Webequie Supply Road

Climate Change and Air Quality Work Plan

Webequie First Nation

11 June 2020
661910

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Table of Contents

Figures

Tables

1. Introduction

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

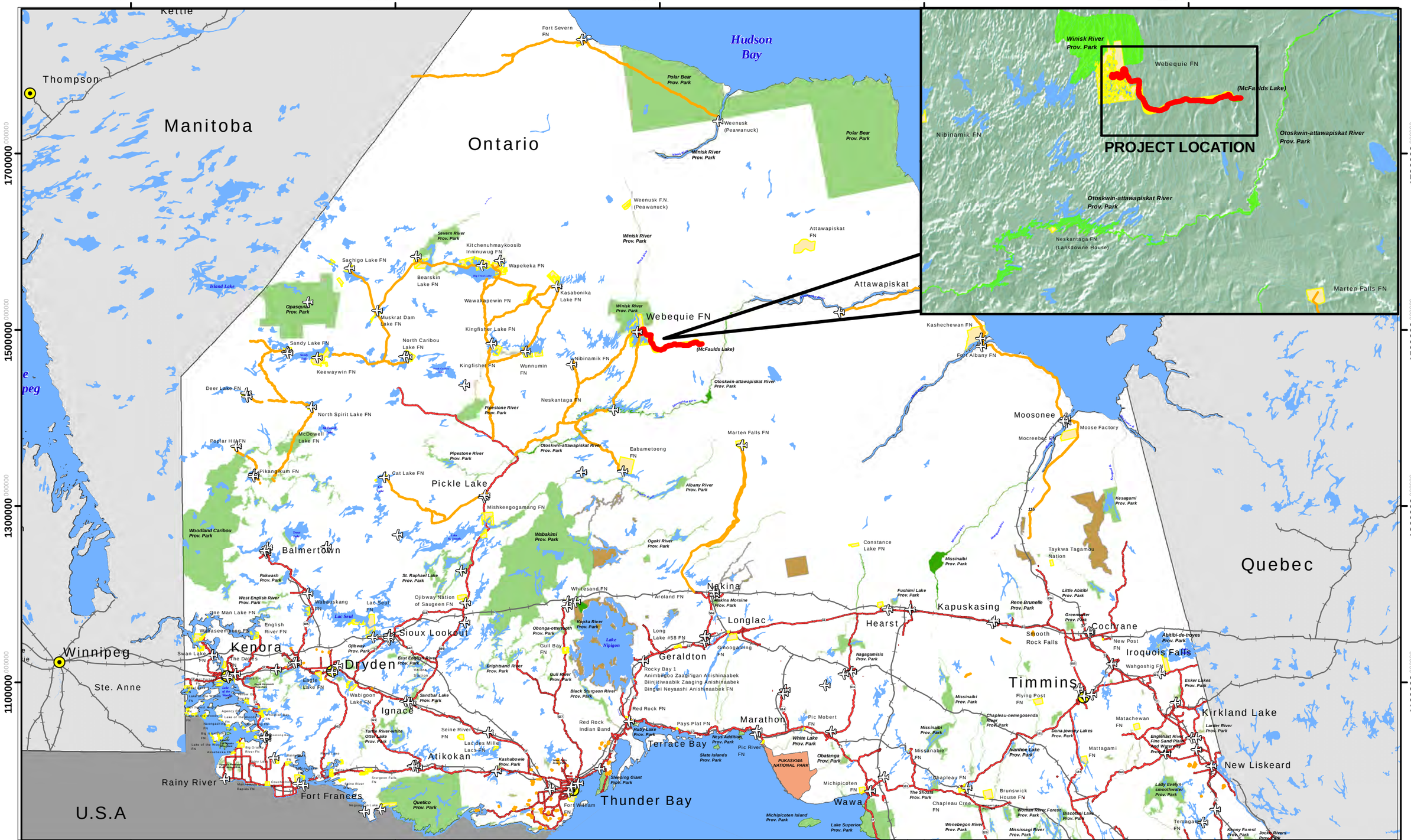
The goals and objectives of the Webequie Supply Road Project are as follows:

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

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

The purpose of this document is to present the work plan developed to assess the impact of the Webequie First Nation Supply Road Project (WSR Project) on climate change and the atmospheric environment. The climate change component will also include an assessment of the impact of climate change on the WSR Project. More specifically, this document describes the general approach that will be applied during the EA process to meet the expectations of the Ontario Ministry of the Environment, Conservation and Parks (MECP) and the Impact Assessment Agency of Canada (IAAC, the Agency), for the following components:

- The project's expected production of greenhouse gas (GHG) emissions and impacts on carbon sinks;
- Vulnerability and resilience of the Project and adjacent ecosystems to changing climatic conditions; and
- The project's expected production of criteria air contaminants (CAC) and toxic contaminants emissions and their impact on air quality in the project area.



Legend

- Optimal Geotechnical Route
- Community Preferred Route
- Airports
- City/Town
- Winter Roads
- All-Season Roads
- Rail
- First Nation Reserve
- Federal National Park
- Provincial Park
- Conservation Reserve
- Waterbody

WSR WEBEQUIE SUPPLY ROAD

0 50 100 Km

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Canada Lambert Conformal Conic Projection

Webequie Supply Road

Project Location

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The Climate Change and Air Quality Work Plan is being submitted to IAAC and MECP requesting that a coordinated review be undertaken, with the objective of providing Webequie with technical guidance in meeting the requirements of the federal Tailored Impact Statement Guidelines (TISG) and provincial Terms of Reference (ToR), pending approval by Ontario. It should be noted that Ontario's review of the work plan is preliminary and secondary to any further review and decisions related to a final approved ToR. The results of the work will be documented in the Environmental Assessment Report/Impact Statement (EAR/IS), which will meet the requirements of both the federal TISG and the provincially approved ToR.

For the GHG emissions and carbon sinks component, the study will comply with the requirements from the IAAC guidelines (Section 15.5 of Webequie Supply Road Project TISG) submitted on February 24, 2020, namely:

- Provide a description of each of the project's main sources of GHG emissions;
- Provide the estimated annual GHG emissions for each source, including calculation methods, assumptions and related parameters that would enable calculations to be reproduced;
- Provide an estimate of yearly net GHG emissions for each year of the project lifetime, including an uncertainty assessment, as per Section 3.3 of the draft Strategic Assessment of Climate Change developed by Environment and Climate Change Canada (ECCC);
- Provide a description of large sources of GHG emissions that may be the consequence of accidents or malfunctions;
- Provide a qualitative description of the project's positive or negative effects on carbon sinks, including from the removal and alteration of wetlands;
- Describe how the Project may contribute to Canada's efforts to reduce GHG emissions, if applicable (e.g., explain how the Project would result in emission reductions in Canada by avoiding emissions from another source);
- Describe how the WSR Project could impact global GHG emissions, including if the Project is expected to displace emissions internationally. Describe how the Project is likely to result in global emission reductions. For example, a project that enables the displacement of high-emitting energy abroad with lower emitting energy produced in Canada could be considered as having a positive impact.

With respect to the impacts of climate change on the Project, the work plan addresses the requirements in TISG Section 23.2 relative to how environmental conditions, including natural hazards such as severe and/or extreme weather conditions and external events (e.g., earthquakes, flooding, drought, ice events, permafrost conditions, landslides, erosion, subsidence, fire), could adversely affect the Project and how this, in turn, could result in effects to the environment, health, social and economic conditions. Specific elements that must be addressed include:

- Provide details of planning, design and construction strategies intended to minimize the potential adverse effects of the environment on the Project;

- Identify any areas of potential wind or water erosion, slumps and slope instability, geologic hazards, including but not limited to those caused by geologic movements;
- Describe any mitigation measures that can be implemented in anticipation or in preparation for effects of the environment on the Project;
- Describe possible mitigation measures to deal with adverse environmental, health, social and economic effects resulting from effects of the environment on the Project;
- Identify the Project's sensitivities/vulnerabilities to change in climate (both in mean conditions and extremes such as short-duration heavy precipitation events), describe climate resilience of the Project and how climate change effects have been incorporated into the Project design (e.g., water crossings) and planning over the lifetime of the Project and describe the climate data, projections used, and related information used to evaluate these sensitivities (i.e., risks) over the full project lifetime;
- Describe any identified trends in meteorological events, weather patterns, or physical changes to the environment that are anticipated to result from climate change (for example, changes to annual freeze-thaw cycles, water levels, break-up season and spring freshet), and incorporate this information in a risk assessment as contributing and complicating factors for possible accidents and malfunctions. Provide mitigation measures (both passive and active) that the proponent is prepared to undertake in order to minimize the frequency, severity and consequences of such projected effects;
- When describing possible effects from climate change on the Project, describe how considerations from Indigenous peoples on climate change may impact the Project were considered; and
- Describe measures to enhance positive environmental, health, social and economic effects resulting from effects of the environment on the Project.

The general methodology to respond to these items during the EA process is presented in **Section 2.1** and **Section 2.2**. By doing so, the guidelines provided in the *Draft Strategic Assessment of Climate Change* from ECCC and the Ontario MECP guidance document entitled *Considering Climate Change in the Environmental Assessment Process* will be considered.

This work plan also provides an overview of the method that will be considered in evaluating the impact of the WSR Project on the atmospheric environment, more specifically on the following requirements from the IAAC TISG (Section 8.1 for baseline and 14.1 for project impact):

- Provide a comprehensive list of project activities (air pollutant emission sources) that may affect ambient air quality.
- Provide a quantitative assessment of common air pollutants (total particulate matter, fine particulate matter ($PM_{2.5}$), respirable particulate matter with a diameter less than 10 microns (PM_{10}), sulphur oxides, nitrogen oxides, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAH), diesel particulate matter (that can be attributed to black carbon (BC)), and carbon monoxide (CO)), as well as any air contaminants potentially associated with the Project,

such as dust resulting from construction activities and ongoing vehicle use during operations or maintenance of the gravel road bed.

- Include an atmospheric dispersion model of the common air pollutants in order to estimate the contaminant concentrations present in the entire area that could potentially be affected by atmospheric emissions resulting from project activities (air pollutant emission sources). Many of the TISG requirements will be embedded in this study.

- Assess the potential for emissions from the Project to contribute to acid deposition and exceedances of critical loads for terrestrial and aquatic ecosystems.

- Provide a description of all methods and practices (e.g., dust suppression strategies and guidelines, control equipment) to be implemented to reduce and control emissions. If the best available technologies are not included in the project design, a rationale for the technologies selected will be provided.

- Provide details of the achievement of emission standards for all mobile and stationary engines used on the Project.

- Provide justification for all control efficiencies used to reduce emission rates of sources within the model, including details of all assumptions associated with the related mitigation measures, and their achievability.

- Describe the locations and characteristics of the most sensitive receptors, including species at risk and differential effects for sensitive receptors.

- Describe consultation with regulators, stakeholders, community groups, landowners and Indigenous groups about potential effects to the atmospheric environment.

The general methodology to respond to these items during the EA process is presented in **Section 2.3**.

The Work Plan also addresses relevant elements of TISG Section 13 (Effects assessment), Section 19 (Effects to Indigenous peoples and impacts on the exercise of Aboriginal and Treaty rights) Section 20 (Mitigation and enhancement measures) and Section 25 (Description of the project's contributions to sustainability).

1.1. Defining Spatial and Temporal Boundaries

1.1.1. Spatial Boundaries

Spatial boundaries define the geographic extent within which the potential environmental effects of the Project are considered. As such, these spatial boundaries define the study areas for the effects assessment. Spatial boundaries to be established for the EA will vary, depending on the valued component and will be considered separately for each. The spatial boundaries to be used in the EA will be refined and validated through input from federal and provincial government departments and ministries, Indigenous groups, the public and other interested parties.

Spatial boundaries will be defined taking into account the appropriate scale and spatial extent of potential effects of the Project; community knowledge and Indigenous knowledge; current or traditional land and

resource use by Indigenous communities; exercise of Aboriginal and Treaty rights of Indigenous peoples, including cultural and spiritual practices; and physical, ecological, technical, social, health, economic and cultural considerations.

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

- **Project Footprint (PF)** – is the identified areas of direct disturbance (i.e., the physical area required for Project construction and operation). The PF is defined as the 35 m right-of-way (ROW) width for the WSR and temporary or permanent areas needed to support the Project, including laydown/storage yards, construction camps, access roads and aggregate extraction sites.
- **Local Study Area (LSA)** - is identified as the area where most effects of the Project are likely to be measurable; therefore, along the PF, the LSA will be the focus of data collection to characterize existing environmental conditions. The LSA for most valued components will extend or buffer approximately 1 km from the supply road ROW boundary, and 500 metres (m) from the temporary or permanent supportive infrastructure.
- **Regional Study Area (RSA)** – encompasses the area outside of the LSA used to measure broader-scale existing environment conditions and provide regional context for the maximum predicted geographic extent of direct and indirect effects of the Project (e.g., in the case of air quality, the typical or standard area within which dispersion modelling would be conducted). Cumulative effects of the Project in combination with past, present, and reasonably foreseeable developments are typically assessed at this larger spatial scale. For the climate change and air quality assessment, the RSA is defined as extending approximately 5 km from the LSA boundary.

Figure 2 presents the initial spatial boundaries for the climate change and air quality assessment.

The study areas were selected to characterize existing environmental conditions and predict the direct and indirect changes from the Project on the subject valued component on a continuum of increasing spatial scales from the Project Footprint to broader, regional levels. The preliminary selection of study areas also considered the physical and biological properties of the valued component and related evaluation criteria.

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

1.1.2. Temporal Boundaries

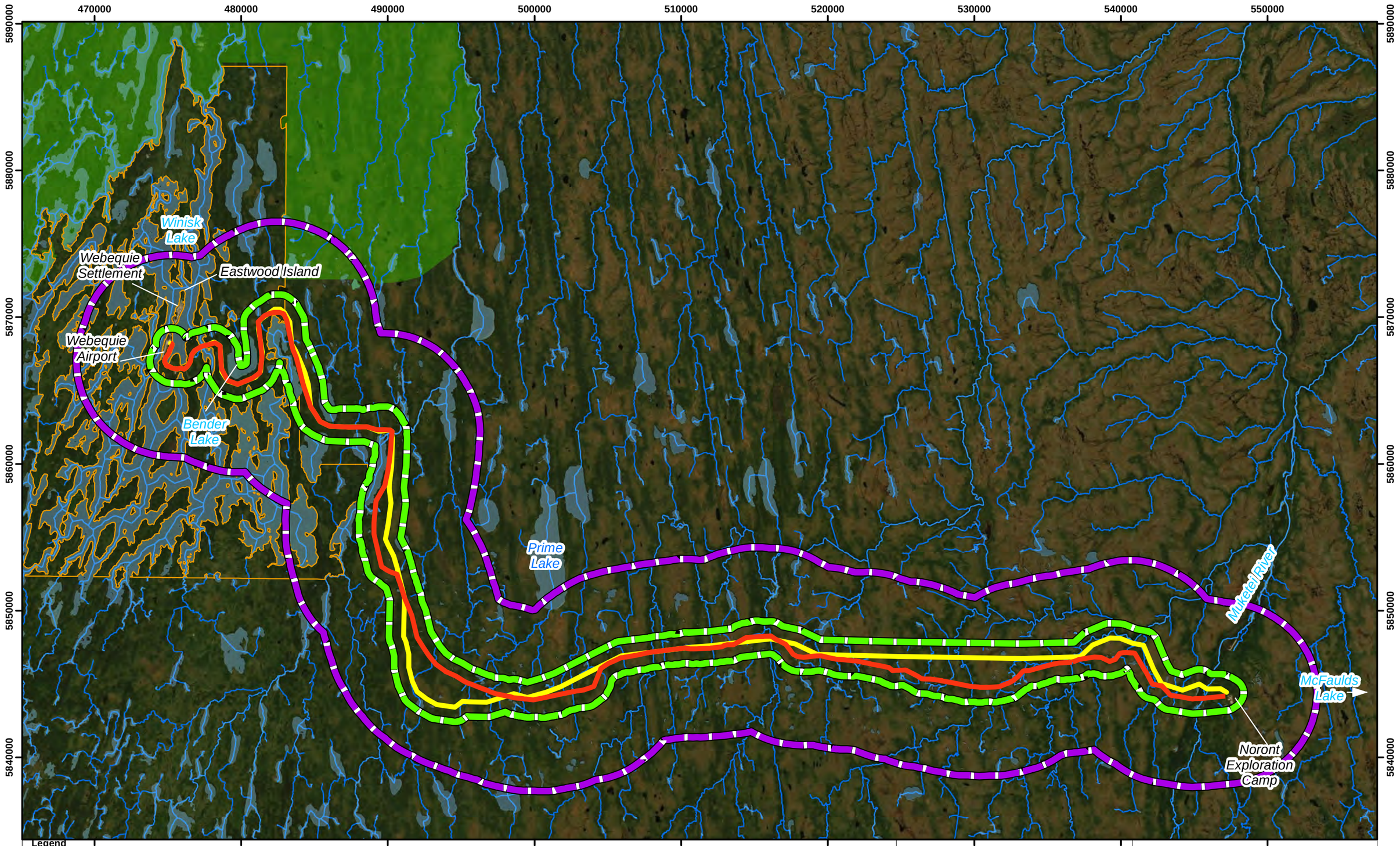
The EA process was designed to evaluate the short-term and long-term changes resulting from the implementation of the Project and associated effects on the environment, including where project activities may overlap such as the restoration (e.g., revegetation) of temporary access roads that could occur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

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

- **Construction Phase**: All the activities associated with the initial development of the road and supportive infrastructure;
- **Operations Phase**: All activities associated with operation and maintenance of the road and any other permanent supportive infrastructure (e.g., operations and maintenance yard, aggregate pits) that will start after construction and continue indefinitely; and
- **Decommissioning/Abandonment/Closure Phase**: The Project will be operated for an indeterminate time period; therefore, retirement (decommissioning/abandonment/closure) is not anticipated and will not be addressed in the EA. Note that clean-up and site restoration, including the decommissioning and removal of temporary infrastructure (e.g., access roads) will be addressed in the construction phase.

Although generally based on the planned stages described above, the final selection of temporal boundaries is criteria-specific and further detail will be provided in the discipline-specific assessment sections of the EAR/IS. Baseline data collection for all biophysical valued components will be provided for a minimum of two years, unless specified otherwise. Temporal boundaries spanning more than one year will enable accounting for annual or seasonal variations (e.g., the effects of storms on migration, delays in the onset of spring conditions, or early snowfalls).

Temporal variation or patterns in potential effects associated with different criteria will also be considered (e.g., differential worst case impacts to air quality and related effects to sensitive receptors associated with the staging/movement of construction along the length of the supply road corridor during the construction period). Temporal considerations will also include potential or foreseeable improvements in technology during the Operations phase. For example, it is expected that supply road traffic projections 10 years after operations start-up will be available. Future changes in traffic levels and newer vehicle fleets may have an impact: we may expect a greater proportion of future vehicles to be hybrid or exclusively electrically powered and, for those that are not, toxic emissions may be lower, since regulatory controls on vehicles are expected to be more stringent.



Legend

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

WSR WEBEQUIE SUPPLY ROAD

0 5 10 Km

N

NAD 83
UTM Zone 16N

Webequie Supply Road

Preliminary Route Alternatives an Combined Study Areas

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2. Work Plan

2.1. Impact of the WSR Project on Climate Change

This section describes the planned approach to assess the impact of the WSR Project on climate change; hence, on the cumulated GHG emissions in Ontario and Canada, all in accordance with the requirements of the IACC WSR Project TISG (Section 15.5) and, when applicable, with the guidance of the MECP climate change guidelines.

2.1.1. WSR Project's Main GHG Emission Sources

The Project is expected to produce GHGs primarily in the form of exhaust from construction equipment and road vehicles during the site preparation, road construction and post-construction demobilization phases, and then from public vehicles travelling on the new roadway and from vehicles and equipment engaged in maintenance activities during the operations phase. In order to estimate the net GHG emissions yielded by the Project on an annual basis, five (5) source categories must be covered, as follows:

Net GHG emissions = Direct GHG emissions + acquired energy GHG emissions – transferred surplus energy GHG emissions – CO_2 captured and stored – avoided domestic GHG emissions

Direct GHG emissions that are occurring on the construction site will include, among others:

- Vegetation clearing (deforestation) equipment;
- Heavy machinery (dozers, excavators, compactors, loaders, graders, etc.);
- Aggregate extraction and processing plant (mobile equipment, crusher, generator sets, etc.);
- Trucks (12-wheel, semi-trailer) traveling on roads;
- Trucks in off-road operation, if applicable;
- Explosives, if applicable;
- On-site generator sets (work camps, construction trailers, light towers, etc.).

During the operations phase, direct GHG emissions will include:

- Private/commercial vehicles traveling on the new roadway;
- Maintenance vehicles working at intervals on the new roadway (i.e., inspection patrols, road repairs, dust control, winter maintenance, vegetation management).

The Project will also create changes to the landscape (permanent removal of peatland and forested areas), potentially resulting in reductions in the ability of these terrestrial carbon sinks to capture and store carbon. The following references will be used to estimate the GHG emissions related to land use change:

- Volume 4 (Agriculture, Forestry and Other Land Use) of the 2006 IPCC Guidelines for National GHG Inventories
  - Land converted to Settlement (Conversion of Wetland to Settlements)
  - Land converted to Settlement (Conversion of Forest to Settlements): 2019 Refinement to the 2006 IPCC Guidelines
  - Harvested Wood Products: 2019 Refinement to the 2006 IPCC Guidelines.

Carbon sinks (and removed natural GHG emissions) affected during the construction phase include:

- Removal of actual carbon stock from deforestation. It may also include the burning of the biomass and GHG releases from dead organic matter, depending on construction planning and permitting; and
- Removal of actual carbon stock from the affected peatland.

During the operations phase, the following carbon sinks will be assessed:

- Removal of carbon stock annual growth caused by deforestation;
- Removal of carbon stock annual growth from the affected peatland; and
- Removal of natural GHG emissions from the affected peatland.

Carbon stocks will be assessed based on default Tier 1 parameters provided by the IPCC per type of forest, trees, soils, etc.

Acquired energy GHG emissions associated with the generation of electricity, heat, steam or cooling that is acquired from a third party is expected to be very low, if not irrelevant, during the site preparation and road construction phase. For the operations phase, the management of road maintenance vehicles at garages powered through the public electrical grid may be considered if it adds to the current baseline GHG emissions (i.e., new garages).

Transferred surplus energy GHG emissions are not relevant to the WSR Project.

CO_2 captured GHG emissions are not relevant to the WSR Project.

Avoided domestic GHG emissions relate to the replacement of existing emission source(s) in Canada with new less-emitting source(s) as a result of the Project. This category is not relevant to the construction phase but can be considered for the operations phase, given that the new roadway will improve local commuting and may reduce the emissions from transportation means used today. Scenarios outlining the baseline and future GHG emissions for a given population group using current transportation means will be developed with the help of the project's stakeholders in order to estimate a net avoided domestic GHG emissions.

As part of the EA process, all identified GHG emission sources, as per above categories, during the site preparation, construction and post-construction demobilization phase will be described, without being limited to the following items. The following information needed to estimate GHG emissions will be gathered and justified:

Construction phase

- Short description of related construction activities, which include workers' camps that will be built and dismantled afterwards;
- Data defining the emission rate (i.e., number of equipment, engine rating, fuel consumption rate, truck size and construction year, etc.);
- Data defining the extent of emissions (i.e., number of days in accordance with schedule).

Operations phase

- Expected vehicular traffic on the new roadway, including the type of vehicles;
- Extent of maintenance operations on the new roadway (i.e., type and number of vehicles, maintenance schedule scenario);
- Electric power usage from newly constructed (or existing) buildings sheltering the maintenance vehicles;
- Scenarios describing the actual and future transportation conditions of the population group affected by the Project.

In addition, mitigation measures that will be implemented for the Project and will, in turn, provide GHG reductions will be considered in the GHG estimates. Such measures may include the use of low-carbon or renewable fuel use in mobile equipment and heavy machinery, anti-idling practices for mobile equipment wherein fuel usage can be reduced.

The following elements will be excluded from the EAR/IS:

- GHG emissions from the decommissioning of the WSR in the future, given that the removal of the road and site restoration is not anticipated;
- Offset credits purchased, as mitigation measure are not included in the net GHG emission estimations, as requested in the IACC guidance document;
- Net GHG emission intensity will not be calculated as part of the WSR Project, as no emission intensity unit can be derived; and
- Upstream GHG emissions (i.e., refinery emissions for the fuel used during construction or operations), as recommended in the IACC guidance document, since they are not expected to reach 500 kt CO2e on an annual basis.

Regarding the upstream GHG emissions, for the Project, these include emission sources related to the production of fuel (diesel for the machinery and mobile sources) and aggregate extraction/production. A demonstration will be provided in the EAR/IS with respect to the annual emissions being less than 500 kt CO_2e to justify the exclusion of these sources.

2.1.2. Qualitative Description of the Project's Effects on Carbon Sinks

These effects of landscape changes due to the Project will be described in the EAR/IS based on the local land conditions (i.e., overview of affected forest and peatland area, forest type, soil type, climate conditions, etc.). A discussion of the project's positive or negative impacts on carbon sinks will touch upon the following:

- Description of project activities in relation to significant landscape features, such as topography, hydrology and regionally dominant ecosystems;
- Land areas directly impacted by the Project, by ecosystem type (forests, cropland, grassland, wetlands, built-up land) over the course of the project lifetime; this includes the areas of restored or reclaimed ecosystem(s);
- Initial carbon stocks in living biomass, dead biomass and soils (by ecosystem type) on land directly impacted by the Project over the course of the project lifetime;
- Fate of carbon stocks on directly impacted land, by ecosystem type: immediate emissions, delayed emissions (timeframe), storage (e.g., in wood products); and
- Anticipated land cover on the impacted land areas after the Project is in place.

2.1.3. GHG Emissions from Accidents or Malfunctions

Based on experience and an initial analysis, the WSR Project is not expected to release or generate direct GHG emissions from accidents or equipment malfunctions, mainly because the final project infrastructure (a road) will not use or operate materials that could potentially result in emissions, through spills (i.e., pipeline dig-ins) or unexpected burning (i.e., fire). Nonetheless, the EAR/IS will go through all foreseeable construction and operations steps, identify potential accident or malfunction events, and determine if those have the potential to release GHG emissions. A qualitative description of the extent of GHG releases and their impact on the project's inventory will be provided.

2.1.4. GHG Emission Estimation Methods

Most, if not all, of the GHG emission source categories identified in **Section 2.1.1** relate to liquid fuel combustion. Therefore, the following information is required to estimate emissions on an annual basis: fuel consumption rate, a usage metric (distance or duration), and emission factors. The fuel consumption rates will either be provided by a project stakeholder, or estimated based on engineering considerations (i.e., diesel engine fuel consumption is related to power rating). The usage metric will be based on the project schedule during site preparation, construction, and operations. For vehicles on roads, a fuel usage estimate is required for calculations (i.e., L per 100 km), which will be provided by a stakeholder or, when applicable, will be assessed using publicly available tools (e.g., US EPA MOVES 2014b). Finally, the emission factors will be selected from recognized sources (i.e., ECCC annual national inventory reports) based on fuel type (i.e., diesel, gasoline) and vehicle category (i.e., road or off-road vehicle).

The greenhouse gases that will be considered in this study are those associated with fuel combustion, namely carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and black carbon (BC). Individual gas emissions will then be combined into a CO_2 equivalent total (t CO_2e) using the global warming potentials (GWP) from the 4th IPCC report (CO_2 = 1; CH_4 = 25; N_2O = 298 t CO_2e/t). For BC, a GWP of 900 t CO_2e/t will be applied, representing a typical value over a 100-year period.

2.1.5. Uncertainty Assessment

As required by the IAAC WSR Project TSIG, estimates of net GHG emissions on an annual basis will be provided in the EAR/IS. For the construction phase, the net emissions will be disaggregated for four (4) years, since site preparation, construction, and post-construction demobilization are expected to last 39 months. The net GHG emissions for the operations phase will also be provided for 25 years, since the WSR lifetime is, at this point, unlimited. Yearly emissions will vary through time, accounting for evolving traffic and transportation scenarios considered by project users/stakeholders.

Uncertainties on net GHG emissions for a project in a planning phase can be extensive. The EAR/IS will therefore provide an overview on the extent of these uncertainties. As such, the following items will be covered:

- The uncertainty of the estimation methods (i.e., emission factors, IPCC carbon stock estimation methods) will be discussed;
- Any source data used in calculations will be attributed an uncertainty factor (i.e., ±30%) based on its quality, but also on the possibility that it could evolve in time due to modified planning, external factors or the fact that uncertainty increases when estimating data for a year further into the future. Justifications on the choice of the uncertainty factor will be provided. Uncertainty on

the yearly net GHG emission estimates will be calculated based on these individual data uncertainties;
- Discussion on how data certainty can be improved during the planning process.

2.1.6. Project's Contribution to Canada's Effort on Climate Change

GHG emissions estimates linked to the WSR Project will be put into perspective with Canada's effort to curb the adverse effects of climate change. Yearly net GHG emissions will be compared with past Ontario and Canada-wide totals and future targets. For that purpose, construction-related emissions will be weighted over 25 years and added to the yearly net GHG emissions from the operations phase.

The impact of the WSR Project on climate change in Canada will be further discussed for the following items, at levels subject to the extent of the project's GHG estimates compared to Canada's targets.

- Overview of related legislation, policies and regulations applicable to the WSR Project;
- GHG reduction potential in Canada by avoiding emissions from another source (see **Section 2.1.1**);
- Considered measures (technologies and/or practices) planned in the design of the WSR Project to mitigate GHG emissions;
- Commitments by stakeholders to reduce the impacts of the WSR Project on climate change over time;
- Assessment of alternatives to the WSR Project that would reduce contribution to climate change;
- Impact of the WSR Project on Indigenous people and surrounding communities with regard to climate change;
- Acquisition of offset credits to compensate the project's emissions, if applicable (refer to exclusions in **Section 2.1.1**).

2.1.7. Project's Contribution to Climate Change on a Global Scale

The WSR Project will not displace GHG emissions at the international level. This assertion will be reviewed and confirmed during the EA process.

2.2. Impact of Climate Change on the Project

As Ontario's climate changes over time, it is critical for infrastructure to be robust and be designed and constructed with potential future climate in mind. An assessment of climate change effects on the Project is needed to assist in identifying unintended potential risks and impacts to adjacent ecosystems and human health. These will be related principally in terms of risk and vulnerability levels to the road infrastructure during the construction and operations phases, in the context of trending severe weather events. The longevity of the road from an integral/structural perspective, as well as reducing the potential for future issues to arise, will depend on the understanding of potential climate changes, particularly those processes associated with severe precipitation patterns. The primary purpose of this component of the work plan will be to gather and analyze the information required to support the EA in terms of assessing the climate change effects on the Project.

The main tasks will include:

- Review historical and present climate data for the project site and Northern Ontario:
  - Precipitation

- Evaporation;

› Analyze future climate projections;
› Assess the risks and ability for the Project to be resilient; and
› Develop robust design criteria taking into account realistic climate scenarios and developing appropriate mitigation measures.

2.2.1. Review Historical and Present Climate Data

The Water Survey of Canada (WSC) maintains several hydrometric monitoring stations throughout Northern Ontario. Environment Canada also maintains meteorological stations. The locations of these stations within the vicinity of the project site are shown on **Figure 3** and the station details are summarized in **Table 1**. This information, along with available information from the *Ontario Flow Assessment Tool* (MNRF, 2019), Google Earth Satellite Imagery, previous studies, Canadian Climate Normals and concurrent field investigations (i.e., geotechnical and biological investigations) will be used to formulate a baseline hydrology, hydrogeological, meteorological (including precipitation and evaporation) and geotechnical understanding of the project area.

Figure 3: Water Survey of Canada and Environment Canada Stations Locations

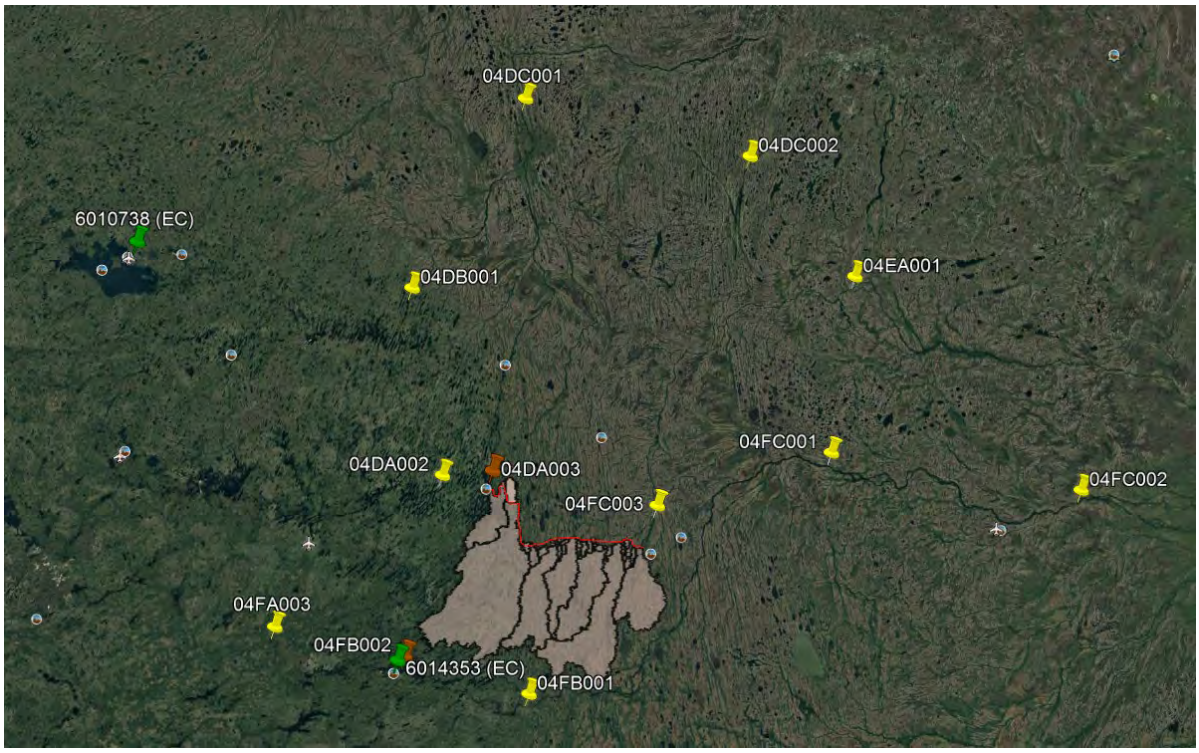

Table 1: Water Survey of Canada and Environment Canada Stations

Station ID	Station No.	Drainage Area	Operating Years
Water Survey of Canada			
Attawapiskat River Below Muketei River	04FC001	36,000	1968-2017
Attawapiskat River Above Lawashi Channel	04FC002	Unknown	2007-2017
Muketei River Near Otoskwin-Attawapiskat River Provincial Park	04FC003	2,310	2013-2017
Ekwan river below north Washagami river	04EA001	10,400	1967-2017
Winisk river below Asheweig River tributary	04DC001	50,000	1965-2016
Shamattawa river at outlet of Shamattawa Lake	04DC002	4,710	1966-2017
Asheweig river at Straight Lake	04DB001	7,950	1966-2016
Winisk River At Kanuchuan Rapids	04DA002	19,000	1967-2016
Winisk Lake at Webequie	04DA003	Unknown	1969-1972
Attawapiskat River Below Attawapiskat Lake	04FB001	24,200	1965-2017
Attawapiskat Lake at Lansdowne House	04FB002	Unknown	1966-1972
Pineimuta River at Eyes Lake	04FA003	4,900	1966-2016
Environment Canada (Precipitation)			
Lansdowne House (Aut)	6014353	-	1971-2006
Big Trout Lake	6010738	-	1967-1992

2.2.2. Future Climate Projections

Once baseline conditions have been established, the effects of future climate conditions will be reviewed. The overall objective of this is to assessing future climate projections, based on robust and adaptable methodologies, to develop design criteria for the project.

The wide range of Ontario-specific climate data and climate models that are available will be reviewed. The Ontario Climate Data Portal will be utilized, particularly the Representative Concentration Pathways (RPC) emission scenario models, to identify potential future climate conditions. MTO Intensity Duration Frequency data will also be reviewed, with a focus on expected future trends. As outlined by MTO, future rainfall values for the year corresponding to the end of the Design Service Life of structures shall be used in the design for conveyance, erosion, scour and stormwater management components. Accordingly, it is anticipated that the 2050 and 2080 projects will be reviewed and assessed.

In conjunction with reviewing single grid point values as noted above, regional-scale temperature projections will be reviewed. Canada's Changing Climate Report (CCCR, 2019) provides an overview of historically observed and projected future changes in Canada's climate. These regional-scale temperature projections provide a robust approach. Utilizing Ontario regional temperature projections (including associated uncertainty) for the highest emission scenario (RCP 8.5) to adjust precipitation over the project lifetime (as described in Canadian Standards Association guidance on IDF for Canadian Water Resources practitioners, 2019), would result in useful estimates of possible changes in extreme precipitation for the project location that correspond to a conservative project design.

While increasing temperatures, solar radiation and heat days are likely to be an issue in the future, in the context of the Project and climate effects on the Project, rainfall and runoff (intensity, duration, frequency) are anticipated to have a significantly larger effect than other climate changes. The review of climate

projections will primarily focus on hydrometeorological changes. The interactions between rainfall and potential changes in runoff and streamflow (as a result of climate induced changes to wetland conditions and the surrounding landscape) will also be taken into account in the assessment of future climate conditions.

The analysis carried out in this task will be used to identify and develop the design criteria for the Project (i.e., return period and discharge rates for watercourse crossings, foundation condition, etc.).

2.2.3. Risk Assessment and Developing Design Criteria

A review of the climate variables and their potential effect on project components will be carried out. The assessment will include identifying the hazard or risk potentially caused by the climate variable, a review of the potential effects on the project component, and identifying controls or mitigation to reduce the effects in anticipation of identified risks. This will also include a description of possible mitigation measures to deal with adverse environmental, health, social and economic effects resulting from effects of the environment on the Project.

An assessment of how the Project directly or indirectly contributions to the vulnerability or resilience of surrounding ecosystems to climate change will also be conducted (i.e., could the project's potential alteration of local drainage patterns exacerbate impacts to water resources projected to occur with climate change). In conjunction with field data, including the geotechnical report, areas of potential wind or water erosion, slumps and slope instability and geologic hazards will be assessed.

It is envisioned this will be carried out as a hazards checklist based on trigger "What-If" questions. The focus will be on credible external events that have a reasonable probability of occurrence and for which the resulting environmental effects could be major without careful management. The review will highlight foreseeable hazards or vulnerabilities (both as it pertains to the road and surrounding ecosystems) and the appropriate controls, mitigation, or project design criteria at different project stages (i.e., design, construction, operations). The potential climate variables and project components to be reviewed, at this stage, are shown in **Table 2**. An example of the project hazard analysis is shown in **Table 3**. It should be noted that this table is an example and not exhaustive.

Table 2: Climate Variable and Project Components

Climate Variable	Project Component
Temperature Extremes • High • Low • Warmest/ Coldest Period **Precipitation (rain):** • Freezing Rain • Intensity • Flooding Return Period • Wet/Dry Period **Precipitation (snow):** • Snow Load • Snow Water Equivalent	**Water Course Crossings** • Design Storm/Crossing Size • Material Selection • Erosion /Sedimentation • Maintenance • Foundation/ Footings **Roadway** • Road profile • Embankment Erosion • Foundations • Material **Maintenance** • Snow Removal

Inclement weather:

- Extreme Gusts
- Fog/Hail

Changes to Ground Conditions:

- Higher/Lower Groundwater
- Higher/Lower Surface ponding
- Settling/ Re-Grading/ Erosion
- Material Stockpiles
- Sedimentation / Ditch Cleaning
- Monitoring/ Safety/ Advisories

Table 3: Example Project Hazard Review

Climate Variable	Event/Issue ("What if")	Affected Project Component	Hazard to the Project (Consequences)	Control/ Mitigation	Project Stage
Precipitation (rain) ▪ Intensity ▪ Return Period	• Future increase in rainfall intensities and frequency lead to higher stream flows	• Watercourse Crossing	• Crossings are undersized and leads to the roadway overtopping, potential failure (blowout) of the crossing and/or increased erosion.	• To reduce the risk of future climate uncertainty, watercourse crossing will be sized to account for potential future increases in flood intensities (i.e., 1/50 year based on future projections from climate models).	• Design
Precipitation (rain) ▪ Intensity	• Future increase in rainfall intensities and frequency lead to higher erosion	• Watercourse Crossing • Road Embankments	• Increased erosion leads to: ▪ washouts or roadway/embankment ▪ instability ▪ scour at crossings ▪ increased maintenance	• Watercourse crossing inlet/outlets will be armoured to mitigate erosion accounting for future climate conditions. • Road topping and embankment material and geometry (gradation, depth, etc.) will incorporate potential increase in rainfall intensity that could lead to washouts.	• Design • Operations

Climate Variable	Event/Issue ("What if")	Affected Project Component	Hazard to the Project (Consequences)	Control/ Mitigation	Project Stage
				• Operations and maintenance will incorporate appropriate grading techniques and material stockpiles. • Sedimentation monitoring and ditch cleaning procedures will be incorporated in the maintenance procedures.	
Changes to groundwater levels	• Groundwater levels increase or decrease in the future	• Road Embankments • Road Foundations	• Changes to groundwater leads to foundation instability or increased road settling.	• Additional piezometric information will be gathered to help understanding groundwater fluctuations and potential impacts (short term, long term and under varying wet/dry periods) on roadway structure and foundation. • Design accounts for potential increase/decrease in groundwater levels.	• Design

Climate Variable	Event/Issue ("What if")	Affected Project Component	Hazard to the Project (Consequences)	Control/ Mitigation	Project Stage
Inclement weather ▪ Extreme gusts	• Extreme winds/gusts are encountered.	• Road Surface • Drivability/Function	• High winds leads to dust issues/ loss of road topping • Dust-up causes visibility issues	• Road monitoring and advisories (i.e., closures due to inclement weather) shall be incorporated in the operations and maintenance procedures • Road pull-off / stopping areas / shoulders shall be incorporated into the design	• Operations • Design
Precipitation (snow): ▪ Intensity ▪ Frequency	• Annual/ monthly snowfall increases	• Drivability/Function	• Increase monthly snowfall leads to more frequent plowing needs, safety issues	• Road monitoring and snow removal procedures and equipment shall be incorporated in the operations and maintenance procedures.	• Operations
Precipitation (rain) ▪ Wet/Dry Period	• There is a prolonged period of increased frequency or intensity of wet periods	• Road Embankments • Drivability/Function	• Increased or prolonged pooling against road embankment leads to instability or higher water levels • Pooling on roadways causes driving issues.	• Design accounts for potential increased/decreased pooling against road embankment (i.e., relief culverts, free draining base material) • Road designed and constructed with a	• Design • Construction • Operations

Climate Variable	Event/Issue ("What if")	Affected Project Component	Hazard to the Project (Consequences)	Control/ Mitigation	Project Stage
				slope/grade to allow proper surface drainage.	

2.3. Impact of the WSR Project on the Atmospheric Environment

This section describes the planned approach to assess the impact of the WSR Project on the atmospheric environment (air quality, excluding noise and visual impact) in accordance with the requirements of the IACC WSR Project TISG (Section 14.1), including the baseline conditions (Section 8.1).

2.3.1. Baseline Conditions

Baseline conditions in the region of Webequie will be determined based on an assessment of existing ambient air monitoring stations located in Northern Ontario and other northern and or remote areas in Canada. The assessment will also consider any available data based on studies that relate to air quality in more rural or remote areas. The assessment will also include the description of emission sources present in the area.

The following contaminants will be considered in the assessment:

- Total suspended particulates, PM_{10}, $PM_{2.5}$, and diesel particulate matter;
- Main combustion gases: CO, NOx, SOx;
- Ground level ozone;
- VOCs: aldehydes and benzene (as recommended in the TISG);
- PAHs and any other contaminants of importance.

The background concentrations will be compared with the Canadian Ambient Air Quality Standards (CAAQS) and Ontario Ambient Air Quality Criteria (AAQC) in accordance with the applicable averaging time period and the statistical form associated with each numerical standard. The baseline conditions will then be put into perspective with the following elements:

- Seasonal variability of available baseline data;
- The impact of current sources of air emissions (direct and indirect) in the Webequie region on observed baseline conditions. The different sources will be identified and assessed through Indigenous consultation and information from stakeholders;
- Qualitative appraisal of baseline concentration levels at key receptor points based on current sources of air emissions. Key receptor points are defined as sensitive locations where the WSR Project could potentially have an impact on the air quality, water, or country food (vegetation) and include cabins, traditional sites, schools, community centers, hospitals, and locations with species at risk. These receptors will be identified by consulting databases with information on health centres, school boards, recreational centres, and others, as well as zoning plans, and consultation with the local community. These receptors will be described and identified on a map, together the WSR Project location.

The WSR Project is located in a remote region of Ontario away from any significant sources of human induced air emissions. Background concentrations are well below the Ontario AAQC and CAAQS. On that account, dispersion modeling of a base case for existing pollutant sources to determine the spatial distribution of pollutant within the study area will not be considered during the EA process.

2.3.2. Impact of the WSR Project on Air Quality

Construction activities have the potential to temporarily affect local air quality in the immediate vicinity of the WSR Project. Emissions from construction are primarily comprised of fugitive dust from wind erosion

and human activity and tailpipe emissions from the movement and operation of construction equipment and road vehicles. The increase of vehicular activity during the operations phase will also have some impact in and around the new road corridor. The EAR/IS will identify the emission sources linked to construction and operation, including, without being limited to:

- Heavy machinery used for vegetation clearing, earthworks, material handling, road construction, etc.;
- Aggregate extraction and processing during construction;
- Blasting activities (dust and explosives) during construction;
- Increased vehicular traffic during construction and operations;
- Vehicles travelling on gravel roadways and other (exposed) earth surfaces generating fugitive dust;
- Diesel generators (power source) at the construction camps and maintenance yards.

The potential project emission sources will be evaluated against regulatory standards in the EAR/IS.

The air contaminants listed in **Section 2.3.1** will be quantified for each identified source on an annual basis using recognized calculation methods and up-to-date inputs from the WSR Project that will be provided by experienced construction staff within the Project's Engineering Team. The emissions information will be used as input to the atmospheric dispersion model for both the construction and operations phases. The model inputs, including emission rates estimates, will be determined using methods listed in the following Ontario ministry guidelines:

- Guideline A-10: Procedure for Preparing an Emission Summary and Dispersion Modelling (ESDM) Report; and
- Guideline A-11: Air Dispersion Modelling Guideline for Ontario.

The dispersion study will integrate the following requirements from the TISG:

- Provide details of all air quality model configuration, including meteorology, land use, gridded and sensitive receptors (as described in **Section 2.3.1**) and chemical and physical transformation settings. The model configuration will be adapted for the level of complexity of sources, terrain and meteorology at hand;

- Provide emission rates for all project sources within the study area, including a description of emission factors, methods for estimating emissions from on-road and off-road activities, assumptions, and other parameters enabling the calculations to be reproduced;

- Provide a description of all methods and practices that will be implemented to reduce and control emissions. Control efficiencies used to reduce the emission rates will be justified. If best available technologies are not considered, a rationale for the technologies selected will be provided. Details of the achievement of emission standards for all mobile and stationary engines will also be provided;

- Describe the source characteristics used in the dispersion model;

- Compare predicted ground-level air concentrations of contaminants against applicable AAQC, or standards and guidelines, including CAAQS, in accordance with the applicable averaging time

period and statistical form of the numerical standard. The assessment against CAAQS will be based on the principles of "keeping clean areas clean" and "continuous improvement", and in the context of air sheds and air zones within the Air Quality Management System;

- Provide an assessment of the WSR Project's emissions potentially contributing or adding to existing levels. Predicted concentrations of contaminants will be added to the background concentrations to show the cumulative air quality impacts of the Project. These, in turn, will be compared against relevant AAQC or other standards and guidelines, including the CAAQS.

- Assess the potential for emissions from the WSR Project to contribute to acid deposition and exceedances of critical loads for terrestrial and aquatic ecosystems;

- Provide the results of predicted concentrations, including cumulative concentrations from the Project, in both tabular form and graphical format (isopleths). Should exceedances be identified, the frequency of these will also be presented. The differential effect of the WSR Project on air quality at identified sensitive receptors will be presented as well.

At this time, dispersion modeling of two emission scenarios, one for the construction phase and another for the operations phase, is planned. Given the length of the WSR (over 100 km long), the model will only simulate the emissions occurring within the Webequie Indian Reserve where a great majority of sensitive receptors are located. Hence, construction and operations-related emissions occurring on the first 10–20 km segment of the new road east of the Webequie community will be considered in the models. However, if sensitive receptors located outside the Webequie Indian Reserve are identified, a new emission scenario on a road section bordering the receptor(s) most at risk may be developed and modeled. The location of the road segment modeled would be chosen to be representative of the worst case, should there be several locations where sensitive receptors are bordering the WSR.

2.4. Air Quality and Climate Change Criteria and Indicators

Criteria are components of the environment that are considered to have economic, social, biological, conservation, aesthetic or cultural value (Beanlands and Duinker 1983). The assessment will focus on valued components, and applicable specific criteria, that have physical, biological, social, economic or health importance to the public, Indigenous groups, federal and provincial authorities and interested parties, and have the potential for change as a result of the Project. Valued components have been identified in the federal TISG and by the Project Team and are, in part, based on what Indigenous communities and groups, the public and stakeholders identify as valuable to them in the EA process to date. The list of valued components identified to date include the following:

- Geology, Terrain and Soils;
- Surface Water;
- Groundwater;
- **Air Quality** (subject of this work plan);
- **Climate Change** (subject of this work plan);
- Noise;
- Vegetation and Wetlands;
- Fish and Fish Habitat (subject of this work plan);
- Wildlife, including migratory birds;
- Archaeological Resources;

- Built Heritage and Cultural Heritage Resources;
- Socio-economic Environment;
- Aboriginal Land and Resource Use;
- Visual/Aesthetic Environment;
- Human Health; and
- Aboriginal and Treaty Rights and Interests.

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

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

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

The proposed set of Evaluation Criteria for assessing the comparative advantages and disadvantages of the methods/means of carrying out the undertaking includes the following considerations pertaining to Air Quality, including elements of climate change (greenhouse gases):

Criterion	Indicators	Rationale for Selection of Indictors	Data Source
Air Quality	Qualitative and quantitative assessment of changes in ambient air quality Vehicle exhaust	Sensitivity of human health to air quality Sensitivity of the environment (soils, plants, animals) to air quality	• Indigenous consultation and Indigenous Knowledge • Most current Ontario Ambient

Criterion	Indicators	Rationale for Selection of Indictors	Data Source
	emissions Dust emissions Greenhouse gas emissions		Air Quality Criteria published online by MECP • Air Quality Pollutant Concentrations – Ministry of the Environment, Conservation and Parks (MECP) • 2019 National Inventory Report (1990-2017): – Greenhouse Sources and Sinks in Canada • National Air Pollution Surveillance Network database

Details on the application of quantitative indicators in the effects assessment are included in **Section 2.1** Impact of the WSR Project on Climate Change and **Section 2.3** Impact of the WSR Project on the Atmospheric Environment.

Where there are discernible differences between the alternative means or methods of implementing the Project (supply road corridors; sites for supporting infrastructure) with respect to air quality (including the production of GHG as it relates to potential for climate change effects), the respective advantages and disadvantages of each alternative will be assessed and incorporated in the evaluation of alternatives and selection of the preferred option. For GHG, this is expected to focus on differences in changes to the landscape and associated reductions in carbon sink capacity (e.g., quantifiable differences in deforestation and the removal of peatlands).

The EAR/IS will further describe the criteria and indicators, including details of how each indicator will be measured, along with data sources and rationale for selection. This will be presented in tabular format and will build on the preliminary criteria and indicators presented above and included in Appendix B of the ToR.

2.5. Effects Assessment Approach

The approach for the assessment of project effects has been developed to satisfy regulatory requirements under the *Environmental Assessment Act* and is based on the MECP *Code of Practice: Preparing and Reviewing Terms of Reference for Environmental Assessments in Ontario* (MOECC 2014), and the Terms of Reference for the Project that is currently pending approval from the MECP. The approach for

the assessment has also been developed to meet the requirements of the federal TISG and specifically Section 13 – Effects Assessment.

2.5.1. Consideration and Evaluation of Alternatives

The EA process requires that two types of project alternatives be considered: “alternatives to” the Undertaking (i.e., functionally different ways of addressing an identified problem or opportunity to arrive at the preferred planning solution) and “alternative methods” of carrying out the Undertaking (options for implementing the preferred planning solution). The consideration and evaluation of alternatives to the Undertaking were documented in the federal Impact Assessment Detailed Project Description (November 2019) and the provincial Environmental Assessment draft Terms of Reference (September 2019), and concluded that developing a new all-season road between Webequie and the McFaulds Lake area is the preferred alternative. It is not proposed that this analysis and conclusion be re-examined as part of the EA process, but it will be documented in the EAR/IS. Therefore, in keeping with the focussed approach, the preferred planning alternative (developing a new all-season road) has been carried forward to the initial consideration of alternative methods of carrying out the Undertaking.

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

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

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

2.5.2. Assessment of Net Effects

A step-wise process will be used to assess the environmental effects of the Project in a systematic and transparent manner once the relevant project elements and activities and their interactions, assessment boundaries, and relevant environmental criteria and indicators are identified and finalized through the

engagement and consultation process. The net effects assessment method will include the following primary steps:

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

2.5.2.1. Identification of Potential Environmental Effects

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

The assessment of potential effects to climate change and air quality will include the characterization of baseline conditions in the project study area using both publicly available information on a regional scale, and data obtained in the field or via desktop review on a local scale or site-specific basis, as described in **Sections 2.1** to **2.3**. The consideration of potential climate change and air quality effects will be based on both quantitative and qualitative assessments. For example, it is expected that the assessment of greenhouse gases and air quality contaminants of concern will be quantitative, entailing an estimation of the generation of carbon equivalents/criteria air contaminants/toxic contaminants emissions based on a determination of the type, number and duration of equipment operation, and with the use of manufacturers' information on equipment and machinery exhaust emission rates/content. Methods and calculations based on the Ontario and International Panel on Climate Change Guidelines for National Greenhouse Gas Inventories will be documented. The degree of calculation and estimation effort will be aligned with the level of significance the Project Team attaches to climate change and air quality effects associated with the Project.

2.5.2.2. Identification of Impact Management Measures

Once potential effects are identified, technically and economically feasible impact management measures (or "mitigation measures") to avoid and minimize potential adverse effects will be identified for each phase of the Project. The definition of effect levels may vary from one valued component or criterion to another, recognizing that the units and range of measurement are distinct for each. Lastly, effects may impact communities, Indigenous groups and stakeholders in different ways, including through a gender-based lens (refer to **Section 2.5.3**) and they may respond differently to them. Therefore, determining and characterizing effects will be based largely on the level of concern expressed through engagement with the Indigenous groups and community members. Refinements to these measures may also be made in the future detail design phase of the Project. Impact management measures will be developed for the Project based on:

- Knowledge and experience of the Project Team with linear infrastructure developments;
- Industry best management practices and applicable agency requirements and guidance; and

- Measures identified by Indigenous communities, the public and stakeholders through feedback received as part of the engagement and consultation program.

The assessment of means to reduce or mitigate potential climate change and air quality effects will generally be qualitative in nature, including consideration of other measures that may have been used on similar projects. Design, construction and operations phase considerations and impact management measures for climate change and air quality, as described in **Sections 2.1.1, 2.1.6** and **2.2.3**, will be identified to offset or eliminate potential adverse effects and will be described in the EAR/IS. Examples include: the use of different construction materials and methods; optimization of transportation of materials and equipment; means to achieve energy efficiencies; waste reduction measures; construction schedule changes; and site restoration measures (e.g., tree planting to offset generated emissions).

It is understood that impact management measures are not always fully effective; therefore, WFN will identify a compliance monitoring and effects monitoring program as part of the EA for implementation during the project phases (refer to **Section 2.5.2.6**).

2.5.2.3. Prediction of Net Effects

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

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

2.5.2.4. Characterizing the Net Effects

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

The assessment of significance of the net effects of the Project on climate change/air quality and other valued components will be informed by the interaction between significance factors (as defined below), in addition to those concerns raised by Indigenous groups, interested agencies, and individuals during the consultation and engagement for the EA. Therefore, predicted net effects, where identified, will be described in terms of the following significance factors that are consistent with the assessment methodology identified in the TISG.

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

The definitions and description of the above factors will be described in detail in the EAR/IS.

2.5.2.5. Assessment of Significance

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

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

2.5.2.6. Identification of a Monitoring Framework

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

- Compliance monitoring; and

- Effects monitoring.

The compliance monitoring will assess and evaluate whether the Project has been constructed, implemented and/or operated in accordance with commitments made during the EA process, and any conditions of the federal IA and provincial EA approvals and other approvals required to implement the Project.

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

2.5.3. Gender Based Analysis Plus (GBA+)

Information and data collected will be disaggregated by diverse subgroups (women, youth, elders, etc.), as part of applying a Gender Based Analysis Plus (GBA+) lens. For climate change and air quality, the baseline information will focus on potential climatic and related environmental changes, including those related to food security, and will seek input from the aforementioned subgroups with respect to their observations and perceptions of changes and trends in climatic parameters and dependent resources and amenities (refer to **Section 3.2.2** Consideration of Input from Indigenous Peoples on Climate Change and Air Quality for examples of topics to be included). This information will be obtained through such methods as socio-economic and health surveys (using Survey Monkey), key informant interviews with community members whose activities or well-being may be affected by climatic or air quality changes (gender, youth, elders), desktop research and Indigenous Knowledge, where provided. This will include qualitative and quantitative data that help to characterize and describe perceptions of climate change through a GBA+ lens, including, where feasible, the data disaggregated by sex, age, and other identity factors. Through Survey Monkey the data will be filtered and disaggregated based on the demographic questions answered (i.e., gender, age, Indigenous community membership of, etc).

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

3. Consideration of Input from the Public and Indigenous Peoples

3.1. Public Participation

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

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

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

1. Project and EA process overview; baseline data collection; spatial and temporal boundaries for assessment; criteria and indicators; and identification and preliminary evaluation of alternatives; and

2. Presentation of the selected preferred alternatives/the Project, including potential effects, mitigation, net effects and their significance and follow-up monitoring.

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

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

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

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

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

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

3.2. Indigenous Engagement and Consultation

3.2.1. Communities to be Included in the Assessment

The assessment of the climate change and air quality component will include the 22 identified Indigenous communities that are to be consulted as part of the EA process, as shown in **Table 4** below. These communities have been identified by the MECP and Agency as communities whose established or asserted Aboriginal and/or treaty rights may be adversely affected by the Project and/or may have interests in the project. Communities marked with an asterisk are those whose Aboriginal and Treaty rights may be affected by the Project.

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

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

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

Table 4: Indigenous Communities to be Consulted

Indigenous Community	Identified by WFN	Identified by MECP	Identified by IAAC
Webequie First Nation	✓	✓*	✓*
Aroland First Nation		✓*	✓*
Attawapiskat First Nation	✓	✓*	✓*
Constance Lake First Nation		✓*	✓
Eabametoong First Nation	✓	✓	✓*
Fort Albany First Nation		✓*	✓*
Ginoogaming First Nation		✓	✓
Kasabonika First Nation	✓	✓*	✓*
Kaschechewan First Nation		✓*	
Kitchenuhmaykoosib Inninuwug		✓*	✓
Kingfisher Lake First Nation		✓*	
Long Lake #58 First Nation		✓	✓
Marten Falls First Nation	✓	✓*	✓*
Mishkeegogamang First Nation		✓	
Neskantaga First Nation	✓	✓*	✓*
Nibinamik First Nation	✓	✓*	✓*
North Caribou Lake First Nation		✓	
Wapekeka First Nation		✓*	
Wawakapewin First Nation		✓*	

Indigenous Community	Identified by WFN	Identified by MECP	Identified by IAAC
Weenusk (Peawanuck) First Nation	✓	✓*	✓*
Wunnumin Lake First Nation		✓*	
Métis Nation of Ontario – Region 2		✓	

3.2.2. Consideration of Input from Indigenous Peoples on Climate Change and Air Quality

In addition to potential impacts to road infrastructure, it is recognized that climate change may have a profound effect on the environmental components valued by users of the land and resource base in the project area. The MECP guide for considering climate change in the environmental assessment process indicates the importance of addressing specific conditions inherent in projects implemented in Ontario's Far North, where climate change is projected to occur at a greater pace or to a broader extent, and particularly related to potential changes in Indigenous communities.

Consequently, the ministry's expectation is that First Nation communities will be engaged and consulted, and that Indigenous Knowledge will be incorporated in the consideration of the potential for climate change. Indigenous communities will have the opportunity to provide input and feedback during the following steps of the EA and more specifically the assessment of climate change and air quality, as outlined in this work plan:

- Provide input to defining the climate change and air quality study areas (spatial boundaries) for the purposes of the baseline data collection and effects assessment;
- Provide input on the criteria and indicators;
- Provide input on methods and types of baseline data and information to be collected, including opportunity to provide Indigenous Knowledge;
- Validate how baseline information is captured and used in the EA;
- Provide input on the effects assessment methodology, including alternatives;
- Discuss potential effects based on predicted potential for climate change and air quality impacts associated with implementing the Project; and
- Provide input to identify mitigation measures and any follow-up monitoring programs during the construction and/or operations phases of the Project, including predicted overall net effects and significance, including those that may interfere with the exercise of rights of Indigenous peoples.

In the context of this work plan, and from information provided by Webequie to date, examples of potential climatic and related environmental changes that will be examined, including those related to food security, include:

- Less average annual rainfall;
- Lower water levels in watercourses and drying wetlands in non-winter seasons, resulting in challenges for hunting and gathering activities (more difficult travel/reduced access to some country food and medicinal plant harvesting areas; fewer sightings of some small mammals; earlier fish spawning and changes in fish taste/texture; additional travel to access some fish species);
- Increased incidence of heavy rain and thunderstorms in winter (increased risk of localized flooding as runoff from frozen ground overwhelms roadside ditches and culverts);

- Increased variability in winter daytime temperatures (benefit of reduced heating costs with increased temperatures);
- Hotter summer days, with short severe heat spells (declines in some upland tree and riparian shrub species; increased risk of wildfires; hot weather health alerts); and
- Changes in staging areas for migrating waterfowl and mating areas for moose (impacts on predictability for timing of goose and moose hunts).

In addition to placing some reliance on historical recorded meteorological data to establish climatic trends, the Project Team, through key informant interviews (including the interactive use of maps to identify sensitive areas) and collection of Indigenous Knowledge, will seek input from First Nation communities with respect to their observations and perceptions of changes and trends in climatic parameters and dependent resources and amenities, including:

- Seasonal precipitation, temperature and wind, including effects on infrastructure (e.g., winter roads);
- Trees, birds, animals and medicinal/edible plants in the bush;
- Lakes, rivers, wetlands and soils (hydrology, permafrost, water quality/levels, fish, birds, animals, insects);
- Severe weather and other major related events/emergencies (thunderstorms, water funnels, tornados; fire and flooding); and
- Related changes in community health and well-being.

Refer also to **Section 3.2.4** on the approach to incorporating Indigenous Knowledge in EA documentation.

3.2.3. Consultation Approach and Methods

A variety of activities and materials will be used to provide information and receive input from Indigenous communities during the EA process. These are outlined and detailed in the provincial ToR which includes the mechanisms, activities and events that are planned for various stages throughout the EA process and will be used at milestone points to ensure optimal engagement with Indigenous communities. In summary, this includes the following:

- Notification letters sent by registered mail to all of the identified Indigenous communities and groups (i.e., Tribal Councils) informing them at key milestones (e.g., Commencement of provincial EA; Submission Draft EAR/IS and Submission of Final EAR/IS);
- Community visits throughout for those communities identified by IACC and MECP whose established or asserted Aboriginal and/or treaty rights may be adversely affected by the Project;
- Meetings (2) with off-reserve community members of the 22 Indigenous communities to be consulted as part of the EA;
- Information meetings with Métis Nation of Ontario;
- Engagement with Tribal Councils and Nishnawbe Aski Nation, with meetings held upon request;
- Communication materials for use at meetings, such as slide decks, project fact sheets, handouts, etc., including, where requested, translation to native language;
- Audio and visual products for those Indigenous communities that have the capability; community meetings and presentations will be live-streamed through local community media to allow for a wider audience to participate in the meetings;

- Use of surveys (e.g., “Survey Monkey”) or focused community-based meetings to obtain information (e.g., socio-economic, human health, etc.) and identify concerns from Indigenous people;
- Project Website (www.supplyroad.ca) for the public to review project related information and documents, including informative video tutorials (e.g., EA studies); and
- Project Newsletter letters.

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

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

3.2.4. Incorporation of Indigenous Knowledge in EA Documentation

Through engagement activities, the Project Team will also collect Indigenous Knowledge relevant to the WSR study area and specific valued components, where available, from the 16 Indigenous communities identified by Ontario and the 10 Indigenous communities identified by the Agency. Indigenous Knowledge will assist in describing existing conditions (e.g., characterizing the study area, natural environment conditions, social and economic conditions, cultural characteristics, community characteristics, past and current land uses and other values of importance. Indigenous Knowledge will be used to assist in developing mitigation measures, monitoring commitments and accommodation measures, where necessary.

The Project Team will document efforts to obtain Indigenous Knowledge. It is recognized that each community may have its own protocols and procedures to be followed in transferring Indigenous Knowledge to outside parties such as WFN and the Project Team. The Project Team will ensure that related protocols are respected and will work with each community to understand how the information will be transferred, securely stored, and applied. Additionally, the Project Team will ensure that the Indigenous Knowledge provided will be protected and kept confidential. The Project Team will seek guidance from the community as to how the information will be used and published.

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

3.2.5. Aboriginal and Treaty Rights

The Webequie Project Team will be engaging with Indigenous communities regarding potential impacts of the Project on the exercise of rights, and where possible, the project's interference with the exercise of rights. Potential effects to be considered will include both adverse and positive effects on the current use of land and resources for traditional purposes, physical and cultural heritage, and environmental, health, social and economic conditions of Indigenous peoples impacted by the Project. For example, this will include such effects as reductions in the quantity and quality of resources available for harvesting (e.g., species of cultural importance, including traditional and medicinal plants; or interference with the current and future availability and quality of country foods (traditional foods). Webequie First Nation and the Project Team will discuss with Indigenous communities their views on how best to reflect and capture impacts on the exercise of rights in the EAR/IS.

Should impacts on the exercise of Aboriginal and Treaty rights be identified, Webequie First Nation and the Project Team will work with Indigenous communities to determine appropriate mitigation measures to reduce or eliminate such impacts. Where no mitigation measures are proposed or mitigation is not possible, the Project Team will identify the adverse impacts or interference to the exercise of Aboriginal and Treaty rights and this will be described (e.g., level of severity) and documented in the EAR/IS. Webequie First Nation and the Project Team will advise Ontario and the Government of Canada on concerns Indigenous communities may have in relation to their exercise of Aboriginal and Treaty rights and whether their concerns cannot be addressed or mitigated by the Project Team.

4. Contributions to Sustainability

4.1. Overarching Approach

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

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

The approach also considers the level of effort required to assess a project's contribution to sustainability to be scalable, depending on the phase of the process and the context of the project, and can/will be adjusted/scoped as the impact assessment proceeds. For example, effects on future generations requires temporal scoping (i.e., consideration of next generation to "seventh generation"), based on

expectations as to how many generations it will take for effects to become fully apparent, including return to VC baseline conditions; resilience of the VC; and whether a VC is expected to recover from effects.

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

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

- could experience long-term effects, including how those effects could change over time, and how they could affect future generations;
- may interact with other VCs;
- may interact with potential effects of the designated project; and/or
- may interact with project activities.

4.2. Assessment of Contribution to Sustainability

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

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

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

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

The long-term effects on the well-being of present and future generations will be assessed. To conduct an analysis on future generations, the Project Team will first determine the potential long-term effects on well-being. This will entail consideration of the elements of environmental, health, social and economic well-being, across a spectrum of VCs, that communities identified as being valuable to them. In the context of subject VC (aquatic environment), well-being could include community cohesion, protection of

the environment, culture, stress, or livelihoods. Available Comprehensive Community Plans (CCP) will be consulted to determine whether sustainability is a CCP central theme. How the environmental, health, social and economic effects on well-being could change over time will also be assessed, as information permits. Although effects on future generations could include effects beyond the lifecycle of a project, this is not expected to be major consideration for the WSR Project, as no expected decommissioning or abandonment timeframe has been identified. With respect to temporal scoping, there is still a need to determine what the "future generation" is (i.e., how far into the future the project effects will be considered). Predicted potential effects on future generations will be assessed based on the supporting data or uncertainty; any uncertainty will be documented.

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

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

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

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

5. Schedule

The preparation and completion of the work described in this work plan is expected to start in November 2020 and to be completed by the end of March 2021.

6. Reporting

The outcome from the work described in **Section 2.1** and **Section 2.2** will be presented in the Climate Change Report deliverable.

The atmospheric environment baseline conditions and dispersion modeling study for the construction and operation phases of the Project, as described **Section 2.3**, will be presented in the Air Quality Assessment Report deliverable.

7. Closure

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