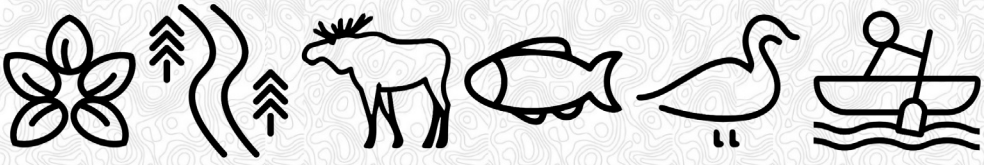
MARTEN FALLS FIRST NATION
ALL SEASON COMMUNITY ACCESS ROAD

FINAL

Peatlands Study Plan

May 2021



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Revision History

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

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Acronyms

Agency, the ... Impact Assessment Agency of Canada
AR5 ..... the IPCC's Fifth Assessment Report
CADE ..... Climate Analytics Data Engine
CAR ..... Community Access Road
CO2 ..... Carbon dioxide
CH_4 ..... Methane
cm ..... centimeter
EA ..... Environmental Assessment
ECCC ..... Environment and Climate Change Canada
GHG ..... Greenhouse Gas
GIS ..... Geographic Information System
IA ..... Impact Assessment
IAA ..... *Impact Assessment Act*
IPCC ..... Intergovernmental Panel on Climate Change
IS ..... Impact Statement
kg ..... kilogram
km ..... kilometre
LiDAR ..... Light Detection and Ranging
LSA ..... Local Study Area
m ..... metre
MECP ..... Ontario Ministry of the Environment, Conservation and Parks
MFFN ..... Marten Falls First Nation
PDA ..... Project Development Area
RCP ..... Representative Concentration Pathways
RSA ..... Regional Study Area
SAR ..... Species at Risk
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 Peatlands 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
Impact Management Measure	Mitigation Measure
Net Effects	Residual Effects
Record of Consultation	Record of Engagement

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[1] discipline currently planned for the Project and the valued components (VCs) covered by the study plans where applicable.

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)
Wildlife	■ Wildlife Study Plan	■ Bats (including SAR-bats such as: Little Brown Myotis [*Myotis lucifugus*], Northern Myotis [*Myotis septentrionalis*] and Tricolored Bat [*Perimyotis subflavus*])

1. *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.*

Environmental Discipline	Study Plan Name	Valued Component(s)
		■ Fur Bearers (proxy VC[2] 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*)
	■ Bird 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*)

2. *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)
		■ Cisco (*Coregonus artedii*) ■ Burbot (*Lota lota*) ■ 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 2020) (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:

- A baseline[3] 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 Peatlands 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), dated February 24, 2020 (the Agency 2020c), for this Project and applicable provincial agency comments on the Draft Terms of Reference (ToR)[4].

As required by the IAA and referenced in TISG Section 7.3, 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**);
- 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**).

3. *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.*
4. *If necessary, the Study Plan will be updated to reflect the approved ToR if approval is obtained.*

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 species at risk, such as those provided by the Ontario Ministry of the Environment, Conservation and Parks or by the Ministry of Natural Resources and Forestry, 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 other applicable agencies. A summary of technical discussions and correspondence held to date on this Study Plan has been provided in **Table 3-1.**

Table 3-1: Summary of Study Plan Technical Discussions

Attendees / Responsible Party	Correspondence	Discussion Point	Solution
■ **The Agency**	■ Preliminary comments received following submission and review of draft Study Plan	■ **17-August-2020:** Comments and clarification questions received, including additional information requirements regarding baseline study design, desktop assessment and concordance with federal and provincial requirements.	■ Additional details and clarification provided within this Study Plan, and responses to these comments are in **Appendix B**.

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[5] 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 2020) (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 2020a) (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

5. *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.

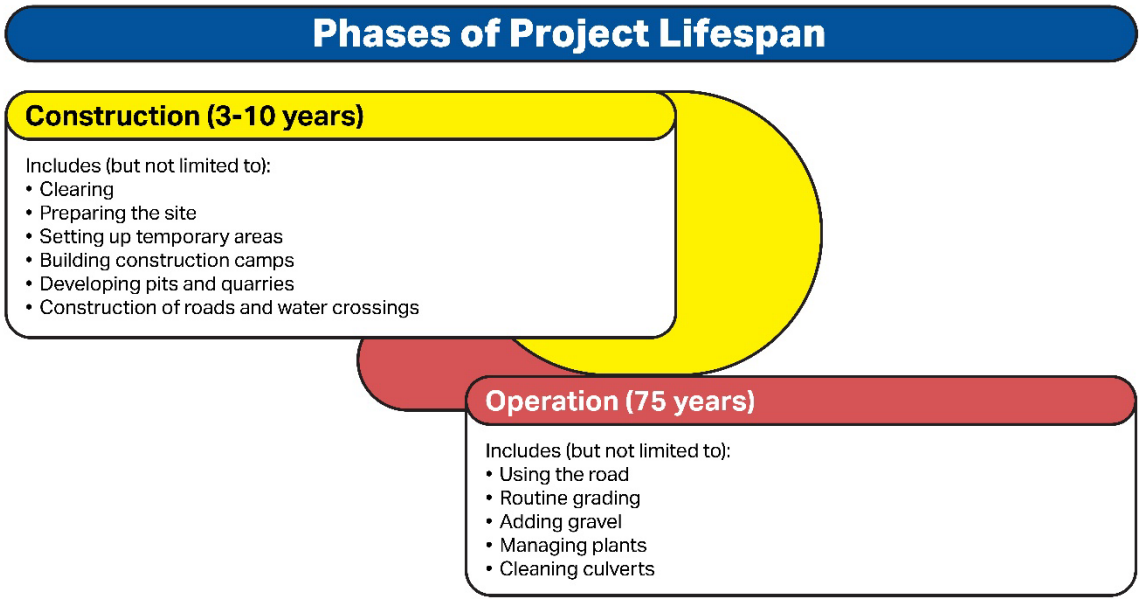
6. Assessment Boundaries

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[6]). 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-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). Location for Project components other than the route itself (e.g., temporary construction access roads, work areas, worker

6. *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.*

camps, and pits, quarries and associated access roads) are unknown at this time; however, the PDA and LSA will be adjusted accordingly as the Project design progresses and as required.

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.

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.

6.2.2 Peatlands Study Areas

The LSA and RSA boundaries for Peatlands are detailed in **Table 6-1** and shown on **Figure 6-2**.

Table 6-1: Peatlands Study Areas

Study Area	Geographic Extent	Rationale
Local Study Area	■ 2.5 km buffer surrounding the PDA (may be refined following desktop analysis and input from other VCs that may indirectly affect Peatlands)	■ The LSA will encompass the PDA and will consider areas outside of the PDA where direct or indirect Project effects Peatlands can occur (e.g., erosion and sedimentation, spills, or dust deposition) ■ To account for potential shifts in route alignment or positioning of temporary infrastructure ■ To encompass the LSAs of other VCs that may affect Peatlands (e.g., Surface Water)
Regional Study Area	■ Borders of overlapping quaternary watershed boundaries (may be refined following desktop analysis and input from other VCs that may indirectly affect Peatlands)	■ Using a boundary at the quaternary watershed spatial area will allow for a large enough area to assess cumulative effects on ecosystems that are found within peatland communities within the RSA.

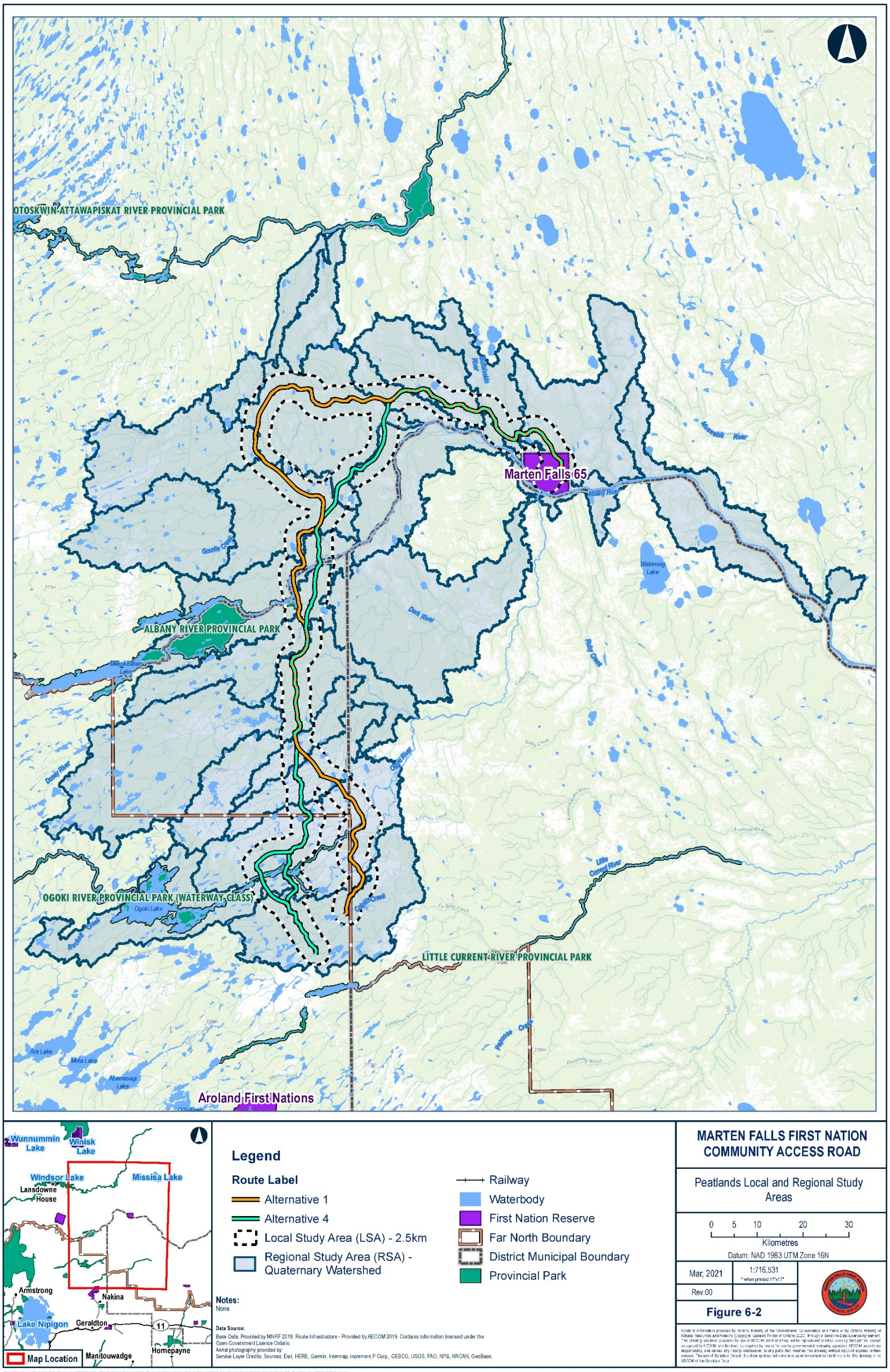
The LSA for Peatlands differs slightly from what is generally being considered, which is an area within 2.5 km of the centreline of Alternative 1 and Alternative 4. This span would generally allow for documentation of existing conditions and prediction of environmental effects. The LSA will be refined during the collection of baseline data where the boundary could extend beyond the general 2.5 km from the PDA. The definition of the LSA will take an ecosystem-centred approach as outlined in the Canadian Environmental Assessment Agency's document Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act* and will consider the topography, climate, soils vegetation and geology of the area (Canadian Environmental Assessment Agency 2018).

The RSA includes the PDA and associated LSA. The RSA was selected to capture the maximum spatial extent of the combined direct and indirect effects that extend beyond the PDA and LSA of the CAR on Peatlands. This is in accordance with the TISG which states that, "study area boundaries should include areas potentially affected by changes to water quality and quantity or changes in flow in the watershed and hydrologically connected waters." The RSA represents the largest of the three study areas and encompasses all far-reaching effects of the CAR. The Peatlands RSA is defined by the borders of all overlapping quaternary watersheds in the Project area. Quaternary watersheds are defined as the drainage areas that make up over 1000 individual subdivisions within the tertiary watersheds in the province of Ontario. Quaternary watersheds were chosen as the geographic extent for the RSA as the farthest-reaching indirect effects on Peatlands are hydrologically driven, and quaternary watersheds provide a representative

boundary and is considered of sufficient size to capture effects to Peatlands within the larger drainage area. The following quaternary watersheds make up the general RSA:

- Garvey Lake-Seabrook Lake;
- Robins Island-Albany River;
- Marten Falls-Albany River;
- Wabassi River-Mouth;
- Gourlie Creek;
- Macina Falls-Wabassi River;
- Tolfree Lake;
- Gittins Lake;
- Buffaloskin River;
- North Channel-Ogoki River;
- Dusey River-Mouth;
- Dark River;
- Jenner Creek-Colpitts Creek;
- Brundrit Lake;
- Tanase Lake;
- Purcell Lake-Albany River; and,
- Stonebasket Island.

Figure 6-2: Peatlands Local and Regional Study Areas



7. Baseline Study Design

In accordance with the TISG, the objective of the Baseline Study Design for the Peatlands Study Plan is to collect data in a manner that enables reliable analysis, extrapolations and predictions for the estimation of baseline conditions at peatland environments. Peatlands is an interdisciplinary field where knowledge of climate, landform, soils, surface water, groundwater, and vegetation are needed to determine the baseline conditions. Therefore, the Peatlands Baseline Study Design aims to build upon and integrate the results of the following Study Plans:

- Atmospheric Environment;
- Climate Adaptation and Resiliency;
- Physiography, Terrain and Soils;
- Surface Water;
- Groundwater and Geochemistry;
- Vegetation; and
- Land and Resource Use.

This approach enables efficiencies in the field when considering logistical challenges such as the remoteness of the site, the short growing season, and the vast tracts of peatland terrain in the subject area. The study design described in the following sections outlines the methods in which the baseline conditions of Peatlands within the Project study areas will be characterized.

7.1 Context

Peatland is a collective term for wetlands that accumulate more than 40 cm of organic soil derived from Sphagnum moss species (Asada and Warner 2005, National Wetlands Working Group 1997, Sims and Baldwin 1996, National Wetlands Working Group 1988). These types of wetlands are considered an important ecosystem both locally and globally in terms of biodiversity, ecosystem function, and carbon storage and flux and, hence, represent a key component to the IS / EA. The following describes the importance of Peatlands in relation to the IS / EA.

Peatlands are home to an extraordinary diversity of life (Tickner et al. 2020). Permanent saturation, high acidity and low electrolyte and nutrient content mean that peatland habitats are colonized by highly adapted

plant and animal species thereby contributing considerably to species diversity (Wolfgang et al. 2006). There are over one thousand documented plant and animal species known to inhabit Peatlands and include a variety of lichens, bryophytes, ferns and allies, herbaceous wetland and terrestrial plants, aquatic and terrestrial invertebrates, birds, and mammals (Wolfgang et al. 2006).

Peatland form and function is largely determined by hydrological processes resulting from water exchange dictated by climate, topography, soil character, vegetation cover and land use. The mechanisms by which water flows overland and through the subsurface is complex. Water movement can occur between branches and leaves and up the stem and through tight networks of peat (Thompson and Waddington 2008). Subsurface flow can also be through a series of macropores and natural pipes or channels and can occur at depth in peat isolated from large-scale groundwater flow systems (Holden 2005, Devito et al. 1997). Subsurface flow within a peatland can also reverse in direction in response to water deficit and water table drawdown (Devito et al. 1997).

Peatlands also form one of the largest carbon sinks[7] in the terrestrial biosphere, representing approximately one third of the world's carbon (Waddington and Price 2000). Peatlands in Canada are most widespread in the Boreal and Subarctic Wetland Regions (Tarnocai et al. 2000, 2005; National Wetlands Working Group 1986) and make up a total surface coverage of approximately 1,135,607 km^2, which accounts for 91% of the total wetlands, or 12% of the land area in Canada (Tarnocai 2006). Because of the large area they cover and their high organic carbon content, Canadian Peatlands contain approximately 147 Gigatonne soil carbon, which is approximately 56% of the organic carbon stored in all Canadian soils (Tarnocai 2006). The movement of water in Peatlands drives carbon storage and flux and it is these small-scale processes that can have global impacts through exacerbated terrestrial carbon release (Holden 2005). When the water table lowers, more peat is exposed to oxygen, therefore decomposing and releasing the previously stored carbon into the atmosphere the forms of carbon dioxide and methane (Holden 2005).

7.2 Desktop Assessment

A desktop review of existing information sources will be completed to identify the relevant information gaps to be addressed through further study. Based on the guidance provided in Section 7.2 'Sources of baseline information' in the Agency's TISG for this Project, a preliminary list of applicable information sources and academic papers have been included in **Appendix A** and reflects federal and provincial guidance received to date. The purpose of the desktop assessment is to confirm that the most up-to-date and relevant science

7. *Carbon sinks are natural environments, such as Peatlands, that absorb carbon from the atmosphere into plant tissues through photosynthesis and prevent the carbon from easily re-entering the atmosphere (International Union for Conservation of Nature 2017)*

and methods are being used for field assessment; to help to ensure information that has already been collected is effectively utilized in the determination of baseline conditions; and to logistically plan for field assessment.

The desktop assessment will include:

- Review of Previous Studies: A review of previous regional baseline studies that pertain to the Project scope and / or RSA will be completed to provide additional climate, hydrogeological, geological, hydrological, geochemical or biological data. If any data are referenced, justification for utilizing these data (i.e., spatial and temporal relevance with respect to the Project RSA), detailed descriptions, and specific data sources will be provided in the Baseline Report.
- Review of existing databases: Existing climate, geological, hydrological and biological databases will be reviewed, a list of which is provided in **Appendix A**.
- Review of relevant academic papers: A list of recommended academic papers is provided in **Appendix A**.
- Review of existing mapping, light detection and ranging (LiDAR) data and aerial photography: A review of existing wetland mapping, Far North Landcover mapping (OMNRF 2014), LiDAR imagery and aerial photography will be conducted to further support the baseline characterization studies.
- Pre-typing of Peatland Communities: The delineation of Peatlands will be completed using background information such as: Far North Land Cover Mapping (OMNRF 2014), Forest Resource Inventory mapping – Ogoki Forest (OMNRF 2020) and surficial geology information, as well as highly detailed LiDAR data that has been procured for the PDA and LSA.
- Coordination with related disciplines: collaboration and coordination will take place with other disciplines to verify that, where applicable, the data requirements to develop the Peatlands assessment have been captured in supporting technical study plans.

The results of the desktop assessment for Peatlands will be documented in the Baseline Report. This report will include:

- a literature review of existing studies to characterize baseline conditions. A list of documents that were reviewed will be provided as an appendix;
- a description of the overall landform, geology and soils that will be based on the results of the Physiography, Terrain and Soils Study Plan;

- a description of the historical climate including annual trends for air temperature, rainfall, snowfall and wind that will be based on the results of the Atmospheric Environment and Climate Adaptation and Resiliency Study Plans;
- a gap analysis to provide the basis for completing additional field or desktop studies to support the baseline characterization studies; and
- a description of the extent of Peatlands within the LSA and RSA as determined through the desktop assessment, coupled with a summary of where these features are known to overlap with water body crossing locations (based on the results of the Surface Water Study Plan and specific to peatland-influenced watercourses that are expected to be crossed by the Project alignment).

7.2.1 Peatland Availability and Distribution

Preliminary desktop mapping will be completed to identify peatland features within the PDA and LSA. Peatlands will be mapped with support of the Physiography, Terrain and Soils studies as well as the Vegetation studies. As per the recommendations outlined by the Physiography, Terrain and Soils Study Plan, terrain mapping will be completed at a scale between 1:2,000 and 1:5,000 using digital stereo imagery. All features identified as organic during the terrain mapping will be further reviewed and classified to peatland formation (swamp, bog, fen, palsa / peat plateau, marsh, open water [poor fen]) and subformation (i.e., open or treed). Results of the terrain mapping and classification of organic terrain features will be verified against vegetation community pre-typing to confirm the extent of Peatlands within the PDA and LSA. In accordance with the requirements of the TISG, Peatlands will be mapped to ecosite (i.e., open, shrub and treed bog / fen / swamp) per the Northern Ecological Land Classification methods within the LSA to the extent possible.

The RSA will not be delineated through the Ecosites of Ontario (Banton et al., 2009) classification methods but will be left to the scale of the Far North Land Cover mapping. Classification of the RSA will remain consistent with the approach suggested by related disciplines (e.g., vegetation). The level of existing information on vegetation and peatland communities within the RSA (Far North Land Cover) is considered adequate to support an assessment of indirect effects on Peatland VCs within the RSA. No additional desktop delineation or classification in the RSA will occur. Concordance tables will be created to provide consensus between the two classification systems, with the Ecosites of Ontario classification being grouped into the broader categories of the Far North Land Cover during assessment of the Project at the RSA scale. Variation of peatland types observed in the LSA will be used to provide a qualitative narrative of the Far North Land Cover data.

7.2.2 Peatland Carbon Storage and Flux

Peatlands represent a large net carbon sink, sequestering between 10 and 35 grams of carbon per metre squared per year (g-C/m^2/y) (Packalen et al. 2014, Roulet et al. 2007, Strack et al. 2016, Vitt et al. 2000). Carbon dynamics in Peatlands include uptake and release of atmospheric CO_2, release of methane (CH_4) to the atmosphere, and export of dissolved organic carbon in water (Roulet et al. 2007). Peatland carbon storage and flux will be determined based on methods outlined in the *Assessment of the vulnerability of peatland carbon in the Albany Ecodistrict of the Hudson Bay Lowlands, Ontario, Canada to climate change* (McLaughlin et al. 2018) and using secondary sources identified in **Appendix A**. Estimating carbon storage will be evaluated from the area of Peatlands and the carbon mass will be estimated per the following regression equation (McLaughlin et al. 2018):

$$\text{Carbon mass (kg m}^{-2}) = 0.4^* \text{ peat depth (m)} + 17.2$$

Peat depth will be estimated during terrain mapping as per the Physiography, Terrain and Soils Study Plan. Field peat depth measurements will be collected during peatland classification and terrain field studies to refine the carbon storage estimates. During the field studies, the peat depths will be measured at field plot locations, noting that plots will be augered to a depth of 2 m, with a plan to characterize individual soil and peat profiles.

Existing regional datasets and secondary sources identified in **Appendix A** will act as the basis for estimating the carbon flux in the form of CO_2 and CH_4 for the Project and will be consistent with the approach used in *Assessment of the vulnerability of peatland carbon in the Albany Ecodistrict of the Hudson Bay Lowlands, Ontario, Canada to climate change* (McLaughlin et al. 2018). The export of dissolved organic carbon is not considered as part of the assessment for the Project. The assessment will focus on atmospheric flux of carbon. The off-site waterborne carbon losses are not anticipated to be significant compared to the on-site emissions.

The assessment to determine peatland carbon storage and flux will include:

- Development of a spreadsheet providing the relevant parameters used to calculate carbon storage and flux with final calculation for each peatland type.
- Assessment of Peatlands with consideration of the pertinent peatland characteristics including peat classification and subform, peat wetness, water table depth, and permafrost.

7.2.3 Peatland Climate

The desktop studies will include an assessment of the potential effects of climate change on peatland function and carbon storage and flux. Peatland primary production, and therefore its ability to act as a carbon sink may be affected by changes in climate (McLaughlin et al. 2018). For example, increased temperatures can drive higher evapotranspiration rates, leading to drier peatland communities. Effects of climate change will be evaluated specifically in response to increased temperature and changes in rainfall patterns. Precipitation changes will be assessed based on their range and seasonality. The climate indices and expressions of change are not expected to be Project driven. However, it is important to understand the context of these changes and how they relate to evolving baseline conditions and anticipated Project effects.

Baseline and projected future climate data will be developed for the assessment of climate change impacts on Peatlands for the Project. One 30-year baseline historical record and two 30-year periods centred on the 2050s (2041 – 2070) and the 2080s (2071 – 2100) will be used to align the assessment of climate change impacts on Peatlands (ECCC 2021, IPCC 2014). This assessment will be developed across time horizons consistent with design life expectations for the Project.

Future climate projections for each assessment time horizon will be reviewed and historical and projected climate information will be compiled for climate factors relevant to Peatlands from locations in proximity to the preferred CAR route. The assessment will use a Climate Analytics Data Engine (CADE) to access credible, quality-checked (by ECCC) historical and projected climate data on relevant climate factors. The CADE Tool develops climate analytics through leveraging a large collection of datasets, including:

- Dataset of available ECCC observation stations (of various record lengths) dating back to 1900 for some stations (daily observations with hourly observations from major airports);
- Dataset of observed historical gridded data for Canada (CANGRD) developed by ECCC and Natural Resources Canada (NRCan) at 10 km resolution;
- For climate projections full datasets of officially available Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) (IPCC 2014) Global Climate Models (GCMs), with consideration of simulations from approximately 40 IPCC GCMs;
- Available ECCC Intensity-Duration-Frequency datasets from across Canada;
- Dataset of ECCC historical Canadian tornadoes; and,
- Dataset of National Building Code of Canada meteorological code standards from across Canada.

7.3 Field Study Methods

Baseline field studies will be completed for peatland environments to confirm and further augment the results of the desktop review of existing information. The purpose of the baseline field studies is to collect site-specific data to enable reliable analysis and extrapolation for estimating baseline conditions and predicting Project-effects on peatland environments both spatially (i.e., within and across the PDA, LSA and RSA) and temporally (i.e., between years). The baseline field study component of this Study Plan will focus on collecting data to determine the following characteristics for Peatlands:

- Peatland Hydrology and Hydrogeology;
- Peatland Composition; and
- Peatland Function

Data collected for these components will be through a combination of in-field and modelling studies.

7.3.1 Peatland Hydrology and Hydrogeology

Peatland hydrology and hydrogeology will be characterized based on the field data collected as part of the Groundwater and Geochemistry Study Plan and Surface Water Study Plan, recognizing that the groundwater field studies will include borehole and associated hydrogeological investigations in peatland environments, while the surface water field studies will involve multi-season flow measurements and water quality sampling at peatland-influenced water body crossing locations. The field studies for the surface water and groundwater monitoring stations have been developed with inputs from the Peatlands Study Plan Lead to confirm that selected monitoring / sampling stations occur within representative Peatlands (as described in **Section 7.3.2)**.

Data required from the Groundwater and Geochemistry Study Plan and Surface Water Study Plan include:

- Depth of groundwater table;
- Location of defined water bodies (i.e., watercourses, lakes, and ponds to be targeted as crossing locations);
- Inferred surface water – groundwater connections at water body crossing locations;
- Estimated drainage area for water body crossing locations;

- Measured / observed variation in surface water flow and water quality for water body crossing locations; and
- Dominant flow direction both in areas that support focused and diffuse flow patterns.

The findings of this field assessment will be provided as part of a Baseline Report. This document will include:

- A characterization of existing surface water and groundwater conditions within peatland ecosystems;
- A description of landscape and / or watershed considering topography, soil types and hydrological linkages associated with peatland-influenced water bodies; and
- A description of hydrological and other functions.

The general timing of this assessment will be conducted in line with field work completed per the Groundwater and Geochemistry Study Plan and Surface Water Study Plan. Results of the Baseline Report will be used to inform the required mitigation measures for the Project (e.g., use of equalization culverts, collection ditches, permeable fill materials) to avoid road-related impacts such as flow disruption and associated loss to peatland environments.

7.3.2 Peatland Composition

It is important to understand the types of Peatlands that may be affected by the Project, given that the various types, or subforms, react differently to environmental and anthropogenic influences (Sims and Baldwin 1996). These considerations will be assessed through the planned field surveys for the Physiography, Terrain and Soils Study Plan and Vegetation Study Plan, with a plan to use these field studies to describe the general composition of representative peatland communities as described in the within the PDA and LSA.

Aerial and ground-based field survey locations, coupled with sample numbers, for the supporting Vegetation Study Plan will be determined based on the field survey site selection and statistical analysis for wetland communities. Representative areas to be ground-surveyed are to include a sample of each peatland ecosite found within the LSA. There will be no ground surveys within the broader RSA.

At each ground and aerial survey location, the peatland will be classified to formations (swamp, bog, fen, palsa / peat plateau, marsh, open water [poor fen]) and subformation (i.e., open or treed) in accordance with the *Ontario Peatland Inventory: Field work Methods* (Riley and Michaud 1994), the *Ontario Wetland*

Evaluation System Northern Manual (OMNRF 2014) as well as the Canadian Wetlands Classification System (National Wetlands Working Group 1997). The following data will be collected at each ground sample point:

- GPS Point: The location of sample point will be recorded in UTM geographic coordinates, including elevation;
- Classification: Peatland will be classified as per the Canadian Wetland Classification System and Ecosites of Ontario based on the vegetation, hydrology, and soils.
- Sphagnum spp. Identification: Sphagnum mosses will be identified to species level by qualified field staff who have the knowledge and experience or have been trained to identify Sphagnum to species within a 1 m x 1 m grid quadrant placed to reflect representative vegetation. Where required, field samples may be collected and submitted to a taxonomic expert for identification. Field resources such as the field guide for identifying Sphagnum species in northwestern Ontario (Sims and Baldwin 1996) will be used, a link of which is provided in **Appendix A.**
- Surface Wetness: This is a general characterization and relative estimate of wetness of the top 20 cm of peat will be categorized into the following:
  - 1 – Dry
  - 2 – Moist
  - 3 – Wet (i.e., water table at 10 to 25 cm below the surface)
  - 4 – Very Wet
  - 5 – Water above Surface
- Geomorphology and Hydrology: Several considerations will be documented including: geomorphology of the peatland (e.g., depressional, riverine, lake fringe, extensive peatland); presence of surface water, flow patterns, connectivity, inputs, outputs, water depth, and evidence of groundwater influence; and existing hydrology alterations (e.g., ditching, beaver activity) will be documented.
- Hummock-Hollow Topography and Average Depth to Water: Microtopographic variability of hummocks consisting of Sphagnum spp. and hollows (pools of wetter graminoid or forb vegetation) may be present within Peatlands and will be recorded as a cover percentage within the 5 m radius of the sample point. The general height of the hummock will be recorded. Average depth to water will be recorded for hummocks and hollows as per the *Ontario Peatland Inventory: Field work Methods* (Riley and Michaud 1994).

- Peat depth and stratification: A Mini-Macaulay auger or a Miller auger is recommended to be used to identify changes in peat type and decomposition using the von Post scale (Ekono 1981) as well as noting capillary characteristics, noting that peat will be sampled in the field to a depth of 2 m.
- Peat decomposition: Substrate decomposition rates will be described using the von Post scale (Ekono 1981).
- Basal sediment: Where encountered, identification of basal sediment (rock, gravel, sand, silt, clay, till) will be made from a relatively small amount of sample taken from the bottom of the auger.
- Canopy height: The height of the canopy will be estimated.
- Vascular plant density / cover percentages: The cover percentages of different structural strata of vegetation (e.g., tree cover, tall shrub, low shrub, graminoid and herbaceous, and moss and lichen species) will be obtained within 5 m of the plot radius.
- Representative Photographs: A series of representative photographs will be taken for each ground survey completed. Landscape photographs will be taken at each cardinal direction (i.e., north, south, east, west) as well as a photograph looking down on the 1 m x 1 m quadrant.

7.3.3 Peatland Function

A functional assessment for the peatland sites will be completed at all ground survey locations. The *Wetland Ecological Functions Assessment: An Overview of Approaches* (Hanson et al. 2008) provides a summary of potential methods that will be used to assess peatland function, indicates the type of data that will be collected, and provides a list of functions that can be expected for each of the different peatland classes (Hanson et al. 2008). These function assessments help to inform the IS / EA Report by providing baseline conditions of the relative functions that the peatland provides to the landscape. The quantitative analysis of peatland function will provide a better understanding of the potential for Project-related effects to Peatlands. The results of the functional assessment will be detailed in the IS / EA Report.

The data collection protocol for the functional assessment will be adapted from the *Wisconsin Rapid Assessment Methodology* (Wisconsin Department of Natural Resources 2014), *Ontario Wetland Evaluation System* (OMNRF 2014), and *the Wetland Ecological Functions Assessment: An Overview of Approaches* (Hanson et al. 2008), noting that these guidelines complement the recommended approaches from ECCC. Peatland composition information collected during the vegetation and physiography, terrain and soils field components (**Section 7.3.2**) will be used to assess the habitat and hydrological function of the peatland

ecosystems. Habitat suitability, and wildlife observations captured as described in the Bird, Ungulates and Wildlife Study Plans will also be incorporated into the functional assessment.

Field assessments for the vegetation studies will be conducted during the leaf-on season which typically occurs from late May through early September. The results of these field surveys will be provided in the Baseline Report for Peatlands, with consideration of the following:

- updated peatland mapping indicating the Ecosite, subformation and location of where ground and aerial surveys were completed for the LSA, noting that feature boundaries will also be refined where applicable;
- a representative description of each peatland subformation including a list of vascular plants and Sphagnum spp observed where applicable;
- completed datasheets will be included as an appendix; and
- representative photographs will be included as an appendix.

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 to established agreements.

8.1 Field Surveys

To maintain consistency and for QA / QC of the data collected, standardized datasheets (either digital or paper) paired with mapping software will be used in the field. Field studies will follow technical protocols that will outline specific work instructions and will be / have been developed to follow provincially and federally acceptable methods. Completeness and accuracy of field data will be verified daily during field verification and field photos and coordinate information will be backed up daily.

8.2 GIS

Finalized Baseline Mapping will be made available in geographic information system (GIS) format and will be provided as electronic geospatial data file(s) compliant with the ISO 19115 standard. This will support the Government of Canada's commitment to Open Science and Data and will 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. This is per the terms of the Open Government License – Canada as applicable with exclusion of sensitive data and confidential Indigenous Knowledge.

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. Databases and GIS files will be accompanied by detailed metadata that meets ISO 19115 standards. 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.

8.3 Peatland Functional Assessment

Each peatland visited during the ground survey locations will be assigned a function ranking / score (e.g., high, moderate, low) based on its relative contribution of various peatland functions (i.e., habitat, hydrology,

biogeochemical) to the surrounding ecological systems. The following will be considered when determining a ranking:

- Surrounding land use types and existing disturbances;
- Hydrological connectivity (flow, isolated wetland vs. wetland complex);
- Hydraulic conductivity (water permanence);
- Vegetation density and open water components;
- Carbon storage and flux;
- Biodiversity, presence of sensitive species or species of cultural importance and habitat suitability; and,
- Water storage and decomposition rates.

This methodology will provide a qualitative and quantitative measure of Peatlands within the PDA and LSA and is anticipated to include sufficient information to describe baseline conditions of peatland abundance and function.

8.4 Peatland Climate

QA / QC routines and algorithms will be applied to identify potentially non-valid data points, and complete additional measures to confirm if outliers represent instrumentation errors or actual extremes values in the data. When data gaps require data supplementation from other sources, those sources will be identified, with the relevant methods and rationale described for their application in this study.

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 as well as projects of similar magnitude and / or location.

A preliminary analysis of Project-environment interactions for the Peatlands Study Plan 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	Peatlands
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]	
	Drilling / Blasting / Aggregate Production	
	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	

Project Phases	Project Activities	Peatlands
Construction Phase: Decommissioning	*Pits and Quarries*	
	Temporary Camps, Roads / Trails and Staging Areas	**x**
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, borrow 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 VCs for Peatlands have been determined through consideration of the following factors listed in the TISG[8]:

- 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;

8. *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 Peatlands.

Table 9-2: Peatlands Indicators

Valued Component	Indicators	Rationale for Selection
Peatland Ecosystems	■ Availability (decrease / increase of overall amount of peatland area) ■ Distribution (changes to the arrangement and connectivity of Peatlands)	■ Social / cultural importance; ■ Available habitat for wildlife; and ■ Ecosystem and landscape level biodiversity.
	■ Function and Composition (change in plant species composition or ecological function).	■ Peatlands provide hydrologic and biogeochemical functions; ■ Sensitive to changes in climate, hydrology and anthropogenic disturbance; and ■ Peatlands can affect subsurface water flow in response to hydrological changes (Devito et al. 1997).
	■ Carbon Storage and Flux	■ Northern Peatlands represent a large portion of the Earth's total terrestrial carbon stores (Thompson and Waddington 2008); and ■ Peatland disturbance is a source of greenhouse gas emissions to the atmosphere (Nugent et al. 2018).
	■ Peatland Climate (changes in temperature, rainfall, seasonal snow accumulation, freeze thaw cycles and / or evapotranspiration rates)	■ Higher temperatures can lead to drying out of peat, increased likelihood of wildfire (and peatland loss), falling water table, increased respiration during warmer months, cracking and erosion (Thompson and Waddington 2008); ■ Changes in rainfall and snow accumulation may impact hydrological cycles (i.e., spring recharge via snowmelt); ■ Changes in freeze / thaw cycles, winter snowmelt events with potential to reduce snowpack available for spring recharge from spring melt runoff; and ■ Drought conditions caused by higher summer temperatures and higher rates of evapotranspiration.

9.3 Potential 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 the Peatlands discipline 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 vegetation could indirectly affect wildlife). **Table 9-3** provides a preliminary identification of how changes to Peatlands may result in indirect effects to other environmental disciplines.

9.4 Methods for Predicting Future Conditions

Assessments of biodiversity metrics, relative abundance and distribution of communities of ecological, economic or human importance will be included in the prediction of future conditions. Percentage of landcover types and changes to land cover can provide critical information on broad scale ecosystem changes. In addition, the extent of wetland cover and amount of wetland loss are also strong indicators of change in biodiversity (Ontario Biodiversity Council 2020). To predict future conditions for the Peatlands VCs, an assessment of the level of pre-existing disturbance versus new disturbance will be assessed. Burned areas, and forestry cut blocks will be included as existing disturbance. The baseline data gathered in terms of area of vegetation communities and abundance, minus existing disturbed areas will be compared to the area and abundance of peatland communities that will be lost or affected by the Project within the PDA, LSA, and RSA.

In addition, fragmentation of the landscape will also need to be assessed. Landscape fragmentation effects both plants and animals by depriving them of habitat however, fragmentation also causes indirect effects which together can result in declines of species populations and richness as well as community composition. An assessment of fragmentation prior to Project development and predicted effects post-development will be included within the IA / EA.

Table 9-3: Potential Discipline Interactions

Discipline and Associated Valued Components	Aboriginal and Treaty Rights and Interests	Atmospheric Environment	Acoustic and Vibration Environment	Physiography, Geology, Terrain and Soils	Surface Water	Groundwater and Geochemistry	Vegetation	Peatlands	Wildlife	Fish and Fish Habitat	Social	Economy	Land and Resource Use	Human Health and Community Safety	Visual Aesthetics	Archaeological and Cultural Heritage
Peatlands ■ **Peatland Ecosystems**	X	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.

Pre-Project specific peatland conditions will rely heavily on data gathered by wildlife, vegetation, physiography, soils and terrain, surface water, and groundwater assessments that will be conducted as outlined under separate Study Plans. The data gathered under these Study Plans will be used to characterize the general hydrological functions of Peatlands within the study area. Assessments will also consider whether Peatlands within the study areas are within a geographic area of Canada where wetland loss or degradation has reached critical levels, or are considered ecologically, socially or economically important to the region.

Climate change projections of temperature and precipitation will be derived from an ensemble of nearly 40 Global Climate Models from the most recent IPCC AR5 (IPCC 2014). These values will be calculated from the AR5 datasets using CADE tools. Within the CADE system, projected values are generated using the "Delta Method", which consists of applying the average projected difference (the "delta") for a given climate parameter to the historical average or baseline value. Projections will be developed for two 30-year periods (time horizons), centred on the 2050s (2041–2070) and the 2080s (2071–2100).

Four future global greenhouse gas (GHG) concentration scenarios have been established by the IPCC. Each of these scenarios is defined by different Representative Concentration Pathways (RCPs). The RCPs are:

- RCP 8.5: considered the global "Business As Usual" (BAU) GHG global emissions regime. This is the current global trajectory based on current global GHG emissions.
- RCP 6.0: GHG emissions double by 2060 and then decrease dramatically but remain above current GHG levels.
- RCP 4.5: a medium GHG scenario derived from assumptions that global GHG emission reduction efforts result in approximately half of the emissions observed under RCP 8.5; and,
- RCP 2.6: a scenario that aligns with global GHG emission reductions that maintain global warming below 2°C above pre-industrial global temperatures.

The IPCC's Special Report on Global Warming (2018) confirms that global GHG emissions continue to track along the RCP 8.5 pathway. This assessment will accordingly apply the RCP 8.5 scenario for the projections used to anticipate future conditions as a conservative approach to risk management. Of the RCP scenarios, the RCP 8.5 pathway, although extreme, represents the closest pathway to historical observations. The RCP 2.6 and 4.5 pathways are highly unlikely pathways given the current data and will therefore not be considered as part of the assessment for the Project. Although the RCP 6.0 pathway is a

plausible scenario, the use of RCP 8.5 allows for an approach that will possibly overestimate climate effects versus an underestimation of climate change.

The IS / EA Report will describe the anticipated activities during the construction and operations phase and will consider the resilience of Peatlands to the effects of the Project. Ecological processes will be evaluated for potential susceptibility to adverse effects from the Project such as considerations for availability, patterns, and connectivity of peatland and the continuation of key ecological and hydrological processes associated with peatland complexes.

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. Proposed mitigation measures will be clearly linked to the extent possible to mitigating potential effects on Peatlands resulting from specific Project components or activities (e.g., vegetation removal, design of equalization culverts, maintenance of hydrological functions) and will be updated as appropriate based on comments received from federal and provincial agencies and stakeholders through the engagement activities. 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 Peatlands (i.e., wetlands) are listed below.

- Describe measures to be used for stockpiling all stripped peat for use during site reclamation or describe the plan for stockpiling stripped peat and mitigate effects related to its long-term stockpiling or removal.

- 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.
  - Provide justification for moving from one mitigation alternative to the next.
- In relation to wetlands, 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:
  - Demonstrate what efforts have been made to avoid and minimize effects to wetlands, and that the mitigation hierarchy has been followed.
  - Demonstrate that mitigation measures have taken into account the health, integrity, and availability of wetland (including peatlands) habitats for the species that rely on them.
  - Explain why alternative locations or means to carry out the Project, or alternatives to the Project were not possible, and how effects to the wetlands will be minimized.
  - Explain how avoidance was considered as the first option and how it can be achieved by identifying alternate means of carrying out the Project (e.g., project location or design) and by considering alternatives to the Project.
  - Explain how minimization can be achieved through project modification or implementation under special conditions after alternative means to the Project have been considered.
  - Describe how the following were considered:
    - Standard procedures and techniques if available for sector or jurisdiction.
    - Procedures and techniques based on sound ecological principles and the best science available.
    - Proven measures over new or experimental techniques.
    - Minimization techniques that take natural succession into account, and should provide for environmental variability over time.
    - Compensation for any residual effect that couldn't be minimized through the following order: restoration, enhancement of existing wetlands, or creation of new wetlands.
    - Evidence that functions can be replaced by the proposed offset activities; and

  - Note that the above requirements are particularly important for peatlands as there is little experience in carrying out restoration or offsets.

- Explain mitigation measures developed specifically for peatlands. For example, mitigation measures to reduce to chance of fire, or build fire resilience; measures to mitigate changes in permafrost; and measures to mitigate changes in hydrological regime.
- In relation to designing offsets for wetlands, 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:
  - indicate if it isn't possible to compensate for lost functions in cases where wetlands are unique, or have habitat functions that support large proportions of migratory birds, or provide habitat required by species at risk, and take that into account when designing offsets.
  - use a minimum ratio of 2:1 of area of wetland restored/created to original wetland.
  - clearly indicate the number of wetlands (location, extent) for which residual effects should be addressed through offset measures;
  - prioritize restoration of drained or altered naturally occurring wetlands of the same type and function as those impacted. Restored wetlands are preferred over enhanced wetlands, both of which are preferred over newly created wetlands.
  - compensate lost wetland functions on-site if site conditions are suitable for wetland functions. Second preference is in the same watershed from which they were lost. Third preference is in the same ecosystem from which they were lost.
  - incorporate compensation measures to minimize the time lag in availability of habitat and functions between when the adverse effects occur to when they have been fully replaced; and
  - In relation to designing offsets for species at risk, mitigation measures should be developed in collaboration with federal authorities and included in the Impact Statement.

Potential effects and specific mitigation measures will be established as part of the effects assessment and selection of the preferred alternative.

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[9]. In this context, direction indicates the positive or negative change from existing conditions. Magnitude indicates the expected change from existing conditions. The geographic extent indicates the spatial area that the effect is expected to occur within. Duration is the period of time an effect occurs, and frequency is how often an effect occurs over time. The reversibility of an effect defines its ability to return to existing conditions and the likelihood indicates the probability that an effect will occur. 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 migratory or calving season for wildlife). 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 9-4**.

Table 9-4: Peatlands Magnitude Definition

Magnitude Level	Definition	Rationale
Negligible	■ Limited to no variation predicted in the measurement indicators for Peatlands VCs	■ Changes to peatland ecosystems are minor and largely indiscernible; therefore, no effect on ecosystem resilience.
Low	■ A small variation predicted in the peatland measurement indicators. Effects will be assessed through a qualitative narrative or numeric quantification support by a reasoned narrative.	■ Minor incremental effects to peatland ecosystems are anticipated to be discernable but remain within the limits of ecosystem resilience.
Medium	■ A moderate variation predicted in the peatland measurement indicators. Effects will be assessed through a qualitative narrative or numeric quantification support by a reasoned narrative.	■ Incremental effects to peatland ecosystems are anticipated to be measurable but is inferred to remain within the limits of ecosystem resilience.

9. *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.*

Magnitude Level	Definition	Rationale
High	■ A large variation predicted in the peatland measurement indicators. Effects will be assessed through a qualitative narrative or numeric quantification support by a reasoned narrative. .	■ Effects to peatland ecosystems are anticipated to be severe and likely to impair ecosystem resilience.

9.7 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 vegetation could indirectly affect wildlife). 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.

9.8 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.

9.9 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. For instance, offsets required as part of the *Endangered Species Act* or the *Species at Risk Act* permitting will incorporate a follow-up program, however an effects assessment and consultation will need to take place prior to formalization of a program. Therefore, the Proponent will include information on follow-up programs that address the requirements outlined in Section 26 of the TISG, 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.

9.9.1 TISG Section 26 Requirements

The below listed follow-up programs are to be considered per the TISG Section 26 requirements in relation to Peatlands:

- if reclamation plantings are created, monitor the plantings biannually (i.e., late spring and fall) during consecutive years, and undertake supplementary planting, as necessary, until the vegetation cover becomes established and continues to grow without further intervention; and
- monitor post-construction effects to wetland functions. A program to monitor wetland functions should be designed in such a way as to help to ensure that the type and amount of each wetland function would be considered individually in determining recovery success and that each wetland function would be recovered to at least the same type and amount of function as assessed during baseline.

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[1]	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 environment on the project will be assessed in accordance with applicable standards and guidance.	■ Section 9.1
2	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
3	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.	■ An ecosystem approach that considers how the project may affect structure and functioning of biotic and abiotic ecosystem components will be used. This includes areas of Indigenous cultural importance, descriptions of ecosystem health and integrity, the presence of protected areas and critical habitat for SAR species.	■ Wildlife Study Plan
4	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 IS / EA Report 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 ecological functions.	■ Section 9.6
5	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 this Study Plan, in Section 6.2.	■ Section 6.2
6	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 is 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 modeling methods and discuss confidence in using desktop and/or field studies when describing baseline conditions.	■ Section 7 ■ Section 8 ■ Section 9.4

ID #	Federal TISG Reference[1]	Requirement / Comment / Concern	Response	Study Plan Reference
7	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 standard. 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 – Canada.	■ 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. Databases and GIS files will be accompanied by detailed metadata that meets ISO 19115 standards (or equivalent). 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.	■ Section 7 ■ Section 8.2
8	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 IA/EA and are summarized in this Study Plan.	■ Section 7
9	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).	■ Methodology concerning data collection (including desktop and field-based, where appropriate) for wildlife species in the area are summarized in the Wildlife Study Plan.	■ Wildlife Study Plan
10	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.	■ 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
11	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 will be included in Study Plans where applicable. A preliminary list of data sources has been provided in Appendix A. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Appendix A
12	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
13	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;	■ Information sources relevant to the Project and study areas will be examined as part of the desktop review, as summarized in the Study Plan. A preliminary list of data sources has been provided in Appendix A.	■ Section 7 ■ Appendix A

ID #	Federal TISG Reference[1]	Requirement / Comment / Concern	Response	Study Plan Reference
		– Bird Conservation Region plans; – 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) – 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; ○ 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.		

ID #	Federal TISG Reference[1]	Requirement / Comment / Concern	Response	Study Plan Reference
14	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.	■ Information on the VCs will be collected from the public and Indigenous communities as described in the IS / EA Consultation Plan and the Aboriginal and Treaty Rights and Interests Study Plan. The IS / EA Report will include an assessment of the effects of the project on the VC.	■ Section 9.2
15	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 IS / EA Report will include detailed descriptions of the VCs, their importance and predicted effects (adverse and positive) as a result of the Project.	■ Table 1-2 ■ Table 2-1 ■ Section 9
16	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 was initially submitted to the Agency in May, 2020. The Study Plan has been updated to respond to preliminary comments from the Agency but has not undergone the full technical review by the Federal Review Team or the Government Review Team. Upon Agency review of the updated Study Plan, any necessary technical discussions will be scheduled with the Agency and other relevant government agencies.	■ Section 3
17	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
18	TISG Section 7.4.1, page 36	■ For biophysical valued components, spatial boundaries should be defined using an ecosystem-centered 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).	■ Geographic extent, and the extent rationale, of the PDA, LSA, and RSA for this VC is provided in this Study Plan.	■ Section 6.2

ID #	Federal TISG Reference[1]	Requirement / Comment / Concern	Response	Study Plan Reference
19	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.	■ Geographic extent, and the extent rationale, of the PDA, LSA, and RSA for this VC is provided in this Study Plan.	■ Section 6.2
20	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.	■ Geographic extent, and the extent rationale, of the PDA, LSA, and RSA for this VC is provided in this Study Plan.	■ Section 6.2
21	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.	■ Temporal boundaries are described in the Study Plan	■ Section 6.1
22	TISG Section 8.5, page 42	– identify and map all wetlands on federal lands, and all wetlands potentially directly or indirectly effected by the Project and within the scope of federal permits, authorizations, or other approvals;	■ Data files and mapped wetlands and vegetation classification features will be provided.	■ Section 7.2 ■ Section 7.3 ■ Section 8.3
23	TISG Section 8.5, page 42	■ The Impact Statement must provide written description and maps of primary, secondary and tertiary watersheds and major and minor rives and lakes;	■ Maps of primary, secondary and tertiary watersheds as well as rivers and lakes will be provided.	■ Section 7.2 ■ Section 7.3 ■ Section 8.3
24	TISG Section 8.5, page 42	■ The Impact Statement must determine whether these wetlands are within a geographic area of Canada where wetland loss or degradation has reached critical levels, or considered ecologically or socially or economically important to a region;	■ Wetlands that are considered socially, ecologically or economically important to the region will be discussed in the IS / EA Report.	■ Section 9
25	TISG Section 8.5, page 42	■ The Impact Statement must identify and describe wetland capacities to perform hydrological and water quality functions, provide for wildlife and wildlife habitat or other ecological functions;	■ Wetland quality and function in relation to wildlife habitat will be discussed in the Wildlife Study Plan and the IS/ EA Report.	■ Wildlife Study Plan
26	TISG Section 8.5, page 42	■ The Impact Statement must quantify, delineate and describe wetlands (fens, marshes, peat lands, bogs) within the local study area potentially directly, indirectly and / or cumulatively effected by the Project in the context of: – wetland class, ecological community type and conservation status; – biodiversity with respect to both flora and fauna; – abundance at local, regional and provincial scales; – distribution; and – current level of disturbance.	■ Direct, indirect and cumulative effects of the Project on wetlands will be described in the IS / EA Report.	■ Section 7 ■ Section 9
27	TISG Section 8.5, page 43	– Collect data from representative wetlands 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;	■ 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 extrapolations.	■ Section 7

ID #	Federal TISG Reference[1]	Requirement / Comment / Concern	Response	Study Plan Reference
		• survey protocol planning for representative wetlands should include modeling and simulations to estimate sampling requirements, and analysis to evaluate resulting design options; and • 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 wetland heterogeneity of the regional study area, and to yield multiple survey locations per wetland type, without requiring aggregation of habitat classes post-hoc.		
28	TISG Section 8.5, page 43	■ The Impact statement must provide a wetland functions assessment in accordance with the guiding principles of Wetland Ecological Functions Assessment: An Overview of Approaches or any subsequent approved guidelines by which to determine the most appropriate functions assessment methodology to use: – complete this assessment prior to the start of Project construction for a representative selection of wetlands that the Project would directly affect and for a representative selection of wetland(s) that are hydrologically connected. In conducting this assessment, the Proponent should show that wetlands are considered in the context of: i. the larger watersheds of which they are a part; ii. adjacent land use with a focus on hydrological and other functions; iii. landscape and / or watershed considering topography, soil types and hydrological linkages; and iv. the global significance of peatlands across the regional study area.	■ The Wetland Ecological Functions Assessment: An Overview of Approaches (Hanson et al., 2008) provides a summary of potential methods that can be used to assess wetland function, indicates the type of data that will be collected, and provides a list of functions that can be expected for each of the different wetland classes (Hanson et al. 2008). It is the intent of this Study Plant to lay out the framework for completing the IA / EA for potential effects to Peatlands as a result of the proposed CAR.	■ Section 7 ■ Section 9
29	TISG Section 8.5, page 44	– identify a regional study area of sufficient size to capture effects to wetlands within the larger drainage area and include wetlands located outside of the local study area that may be effected by hydrological changes as a result of cumulative effects.	■ Geographic extent, and the extent rationale, of the PDA, LSA, and RSA for this VC is provided in this Study Plan.	■ Section 6.2
30	TISG Section 8.5, page 44	■ Submit complete data sets from any survey sites, including GIS files. Databases and GIS files should be accompanied by detailed metadata that meets ISO 19115 standard. Contact provincial and/or local government authorities to determine if other wetland conservation policies, regulations or wetland compensation guidelines apply (refer to The Wetland Network30);	■ 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. Databases and GIS files will be accompanied by detailed metadata that meets ISO 19115 standards (or equivalent). 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.	■ Section 8.2
31	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.	■ Wetland functions assessments and related surveys have been described in the Study Plan	■ Section 7.3.3
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 associated with SAR such as Peatlands, will be considered VCs.	■ Wildlife Study Plan
33	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, some of which is also summarized in this Study Plan.	■ Section 9

ID #	Federal TISG Reference[1]	Requirement / Comment / Concern	Response	Study Plan Reference
34	TISG Section 14.3, page 88	■ The Impact statement must describe any contaminants of concern (e.g., arsenic, chromium, mercury) potentially associated with the Project (including from spills or accidental discharges) that may affect soil, sediment, wetlands, and surface and ground water (including substances used during summer and winter maintenance activities);	■ Potential changes to surface and groundwater (quality and quantity), including subsequent effects on other VCs, will be assessed as part of the IS / EA Report. Sampling of contaminants of potential concern has been described in the Groundwater and Geochemistry Study Plan and the Surface Water Study Plan. Accidents and malfunctions will be assessed in the IS / EA Report.	■ Surface Water Study Plan ■ Groundwater and Geochemistry Study Plan
35	TISG Section 14.3, page 88	■ The Impact statement must describe how hydrological or drainage changes may disturb soils, wetlands, peatlands or muskeg and result in the release of mercury or methylmercury from disturbed soils, which may affect water and groundwater quality, fish, wildlife and human health;	■ Changes in surface water drainage and the subsequent effects on other VCs will be assessed in the IS / EA Report. Groundwater studies will include a sampling program for mercury and methylmercury. A qualitative assessment of potential pathways for the release of methylmercury will be included in the peatland assessment.	■ Surface Water Study Plan ■ Groundwater and Geochemistry Study Plan
36	TISG Section 14.3, page 88	■ The Impact statement must describe any hydrological or drainage changes that may alter moisture regimes and how that may affect vegetation and wetland function;	■ Changes in surface water drainage and the subsequent effects on other VCs will be assessed in the IS / EA Report.	■ Surface Water Study Plan
37	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
38	TISG Section 14.3, page 89	■ The Impact Statement must describe any positive changes (e.g., from offsets that result in re-vegetation, new wetlands etc.).	■ The effects assessment will identify positive and adverse effects that may be caused by the Project on the environment.	■ Section 9.6
39	TISG Section 14.3, pages 88-89	■ The Impact statement must describe direct, incidental and cumulative predicted positive and / or adverse effects to riparian, wetland (including separate description relevant to peatlands) and terrestrial biodiversity metrics, effects of fragmentation, changes to regional biodiversity that could be caused by all project activities, including but not limited to effects to wetland ecological functions, including effects that may alter the wetland's capacity to perform hydrological, biogeochemical cycling, habitat, and climate functions	■ Peatland predicted effects will rely heavily on data gathered by surface and groundwater assessments that will be conducted and provided under separate study plans. Information collected under these study plans will be used to characterized the existing conditions to the extent possible. Peatland availability and distribution will be used to provide an understanding of how the Project may affect peatland fragmentation and hydrological function.	■ Section 9.1
40	TISG Section 15.2, page 93	■ The Impact Statement must 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 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 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.	■ Wildlife Study Plan
41	TISG Section 15.3, page 94	■ The Impact Statement must describe changes to key habitat, including eskers and similar geologic features, wetlands and peatlands, for species important to current use of lands and resources for traditional purposes;	■ The IS / EA Report will describe changes to wetlands and Peatlands and their effects to species important to current use for traditional purposes.	■ Section 9.2
42	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.	■ Identification of and assessment of effectiveness of impact management measures will be done as a discipline or VC-specific exercise, and will be done as part of the IS / EA Report.	■ Section 9.5
43	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 IS / EA Report.	■ Section 9.6
44	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 IS / EA Report	■ Section 9.6
45	TISG Section 24, pages 137-138	■ Section 24 of the TISG includes guidance on how to describe the effects of the Project in the context of Canada's environmental obligations.	■ The IS / EA Report will include discussion on how the project effects contribute to Canada's environmental obligations.	■ Section 9.2
46	TISG Section 25, pages 139-140	■ Section 25 of the TISG provides guidance on how to demonstrate the Project's contributions to sustainability.	■ The sustainability assessment for the Project will be undertaken on the preferred alternative and will characterize the Project's contribution to sustainability incorporating the requirements set out in Section 25 of the TISG.	■ Section 9.7
47	TISG Section 26.2, page 143	■ 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.	■ The IS / EA Report will include descriptions of follow up programs, as required by VC.	■ Section 9.9

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

ID#	Comment from Regulatory Agency	Comment Type	Requirement / Comment / Concern	Response	Study Plan Reference
1	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.	■ This Study Plan will be reviewed by relevant federal and provincial agencies.	■ N/A
2	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 workplans at the outset of the EA phase, including opportunities for technical review.	■ This Study Plan will be reviewed by relevant federal and provincial agencies.	■ N/A
3	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.	■ Methodology concerning data collection (including desktop and field-based, where appropriate) are summarized in this Study Plan.	■ Section 7
4	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.	■ This Study Plan will be reviewed by relevant federal and provincial agencies.	■ N/A

ID#	Comment from Regulatory Agency	Comment Type	Requirement / Comment / Concern	Response	Study Plan Reference
5	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. ■ Section 7.2 of the Draft ToR identifies potential effects of the Project and includes effects to vegetation (Section 7.2.6) and wildlife (Section 7.2.7). Vegetation and wildlife will consider natural heritage features (e.g., wetlands, significant wildlife habitat and areas of natural and scientific interest). Section 8 of the Draft ToR confirms that the EA will recommend impact management measures to avoid, eliminate or minimize potential effects of the Project. This will include the identification of measures specific to natural heritage features.	■ Section 7.2.6; Section 7.2.7; Section 8 of ToR
6	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ **2.1 Peatlands/wetlands** – Peatlands/wetland in Ontario's Far North are important on local through to global scales. The alternatives analysis should consider not only the length of road corridor that will cross through peatlands for each of the alternatives considered, but also consider how impacts to peatland/wetland function may be minimized. This should include, for example, identification and consideration of concentrated areas of peat that function as carbon sinks; impacts to biological functions of wetlands in providing wildlife habitat; effects of the project on client change and vice versa; etc.	■ The Draft ToR has been updated to include proposed criteria and indicators for the effects assessment (provided in Appendix A). Wetland ecosystems is a proposed criterion for the effects assessment. Availability, distribution, function (i.e., as a carbon sink) and composition are proposed indicators to measure changes to wetlands. The EA will assess direct effects of the alternative routes on wetlands (Section 7.2.6), and the indirect effects on wildlife habitat (Section 7.2.7) and climate change (Section 7.2 and Section 7.2.1) from changes to wetlands and / or peatlands.	■ Section 7.2 of ToR
7	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. ground water, surface water, caribou, etc.).	■ The study areas for Peatlands have been described in Section 6.2 and Figure 6-2. The study areas are preliminary and can be further refined based on inputs from Indigenous communities and interested persons. The local and regional study areas for other disciplines, such as groundwater, surface water, or caribou, can be found in their respective study plans. ■ A preliminary study area for the EA is identified in Section 7.1.1 of the Draft ToR. The study area maps have been revised to include the area within 2.5 km of the centre line of Alternative 1 and Alternative 4 only. Although the Draft ToR identifies one preliminary study area for the EA, it is understood that the study area for each environmental component may vary to capture the area within which environmental effects are anticipated to occur. Therefore, the ToR indicates that the study area will be refined in the EA through identification of discipline-specific local and regional study areas. The local and regional study areas will be consulted on with MFFN community members, neighbouring Indigenous communities and other interested persons. Study areas are included in the EA Consultation Plan under the key milestone "Evaluation Criteria and Development of Alternatives".	■ Section 7.1.1 of ToR ■ Section 6.2 ■ Figure 6-2

ID#	Comment from Regulatory Agency	Comment Type	Requirement / Comment / Concern	Response	Study Plan Reference
8	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.	■ The NHRM and SWHTG will be added to Appendix A list of resources. The criteria and indicators will be updated to include quantitative measures.	■ Appendix A ■ Table 9-2
9	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.	■ Available resources will be utilized to help inform the draft criteria and indicators including those suggested.	■ Appendix A
10	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ Peatlands / wetlands in the Far North are important on local through to global scales. The proposal should indicate the length of road corridor that will cross through peatlands for each of the alternatives considered. It should also describe the potential effects of an all-weather road on peatland / wetland functions and how these may be minimized. This should include, for example, identification of concentrated areas of peat that function as carbon sinks; measures that can be taken to sustain normal hydrological flow and related ecosystem services such as flood protection; effects to biological functions of wetlands in providing wildlife habitat; working with watershed and sub-watershed boundaries to inform routing; and consideration of the potential effects of the road and existing activities in the region to peatlands / wetlands.	■ The direct, indirect and cumulative predicted positive / and or adverse effects on the local Peatlands and their function will be investigated and documented. Potential effects that will be described include but are not limited to effects to wetland ecological functions, including effects that may alter the wetland's capacity to perform hydrological, biogeochemical cycling, habitat and climate functions. ■ Impact management measure developed specifically for Peatlands will be described and outlined in the IS / EA Report.	■ Section 9.1-9.6
11	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ A climate change risk assessment is proposed along with estimating greenhouse gas emissions and sampling peatlands. Referencing available literature and contacting researchers such as Jim McLaughlin and Maara Packalen (MNRF) who have published research on these topics and related subjects is encouraged. Suggest contacting researchers such as Jim McLaughlin (MNRF) and Maara Packalen (MNRF) who have published research on climate change - vulnerability assessment, peatland carbon modelling and hydrology. For example: – McLaughlin, J., M. Packalen and B. Shrestha. 2018. Assessment of the vulnerability of peatland carbon in the Albany Ecodistrict of the Hudson Bay Lowlands, Ontario, Canada to climate change Ontario Ministry of Natural Resources and Forestry, Science and Research Branch, Peterborough, ON. Climate Change Research Report CCRR-46	■ Resources provided will be incorporated into the climate change assessment component for the Project.	■ Section 7.2 ■ Appendix A

ID#	Comment from Regulatory Agency	Comment Type	Requirement / Comment / Concern	Response	Study Plan Reference
			– Packalen, M.S., S.A. Finkelstein and J. McLaughlin. 2016. Climate and peat type in relation to the spatial variation of the peatland carbon mass in the Hudson Bay Lowlands, Canada. Journal of Geophysical Research: Biogeosciences – McLaughlin, Jim and Kara Webster, 2013. Effects of a changing climate on peatlands in permafrost zones: A literature review and application to Ontario's Far North. Ontario Ministry of Natural Resources and Forestry, Science and Research Branch, Peterborough, ON. Climate change research report CCRR 34 – References available 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 • MNRF climate change publications see MNRF_Climate_Change_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		

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 7.4.2, page 37	■ 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).	■ Data (desktop and field-based) will be collected to represent temporal sources of variation. Data collected will be representative of the temporal perspective of multi-years of study by using baseline data from previous years / seasons and desktop studies to supplement proposed field studies.	■ The combined methodologies outlined in Sections 7.2 to 7.3 will constitute multiple years of study per 7.2 and 7.4.2 of the Guidelines. It is not anticipated that changes to the biophysical aspects of the Peatland VC will be substantially varied between subsequent years of field studies.	■ N/A

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Impact Assessment Agency of Canada, 2020b:
Glossary of Terms for the impact assessment of designated projects under the IAA. https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/glossary-of-terms.html

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Appendix A

Preliminary List of Data Sources

The following lists data sources and academic papers that may be relevant to the Peatlands Study Plan.

Baseline Data Methodology

Open Government Licence – Canada:

Available at: https://open.canada.ca/en/open-government-licence-canada Standard on Geospatial Data. Available at: https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=16553

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Ontario Ministry of Natural Resources, 2000:

Significant wildlife habitat technical guide. 151p. Available at: https://docs.ontario.ca/documents/3620/significant-wildlife-habitat-technical-guide.pdf

Conservation Issues

Fire Disturbance Area:

Available at: https://geohub.lio.gov.on.ca/datasets/fire-disturbance-area

Government of Canada's Operational Framework for the Use of Conservation Allowances

Available at: https://www.canada.ca/en/environment-climate-change/services/sustainable-development/publications/operational-framework-use-conservation-allowances.html

Interim Guidance:

Considering the Extent to which a Project Contributes to Sustainability Available at: https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/practitioners-guide-impact-assessment-act/interim-guidance-considering.html

Interim Framework: Implementation of the Sustainability Guidance:

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NatureServe Conservation Status Assessments:

Factors for Evaluating Species and Ecosystem Risk. Available at: https://www.natureserve.org/sites/default/files/publications/files/natureserveconservationstatusfactors_apr12_1.pdf

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Rempel, R.S., R.W. Mackereth, A.R. Rodgers, E.P. Iwachewski, P.D. Furlong, J.S. Hagens, J.L. Shuter, J.M. Jackson, R.S. Kusheriuk and D.J. McCormick, 2016:
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Greenhouse Gas Emissions and Climate Change

Bubier, J.L. and T.R. Moore, 1993:
Methane emissions from wetlands in the midboreal region of northern Ontario, Canada. Ecology 74(8): 240-2254.

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Pan-Canadian Greenhouse Gas Offsets Framework:
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Government of Canada:
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Mid-Century Long-Term Low-Greenhouse Gas Development Strategy: http://publications.gc.ca/site/eng/9.825953/publication.html

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Pan-Canadian Framework on Clean Growth and Climate Change: https://www.canada.ca/en/services/ environment/weather/climatechange/pan-canadian-framework/climate-change-plan.html

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- Digital data and imagery available through GeoHub
- Infrared, black and white stereo aerial photographs or ortho-rectified digital aerial imagery
- National Topographic Series (NTS) maps
- Forest Resources Inventory (FRI) maps
- Satellite imagery (such as LandSat and SPOT)

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Wetland Databases

- Ontario's Natural Heritage Information Centre database available at: https://www.ontario.ca/page/get-natural-heritage-information
- iNaturalist available at: https://www.inaturalist.org/;
- NatureServe available at: https://www.natureserve.org/;
- Ramsar site database available at: https://www.ramsar.org/wetland/canada;
- Environment Canada's database on wetlands available at: https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/extent-wetlands.html and: https://open.canada.ca/data/en/dataset/161c7be5-0912-58b1-87f7-6da4b575a7af

Appendix B

Agency Comments on the Draft Study Plan

Draft Study Plan Comments – Federal

Comment # / Ref #	Study Plan Section	Comment / Context	Action Item	Final Response	Study Plan Reference
PL-01	■ GC	■ 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 Marten Falls First Nation - General Comments on MFCAR Draft Study Plans". The Agency has provided these other required actions to highlight common sections of the Tailored Impact Statement Guidelines (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
PL-02	■ Section 4 Baseline Study Design	■ Section 4 of the study plan states that there are three main components in the peatlands study plan: Vegetation and Wildlife Community, Hydrology and Climate Change. It also states "Additional details on each of these components are provided in the individual VC Study Plans." ■ Ideally, information already found in other study plans should not be repeated. For example, the majority of the information provided in Sections 4.2.1, 4.3.1, 5.1 and 6.2.1 of the peatlands study plan is the same as in the vegetation study plan (with the word "wetland" changed to "peatland"). If the methods and approaches to meet the relevant requirements of the Guidelines are the same for both wetlands and peatlands, the information only needs to be provided once, specifying that it will apply to both wetlands and peatlands. ■ The Agency strongly recommends addressing the requirements of the Guidelines related to peatlands within other study plans, particularly within the vegetation study plan. The rationale for this request is that the same federal experts are involved in the review of the vegetation and peatlands study plans and the review is facilitated by having a fulsome presentation of the information in one document. The avoidance of redundancies also reduces the time needed for the FRT's review of the study plans.	■ Required Action #1: Combine the study plans by addressing peatlands-specific requirements within other plans (vegetation, wildlife, surface water or climate change), as appropriate. If there is a reason why this would not be considered an appropriate approach, provide a rationale. ■ Required Action #2: The Agency notes that the following requirements of the Guidelines were not addressed in any of the submitted study plans: effects to wetlands related to wildlife habitat (wetland functions), surface water quality, climate change considerations (such as removal of carbon sinks). Moreover, the study plans should address potential effects on eskers and habitat fragmentation. Update the study plans to provide the information required by the Guidelines.	■ The Peatlands Study Plan remains a separate Study Plan due to the importance of peatlands and the concern expressed by the MECP and the MNRF. We recognize that having information repeated and presented similarly in other study plans makes for redundancies. Therefore, the Peatland Study Plan describes in detail what only pertains to Peatlands and refers to other Study Plans where similar information is needed. Required Guidelines for peatland function, climate change, and habitat fragmentation have been incorporated into the Study Plan.	■ Sections 6 through 11 of the Peatlands Study Plan
PL-03	■ 4.1 Desktop Assessment	■ Section 4.1 of the study plan states "A detailed review of a wide variety of secondary sources will be used to prepare a desktop assessment." The study plan then provides requirements from the Guidelines in paragraph form with a statement that it will be collected/ described / included etc. No information is provided about how the data for each requirement will be collected, or what existing information will be used. ■ Section 7.2 of the Guidelines requires that detailed descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed are provided 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. ■ If using existing data sources, the study plan should provide justification to show that the data sources are relevant in spatial and temporal coverage to the Project.	■ Required Action #3: For any approach related to peatlands that is different from what is described in the vegetation, surface water or climate change study plans, provide detailed descriptions of specific data sources that will be used to identify gaps and inform baseline characterization. Sources should be listed and preferably correlated to the criteria and indicators that they will inform. Provide justifications to demonstrate that each data source is relevant in spatial and temporal coverage to the project.	■ The Desktop Assessment and Field Assessments provide justification that recommended data sources are relevant in spatial and temporal coverage to the Project.	■ Section 7

Comment # / Ref #	Study Plan Section	Comment / Context	Action Item	Final Response	Study Plan Reference
PL-04	■ Section 7 Conformance with Federal and Provincial Guidance	■ There are requirements related to peatlands throughout the Guidelines (Section 8.5, 8.9, 8.11, 14.3, 15.2, 15.3 and 20). For the most part, these requirements are only mentioned in the concordance table at the end of this plan, without providing enough information to be validated by the experts (including but not limited to the assessment of methylmercury from disturbed soils and changes to key habitat).	■ Required Action #4: Provide details, including methods and approaches that demonstrate how each of the requirements in the Guidelines related to peatlands will be met.	■ Requirements listed throughout the TISG (i.e. Section 8.5, 8.9, 8.11, 14.3, 15.2, 15.3 and 20) have been incorporated into Section 6, 7 and 9 of the Peatlands Study Plan. The TISG requirements and responses related to Peatlands can also be found in Table 11-1.	■ Section 6 ■ Section 7 ■ Section 9 ■ Table 11-1

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