/fen birds, and other wetland birds." ■ Section 15.2 – "analyze predicted effects for all birds, each valued component, and for Bird Conservation Region Priority Species and include relevant effects from Appendix 2 and 3. Include separate analyses for each project activity, component, and phase. Incorporate sources of error for all analyses to insure final impacts estimates show the best available estimate of precision"	■ As valued components, each specified bird group should be included in the effects assessment.	■ Provide detail about the effects assessment methodology for each valued component identified in the Guidelines related to this study plan (birds, wildlife, species at risk).	■ The Study Plan is updated to indicate that breeding birds are categorized into their respective bird group (including species at risk) in the effects assessment. Methods for the effects assessment are described for each group.	■ Birds Study Plan: Table 9-2 and Section 9.2
WH-25	■ Section 6.1 Wildlife Indicators – "Habitat availability and distribution • Survival and reproduction (Population state) • Disruption to breeding behaviour • Fragmentation of habitat • Effects to prey population or access to food • Change in wildlife behaviour (during and after construction) – Change in wildlife mortality (due to increase anthropogenic stressors; hunting, trapping, vehicle travel, etc.)"	■ Section 15.2 – "account for indirect effects such as the increased movement of predators in the predictions of mortality effects"	■ It is unclear if the effects of increased movement of predators in the predictions of mortality effects will be included.	■ Provide detail to demonstrate how the requirement to account for increased movement of predators in the prediction of mortality effects will be addressed, per Section 15.2 of the Guidelines.	■ Predictions of mortality effects from increased predator movements will be estimated using motion sensitive tracking camera data. ■ Pre- construction data of predators and herbivores along planned linear features (i.e., the routes and secondary access roads) will be compared against estimates based on a desktop review to account for increased movement of predators in predictions of mortality effects.	■ Wildlife Study Plan: Section 8.3.4
WH-26	■ Section 6.1 Indicators and Expression of Change – "Effects to SAR will consider potential direct, incidental and cumulative adverse effects of the Project on SAR and, where applicable, its critical habitat." ■ Section 7 Conformance with Federal and Provincial Guidance – "…will be analyzed and addressed in the IA/EA"	■ Section 15.4	■ Section 15.4 of the Guidelines includes additional specific considerations for the effects assessment, as well as considerations when describing potential and predicted effects. ■ It is unclear if all relevant requirements from Section 15.4 of the Guidelines will be addressed for each species at risk.	■ Provide detail to demonstrate that all requirements from Section 15.4 of the Guidelines will be met for all SAR. Describe the methods and approaches taken to meet the requirements for each SAR.	■ The Study Plan has been updated to describe the methods for meeting the requirements in Section 15.4 of the TISG (the Agency 2020a) with respect to data collection and considerations for the effects assessment are generally described for SAR. Specific methods and approaches will be described in greater detail in the IS / EA Report.	■ Wildlife and Birds Study Plans: Section 8 and Section 9.4.2.

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WH-27	■ Section 6.2 Methods for predicting future conditions – "Modelling methods, error estimate and assumption will be reported when possible." ■ Section 6.2.1.3 Model Confidence and Resolution – "That being said, models will be based on best available science and will be thoroughly described including assumptions, calculations of margins of error and other relevant statistical information when possible."	■ Section 7.1 Methodology – "If the baseline data have been extrapolated or otherwise manipulated to depict environmental, health, social and/or economic conditions within the study area, modelling methods must be described and must include assumptions, calculations of margins of error and other relevant statistical information. Models that are developed should be validated using field data from the appropriate local and regional study areas" ■ Section 8.9 – "Provide estimates of confidence or error for all estimates of abundance and distribution. Estimates should be defined (e.g., mean across years, mean across sites, modeled prediction) and, if appropriate, confidence or other intervals should be defined (e.g., 95% confidence intervals, credible intervals). Use of hypothesis testing p - values is generally not appropriate in this context and their use should be justified"	■ It is unclear if estimates of confidence or error for all estimates of abundance and distribution of birds will be provided, as per the requirement in Section 8.9 of the Guidelines. Published studies are unlikely to be sufficient replacement for data collection, data analysis and area specific modeling for this project area. ■ Section 7.1 of the Guidelines requires that modelling methods be described and must include assumptions, calculations of margins of error and other relevant statistical information. ■ It is unclear under what circumstances it would not be possible to provide this information. The Agency would like to reiterate that the Impact Statement is expected to address all requirements from the Guidelines.	■ Provide detail to demonstrate that estimates of confidence and error for all estimates of abundance and distribution of birds will be provided. Ensure that modelling methods, including assumptions, calculations of margins of error and other relevant statistical information are provided for any quantitative model used (including for other wildlife presented in this study plan).	■ The Study Plan is updated to provide the modelling methods, including assumptions, calculations of margins of error and other relevant statistical information for all models proposed for birds and other wildlife.	■ Wildlife and Birds Study Plans: Section 9.4.1
WH-28	■ Section 6.2.1 Wildlife Habitat Development – "HSI models will be developed by gathering background information on wildlife indicators which will be summarized into species accounts, developing wildlife habitat ratings based on this background information, and evaluating the models against field conditions. – HSI models are a simplification of the relationships among environmental parameters and habitat quality based on expert opinion. These models are limited by the extent of knowledge about a species, species-specific habitat use, and the ecosystems. The HSI models developed will be based on the evaluation of ELC units and their assumed relationships to a wildlife VC's habitat suitability in the LSA. That being said, models will be based on best available science and will be thoroughly described including assumptions, calculations of margins of error and other relevant statistical information when possible."	■ Section 7.1 – "If the baseline data have been extrapolated or otherwise manipulated to depict environmental, health, social and/or economic conditions within the study area, modelling methods must be described and must include assumptions, calculations of margins of error and other relevant statistical information. Models that are developed should be validated using field data from the appropriate local and regional study areas." ■ Section 7.2 – "If using existing data sources, the Impact Statement must provide justification to show that the data sources are relevant in spatial and temporal coverage to the Project. Some data sources may have good coverage in Southern Ontario or existing road networks but be unsuitable as a baseline for these northern areas where there are not roads…. – ….Existing data should be considered as a limited augmentation of this new data."	■ It is not clear whether and how collected data will be incorporated into the process described in this section. Qualitative information can often be valuable to augment data but the Guidelines recommends the collection and analysis of study-area specific, quantitative data, using current and accepted quantitative analytic approaches. ■ It should be made clear how assumptions based on published information, much of which is likely to be of limited or unknown relevance to the particular project area, will be sufficiently valid in the absence of quantitatively including collected, local data.	■ Provide details to demonstrate how collected data will be incorporated into the process described in Section 6.2.1 of the study plan. ■ Provide details to demonstrate how the data sources are relevant in spatial and temporal coverage to the Project and how the models will be validated using field data from the study areas, as per the requirements in Sections 7.1 and 7.2 of the Guidelines.	■ The Study Plan is updated to describe how the quantitative, locally collected data will be incorporated in model development and that all data sources will be spatially and temporally relevant to the Project.	■ Wildlife Study Plan: Section 9.4.2

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WH-29	■ Section 6.2.2 Predicted Effects of the Project – "For migratory birds, A Framework for the Scientific Assessment of Potential Project Impacts on Birds (Hanson et al. 2009) will be consulted to assist in analyzing predicted effects for all birds including non-linear, indirect and synergistic responses where possible and applicable. Any assumptions of displacement will be justified with scientific references and best management practices."	■ Section 8.9 – [all content] ■ Section 15.2 – "analyze predicted effects for all birds, each valued component, and for Bird Conservation Region Priority Species and include relevant effects from Appendix 2 and 3. Include separate analyses for each project activity, component, and phase. Incorporate sources of error for all analyses to insure final impacts estimates show the best available estimate of precision;"	■ Based on the information provided in Section 6.2.2 of the study plan, It is unclear if *A Framework for the Scientific Assessment of Potential Project Impacts on Birds* (Hanson et al. 2009) will be consulted to assist in analyzing predicted effects for all birds or migratory birds only. ■ To reliably analyze predicted effects, per Section 15.2 of the Guidelines, baseline data must be designed, collected, and analyzed according to the direction provided in Section 8.9 of the Guidelines. Detailed descriptions of design process and design outcomes (including maps, sample sizes overall and by landcover type) are required to understand and evaluate the design relative to the Guidelines.	■ Provide details to demonstrate that baseline data will be collected according to the direction provided in Section 8.9 of the Guidelines. ■ Generate predictive estimates of abundance (or density/occurrence if justified) across the LSA, PSA, and RSA and provide predictive estimates with associated margins of error at scales that are justified at the scale and shape of the study areas through modelling. Total area may not be an appropriate measure of scale for linear projects that are small scale at any point, but stretch along a large area due to length. Use modelling to predict local effects along the project as well as larger scale patterns along the length of the project. Useful predictions require data inputs from each of the study areas to which extrapolations will be made.	■ The Study plan is updated to show that Hanson et al. (2009) will be consulted for all indicators. This includes detailed descriptions of the design process and outcomes.	■ Birds Study Plan: Section 8
WH-30	■ Section 7 Conformance with Federal and Provincial Guidance – "Outlined as Indicators and Expressions of Change. To be addressed in the IA/EA"	■ Section 15.3 – "describe changes to insects, pollinating species in particular"	■ Section 7 of the study plan states that changes to insects is outlined as indicators and expressions of change. It is not clear how the indicators and expressions of change in Sections 6.1 and 6.2 will enable description of changes to insects.	■ Provide detail to demonstrate how changes to insects will be described, as per the requirement in Section 15.3 of the Guidelines.	■ Changes to insect habitat availability and spatial and temporal distribution will be assessed in the effects assessment.	■ Wildlife Study Plan: Section 8.4 and Section 9.2
WH-31	■ Section 7 Conformance with Federal and Provincial Guidance – "This requirement is partially addressable as: • Overwintering surveys are not feasible as the lower limit of a SM3BAT operating temperature is -20 degree Celsius"	■ Section 8.9 – "Collect bird data to adequately represent the following temporal sources of variation: • among years; • within and among seasons (e.g., spring migration, breeding, fall migration, overwintering); and • within the 24-hour daily cycle."	■ The model noted in the plan text (i.e. SM3BAT) is for bat monitoring and is not suitable for surveying birds. ■ ARUs can be deployed in late winter to provide an index of overwintering bird use of sites. Although extreme cold impair some individual programmed recording events, site use by overwintering birds should not be eliminated from data collection efforts (note 2: Wildlife Acoustics. Climate Change Canada – Landbird Monitoring Along Winter Roads. https://www.wildlifeacoustics.com/customer-stories/climate-change-canada-landbird-monitoring-along-winter-roads)	■ Provide details to demonstrate how overwintering surveys will be conducted, as per the requirements in Section 8.9 of the Guidelines and the information provided in the context column.	■ The Study Plan is updated to indicate that ARUs will be deployed in either early winter (December 1 to December 31) or late winter (March 1 to March 31). ARU bird studies are outlined in detail in the Study Plan to meet section 8.9 of the guidelines with respect to overwintering bird surveys.	■ Birds Study Plan: Section 7.2.2 and Table 7-3

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WH-32	■ Section 7 Conformance with Federal and Provincial Guidance – "The requirement cannot be addressed as: • Project components other than the route itself are unknown at this time"	■ Section 8.9 – "Project components other than the route itself should be sampled. Such components that are linear (e.g., access or service roads) should be surveyed using transects as above. Non-linear components (e.g., aggregate pits) should be surveyed using a grid of sites spaced 250 metres apart and be sufficient to cover the Project component, plus a maximum 3-kilometre buffer. As with transect lengths, modification of buffer width to a minimum of 500 metres may be justifiable if land cover analysis demonstrates no further change in land cover classification with increasing buffer width"	■ A sampling plan was not presented for baseline conditions in relation to service roads, aggregate pits and project components other than the road itself. Information about these project components and sampling plans enable the evaluation of the plans relative to the Guidelines. ■ Section 8.9 of the Guidelines require that project components other than the route itself are sampled. If the exact locations of the other components are not known at this time, the study plan should outline how this requirement will be met once the locations are confirmed. ■ Include potential project components in the study design. For example, Figure 1-2 in document IA#13143E, the detailed project description shows potential sources of aggregate.	■ Provide details to demonstrate how project components, other than the route itself, will be sampled. Include information about the methods and approaches that will be used to address the requirement in Section 8.9 of the Guidelines.	■ Study Plan **Section 6.2** indicates that the PDA encompasses the 100 m wide CAR right-of-way, temporary construction access roads, work areas, worker camps, and long-term aggregate sources and associated access roads. The specific location of Project components, including the roadway, pits and quarries, aggregate source areas and temporary infrastructure, are not yet known and will be included in the IS / EA Report.	■ Birds and Wildlife Study Plans: Section 6.2
WH-33	■ Section 7 Conformance with Federal and Provincial Guidance – "This requirement is partially addressable as: • According to the Atlas of the Breeding Birds of Ontario, the window for the standard breeding surveys (e.g., point counts) in northern Ontario is June 1 to July 10 and in the Hudson Bay Lowlands is June 1 to July 17. • Overwintering surveys not feasible as lower limit of SM3BAT operating temperature is -20 degree Celsius"	■ Section 8.9 – "Regarding "bird sampling"… a) Within each sampling year, ARUs should be deployed at sites as long as possible, with a minimum period of May 1 through July 10 (Breeding Recordings). Use deployments that maximize full use of battery and sound card capacity; b) A subset of at least 50% of the ARU sites should have ARUs deployed to align with periods during which sites are used by birds in fall migration (August 1 through September 30) and during the winter (December 1 through March 31) (i.e., collectively, Fall/Winter Recordings). These fall and winter sites may be a subset of either entire ARU transects or sites along transects but land cover analysis should be used to ensure the subset is an unbiased sample of the population of ARU sites; c) ARU deployments for Breeding Recordings should be programmed to record daily or every 2nd day,	■ Species vary in their peak breeding and detectability periods. Guidelines from the 2nd Ontario Breeding Bird Atlas were intended to focus human surveys within a period of peak breeding by many or most species. Sampling with ARUs should capture the full extent of the breeding period, not only the restricted peak time for most species. ■ Since eskers may serve as migration corridors for many bird species, use ARUs to sample earlier spring and fall periods to provide information on migrating species using the project area.	■ Provide details to demonstrate how sampling with ARUs will be conducted, as per the requirements in Section 8.9 of the Guidelines and the information provided in the context column.	■ The Study Plan has been revised to include ARU deployment during spring migration (April 15-May 31), fall migration (August 1-September 30) and early winter (December 1-December 31) or late winter (March 1-31). Proposed winter sampling is reduced due to temperature limitations of ARU. ■ Planned sampling frequency and analysis proposed during spring and fall migration and early winter (i.e., three 3-minute segments randomly selected from the Morning Period per week) is in line with recommendations in Section 8.9 of the TISG (the Agency 2020a). ■ Specific locations and dates of ARU deployment will be provided at a later date.	■ Birds Study Plan: Section 7.2.2.4

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		with a morning and an evening schedule. Recording should occur in two phases to avoid single recordings spanning two dates. Phase 1 would 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 would start 30 minutes before local sunset, with a schedule of 3-minutes On and 12-minutes Off until 23:56 (HH:MM); d)ARUs should be set to record using a sampling rate of 44.1 kHz."				
WH-34	■ Section 7 Conformance with Federal and Provincial Guidance – "Data will be collected in ways that enable reliable extrapolations in space and in time. Surveys will be destined to represent the spatial and temporal targets of modeling and extrapolations… – Sample size will be planned to support evaluation of the project within the context of the local study area and regional study area. Study designs will implement multiple survey locations to cover multiple habitat classes and land cover types…. – Survey design sampling effort will be most intense within the project study area. Efforts outside the PSA will be carefully implemented to remove biases when comparing areas from within the PSA."	■ Section 8.9 – "Collect data in a manner that enables reliable extrapolations in space (i.e., at minimum to Project, local and regional study areas) and in time (i.e., across years): • design surveys so that they represent the spatial and temporal targets of modeling and extrapolations, and to produce scientifically defensible predictions of impacts and estimates of mitigation effectiveness. Survey designs should be sensitive enough to detect and quantify the impacts at the spatial and temporal scales identified above (i.e., project study area, local study area, and regional study area), any departures from predictions, and the effectiveness of mitigations. Justify the selection of modeling techniques based on current and recent scientific literature; Sample size must be planned to support evaluation of the project study area within the context of the local study area and regional study area. – Appropriate design of surveys will need to consider multiple survey locations in order to represent the habitat heterogeneity of the regional study area, and to yield multiple survey	■ Information provided in the study plan is not sufficient to verify the assertion that data will be collected in ways that enable reliable extrapolations in space and time, and represent the spatial and temporal targets of modeling and extrapolations. ■ Detailed descriptions of design process and design outcomes (including maps, sample sizes overall and by landcover type) are required to understand and evaluate the design relative to the Guidelines. Following this approach should lead to a detailed platform for evaluating the sufficiency of the selected design, for communicating the rationale for choosing that design, and for communications regarding clarifications, suggestions and recommendations.	■ Provide specific details to demonstrate how the data collection design incorporates and addresses the requirements in Section 8.9 of the Guidelines.	■ The Study Plan is updated to provide the modelling methods, including assumptions, calculations of margins of error and other relevant statistical information for all models proposed for birds and other wildlife.	■ Wildlife and Birds Study Plans: Section 7 and Section 9.4.1

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		locations per land cover or habitat class, without requiring aggregation of habitat classes post-hoc; Sampling effort per unit area - field survey effort should be most intensive within the project study area. The level of effort per unit area may be similar or somewhat less within the remainder of the local study area but should be scaled to the likelihood that project effects will impact birds within that zone. Efforts outside the project study area should be carefully designed to ensure that estimates comparing within and across the project study area, local study area and regional study area are unbiased and as precise as possible;"				
WH-35	■ Section 7 Conformance with Federal and Provincial Guidance – "A point count survey location will be conducted within each vegetation community identified for Ground Investigations, within 1 km of helicopter landing pads. Study design will not implement point count survey sites along 5 km long transects for the following reasons: • Length of transect not reasonable / feasible method given landscape (e.g., dense forest, blow down, water features, etc.) and field staff health and safety considerations, • Evenly space transects conflicts with randomized selection of habitats or if specific (i.e., rare habitats are to be targeted)."	■ Section 8.9 – "design suggestions for Project Study Area and Local Study Area scales: • Use a standardized design approach during survey planning. The resulting design details will serve as the basis to develop alternative designs, evaluate options for particular design details, and to identify potential efficiencies. The approaches and tools suggested elsewhere in this document (e.g., land cover analysis, data simulations) should be considered during the planning phase. The following should be considered as inputs to design planning and evaluation; • transects and sites: ○ transects should be spaced every 2 kilometers along the route, oriented perpendicular to the route, and with the mid-point of each transect located on the centerline of the route. A maximum length of 5 kilometers is likely suitable for sampling most habitat types, including those associated with eskers and similar linear features	■ The suggested design was offered as a foundation for modification, with justifications. Adjustments of suggested design are anticipated and application of proponent-held knowledge and information is likely necessary for those adjustments. ■ Adding bird counts to a Vegetation Study design is unlikely to address the bird information needs described in the Guidelines. ■ Remote fieldwork can often be challenging but can be done safely. Direct and recent field experience by the reviewers and colleagues indicates that it is feasible to deploy acoustic recorders at remote locations that have been pre-selected according to a random, spatially dispersed design. With helicopter drop-offs and overland travel, crews have deployed acoustic recorders on and across eskers, in peatlands, and at forest sites in remote parts of northern Ontario, including in the ecoregions of interest here. With some additional constraints (e.g. daylight, weather) this is also possible to do for bird point counts.	■ Provide detail to demonstrate how the design suggestions in Section 8.9 of the Guidelines were used a basis to develop alternative designs in the study plan. Provide rationale for any modifications.	■ Planned sampling frequency and analysis proposed during spring and fall migration and early winter (i.e., three 3-minute segments randomly selected from the Morning Period per week) is in line with recommendations in section 8.9 of the Guidelines (page 54).	■ Birds Study Plan: Section 7

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		in alignment with the route. Transect lengths less than 5 kilometers may be suitable but should be justified with respect to an analysis of land cover that demonstrates no further change in land cover composition with increasing distance from the intersection of route and transect mid- point"				
WH-36	■ Section 7 Conformance with Federal and Provincial Guidance – "Wildlife data will be collected to represent temporal sources of species variation (i.e. among years, among seasons and within 24 periods)'	■ Section 8.10 – "Collect wildlife 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. Rare species require more survey effort to detect than common species, and this needs to be accounted for in survey design by increasing the number and duration of surveys."	■ More information is needed on the timing of surveys outlined in Section 4.3 to determine whether variation among years and seasons is represented.	■ Provide a schedule for all surveys to be conducted along with detailed survey designs that demonstrates how temporal variation requirements for wildlife data collection would be met, per Section 8.10 of the Guidelines.	■ The Study Plan has been updated with timing information, where available. Further information regarding future sampling locations and dates will be provided in the future Work Plan.	■ Wildlife Study Plan: Table 7-1 and Table 7-2 ■ Birds Study Plan: Table 7-3, Table 7-4, and Table 7-5.
WH-37	■ Section 7 Conformance with Federal and Provincial Guidance – "Section 4.3.1.3?"	■ Section 8.9 – "describe the use of (magnitude, timing) migratory and non-migratory birds as a source of country foods (traditional foods) or where use has Indigenous cultural importance (e.g., Canada Goose, Snow goose, Swans, Gyrfalcon, Loon, Peregrine Falcon, and duck species)"	■ It is unclear how or if the use of migratory and non migratory birds as a source of country foods and species that have Indigenous cultural importance will be described. ■ Note: Table 7.1 has this requirement listed, but the "response" section is blank. Additionally, the referenced section in the study plan has a question mark, which may be an editorial error. However, there is no mention of country foods in the section that is referenced.	■ Provide detail to demonstrate how use of migratory and non migratory birds as a source of country foods and species that have Indigenous cultural importance will be described. Include information about the methods and approaches that will be used to meet the requirement in Section 8.9 of the Guidelines. ■ Update table 7.1 to include a response to section 8.9 TISG requirements.	■ Specific locations and dates of ARU deployment will be provided at a later date.	■ Birds Study Plan: Section 7.2.1
WH-38	■ Section 7 Conformance with Federal and Provincial Guidance – "Long- and short-term habitat changes and food sources of wetland fauna will be described and documented including changes in terms of the health, integrity and availability of habitats related to wildlife, migratory and non-migratory birds"	■ Section 15.2 – "describe short term and long term changes to habitats and food sources of migratory and non-migratory birds (types of cover, ecological unit of the area in terms of quality, quantity, distribution and functions), with a distinction made between these two birds categories, including losses, structural changes and fragmentation	■ It is unclear how all aspects of the requirement in Section 15.2 of the Guidelines will be met. The information provided in Section 7 only refers to wetlands, but the Guidelines require that riparian and terrestrial environments be described as well.	■ Provide detail to demonstrate how all aspects of the requirement in Section 15.2 of the Guidelines will be included in the effects assessment.	■ Long- and short-term habitat changes and food sources of fauna will be described and documented including changes in terms of the health, integrity and availability of habitats related to wildlife, migratory and non-migratory birds.	■ Birds and Wildlife Study Plans: Section 9.4.2

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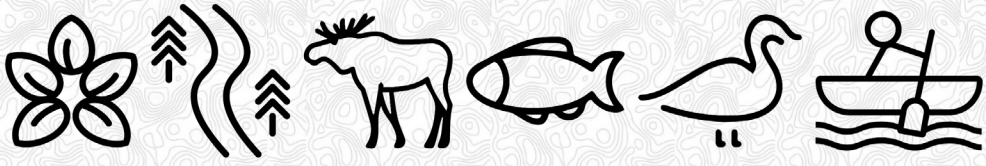
		of riparian habitat (aquatic grass beds, intertidal marshes), terrestrial environments (e.g., uplands, grasslands, forested, old growth, post fire) and wetlands frequented by birds. Describe changes in terms of the health, integrity, and availability of habitats. Important habitats to consider include eskers, (and similar upland features), forest, riparian, bog/fen/peatlands, other wetlands, and open water;"				
WH-39	■ Section 7 Conformance with Federal and Provincial Guidance – "Will be accounted for in the IA/EA – The expressions of change to newly created habitat through the activities of the project will be described in the IA/EA"	■ Section 15.2 – "Account for changes in detection pre- and post-project construction. For instance, roads allow for greater detection distances and therefore any estimates of abundance or presence need to account for differential detectability; describe the effects caused by the new habitat types created in the project area by clearing vegetation. – The new habitats created may attract migratory birds, which were not present before (such as the Eastern Whip-poor-will or the Common Nighthawk). Describe how these species at risk may be impacted by the project."	■ There is not enough information provided to determine if the requirements in Section 15.2 of the Guidelines will be met. There is no discussion about methodologies or studies that will take place.	■ Provide detail in the study plan to demonstrate the proposed approaches and methods to be used to integrate the requirements from Section 15.2 of the Guidelines into the assessment.	■ Post-construction survey requirement will be determined based on the results of the IA / EA, and changes in detectability will be accounted for in the IS / EA Report if impacts are determined.	■ Birds Study Plan: Table 11-3
WH-40	■ Section 7 Conformance with Federal and Provincial Guidance – "Biodiversity metrics for the Wildlife VC will consider: • Distribution in space; Frequency of occurrence; Patterns of occurrence and abundance in time; Abundance and, if possible, density; and Associate habitat types and strength of associations"	■ Section 15.3 – "describe effects to terrestrial wildlife biodiversity considering biodiversity metrics, effects of habitat fragmentation, changes to regional biodiversity"	■ It is unclear how the effects of fragmentation on terrestrial wildlife biodiversity and changes to regional biodiversity will be studied.	■ Provide further detail to demonstrate how changes to regional biodiversity and the effect of fragmentation on terrestrial wildlife biodiversity will be described, as per the requirements in Section 15.3 of the Guidelines.	■ The Study Plan is updated to describe how the effect of fragmentation on biodiversity metrics will be examined pre- and post-construction at the PDA and LSA level.	■ Birds and Wildlife Study Plans: Section 9.4.1.2, 9.4.2

Draft Study Plan Comments – Provincial



Comment # / Ref #	Draft Study Plan Section	Agency/Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Section Reference
1	■ Page 2, s. 2 – Same comment in Wildlife, Ungulates and Vegetation work plans	■ MECP, Environmental Assessment Branch	■ Key objectives of conducting an EA include the elements mentioned in the work plan and also describing the existing environment, describing potential effects (positive and negative) of the project and alternatives, and consult about the project.	■ Suggest the following revisions to add additional key objectives of the EA process: – *The key objectives of conducting an IA / EA are to describe the existing environment, gather sufficient information to predict Project-related effects (positive and negative) of the project and alternatives on the environment, ~~on Ungulates (moose and woodland caribou) and~~ determine measures needed to avoid or minimize adverse Project effects and enhance beneficial Project effects where feasible, and undertake consultation.*	■ Changes made.	■ Birds and Wildlife Study Plans: Section 2
2	■ Page 2, footnote – Same comment in Wildlife, Ungulates and Vegetation work plans	■ MECP, Environmental Assessment Branch	■ The footnote is appreciated though requires clarification. Will the study plans be updated to reflect any other comments during the ToR review process or post-ToR, e.g. federal, Indigenous, public?	■ Please clarify if the study plans will be included with the ToR submission. ■ If not included in the ToR submission, please clarify if and when the project team intends to consult broadly on the work plans. The footnote should also be revised to state that the study plans will be updated to reflect the approved ToR if approval is obtained.	■ The Study Plans will not be included with the ToR submission. They have considered public, agency, and Indigenous input received on the Project to date. Government agencies, interested persons, and Indigenous communities will have the opportunity to comment on components of the study plans throughout the IS / EA Report consultation and engagement process. Further details have been provided in Section 3 of the Study Plans. ■ The revision regarding the footnote has been incorporated into the updated Study Plan.	■ Birds and Wildlife Study Plans Section 4 and Section 5
3	■ Pages 6-7, Figures 3-1 and 3-2 – Same comment in Wildlife, Ungulates and Vegetation work plans	■ MECP, Environmental Assessment Branch	■ Figures 3-1 and 3-2 are missing locations for other project infrastructure – can this be added to the maps?	■ Please add locations of other project infrastructure and associated study areas to Figures 3-1 and 3-2, or clarify when these locations will be known.	■ As noted in **Section 6.2** of the Study Plan "The specific location of Project components, including the roadway, pits and quarries, aggregate source areas and temporary infrastructure, are not yet known and will be included in the IS / EA Report. While most of the Project components are expected to be located within the preliminary 5 km wide study area, benefits (e.g., reduced environmental disturbance, avoidance of sensitive features, technical considerations, concerns received through consultation) for locating Project components on lands outside of the 5 km wide study area may become known during the IA / EA process. If the need to locate Project components outside the 5 km wide study area is determined to be required or of benefit to the Project, the study area would be adjusted."	■ Birds and Wildlife Study Plans: Section 6.2
4	■ Page 27, Table 6-1	■ MECP, Environmental Assessment Branch	■ Minor typo in the 2nd row, 3rd column: “Little **Brow** Myotis.”	■ Fix typo.	■ Typo addressed.	■ Wildlife Study Plan: Table 2-1

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5	■ Page 28, s. 6.2	■ MECP, Environmental Assessment Branch	■ Minor typo in 1st paragraph of section 6.2: “The IA/EA will provide describe the anticipated activities..."	■ Fix typo.	■ Phrase has been removed.	■ No Reference
6	■ Page 30, s. 6.3 – Same comment in Wildlife, Ungulates and Vegetation work plans	■ MECP, Environmental Assessment Branch	■ A few comments on the first paragraph: – It is stated that project phases include construction and operation. It would be helpful if this section clarifies that the construction phase includes decommissioning of temporary infrastructure, per page 14 of the draft ToR. – Residual effects are mentioned but not explained. For clarity, there should be a statement that residual effects (net effects using provincial language) are the effects left over after application of impact management measures, per Ontario’s EA Code of Practice. – The paragraph states the residual effects will “be described in terms of the magnitude, geographic extent, **timing, duration,** frequency, **social and ecological context,** likelihood, and whether effects are reversible or irreversible.” These characteristics are not all the same as what was stated in the draft ToR: “direction, magnitude, geographic extent, direction [sic], frequency, reversibility and likelihood” (p. 54-55 of draft ToR). Bolded font added to show differences. The remainder of section 6.3 describes further effects assessment methodology. The work plan and final ToR should align in methodology.	■ Please add to this section that the construction phase includes decommissioning of temporary infrastructure, using consistent language as the ToR. ■ Please add to this paragraph that ‘residual (net) effects are the effects remaining after the application of impact management measures.’ ■ Please align the work plan methodology with the final ToR methodology in terms of assessing effects and alternatives, or provide sufficient rationale if methodologies are different. Per Ontario’s EA Code of Practice, the evaluation method(s) chosen must be able to produce an assessment that is clear, logical and traceable.	■ The requested revisions have been made.	■ Birds and Wildlife Study Plans: Section 6.1 and Section 9.6.
7	■ Indigenous knowledge Same comment in Wildlife, Ungulates and Vegetation work plans	■ MECP, Environmental Assessment Branch	■ The work plan indicates that the EA will consider Indigenous knowledge to inform the effects assessment. The work plan does not provide a proposed methodology for how the proponent intends to seek Indigenous knowledge, from whom, and how it will be incorporated.	■ Please provide further details about how Indigenous knowledge will be collected and incorporated. Alternatively it may be helpful to include a reference to the relevant components of the ToR and ToR consultation plan that provide further details.	■ As identified in **Section 4.2** of the Study Plan, the Proponent will provide opportunities for consultation and engagement with Indigenous communities identified in **Table 4-1**, which is inclusive of all Indigenous communities identified in the Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment (the Agency 2020a). ■ Further information on how Indigenous Knowledge will be considered in the IS / EA Report has been included in **Section 5** of the Study Plan. **Section 5** of the Study Plan provides further details on the two concurrent and complementary avenues for Indigenous communities and groups to be engaged with and provide input on the Project: the Indigenous Knowledge Program and the Consultation and Engagement Program.	■ Birds and Wildlife Study Plans: Section 4 and Section 5

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8	■ Criteria and indicators table ■ Same comment in Wildlife, Ungulates and Vegetation work plans	■ MECP, Environmental Assessment Branch	■ For the tables containing criteria and indicators, some work plans include the three columns Valued Component, Indicators and Rationale for Selection. Other work plans include the columns Indicator, Expression of Change and Rationale for Selection. The table formats of criteria and indicators should be consistent across work plans. ■ There are also differences between the criteria/indicators in the draft work plans vs. the criteria and indicators in the draft ToR	■ Please review draft work plans to achieve consistent format in how criteria and indicators are presented in the tables. ■ Where there are differences between the criteria/indicator tables in the draft work plans and the draft ToR Appendix A, please ensure the work plans and final ToR align so that the assessment methodology is consistent and to avoid confusion.	■ Study Plans have been updated to ensure consistent format in how criteria and indicators are presented. ■ The criteria and indicators have evolved through input from Indigenous communities, government agencies and interested stakeholders and will continue to do so. The starting point for the criteria/indicator tables in the updated Study Plans was Appendix A of the Proposed ToR. However, there are a few circumstances where agency comments were provided on criteria/ indicators following the finalization of the Proposed ToR and so there are a few circumstances where the criteria/indicators included in the updated Study Plans deviate slightly from that provided in Appendix A of the Proposed ToR.	■ Birds and Wildlife Study Plans: Section 9
9	■ Pg. 4 / Table 3-1	■ MECP, Species At Risk Branch	■ Limited rationale has been provided to substantiate the use of tertiary watersheds to define the Regional Study Area (RSA). The identification of the RSA for Wolverine should be based on Wolverine specific considerations, such as their geographic extent within and across the study areas (e.g., broad use of large landscapes, etc.). This may also include consideration of ecosystem-based considerations relevant to Wolverine (e.g., ecoregions/ecodistricts, Wildlife Management Units, etc.) where appropriate. If watersheds are to be used to identify the RSA, appropriate rationale/ justification needs to be included describing their relevance to Wolverine.	■ Update the draft Work Plan to provide appropriate rationale that supports the use of tertiary watersheds for Wolverine.	■ The Wolverine RSA has been updated to include all WMUs that intersect the Wolverine LSA. The rationale for this selection has been provided in the Study Plan.	■ Wildlife Study Plan: Section 6.2
10	■ Pg. 9 – 10 / s.4.1.1.2 – ■ Crepuscular Bird Acoustic Surveys	■ MECP, Species At Risk Branch	■ Insufficient information is provided on the number and areas of potential habitat that were identified and surveyed for Eastern Whip-poor-will.	■ Update the draft Work Plan to include a map of the potential habitat that was identified and surveyed for Eastern Whip-poor-will.	■ The requested revision has been made.	■ Birds Study Plan: Figure 7-2
11	■ Pg. 10	■ MECP, Species At Risk Branch	■ Document states “ARUs recorded data for two hours starting 30 minutes after sunrise…” – given that the species being targeted (Whip-poor-will and Common Nighthawk) are crepuscular, was this meant to say..”for two hours starting 30 minutes after sunset..”?	■ Correct typo or provide rationale for timing of acoustic studies meant to target crepuscular bird species	■ Changes made.	■ Birds Study Plan: Section 7.2.2
12	■ Pg. 10 / s.4.1.1.2 – 2019 Golder Bird Survey (Crepuscular Bird Acoustic Surveys)	■ MECP, Species At Risk Branch	■ Document states “This survey program is based on the Ontario Ministry of Natural Resources and Forestry’s (MNRF) Draft Survey Protocol for Eastern Whip-poor-will in Ontario (2014)” however the MNRF protocol does not speak to this method of survey (i.e. the use of acoustic song-meters in lieu of point counts). The use of acoustic song-meters is not typically a recommended approach given the difficulties associated with triangulating calls and thus determining locations of calling Whip-poor-will and delineating breeding territories.	■ Update the draft Work Plan to appropriately acknowledge that only some aspects of the referenced survey protocol were used and provide rationale describing why the full draft protocol was not followed.	■ The Study Plan has been updated to include language to show which parts of protocols were followed.	■ Birds Study Plan: Section 7.2.2.5

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13	■ Pg. 10 / s.4.1.1.2 – 2019 Golder Bird Survey (Crepuscular Bird Acoustic Surveys)	■ MECP, Species At Risk Branch	■ Regarding the selection of segments from the ARUs – no mention of selection of periods based on their proximity to full moon occurrence, which is one of the most important criteria when conducting surveys for Whip-poor-will. It is recommended that proximity to full moon be a primary consideration in the selection of ARU segments.	■ Update the draft Work Plan to provide rationale for selection of segments from the ARUs, including, but not limited to, proximity to full moon, moon illumination, weather, etc.	■ The Study Plan has been updated to include a rationale for selection of ARU segments when conducting surveys for Whip-poor-will.	■ Birds Study Plan: Section 7.2.2.5
14	■ Pg. 10 / s.4.1.1.2 – 2019 Golder Bird Survey (Crepuscular Bird Acoustic Surveys)	■ MECP, Species At Risk Branch	■ No mention of the results of the surveys for Whip-poor-will are included. Considering an appropriate survey protocol was not followed, if no birds were heard, these results may be deemed inconclusive and additional surveys may be required to accurately confirm presence.	■ Update draft Work Plan to include results of surveys conducted to date.	■ The results of previous surveys will be provided at a later date.	■ No Reference
15	■ Pg. 10 / s.4.1.1.2 – 2019 Golder Bird Survey (Bank Swallow and Barn Swallow)	■ MECP, Species At Risk Branch	■ Document states that areas of potential suitable habitat identified from the air were surveyed on the ground, wherever access permitted (i.e., within proximity to a safe helicopter landing location). However, no definition is provided on what distance was considered to be 'within proximity'. Were areas of potential habitat excluded from ground surveys because they were deemed to be too far away from a safe helicopter landing location?	■ Update draft Work Plan as appropriate.	■ The Study Plan has been updated to specify "within proximity" to mean within 1-km from a helicopter landing location.	■ Birds Study Plan: Section 7.2.2.3
16	■ Pg. 10 / s.4.1.1.2 – 2019 Golder Bird Survey (Bank Swallow and Barn Swallow)	■ MECP, Species At Risk Branch	■ Document states that no habitat or potential habitat of Bank Swallow or Barn Swallow were identified within the LSA. It is unclear if this conclusion was made during the desktop exercise using aerial imagery to identify features, and therefore no ground surveys actually took place; or whether the desktop exercise resulted in the identification of potential habitat that was subsequently surveyed from the ground and determine to not be used/occupied.	■ Update the draft Work Plan to clearly indicate whether the conclusion the no potential Barn Swallow or Bank Swallow habitat is present in the LSA was a result of the desktop exercise or the aerial/ground surveys. ■ If this conclusion was based on the desktop exercise, update the draft Work Plan to clearly indicate that aerial/ground surveys were not conducted.	■ The Study Plan has been updated to indicate that the conclusion of no potential Barn Swallow or Bank Swallow habitat present in the LSA was based on desktop review and aerial / ground surveys. Additional results of previous surveys will be provided at a later date.	■ Birds Study Plan: Section 7.2.2.3
17	■ Pg. 10 / s.4.1.1.2 – 2019 Golder Bird Survey (Bank Swallow and Barn Swallow)	■ MECP, Species At Risk Branch	■ No mention of the results of the surveys for Barn Swallow or Bank Swallow are included in the draft Work Plan. Considering the results concluded that no potential Bank Swallow and Barn Swallow habitat were identified within the LSA, the results of the desktop exercise and/or areas searched by air/ground are required to determine if additional surveys may be required to accurately confirm presence.	■ Update draft Work Plan to include results of surveys conducted to date.	■ The results of Golder's field reconnaissance were added to the study plan showing that no habitat was identified. Additional results of previous surveys will be provided at a later date.	■ Birds Study Plan: Section 7.2.2.3
18	■ Pg. 11 / s.4.1.2.1 – 2019 Golder Bat Surveys	■ MECP, Species At Risk Branch	■ The draft Work Plan identifies that Acoustic Monitors were deployed at 167 stations within the LSA, but further describes that data was collected from 15 stations. Is there an error in the reported number of stations acoustic monitors were deployed or in the reported number of stations that data was collected from?	■ Update draft Work Plan accordingly.	■ Changes made.	■ Wildlife Study Plan: Section 7.2.2.2.2
19	■ Pg. 11 / s.4.1.2.1 – 2019 Golder Bat Surveys	■ MECP, Species At Risk Branch	■ Insufficient details are provided regarding the number and placement of acoustic monitors. The draft Work Plan only indicates that final bat acoustic station locations were identified in the field based on suitable habitat and proximity to safe helicopter landing locations. Additional detail on the selected locations and placement of acoustic monitor locations (e.g., candidate roost trees, snag tree density, surrounding objects, height, etc.) is required to confirm appropriate placement and whether additional surveys may be required to accurately confirm presence.	■ Update draft Work Plan to include additional details regarding the location (i.e., maps) and specific placement of acoustic monitors for surveys conducted to date.	■ The Study Plan has been updated to include a map of bat ARU placement in support of the study design. A description of the habitat at ARU sites will be provided at a later date. Additional bat acoustic monitoring survey locations will be outlined in the upcoming work plan.	■ Wildlife Study Plan: Section 7.2.1.2.2.

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20	■ Pg. 11 / s.4.1.2.1 – 2019 Golder Bat Surveys	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that acoustic monitors were deployed between Jun 13-17, 2019 and retrieved between Sept. 2-4, 2019. Acoustic monitors should be deployed throughout the maternity period (May 1 to August 31) and swarming period (August 1 to September 30) to provide sufficient information to quantify baseline bat activity and evaluate habitat use (i.e., maternity roosting, foraging, travel, swarming).	■ Update the draft Work Plan to address how all aspects of bat activity and habitat use will be addressed.	■ No bat hibernacula habitat was identified, so data was not collected during the swarming period. Future surveys will occur for at least 10 days between June 1 and June 30 in appropriate maternity habitat and from August 1 to August 31 if potential hibernacula are identified.	■ Wildlife Study Plan: Section 7.2.1.2.2 and 7.2.1.2.3
21	■ Pg. 11 / s.4.1.2.1 – 2019 Golder Bat Surveys	■ MECP, Species At Risk Branch	■ Notwithstanding previous comments, bat roosts in forested environments are particularly difficult to identify without more intensive methods (i.e., trapping and attaching transmitters). Bats are also known to shift roost locations. As such, where existing evidence already confirms presence of SAR Bats (Little Brown Myotis, Northern Myotis, Tri-Coloured Bat) it can be assumed that bats will be roosting in certain forest types based on stand composition and tree characteristics (i.e., cavities, crevices, cracks, loose bark, etc.).	■ No action required.	■ Comment noted.	■ No Reference
22	■ Pg. 11 / s.4.1.2.1 – 2019 Golder Bat Surveys	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that, based on a desktop review of the Abandoned Mine Information System (AMIS) and subsequent field surveys, no potential hibernacula were identified. Considering these results, it is reasonable to assume that there are no hibernacula present.	■ No action required.	■ Comment noted.	■ No Reference
23	■ Pg. 10-11 / s.4.1.2.1 – 2019 Golder Bat Surveys	■ MECP, Species At Risk Branch	■ No mention of the results of the 2019 bat surveys are included in the draft Work Plan and no initial conclusions are presented (e.g., presence/absence of SAR bats, etc.).	■ Update draft Work Plan to include results of surveys conducted to date.	■ The results of previous surveys will be provided at a later date.	■ No Reference
24	■ Pg. 11-12 / s.4.1.4 – Wildlife Cameras	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that 21 wildlife cameras were deployed across the LSA. No information on the intended purpose of these cameras is provided (e.g., habitat use, presence/absence, abundance, etc.) and no results are presented. It is unclear what these were intended to inform and/or how this information will be used. Additional details on methodology and intended application are required.	■ Update draft Work Plan to include additional details on methodology, intended purpose and results of surveys conducted to date.	■ The requested revision has been made. The results of previous surveys will be provided at a later date.	■ Wildlife Study Plan: Section 7.2.3.2.4 and Section 8.3.4.
25	■ Pg. 11-12 / s.4.1.4 – Wildlife Cameras	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that the wildlife cameras were deployed between mid-June to early September. Depending on the intended application of this data (e.g., abundance, presence/absence) this is insufficient to adequately identify habitat use across seasons and across years for Boreal Caribou and Wolverine.	■ Pending additional information on intended application of wildlife cameras, additional data collection with wildlife cameras may be required.	■ Motion sensitive cameras will be used to estimate the seasonal distribution, abundance, and density of mammals (including Caribou and Wolverine) in the LSA among years. Surveys completed in 2019 are intended to represent one year of data, an additional year of data is proposed in the Study Plan.	■ Wildlife Study Plan: Section 7.2.3.2.4
26	■ Pg. 12 / s.4.3 – Study Methods	■ MECP, Species At Risk Branch	■ It is identified that the following study methods have been designed to support addressing elements of the TISG as well as implementing survey protocols that may be identified for Critical Habitat under the Schedule of Studies as outlined in various SAR recovery strategies that exist for species protected under SARA. It is recommended that the study methods be designed to also consider provincial direction (i.e., recovery strategies, government response statements, general habitat descriptions [GHD's], etc.) ensuring specific reference is made to appropriate policy and guidance documents.	■ Update draft Work Plan accordingly.	■ The Study Plan has been updated to include the following: " The following study methods have been designed to address elements of the TISG required for field investigations... recovery strategies that exist for species protected under SARA (Environment Canada 2015; Environment Canada 2016), provincial recovery strategies (Ontario Wolverine Recovery Team. 2013, Humphrey and Fotherby 2019), government response statements (MECP 2020; MNRF 2016), and General Habitat Descriptions (MNR 2017)."	■ Birds and Wildlife Study Plans: Section 7.2

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27	■ Pg. 13 / s.4.3.1.1 – Field Study Design	■ MECP, Species At Risk Branch	■ Insufficient information is provided regarding the number of sampling plots that will be established to survey for Eastern Whip-poor-will (i.e., number of ground survey stations / number of ARU stations in Eastern Whip-poor-will habitat) (see comment #20).	■ Update the draft Work Plan to clearly identify the number of survey stations that will be established for Eastern Whip-poor-will.	■ The Study Plan has been updated to include a map of ARU station locations. Additional survey locations will be provided in the upcoming work plan.	■ Birds Study Plan: Figure 7-1
28	■ Pg. 13 – 14 / s.4.3.1.1 – Field Study Design	■ MECP, Species At Risk Branch	■ Insufficient information is provided regarding the number of Ground Investigation sites. Several components of the proposed Wildlife Work Plan reference the Ground Investigation sites (e.g., Bat ARU stations, Wolverine Hair Snag Traps, etc.), however without understanding the number and distribution of these sites, it is difficult for MECP-SARB to provide appropriate comments on the adequacy of proposed surveys.	■ Update the draft Work Plan to clearly identify the number of Ground Investigation sites that will be established.	■ The Study Plan has been updated to indicate the number of Bat ARU stations and Wolverine hair snags and general distribution. Survey locations will be provided in the upcoming Work Plan.	■ Wildlife Study Plans: Sections 7.2.1.2.2 and 7.2.3.2.5
29	■ Pg. 16 / s.4.3.1.5 – Autonomous Recording Unit (ARU)	■ MECP, Species At Risk Branch	■ Ideally, MNRF's 2014 Draft Survey Protocol for Eastern Whip-poor-will should be followed as opposed to deployment of ARUs. However, if ARUs must be used, they should be set to record during a period when the moon is greater than 50 percent illuminated in order to maximize chances of catching calling individuals. If Whip-poor-will are captured during ARU deployment, how will their presence (and lack of ability to triangulate their location) as well as habitat be mapped?	■ Update the draft Work Plan to clearly describe how the application of ARUs will be used to inform the EA.	■ The requested revisions have been made to the updated Study Plan.	■ Birds Study Plan: Section 7.2.2.5 and Section 7.2.2.7
30	■ Pg. 17 – 18 / s.4.3.1.8 – Data Collection	■ MECP, Species At Risk Branch	■ Sufficient samples of ARU data specific to Eastern Whip-poor-will should be provided and rationalized. ARU data should be sampled during appropriate timeframes/conditions for Eastern Whip-poor-will (i.e., 30 minutes before sunset to 30 minutes after sunrise, during a period when the moon is greater than 50 percent illuminated, etc.) to maximize the chances of identifying calling individuals.	■ Update the draft Work Plan to clearly describe and rationalize the number of samples for Eastern Whip-poor-will and the criteria for selection.	■ The Study Plan has been updated to include a description of the ARU sampling strategy for Eastern Whip-poor-will based on binomial expansion of published detection rates during the time periods identified in the comments.	■ Birds Study Plan: Section 7.2.2.4 and Section 7.2.2.5
31	■ Pg. 18 / s.4.3.2 – Bats	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that Little Brown Myotis and Northern Myotis are known to have roosting habitat within the RSA. Recent evidence from Layng et al., 2019 identified Tri-colored Bat within the general vicinity of the Project. As such, the potential for this species to be present within the PSA, LSA and/or RSA cannot be ruled out. The draft Work Plan should clearly indicate how this species at risk will be considered.	■ Update draft Work Plan accordingly.	■ The Study Plan has been updated to include the Tri-colored bat.	■ Wildlife Study Plan: Table 2-1 and Section 7.2.1
32	■ Pg. 18 / s.4.3.2.1 – Habitat Identification	■ MECP, Species At Risk Branch	■ The referenced document (Bats and Bat Habitat: Guidelines for Wind Power Projects) was published in 2011, not 2019. ■ It is recommended that bat habitat be identified using direction provided in the draft Technical Note Species At Risk (SAR) Bats (2015) as this provides additional and up-to-date information.	■ Correct reference year ■ Update draft Work Plan to reflect that the draft Technical Note will be used to identify suitable bat habitat.	■ The requested revision has been made to the updated Study Plan.	■ Wildlife Study Plan: Section 7.2.1.1
33	■ Pg. 18 / s.4.3.2.1 – Habitat Identification	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that field surveys will be used to confirm bat habitat presence in high potential areas. It also indicates that the habitat suitability exercise will inform the locations of the acoustic surveys which will be designed to locate and identify high value habitat features such as maternity roosts, foraging areas and hibernacula. ■ As mentioned, the survey methods presented are reasonable approaches to identify presence/absence and general bat activity. However, while the identification of 'high potential' or 'high value' habitat can potentially inform appropriate locations to deploy acoustic monitors, assessment of impacts should consider all potential habitat.	■ Update the draft Work Plan to clarify that the acoustic surveys target 'high potential' habitat, as identified through the habitat identification exercise, is intended to inform presence/ absence and general bat activity for comparative purposes to inform the location of the road within the LSA and an assessment of impacts; and not to identify high/low quality habitat.	■ The Study Plan has been updated to clarify that acoustic surveys will target "high potential" bat habitat rather than "high quality" bat habitat.	■ Wildlife Study Plan: Section 7.2.1 and Section 8.1

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			Bat roosts in forested environments are particularly difficult to identify without more intensive methods (i.e., trapping and attaching transmitters). Bats are also known to shift roost locations. As such, where existing evidence already confirms presence of SAR Bats (i.e., Little Brown Myotis, Northern Myotis, Tri-Coloured Bat) it can be assumed that bats will be roosting in certain forest types based on stand composition and tree characteristics (i.e., cavities, crevices, cracks, loose bark, etc. through the PSA, LSA and RSA.			
34	■ Pg. 18 / s.4.3.2 - Bats	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that the study will be designed in such a way to be able to describe the distribution and abundance of bats in relation to the Study Areas. Information collected from stationary acoustic recorders won't be able to provide abundance measures as there is no way of separating individual bats with this method. However, the method can provide presence/absence data, and relative importance of different habitats for bats in different seasons using the proposed bat activity index.	■ Although currently limited due to existing access, actual counts of bats (to inform abundance) in the different habitats encountered along the route is possible using mobile acoustic recordings, as described in A Plan for the North American Bat Monitoring Program (NABat) (Loeb et al., 205). ■ Note: mobile acoustic recordings could also be obtained on the supply road after construction.	■ Stationary acoustic recorders are proposed as a method to provide presence data and to improve our understanding of natural variability in bat relative abundance within and among seasons and years in the PDA and LSA. ■ The possibility of using mobile acoustic recorders may be explored for post-construction monitoring of bat abundance.	■ Wildlife Study Plan: Section 7.2.1.2.2
35	■ Pg. 19 / s.4.3.2.2 – Acoustic Surveys ■ And s.4.3.2.3 – Data Collection	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that acoustic surveys will be designed to account for inter-annual and within-season variability in habitat use by taking place during multiple nights in the late spring, summer and fall seasons to capture bat dispersal and identify breeding and roosting habitats. However, the following section (Data Collection) only indicates that ARUs will be deployed during the roosting period of June 1 to June 30 and peak swarming period of August 1 to August 31. This is not sufficient to appropriately assess all timing and habitat used for migration. Bat acoustic surveys should be extended to September 30.	■ Update the draft Work Plan to describe how all aspects of bat habitat and timing will be assessed.	■ The Study Plan has been refined to indicate that a desktop review will be conducted to identify potential migration corridors.	■ Wildlife Study Plan: Section 7.2.1 and Section 7.2.1.2
36	■ Pg. 21 / s.4.3.4 – Mammals	■ MECP, Species At Risk Branch	■ Table 6-1: Wildlife Indicators (draft Work Plan) and Appendix A – Draft Criteria and Indicators for Alternatives Evaluation (draft Terms of Reference) identify the following example indicators for Wolverine: – Change to Habitat availability (quantity and quality) – Change to Habitat Distribution (i.e., configuration and connectivity) – Change to survival and reproduction ■ As described in both documents, the above indicators are preliminary and will be further refined in the EA, and are provided for the purposes of gathering feedback for the refinement in the EA. As such, it is recommended that additional indicators be considered for Wolverine, including impacts to the species (i.e., spatial and temporal distribution, abundance, den site selection and use, harvest). ■ The draft Work Plan does not adequately address necessary field studies to inform these indicators. Previous and proposed winter aerial surveys and proposed camera trap surveys, which identified the presence of wolverine, are not sufficient to inform the effects of the Project on all stated indicators.	■ Update the draft Work Plan to include additional recommended indicators for Wolverine. ■ Update the draft Work Plan to provide additional detail describing how all relevant indicators for Wolverine will be addressed in the EA. If no additional field studies are proposed, a thorough description of rationale and justification should be provided to MECP and all other relevant regulatory authorities to substantiate this decision.	■ The Study Plan has been updated to more clearly state the objectives of field studies to include determining the seasonal distribution, abundance, population status, movements, and habitat requirements. Interviews for harvest data has been included in a separate section to be more clearly visible. ■ Information about den site selection and use are not included in the Study Plan with the following justification: "Given the low population density of Wolverine in the Study Area, the risk of trapping and radiotracking individuals to obtain den site selection and use information will potentially cause undue harm to the population. This Study Plan assumes that Wolverine are present in the Study Areas and appropriate mitigation measures will be recommended in consultation with the MECP if any den sites are discovered incidentally."	■ Wildlife Study Plan: Section 7.2.3 and 7.2.3.1

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37	■ Pg. 21 / s. 4.3.4.1 – Air Surveys for Mammals	■ MECP, Species At Risk Branch	■ In addition to recording the species, number, location, habitat and time of any observed mammal, evidence of caribou (e.g., tracks, cratering, slushing, etc.) and wolverine (e.g., tracks, etc.) should also be recorded.	■ Update the draft Work Plan accordingly.	■ The requested revision has been made to the updated Study Plan.	■ Wildlife Study Plan: Section 7.2.3.2.2
38	■ Pg. 21 – 22 / s.4.3.4.2 – Wolverine Aerial Surveys	■ MECP, Species At Risk Branch	■ As stated, wolverine live at extremely low densities and the probability of encountering their tracks is low. As such, the proposed transect spacing of approximately 10.6 km apart is insufficient to adequately sample the RSA for wolverine. While MECP recognizes the proposed approach follows the recommended 'Ozhiski Protocol' for caribou (MNRF's Ozhiski Caribou Aerial Survey, 2018: Operating Procedures and Background), reduced transect spacing (i.e., more transects) would increase the sampling area and the likelihood of observing wolverine and/or evidence of wolverine (e.g., tracks). ■ It is recommended that the same hexagon grid referenced in the Ozhiski Protocol be used in the planning of transect layout to ensure consistency with and future range level monitoring for caribou (and wolverine), but that a 2 km spacing is used as per the Select Wildlife and Habitat Features: Inventory Manual (Ranta 1997).	■ Update the draft Work Plan accordingly.	■ Wolverine aerial tracking transect spacing details are provided in the updated Study Plan.	■ Wildlife Study Plan: Section 7.2.3.2.2
39	■ Pg. 21 – 22 / s.4.3.4.2 – Wolverine Aerial Surveys	■ MECP, Species At Risk Branch	■ Additional detail is required on the number of surveyors that will carry out the proposed wolverine aerial surveys. It is recommended that in addition to the pilot, a navigator/lead surveyor and two additional surveyors in the rear of the aircraft (for a total of 4 surveyors) comprise the survey crew.	■ Update the draft Work Plan accordingly.	■ The requested revision has been made to the updated Study Plan.	■ Wildlife Study Plan: Section 7.2.3.2
40	■ Pg. 21 – 22 / s.4.3.4.2 – Wolverine Aerial Surveys	■ MECP, Species At Risk Branch	■ Additional detail is required regarding the survey area. The draft Work Plan indicates that the winter aerial Caribou surveys that will be completed, as per the draft Ungulate Work Plan, will also search for Wolverine. However, the survey area for Caribou is proposed to cover the Caribou LSA (i.e., 35 km buffer of PSA as per draft Ungulate Work Plan) which differs from the Wolverine LSA (i.e., 10 km buffer of PSA).	■ Update the draft Work Plan to provide clarity on the survey area for Wolverine aerial surveys.	■ The study areas are defined in **Section 6** of the Study Plans.	■ Wildlife Study Plan: Section 6 Ungulates Study Plan
41	■ Pg. 22 / s.4.3.4.3 – Motion Sensitive Camera Tracking for Fur Bearers and Small Mammals	■ MECP, Species At Risk Branch	■ Additional detail is required on the intent of the wildlife cameras including a description of how any species at risk information will be used in the impact assessment.	■ Update the draft Work Plan accordingly.	■ The requested revision has been made to the updated Study Plan.	■ Wildlife Study Plan: Section 8.3.4
42	■ Pg. 22 / s.4.3.4.3 – Motion Sensitive Camera Tracking for Fur Bearers and Small Mammals	■ MECP, Species At Risk Branch	■ Additional detail is required on the specific targeted species. If this includes Wolverine, additional detail is required on the number and distribution of trail cameras that will be deployed (see comment #20), the considerations that will inform the placement of cameras, the dates/duration in which they will be deployed, and the information retrieval schedule.	■ Update the draft Work Plan accordingly.	■ The Study Plan has been updated to include additional detail about the specific targeted species, the number and distribution of trail cameras, and considerations for placement of cameras. ■ Additional survey locations and dates will be provided in the upcoming work plan.	■ Wildlife Study Plan: Section 7.2.3.2.4

Comment # / Ref #	Draft Study Plan Section	Agency/Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Section Reference
43	■ Pg. 22 / s.4.3.4.4 – Wolverine Hair Snag Traps	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that Wolverine hair snag traps will be deployed to determine the potential presence in the PSA and LSA. While presence/absence within the PSA and LSA is relevant information, the Wolverine Hair Snag Traps should also be designed to target collection of demographic information (i.e., determine reproductive female ranges within PSA, LSA and RSA). All aspects of the Wolverine Hair Snag Traps regarding intended purpose, how the information will be analysed and how it will inform the impact assessment need to be clearly identified and described in this section.	■ Update the draft Work Plan accordingly.	■ **Section 7.2.3.5** and **Section 8.3.5** have been updated to include more information.	■ Wildlife Study Plan: Section 7.2.3.2.5 and Section 8.3.5
44	■ Pg. 22 / s.4.3.4.4 – Wolverine Hair Snag Traps	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that two hair snags will be placed at each motion camera deployment location. As per comment #20 and #34, additional detail is required regarding the number of Ground Investigation sites and motion camera locations to clearly indicate how many Wolverine hair snag traps that will be deployed and their distribution.	■ Update the draft Work Plan accordingly.	■ Additional detail has been added about the number and distribution of Wolverine hair snag traps.	■ Wildlife Study Plan: Section 7.2.3.2.5
45	■ Pg. 22 / s.4.3.4.4 – Wolverine Hair Snag Traps	■ MECP, Species At Risk Branch	■ Additional detail is required related to how the camera information collected through hair snag traps will be analysed and be used to inform an assessment of impacts to Wolverine (e.g., unique pelage pattern for unique identification of individuals, sex, reproductive females, etc.)	■ Update the draft Work Plan accordingly.	■ The requested revision has been made to the updated Study Plan.	■ Wildlife Study Plan Section 8.3.4
46	■ Pg. 22 / s.4.3.4.4 – Wolverine Hair Snag Traps	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that local interviews and harvest records from trapping can be used to gain an understanding of the local presence of fur bearers. It is unclear if and/or how this information will be used in the impact assessment. MECP-SARB recommends documenting incidental harvest within the RSA (potentially available through MNRF district offices) and, if possible, conducting local interviews to determine the extent of traditional harvest; as well as a commitment to monitoring harvest rates post-construction to determine the impacts of the road on wolverine populations. ■ The literature suggests the largest source of wolverine mortality is related to harvest (e.g., Krebs et al. 2010, J. Wildl. Manage. 68(3):493-502). The development of a road into an otherwise largely undisturbed landscape increases the risk of harvest as a result of easier access by trappers to these previously inaccessible areas.	■ Update the draft Work Plan to describe how harvest of Wolverine will be incorporated into the baseline studies and considered in the impact assessment.	■ Harvest data will be incorporated into the baseline studies and considered in the impact assessment.	■ Wildlife Study Plan: Section 7.2.3, Section 8.3.1, and Section 9.4.2 ■ Land and Resource Use Study Plan
47	■ Pg. 24 / s.5.1 – GIS	■ MECP, Species At Risk Branch	■ In addition to IAAC, all baseline data available in GIS format should also be provided to the MECP's Species at Risk Branch and MNRF's Natural Heritage Information Centre (NHIC) as complete data sets from all surveys.	■ Update draft Work Plan accordingly.	■ The requested revision has been made to the updated Study Plan.	■ Wildlife Study Plan: Section 8.6 ■ Birds: Section 8.1
48	■ Pg. 24 / s.5.2 – Birds	■ MECP, Species At Risk Branch	■ As it relates to Eastern Whip-poor-will, the identification of each breeding territory should be used to categorize habitat according to the General Habitat Description (GHD).	■ Update draft Work Plan accordingly.	■ The requested revision has been made to the updated Study Plan.	■ Birds Study Plan: Section 7.2.2.7

Comment # / Ref #	Draft Study Plan Section	Agency/Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Section Reference
49	■ Pg. 25 / s.5.3 – Bats	■ MECP, Species At Risk Branch	■ Similar to comment #25, the survey methods presented are reasonable approaches to identify presence/absence and general bat activity. ■ However, while the identification of 'high potential' or 'high value' habitat can potentially inform appropriate locations to deploy acoustic monitors, assessment of impacts should consider all potential habitat. Bat roosts in forested environments are particularly difficult to identify without more intensive methods (i.e., trapping and attaching transmitters). Bats are also known to shift roost locations. As such, where existing evidence already confirms presence of SAR Bats (i.e., Little Brown Myotis, Northern Myotis, Tri-Coloured Bat) it can be assumed that bats will be roosting in certain forest types based on stand composition and tree characteristics (i.e., cavities, crevices, cracks, loose bark, etc.) through the PSA, LSA and RSA.	■ Update the draft Work Plan to clarify that the acoustic surveys target 'high potential' habitat, as identified through the habitat identification exercise, is intended to inform presence/absence and general bat activity for comparative purposes to inform the location of the road within the LSA and an assessment of impacts; and not to identify high/low quality habitat.	■ The requested revision has been made to the updated Study Plan.	■ Wildlife Study Plan: Section 7.2.1 and Section 8.1
50	■ Pg. 26 / s.5.4.2.1 – Aerial and Track Surveys	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that data acquired from the aerial surveys and remote camera tracking in the PSA will be correlated with specific habitat and environments in the PSA and LSA to determine wildlife activity hotspots. Additional detail is required to describe how baseline information will be used to evaluate impacts to species at risk within the defined RSA's. ■ This comment is also broadly applicable to all proposed monitoring and analyses applicable to species at risk.	■ Update draft Work Plan accordingly.	■ The Study Plan has been updated to include more detail to the data analysis to describe how baseline information will be used to identify wildlife hotspots.	■ Wildlife Study Plan: Section 8.3, Section 8.5, and Section 9 ■ Birds: Section 8 and Section 9
51	■ Pg. 27 / Table 6-1: Wildlife Indicators	■ MECP, Species At Risk Branch	■ Not all species at risk birds (e.g., Eastern Whip-poor-will) are specifically identified under the Breeding Birds indicator along with Olive-sided flycatcher, rusty blackbird and common nighthawk.	■ Update draft Work Plan accordingly.	■ The Study Plan has been revised to include all avian SAR in the table.	■ Birds Study Plan: Table 2-1
52	■ Pg. 27 / Table 6-1: Wildlife Indicators	■ MECP, Species At Risk Branch	■ As per comment #23, recent evidence from Layng et al., 2019 identified Tri-colored Bat within the general vicinity of the Project. As such, the potential for this species to be present within the PSA, LSA and/or RSA cannot be ruled out. The draft Work Plan should clearly indicate how this species at risk will be considered.	■ Update draft Work Plan accordingly.	■ The Study Plan has been updated to include Tri-colored Bat.	■ Wildlife Study Plan: Table 2-1 and Section 7.2.1;
53	■ Pg. 27 / Table 6-1: Wildlife Indicators	■ MECP, Species At Risk Branch	■ Additional factors (i.e., identified as Expressions of Change in the draft Work Plan) should be considered, including changes to predator/prey dynamics. ■ Changes in prey densities (e.g., moose) as a result of changes in landcover (e.g., increased browse) results in increased predator (e.g., wolf) densities. This can often have an impact on caribou and wolverine populations through opportunistic predation.	■ Update draft Work Plan accordingly.	■ The Study Plan has been updated to include changes to predator / prey dynamics as an expression of change. ■ Additional details are provided in the Ungulate Study Plan.	■ Wildlife Study Plan: Table 9-2 ■ Ungulates Study Plan
54	■ Pg. 27 / Table 6-1: Wildlife Indicators	■ MECP, Species At Risk Branch	■ The Indicators identified in the draft Work Plan are listed as Criteria in the draft Terms of Reference and the Expression of Change in the draft Work Plan are listed as Indicators in the draft Terms of Reference. Consistent terminology needs to be used across documents.	■ Update the draft Work Plan accordingly.	■ The requested revision has been made to the updated Study Plan.	■ Birds and Wildlife: Study Plans Section 9.2

Comment # / Ref #	Draft Study Plan Section	Agency/Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Section Reference
55	■ Pg. 28 / s.6.2 – Methods for Predicting Future Conditions	■ MECP, Species At Risk Branch	■ Ecological processes that will be evaluated for potential susceptibility to adverse effects from the Project should also include hydrological processes associated with fen and bog complexes typical of this land base, specifically how the Project may affect the flow of water through the transitional zone between the Ontario Shield and Hudson Bay/James Bay Lowlands (i.e., ecodistricts 2W-2, 2E-4, 2E-1) resulting in changes to landcover and vegetation associated with species at risk habitat (e.g., caribou, wolverine, etc.).	■ Update the draft Work Plan to indicate that the evaluation of ecological processes will include consideration of Project impacts on hydrological processes that could result in a change to species at risk habitat availability and distribution.	■ The Study Plan has been updated to include the following: "The IA / EA will also consider potential adverse effects from the Project on hydrological processes associated with fen and bog complexes, specifically how the Project may affect the flow of water through the transitional zone between the Ontario Shield and Hudson Bay / James Bay Lowlands and the resulting changes to land cover and vegetation associated with SAR habitat (e.g., Rusty Blackbird, Yellow Rail, Wolverine)."	■ Birds and Wildlife Study Plans: Section 9.4.2 ■ Vegetation Study Plan ■ Surface Water Study Plan
56	■ Pg. 29 / s.6.2.1.2 – Wildlife Habitat Ratings	■ MECP, Species At Risk Branch	■ As per comment #42, additional detail is required to describe how baseline information will be used to evaluate impacts to species at risk within the defined RSA's.	■ Update the draft Work Plan accordingly.	■ The Study Plan has been revised to include potential impacts to SAR based on baseline information.	■ Birds and Wildlife Study Plans: Section 9.4.2
57	■ Pg. 29 / s.6.2.1.2 – Wildlife Habitat Ratings	■ MECP, Species At Risk Branch	■ The referenced HSI models were developed in Western Canada where Wolverine use of the landscape may vary to that in Ontario (i.e., use of elevation resulting in smaller home range sizes). As such, the conditions referenced (i.e., Distance from Linear Feature [0-400m / 400-800m / >800m]) may not be as directly relevant to Ontario wolverine. The Variable and Suitability Index for wolverine presented in Table 6-2 should consider the broader landscape scale and, where available, fine-scale considerations related to den site selection (e.g., avoidance of roads) by Wolverine in Ontario when defining the model variables in the design of HSI models. ■ Wolverine utilize large landscapes with minimal overlap between male home ranges. Evidence specific to Ontario estimated average home range sizes for males and females of 2,563 km2 and 428 km2 respectively (Dawson et al., 2010). These are considerably larger than those cited in the referenced paper associated with North America (Blouin et al., 2004), suggesting Wolverine in Ontario utilize larger landscapes. ■ Additionally, Wolverine are very sensitive to human-caused disturbances, particularly during the denning period. Human contact may cause females to abandon den sites (Myrberget 1968, Copeland 1996; both cited in Copeland and Krucera 1997). Available information suggests that dens are generally located considerable distances from roads, generally supporting large buffers between dens and human activities that range from 2 to 8 km (e.g., Univ. Wyoming 2000, BCMWLAP 2002, Blouin 2006). Current direction in Ontario's Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (2010) prescribes an AOC with a radius between these extremes (i.e., 4 km). ■ As such, the various modelling variables (i.e., distance to linear features) in the Habitat Suitability Index should also reflect wolverine avoidance of linear features, such as roads, in den site selection to carry out their life processes.	■ Update the draft Work Plan accordingly.	■ The Study Plan has been revised to describe how models will be developed in the IA / EA. The Habitat Suitability Index (HSI) modeling approach is no longer being proposed.	■ Wildlife Study Plan: Section 9.4, Section 3

Comment # / Ref #	Draft Study Plan Section	Agency/Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Section Reference
58	■ Pg. 29 / s. 6.2.1.3 – Model Confidence and Resolution	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that the HSI models will be based on the evaluation of ELC units and their assumed relationships to a wildlife VC's habitat suitability in the LSA. As per comment #42, additional detail is required to describe how baseline information will be used to evaluate impacts to species at risk within the defined RSA's.	■ Update the draft Work Plan accordingly.	■ The Study Plan has been revised to identify the potential impacts to SAR based on baseline information. The HSI modeling approach is no longer being proposed.	■ Wildlife Study Plan: Section 9.4
59	■ Pg. 30 / s.6.2.2 – Predicted Effects on the Project	■ MECP, Species At Risk Branch	■ Additional effects should be considered as they relate to wolverine, such as increased trapping/harvest of wolverine (e.g., incidental trapping, etc.). ■ The literature suggests the largest source of wolverine mortality is related to harvest (e.g., Krebs et al. 2010, J. Wildl. Manage. 68(3):493-502). The development of a road into an otherwise largely undisturbed landscape increases the risk of harvest as a result of easier access by trappers to these previously inaccessible areas.	■ Update the draft Work Plan to identify increased trapping and/or harvest as one of the predicted effects that will be assessed for wolverine.	■ The Study Plan has been revised to include increased trapping / harvesting (i.e., Wolverine) to predicted effects.	■ Wildlife Study Plan: Section 9.4
60	■ Pg. 30 / s.6.2.2 – Predicted Effects on the Project	■ MECP, Species At Risk Branch	■ Additional effects on habitat use by SAR should be considered, including bat habitat (e.g., roosting, foraging, swarming, hibernacula, etc.), Eastern Whip-poor-will (e.g., nesting, foraging, etc.) and Wolverine (e.g., landscape-scale habitat, fine-scale habitat such as denning).	■ Update the draft Work Plan accordingly.	■ The effects assessment describes how the general life history of SAR as well as their Critical Habitat may be affected by the Project.	■ Wildlife Study Plan: Section 8.5 ■ Birds Study Plan: Section 8
61	■ Pg. 31 / s. 6.3 – Magnitude of Effect	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that 'severity' is defined as the level of damage to the VC from the effect that can reasonably be expected. It is typically measured as the degree of destruction or degradation within the scope or the degree of reduction of the population within the scope. This definition should include reference to not just degree of destruction or degradation within the scope of the degree of reduction of the population, but also the function of their habitat. ■ The Endangered Species Act, 2007 defines damaging habitat as "an activity that alters the habitat in ways that impair the function (usefulness) of the habitat for supporting one or more of the species' life processes" and destroying habitat as "an activity that alters the habitat in ways that eliminate the function (usefulness) of the habitat for supporting one or more of the species' life processes".	■ Update the draft Work Plan to provide clarity that 'severity' includes both the degree of destruction or degradation within the scope or the degree of reduction of the population and function of habitat.	■ The requested revision has been made to the updated Study Plan.	■ Birds and Wildlife Study Plans: Section 9.6
62	■ Pg. 33 / Table 7-1 - ID#3	MECP, Species At Risk Branch	■ Although Project components other than the route itself are unknown at this time, it is important to recognize that potential impacts from these components of the Project (i.e., aggregate pits, quarries, access roads, etc.) to species at risk will need to be assessed under the Endangered Species Act, 2007 to determine if an ESA authorization is required. As such, additional field studies may be required for species at risk where sufficient information does not already exist.	■ No action required at this time.	■ Comment noted.	■ No Reference
63	■ Pg. 35 / Table 7-1 - ID#24	■ MECP, Species At Risk Branch	■ As per comment #42, all sensitive areas for species at risk need to be identified within the PSA, LSA and RSA, not just the PSA and LSA.	■ Update the draft Work Plan accordingly.	■ Identification of sensitive areas for SAR in the RSA will be conducted through desktop analysis.	■ Wildlife Study Plan: Section 8.5 ■ Birds Study Plan: Section 8

Comment # / Ref #	Draft Study Plan Section	Agency/Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Section Reference
64	■ Pg. 35 / Table 7-1 - ID#29	■ MECP, Species At Risk Branch	■ As per comment #23, recent evidence from Layng et al., 2019 identified Tri-colored Bat within the general vicinity of the Project. As such, the potential for this species to be present within the PSA, LSA and/or RSA cannot be ruled out. The draft Work Plan should clearly indicate how this species at risk will be considered.	■ Update draft Work Plan accordingly.	■ The Study Plan has been updated to include Tri-colored Bat.	■ Wildlife Study Plan: Table 2-1 and Section 7.2.1;
65	■ Pg. 35 / Table 7-1 - ID#48	■ MECP, Species At Risk Branch	■ As per comment #4, modifications were made to Ontario Ministry of Natural Resources and Forestry's (MNRF) Draft Survey Protocol for Eastern Whip-poor-will in Ontario (2014) through the use of ARU's. However, this is not identified in the draft Work Plan as committed to in Response #48 of Table 7-1.	■ Update the draft Work Plan accordingly.	■ The Study Plan has been updated to indicate that the study design will partially follow the MNRF draft protocol and cited published scientific papers on the use of ARUs to determine the sampling frequency for Eastern Whip-poor-will.	■ Birds Study Plan: Section 7.2.2.5
66	■ Comment on Wildlife, Ungulates and Vegetation work plans	■ MNRF, Nipigon District	■ MNRF staff have reviewed these draft field work plans. We found that they address the field work needs related to our mandates. However MNRF may have items/comments to contribute during the further development of the ToR and the EA.	■ N/A	■ Comment noted.	■ No Reference

Appendix C

MFFN Bird Study Design and Modelling Memo

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Date: March 2, 2021
Project #: 60593122

From: Douglas Baldwin, Ph.D
Hugo Gee, Ph.D
AECOM Canada Ltd.

Memorandum

Subject: **Marten Falls First Nation Community Access Road Breeding Bird Study Design Bias and Representativity**

1. Summary

Comparisons were made between the Generalized Random Stratified Tessellation (GRTS) breeding bird study design used for Marten Falls First Nation Community Access Road Project and the Tailored Impact Statement Guidelines' (TISG; the Agency 2020) benchmark study design of transects through: (1) model development; (2) model simulations to identify a relatively "optimal" sample design, and (3) by describing habitat and covariate representativity compared to the TISG benchmark study design.

1. Abundance models were developed for six proxy valued component bird species and two species at risk (Canada Warbler [*Cardellina canadensis*] and Olive-sided Flycatcher [*Contopus cooperi*]).
2. Given an existing 273 site visits, model simulations (n = 50) of the bird abundance models indicate that an additional 300 site visits (150 survey stations visited twice) will stabilize the precision of model estimates and minimize bias relative to a TISG benchmark study design.
3. Compared to the TISG (the Agency 2020) benchmark study design, the GRTS study design oversampled deciduous forest and mixedwood forest and undersampled treed to open fen, treed to open bog, and coniferous swamps. This is an acceptable habitat representativity given that the TISG (the Agency 2020) recommends oversampling of land cover types associated with eskers such as deciduous forest and mixedwood forest and fulfills our objective of covering existing data gaps in these areas. Covariate representativity was adequately achieved for 20 of 50 model simulations with a sample size of 150 survey stations selected with the GRTS study design compared to the TISG (the Agency 2020) benchmark study design.

2. Introduction

Marten Falls First Nation (the Community) is proposing an all-season Community Access Road (the Project) that will connect the Community to the Ontario's provincial highway network (Highway 643) to the south via the existing Painter Lake Road. The Community has retained AECOM Canada Ltd. to assist with the Impact Assessment required for Project review by the Impact Assessment Agency of Canada (the Agency) under the federal *Impact Assessment Act* and Environmental Assessment for Project review by the Ministry of the Environment, Conservation and Parks under the Ontario *Environmental Assessment Act*. This memorandum is a follow-up on the Bird Technical Meeting (Working Group) of February 1, 2021. The objectives of this memorandum are to:

1. Describe the breeding bird species model development process and results.
2. Present model simulations to compare multiple study designs to identify an “optimal” sample size that reduces model predictive bias and maximizes precision to the best extent possible.
3. Describe the chosen “optimal” study design’s bias and habitat representativity compared to the TISG study design (the Agency 2020).
4. Describe the chosen study design’s representativity of model covariates relative to the Local Study Area (LSA – 3 km buffer from Project centreline) and Regional Study Area (RSA – 11 km buffer from Project centreline).

As per section 8.9 of the TISG (the Agency 2020), simulations were conducted using simple models developed with existing point count data (Zoetica 2018, Golder 2019) to describe any bias introduced by using a Generalized Random Tessellation Stratified (GRTS) study design compared to the TISG (the Agency 2020) benchmark study design. The GRTS study design takes into consideration limited site accessibility combined with a Project that is expected to impact less common geologic features (i.e., eskers) and associated habitat types in greater proportion to their availability as required by the TISG (the Agency 2020). Habitat types were given unequal probabilities (i.e., weighted values) using three qualitative values (High, Medium, and Low species richness) based on their importance to breeding bird species in the region. Deciduous and mixedwood forests were classified as high species richness; coniferous, second-growth / regenerating, and burned / disturbed forests were classified as medium species richness; and swamp, bog, and fen were classified as low species richness. The TISG benchmark study design consists of multiple survey stations along transects spaced 2 km apart positioned perpendicular to the Project route (the Agency 2020).

3. Bird Species Model Development

3.1 Methods

Generalized Linear Models with a Zero Inflated Poisson distribution (GLM-ZIP) and QPAD offsets (Sólymos 2020) were generated for species abundance of Proxy Valued Components (VC) of species in the Forest Birds VC and Bog / Fen Birds and Other Wetland Birds VC (**Table 3-1**). Common Yellowthroat (*Geothlypis trichas*) was modelled as a fen species due to insufficient observations of fen specialists. Attempts were made to generate models for two Species at Risk (SAR), Canada Warbler and Olive-sided Flycatcher.

Table 3-1: Bird Valued Components for Preliminary Modelling

Bird Valued Component	Proxy Valued Component		Federal Status	Provincial Status
	Common Name	Scientific Name		
Forest Birds	Red-eyed Vireo (deciduous forest)	*Vireo olivaceus*	-	-
	Ovenbird (mixedwood forest)	*Seiurus aurocapilla*	-	-
	Dark-eyed Junco (coniferous forest and disturbed [forestry or fire] forest)	*Junco hyemalis*	-	-
Bog / Fen Birds and Other Wetland Birds	Palm Warbler (bog)	*Setophaga palmarum*	-	-
	Common Yellowthroat (fen)	*Geothlypis trichas*	-	-
	Northern Waterthrush (swamp)	*Parkesia noveboracensis*	-	-
Species at Risk	Canada Warbler	*Cardellina candensis*	Threatened	Special Concern
	Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Special Concern

Bird abundance data was compiled from 273 site visits at 171 survey stations (Zoetica 2018, Golder 2019). **Table 3-2** summarizes bird counts relative to each land cover.

Table 3-2: Total Bird Counts from Existing Datasets Summarized by Land Cover

Land Cover	Total Bird Count							
	Red-eyed Vireo	Ovenbird	Dark-eyed Junco	Palm Warbler	Common Yellowthroat	Northern Waterthrush	Canada Warbler	Olive-sided Flycatcher
Coniferous Treed	3	5	14	6	2	5	1	11
Coniferous/ Thicket Swamp	2	2	12	9	14	12	1	4
Deciduous Treed	4	0	4	1	3	4	1	1
Disturbance - Non and Sparse Woody	5	3	17	11	9	6	2	5
Disturbance - Treed and/or Shrub/Sparse Treed	7	7	5	2	2	7	1	3
Mixed Treed	13	3	6	0	1	6	2	1
Treed/Open Bog	0	2	18	19	1	2	2	6
Treed/Open Fen	3	2	13	5	9	5	0	4
Total	**37**	**24**	**89**	**53**	**41**	**47**	**10**	**35**

The GLM-ZIP models utilized a subset of biotic and abiotic variables proposed in **Section 9.4.1** of the *Birds* – Study *Plan*. Biotic variables focused on the proportion of land cover (i.e., coverage class) within a 100 m radius of breeding bird survey points. Land cover was based on the Ministry of Natural Resources and Forestry (MNRF) Far North Landcover (FNLC) database (MNRF 2014) modified to describe fire disturbed habitats using Ontario's Provincial Satellite Derived Disturbance Mapping digital resource (**Table 3-3**). Another indirect biotic variable is year of disturbance, as detected from changes in satellite datasets (CCFM 2020). Biotic variables also included aboveground biomass and the dynamic habitat index which is a data product largely based on vegetation indices (CCFM 2020).

Abiotic variables for breeding bird survey points included elevation (m) based on the Provincial Digital Elevation Model (DEM) (MNRF 2020) with calculations made for surface roughness (**Table 3-4**). Surface roughness is a degree of surface irregularity and is calculated by the largest inter-cell difference of a central pixel and its surrounding cell. The QGIS Roughness module was used to calculate surface roughness (QGIS Project 2021).

Statistical offsets were applied to GLM-ZIP models based on sampling area (100 m radius from survey station), sampling time (0-3 minutes, 3-5 minutes, 5-10 minutes), and distance of observation (0-49 m, 50-100 m). Time since local sunrise (TSSR) and Julian day were used as covariates to model duration probability (i.e., sampling time). Year showed little to no utility as an effect in the current set of models that were developed with two years of data. Year will be tested and included as a potential random effect after the upcoming field season.

Table 3-3: Predictor Variables

Dependent Variables	Independent Variables	
	Biotic	Abiotic
Abundance	**Land Cover[1] Within 100 m Radius:** ■ coniferous treed ■ coniferous/thicket swamp ■ deciduous treed ■ disturbance – non and sparse woody ■ disturbance – treed and/or shrub/sparse treed ■ mixed treed ■ treed and open bog ■ treed and open fen **Year of Disturbance[2]** **Aboveground Biomass[2]** **Dynamic Habitat Index[2]**	**Digital Elevation Model (m)[3]** ■ elevation ■ surface roughness **Time** ■ time since sunrise (TSSR) ■ survey date (Julian day) ■ year

Notes: 1 MNRF 2014 / 2 CCFM 2020 / 3 MNRF 2020

Akaike's Information Criterion (AIC) was used as a guide for model fit and selection by comparing candidate models using metrics that represent model accuracy and penalizing models with a greater number of covariates (Akaike 1978). The initial best candidate models were selected using a step-wise model selection. Covariate adjustments were made to the initial candidate models to maximize the amount of variance explained by the model, minimize the mean model bias, and minimize AIC. Leave-one-out cross-validation was used to examine within-sample model bias relative to each covariate. Leave-one-out cross-validation includes withholding one point and re-fitting the model on the rest of the observations and repeating this process for each available observation (Allen 1974). By comparing the residuals (observed - predicted) of each of these model predictions from the leave-one-out cross-validation to each covariate, one may get a sense of the bias each covariate may be contributing to any model biases. Other diagnostics, such as deviance squared, Spearman Rho between observed and predicted counts, and Chi-square test using deviance statistics were recorded for each model.

The variance inflation factor (VIF) of models were examined to quantify the multi-collinearity of all predictor variables (Longnecker and Ott 2004).

3.2 Results and Discussion

Models were developed for the six proxy VCs and two SAR (**Table 3-4**). GLM-ZIP models will be refined as additional breeding bird data is collected and will include more explanatory variables as described in section **9.4.1** of the *Birds Study Plan* (AECOM 2021). The maximum VIF of models did not exceed five, suggesting that no further action was required to reduce the multi-collinearity of predictor variables.

The bird count summary in **Table 3-2** indicates that there are generally no clearcut associations between proxy VCs and their expected habitats. Only the abundance models for Dark-eyed Junco (*Junco hyemalis*) and Palm Warbler (*Setophaga palmarum*) show positive relationships between their expected habitats and abundance. Similarly, the zero-inflated model for Common Yellowthroat showed higher probability of presence in treed and open fens.

Table 3-4: Bird Abundance Models and Diagnostics

Species Model	Model Type	Covariates (Abundance model)	Covariates (Zero-inflated model)	Model Diagnostics			
				Spearman rho	Deviance^2	Chi-square p value	Max VIF
Red-eyed Vireo (deciduous forest)	GLM-ZIP	-Intercept - DNSWdy + Elevation + AGBiomass - CTSw - MT + DynamicHabitat - TOFen	-Intercept - DNSWdy - CTSw - Roughness + DynamicHabitat - TOFen	0.62	0.34	1	2.4
Ovenbird (mixedwood forest)	GLM-ZIP	-Intercept - DNSWdy - AGBiomass + DTSST + DynamicHabitat - TOBog - TOFen	-Intercept - DNSWdy - AGBiomass - CT - MT + DynamicHabitat - TOBog - TOFen	0.47	0.24	1	3.0
Dark-eyed Junco (coniferous forest and disturbed forest)	GLM-ZIP	Intercept + DNSWdy + CT + DT + TOBog + Roughness	-Intercept + CTSw + Roughness + TOBog + TOFen - DynamicHabitat	0.43	0.16	0.96	1.4
Palm Warbler (bog)	GLM-ZIP	-Intercept + Elevation + Roughness + DynamicHabitat + TOBog	-Intercept + CTSw + Roughness + CT + MT - TOBog + DynamicHabitat	0.53	0.28	1	1.7
Common Yellowthroat (fen)	GLM-ZIP	-Intercept - AGBiomass - CT - DTSST - TOFen	-Intercept + CT + MT + TOFen + TOBog	0.39	0.22	1	1.2
Northern Waterthrush (swamp)	GLM-ZIP	Intercept - Elevation - CTSw - CT - MT - ChangeYear - TOBog	-Intercept + Roughness + CT + TOFen - CTSw - DTSST - DynamicHabitat	0.43	0.21	1	1.5
Canada Warbler (SAR)	GLM-ZIP	Intercept + DNSWdy- Elevation + CT + DTSST + TOFen	Intercept -Elevation + CT + DTSST + DNSWdy + TOFen - ChangeYear + log(AGBiomass+10)	0.36	0.46	1	3.7

Species Model	Model Type	Covariates (Abundance model)	Covariates (Zero-inflated model)	Model Diagnostics			
				Spearman rho	Deviance[2]	Chi-square p value	Max VIF
Olive-sided Flycatcher (SAR)	GLM-ZIP	-Intercept - Elevation - DynamicHabitat - Roughness - MT	-Intercept - Elevation - DynamicHabitat -MT - Roughness + DTSST	0.28	0.12	0.98	1.7

Notes: AGBiomass: Aboveground biomass; CT: Coniferous Treed; CTsw: Coniferous Tree Swamp; DNSWdy: Disturbed – Non and Sparse Woody; DTSST: Disturbed – Treed and or Shrub/Sparse Treed; DT: Deciduous Treed; MT: Mixed Treed; TO Bog: Treed to Open Bog; TO Fen: Treed to Open Fen

4. Model Simulations to Determine "Optimal" Sample Size and Study Design to Fill Data Gaps

4.1 Methods

Model simulations were conducted to compare multiple study designs to identify an "optimal" sample size that reduces model predictive bias and maximizes precision to the best extent possible. The following four study designs were compared using simulations of the previous bird models:

1. The existing GRTS study design (273 sample visits at 171 survey stations)
2. Using the existing GRTS study design (273 sample visits at 171 survey stations) with additional sampling selected using the existing GRTS study design (60% of survey stations from existing sites and 40% new survey stations).
3. A simple random study design.
4. The TISG (the Agency 2020) benchmark study design.

Model simulations (n = 50) were conducted where potential site visits from each study design were randomly selected for an incremental range of sample sizes. A series of sample sizes (e.g., increments of 50 until 2,300 for the TISG (the Agency 2020) benchmark study design; increments of 50 until 500 for others) were simulated, assuming that each survey station was visited twice (i.e., sample size of 100 = 50 survey stations). Time-associated covariates that are used to calculate QPAD offsets were simulated with a simple Monte Carlo sampling routine, where mean and standard deviation parameters were derived from TSSR and Julian Day data in the existing dataset.

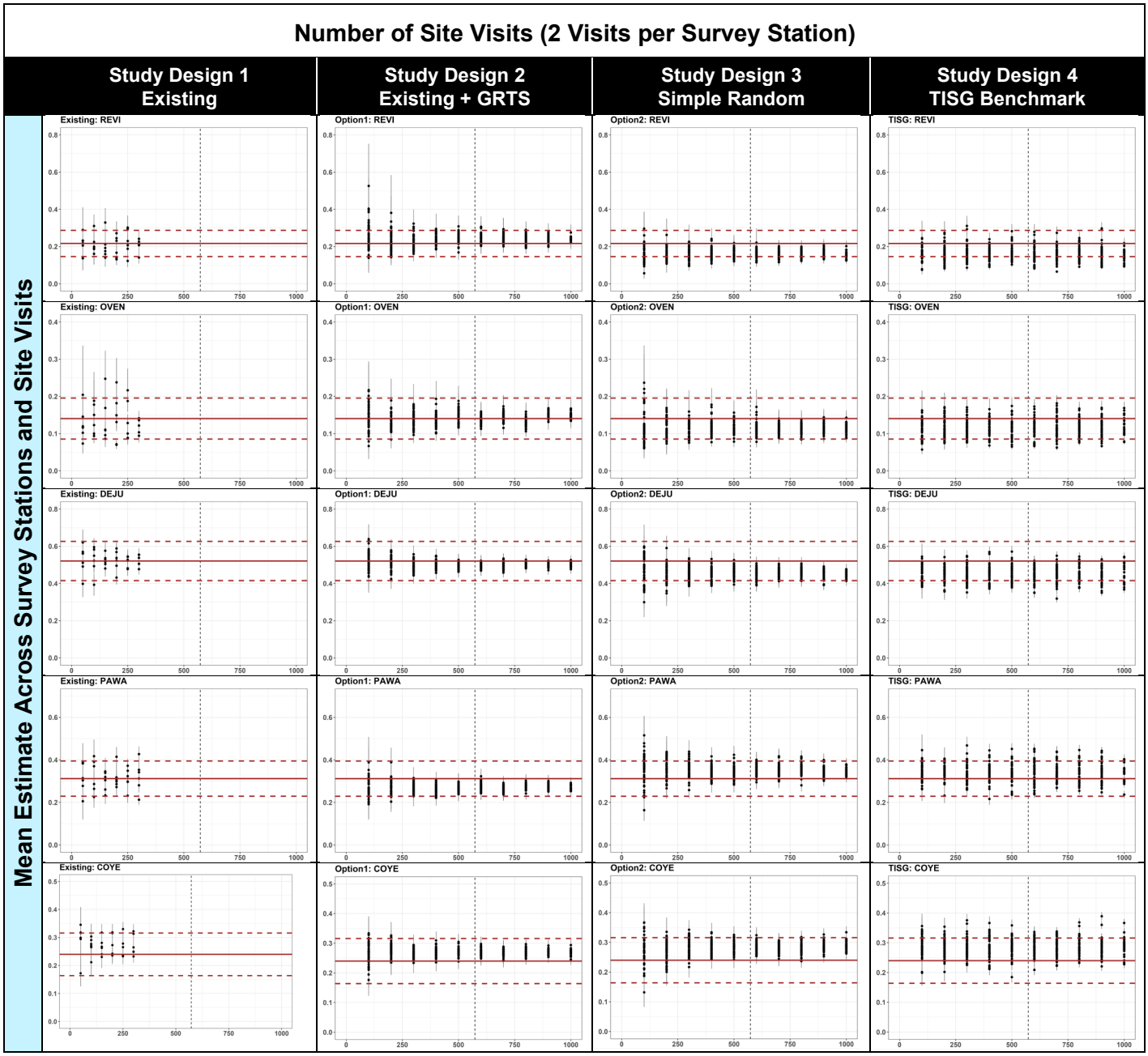
The precision and average bias of abundance estimates from each bird species model was examined across each sample size increment by calculating the mean and the variance (95% confidence interval around the mean) for each study design. With 50 model simulations, an ideal sample size would have 50 mean abundance estimates relatively close to the observed mean (low average bias) with small or comparable confidence intervals relative to the observed confidence interval (high precision).

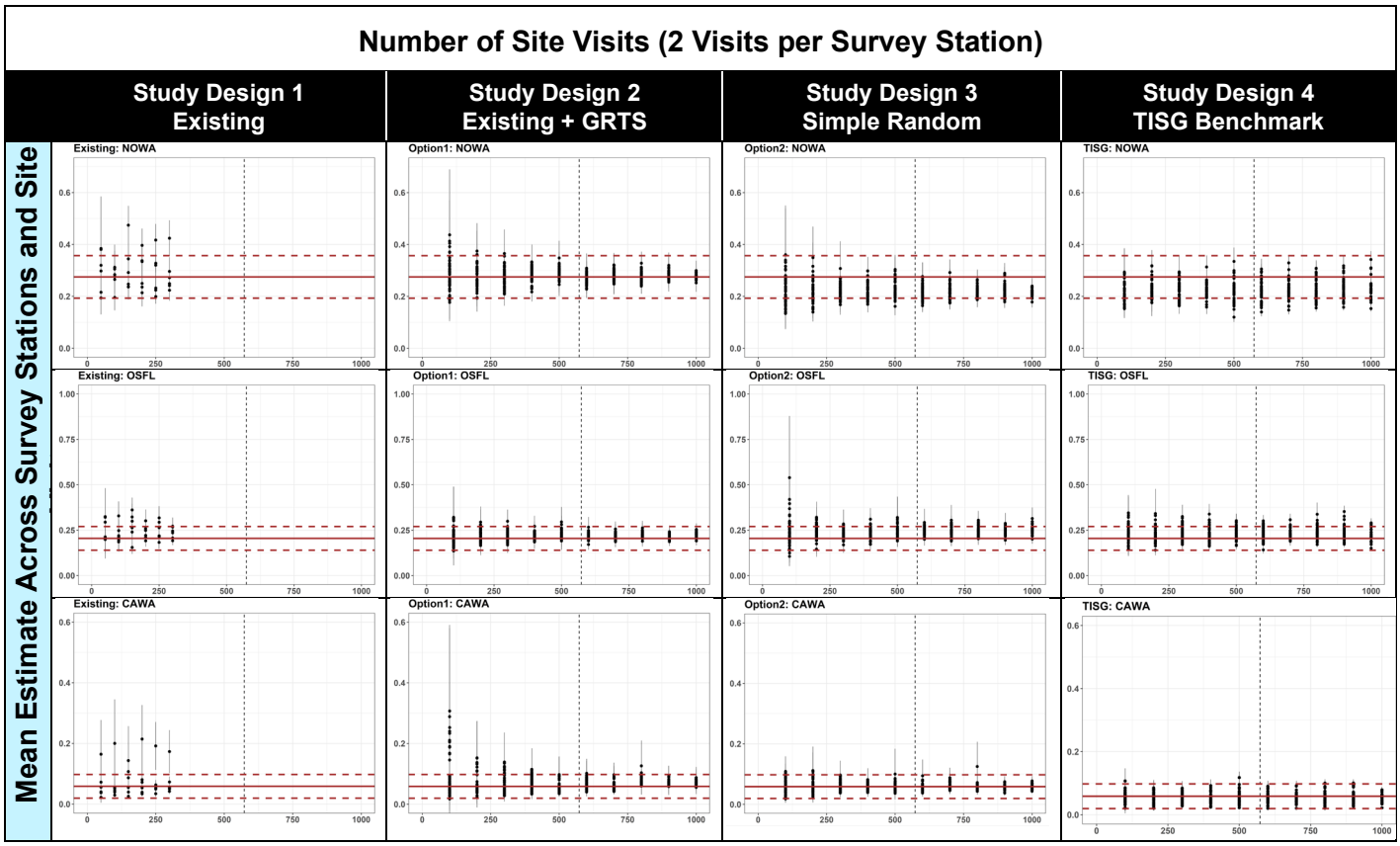
4.2 Results and Discussion

The variance of bird species models for the existing 273 site visits selected with the GRTS study design shows initial signs of decreasing (**Figure 4-1**). In contrast, the mean and variance of estimates from each bird species model is stable at a fairly low number of site visits with the TISG (the Agency 2020) benchmark study design (**Figure 4-1**). The mean and variance from each bird species model for study designs 2 to 4 stabilize by 573 site visits (**Figure 4-1**). This would indicate that 300 additional site visits (two site visits at 150 survey stations) on top of the 273 site visits already completed (Zoetica 2018, Golder 2019) is a reasonable "optimal" sample size.

The variance in the study designs 2 and 3 show a substantial decline before stabilizing after 500 visits for each species (**Figure 4-1**). Study design 2 (GRTS study design) is the preferred option for selecting additional sites based on the lower variance and mean bias by 573 site visits for Olive-sided Flycatcher (**Figure 4-1**), relative to other study designs. Study design 2 has similar variance and bias around its mean model estimates as study designs 3 and 4 for Canada Warbler.

Figure 4-1: Mean Estimate and Variance (95% confidence interval) by Number of Site Visits (2 visits per survey station) for Each Bird Species Model using Study Design 1 (existing GRTS Study Design), Study Design 2 (existing GRTS study design and additional survey stations selected using the GRTS study design), Study Design 3 (simple random study design), and Study Design 4 (TISG (the Agency 2020) **benchmark study design).**





Notes: *REVI = Red-eyed Vireo* *OVEN – Ovenbird* *DEJU = Dark-eyed Junco*
PAWA = Palm Warbler *COYE = Common Yellowthroat* *NOWA = Northern Waterthrush*
OSFL= Olive-sided Flycatcher *CAWA = Canada Warbler*

5. Habitat Representativity of Additional Points

5.1 Methods

Land cover within a 100 m radius of survey stations was calculated for 300 site visits (two visits to 150 survey stations) with each study design based on 50 simulations and compared to the land cover in the LSA (3 km buffer from centreline) and RSA (11 km buffer from centreline). The LSA and RSA were selected using an ecosystem-centred approach recommended in section 7.4.1 of the TISG (the Agency 2020). As such, the proportion in each land cover represented by the LSA is similar to the RSA.

5.2 Results and Discussion

The land cover for study design 3 (simple random sampling) and study design 4 (TISG benchmark study design) are comparable to the LSA and RSA (**Table 5-1**). Compared to study design 4, the preferred study design 2 (GRTS study design) oversampled in deciduous and mixedwood forest and undersampled in treed to open fen, treed to open bog, and coniferous swamps (**Table 5-1**). This is an acceptable representativity given that the TISG (the Agency 2020) recommends oversampling of land cover types associated with eskers such as deciduous and mixedwood forest. Coniferous treed is also consistently oversampled by the additional 150 survey stations from study design 2, which is beneficial given the higher counts of Olive-sided Flycatcher in this land cover (**Table 3-2**).

Table 5-1: Land Cover Within 100 m of 150 Survey Stations Selected Through Four Study Designs Compared to Land Cover in the Local Study Area (LSA) and Regional Study Area (RSA)

Land Cover	Proportion					
	Study Design 1: Existing 171 Survey Stations (273 site visits) using GRTS Study Design	Study Design 2: Additional 150 Survey Stations using GRTS Points (mean [SD])*	Study Design 3: Additional 150 Survey Stations using Simple Random Sampling (mean [SD])*	Study Design 4: Additional 150 Survey Stations using TISG Benchmark Study Design (mean [SD])*	LSA	RSA
Coniferous Treed	0.18	0.18 (0.01)	0.12 (0.03)	0.11 (0.04)	0.11	0.11
Coniferous/Thicket Swamp	0.18	0.16 (0.02)	0.28 (0.03)	0.30 (0.07)	0.26	0.27
Deciduous Treed	0.04	0.06 (0.01)	0.02 (0.01)	0.02 (0.01)	0.02	0.02
Disturbance – Non and Sparse Woody	0.14	0.11 (0.02)	0.08 (0.02)	0.09 (0.04)	0.08	0.08
Disturbance – Treed and/or Shrub/Sparse Treed	0.09	0.09 (0.01)	0.08 (0.02)	0.07 (0.04)	0.07	0.06
Mixed Treed	0.09	0.15 (0.01)	0.04 (0.01)	0.05 (0.04)	0.04	0.04
Treed/Open Bog	0.14	0.11 (0.01)	0.19 (0.03)	0.17 (0.06)	0.18	0.19
Treed/Open Fen	0.15	0.13 (0.02)	0.19 (0.03)	0.19 (0.05)	0.18	0.18

**Note: summary statistics representative of 50 simulations with 150 survey stations*

6. Covariate Representativity of Additional Points

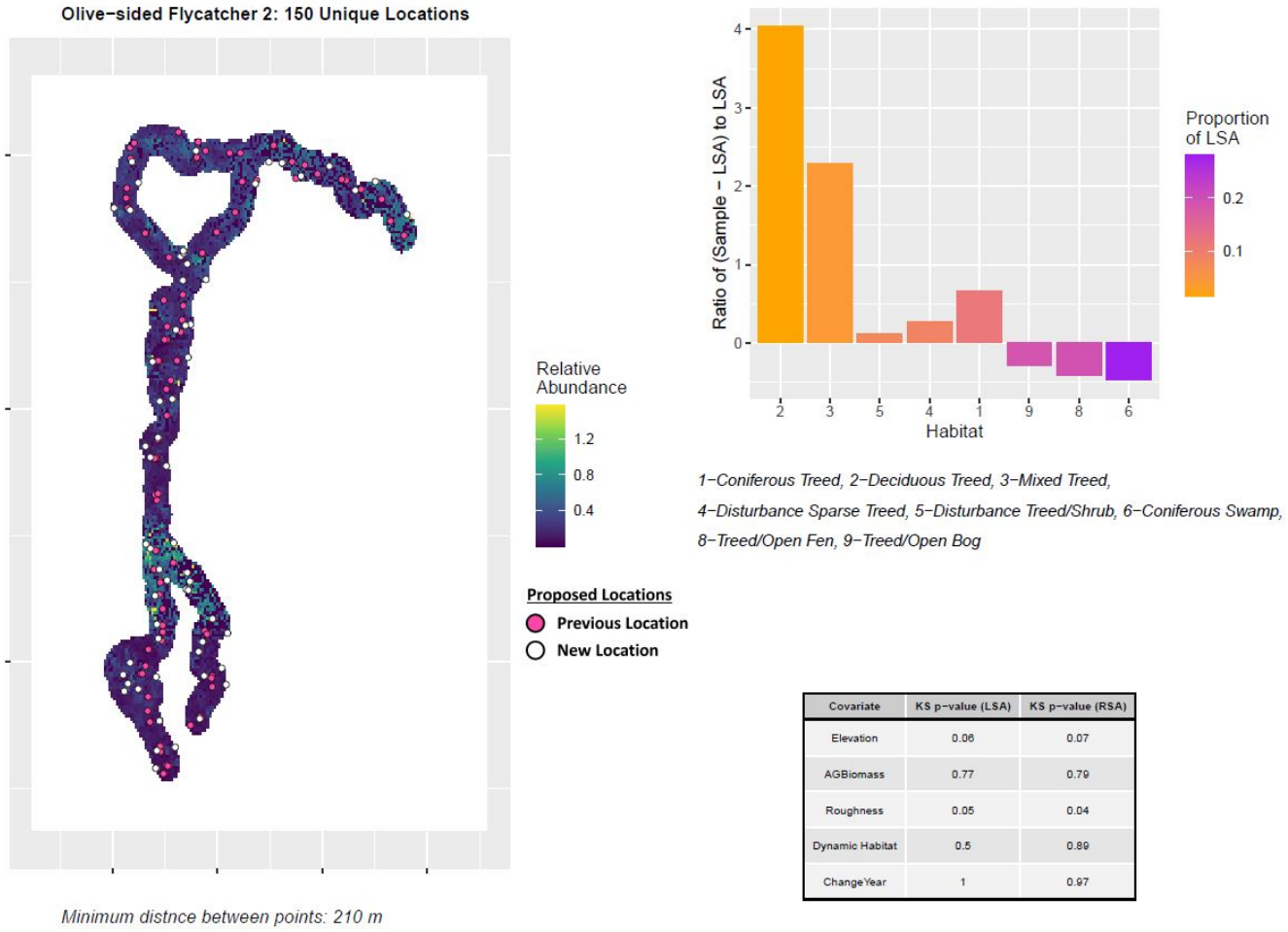
6.1 Methods

To examine the covariate representativity of the preferred study design 2 (GRTS study design), we analyzed the similarity of model covariate distributions across 150 additional survey stations generated by study design 2 with respect to distributions of model covariates across the entire LSA and RSA. A non-parametric multiple comparisons test (Kolmogorov-Smirnov test; Conover 1971) was used to assess whether distributions of all model covariates from survey stations generated by study design 2 are statistically significantly similar (reject H_o at $p < 0.05$; H_o = distributions are not different) to covariate distributions across the LSA and RSA. This was conducted for 50 model simulations using study design 2's approach for each bird model.

6.2 Results

A total of 20 of 50 simulations selected 150 survey stations where elevation, aboveground biomass, change year, and dynamic habitat that were similar to both the LSA and RSA. Surface roughness is highly skewed and difficult to represent completely with 150 survey stations, although one simulation (Simulation 2) did provide a relatively similar distribution for the LSA (**Figure 4-1**). **Figure 4-1** is an example of a simulation showing an adequate distribution's Kolmogorov-Smirnov results for each covariate, the predicted relative abundance map across the LSA for Olive-sided flycatcher, and graphically displays the relative over/under-sampling representativity of the additional 150 survey stations.

Figure 6-2: Spatial Distribution of 150 additional Study Design 2 Survey Stations, modelled relative abundance for Olive-sided flycatcher, Kolmogorov-Smirnov test p-values for important continuous variables used in the models, and the relative over/under sampling of each land cover class relative to the LSA.



Covariate	KS p−value (LSA)	KS p−value (RSA)
Elevation	0.06	0.07
AGBiomass	0.77	0.79
Roughness	0.05	0.04
Dynamic Habitat	0.5	0.89
ChangeYear	1	0.97

All 50 simulations produced high oversampling of deciduous and mixedwood forest, slight oversampling of disturbed forest types and coniferous forest, and slight undersampling of treed to open bog, treed to open fen, and coniferous swamps. This is an acceptable representativity given that the TISG (the Agency 2020) recommends oversampling of land cover types associated with eskers such as deciduous and mixedwood forest.

7 Conclusion

Bird model simulations indicate that a total of 573 sites visits is the “optimal” sample size that reduces model predictive bias and maximizes precision to the best extent possible. Given that 273 site visits to 171 survey stations has already been completed (Zoetica 2018, Golder 2019), an additional 150 survey stations (two site visits per survey station) selected using the GRTS study design provides acceptable habitat representativity based on the TISG requirement to emphasize habitats associated with eskers such as deciduous and mixedwood forests. Furthermore, covariate representativity was adequately achieved for 20 of 50 model simulations with a sample size of 150 survey stations selected with the GRTS study design.

We hope this memorandum meets your expectations for future discussion. If you have any further questions, please do not hesitate to contact the undersigned.

Sincerely,

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