



February 2018

NEXTBRIDGE INFRASTRUCTURE LP

**Amended Environmental
Assessment Report for
the East-West Tie
Transmission Project**

Project Number: 1536607/2000/2219

NEXTBRIDGE
INFRASTRUCTURE

LIMITATION

The reported information is believed to provide a reasonable representation of the East-West Tie Transmission Project (the Project) being proposed at this time and the general environmental conditions at the Project location. Any use of this report, or any reliance on or decisions based on this report, by a third party is the responsibility of such third party. NextBridge Infrastructure LP (NextBridge) will not be held responsible or liable for any damages to the physical environment, any property, or to life which may have occurred from actions or decisions based upon any of the information within this report.

NextBridge will comply with all legislative requirements. It is recognized that the Project will undergo a regulatory review and permitting process with the regulatory authorities following the Environmental Assessment approval process. Section 13.9 describes that this will include Department of Fisheries and Oceans and the regulatory requirements with respect to fish and fish habitat under the *Fisheries Act*.

EXECUTIVE SUMMARY

This amended Environmental Assessment Report has been prepared in fulfillment of provincial Environmental Assessment requirements for the East-West Tie Transmission Project, as defined in the Terms of Reference approved by the Ontario Minister of the Environment and Climate Change.

Introduction and Project Overview

NextBridge Infrastructure LP (NextBridge) is proposing to construct, own, and maintain the East-West Tie Transmission Project (the Project or undertaking). The Project is a new, approximately 450 kilometre long double-circuit 230 kilovolt transmission line that connects the Lakehead Transformer Station in the Municipality of Shuniah near the City of Thunder Bay to the Wawa Transformer Station located east of the Municipality of Wawa (with a connection at the Marathon Transformer Station, in the Town of Marathon)

The Project has been identified as a priority project by the Province of Ontario, and a needed project by the Independent Electricity System Operator to meet future electricity demand in northwestern Ontario.

A draft Environmental Assessment Report was prepared and submitted in December 2016, with a comment period from December 2016 to March 2017. Project planning and consultation continued during this period, and NextBridge also received additional data that resulted in updates to the Project. A final Environmental Assessment Report was submitted in July 2017, with the comment period ending in September 2017. During this period, NextBridge and the Ministry of the Environment and Climate Change corresponded to discuss feedback on the draft and final EA reports, and in September 2017, NextBridge committed to amend the Environmental Assessment report to address the feedback received from the provincial government review team, Indigenous communities and other interested persons.

Consultation and Engagement Summary

The Environmental Assessment process allows potentially affected Indigenous communities, government representatives and agencies, and other communities, property owners, and people or groups opportunities to provide input into project planning, with the intent of developing a project that is compliant with applicable legislation and regulations and mindful of the interests and concerns of interested parties. Consultation with interested parties has been ongoing since 2013. Information gathered during the consultation and engagement program has been considered and assisted with identifying topics, addressing concerns, and responding to questions raised by Indigenous communities and organizations, property owners, and other stakeholders. Engagement has also provided Indigenous communities and organizations, property owners, and other stakeholders (e.g., regulators) with an understanding of the Project's potential effects. Information gathered during the consultation and engagement program has also been incorporated in this report where relevant, including the effects assessment and mitigation measures.

Evaluation of Alternatives

Proceeding with the Project was compared to the “do nothing” alternative. The “proceed with the Project” alternative was selected as the preferred alternative as it best addresses the need to supply electricity to northwestern Ontario.

Alternative methods of carrying out the Project were also considered as part of the amended Environmental Assessment. The following alternative methods were evaluated: alternative route segments; local route

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refinements; alternative siting of transmission structures; alternative transmission structure types; alternative access and construction plan; and alternative siting of laydown yards and construction camps.

The preliminary preferred route refers to the route referenced during NextBridge's Ontario Energy Board's competitive bid process and referenced in the approved Terms of Reference for the Project. The preliminary preferred route was identified using comparative analysis and reflects feedback received through consultation and engagement. The preliminary preferred route generally parallels the existing East-West Tie line except for select alternative route segments. Alternative route segments around federal lands were identified to avoid Pukaskwa National Park and the Pays Plat First Nation and Michipicoten First Nation reserves. Parks Canada has determined that it is not prepared to authorize access to study a new transmission line through Pukaskwa National Park, so the alternative around the park that parallels a 115 kilovolt transmission line and logging roads and crosses a cutover area is considered the best feasible alternative and forms part of the preferred route. The reference route through Pays Plat First Nation is identified as the preferred route because there are no existing, previously disturbed rights-of-way to follow around the reserve and therefore the alternative would be considered a greenfield route. The reference route through the Michipicoten First Nation Reserve lands is determined to be the preferred route when comparing to the alternative routes as it best meets the screening criteria.

Alternative route segments around provincial parks, conservation reserves and protected areas were also identified. Alternative route segments were evaluated as a result of the individual assessment for the following protected areas: Kama Cliffs Conservation Reserve; Gravel River Nature Reserve (Provincial Park); Gravel River Conservation Reserve; Kwinkwaga Ground Moraine Uplands Conservation Reserve; Kwinkwaga Ground Moraine Forest Reserve; Pukaskwa River Provincial Park; Ruby Lake Provincial Park; and Nimoosh Provincial Park. In addition, based on feedback received through public consultation with the residents of Loon Lake and the Township of Dorion and the results of the desktop analysis, routing to the north of Loon Lake and west of Ouimet Canyon Provincial Park is generally preferred in these areas.

An alternative route segment around caribou Category 1 habitat was identified. For a comparative assessment, an alternative route was developed that deviates around or avoids this section of Category 1 habitat for caribou wintering and nursery areas. Other alternative route segments were considered, but only one alternative route segment was assessed as there were no reasonable alternatives to the south because of Lake Superior.

Alternative route segments around species at risk and species of special concern were identified. Alternative route segments were evaluated for bat hibernaculum areas and eastern whip-poor-will sites.

An analysis of alternatives was completed to assess the development of greenfield route segments as an alternative to avoid three separate active aggregate sites along the reference route. The three aggregate sites crossed by the Project are Tonnes Hacquil Site, Site Chief Xavier and Site AV Terrace Bay. The reference route through the aggregate sites was determined as the preferred route.

In addition to the aforementioned alternative routes, and based on comments received from various stakeholders, it was determined that some localized route refinements should be considered and assessed as potential alternatives. Some segments of the reference route could not be sited adjacent to the existing Hydro One East-West Tie transmission line because of technical, social, or environmental constraints. These segments are referred to as "greenfield route refinements" in this analysis of local route refinements. There are four greenfield route refinements that deviate from the existing Hydro One transmission line (i.e., the reference route): Kama Hills Provincial Park Greenfield; Angler Creek Internment Camp Greenfield; Hydro One Crossover Greenfield; and Hemlo Mine Greenfield. All preferred alternative route segments, which are the focus of this assessment, feature the preferred balance of advantages and disadvantages. The preferred route segments combined are referred to as the "preferred route" in this amended EA Report.

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Structure siting refers to the engineering selection of tower locations along a transmission line route considering public safety, potential environmental effects, transmission system reliability, and technical considerations such as cost. NextBridge has attempted to accommodate the preferences of stakeholders regarding positioning of structures, to the extent practicable. Additional site-specific siting of transmission structures will be determined during detailed design once additional ground-trothing for proposed structure locations is complete.

Alternative transmission structure types will be required at a variety of locations along the right-of-way to: provide additional height and conductor spacing for longer spans; support increased loads at turning points; and reduce the required right-of-way width. The final site-specific selection of structure types will be made during detailed engineering design.

Construction requires the ability to access each structure with heavy equipment, set up sufficient laydown yards and storage yards to stage construction materials to keep pace with construction, and identify construction camp locations with the required amenities. NextBridge will continue to refine the construction and access plan as Project development continues and will continue to consult with Indigenous communities and stakeholders.

Laydown yards and construction camps to support the Project have been sited to avoid federal lands, provincial parks, and conservation reserves. As well, site-specific alternative locations or avoidance has been adopted based on feedback received from Indigenous communities and stakeholders. If additional laydown yards, storage yards and construction camps are required, these will be located within previously disturbed areas, and/or at reasonably flat with stable soil sites, wherever practicable.

Project Description

The Project is anticipated to be constructed over approximately two years and to operate indefinitely. Approximately 1,000 direct person-years of employment are required to construct the Project.

The approximately 450 kilometre long transmission line will be constructed in a right-of-way that is typically up to 64 metres wide. Access roads will be constructed or upgraded to facilitate construction. A portion of these access roads will be maintained through the operation phase, while the remainder will be decommissioned and reclaimed following construction. Storage yards, laydown yards, and construction camps will be established during the construction phase. Construction camps are anticipated to be established in proximity to the Township of Nipigon, Township of Terrace Bay, Township of White River, and Municipality of Wawa.

The primary transmission structure will be steel, double-circuit Guyed-Y lattice tower structures, anticipated to be used for approximately 65 percent of the line length. Approximately 35 percent of the structures will consist of self-supporting tangent and angle, and dead-end structures. Approximately 1,265 transmission structures are expected to be installed.

Environmental Effects Assessment Approach

The effects assessment approach involves the following steps:

- describing the Project and the alternative methods of carrying out the Project;
- developing a preliminary description of the existing environment;
- identifying environmental criteria that may interact with the Project and indicators to characterize changes to those criteria;
- establishing temporary boundaries (i.e. construction and operation phases) and study areas (i.e. Project footprint and local study area) for the assessment of effects of each criterion;

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- describing the existing environment (i.e., baseline characterization) and identifying environmentally sensitive features specific to each criterion;
- identifying potential Project-environment interactions;
- undertaking the net effects assessment:
 - identifying potential environmental effects,
 - identifying mitigation measures,
 - predicting the net effects, and
 - characterizing the net effects (i.e., after mitigation) of the Project on environmental criteria.
- assessing the significance of the net effects;
- conducting a cumulative effects assessment of the net effects in combination with other past, present, or reasonably foreseeable developments and activities and assessing applicable significance of those effects;
- determining the degree of certainty in the net effects prediction and associated assessment of significance;
- identifying follow-up, inspection, and monitoring programs that will be completed during and after construction; and
- evaluating the overall advantages and disadvantages of proceeding with the Project.

Physical Environment

Geology, Terrain and Soils

Baseline Conditions

The Project study areas are largely underlain by granitic or gneissic bedrock, with intrusive areas of less acidic metavolcanic and metasedimentary rock and formations of basalt and other volcanic rocks. Glaciolacustrine deposits are present on the west part of the Project study areas near Black Sturgeon River and fluvial deposits are scattered throughout the Project study areas where abandoned flood plains, terrace remnants, or modern flood plains exist. Till is mostly present north from Pukaskwa National Park on the east side of the Project study areas where it is intermixed with glaciofluvial ice-contact deposits and gravel and sand beach glaciolacustrine deposits. The topography has a variable relief with some areas characterized by rough, broken topography with hills rising steeply from Lake Superior and along river valleys leading to the shore.

Substrates are generally poorly developed and varied in the Project study areas. Steep terrain yields rock outcrops with poor or no substrate development. Where rock is covered by a discontinuous layer of drift, soils are usually dominated by podzols and brunisols. In neutral to calcareous areas, fine-textured materials dominate, and organic peats and gleysols are found in poorly drained sites and bedrock depressions.

Net Effects

The criterion identified for geology, terrain and soils is terrain and soils. The indicators identified for geology, terrain and soils are: terrain distribution; soil quality; and soil distribution.

Terrain and Soils

Net effects were predicted for the terrain distribution indicator:

- Decrease in terrain distribution (surficial geology and topography) from site clearing and preparation
- Decrease in terrain distribution (topography and surficial geology) from blasting

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Net effects were predicted for the soil quality indicator:

- Decrease in soil quality from compaction, rutting, and admixing
- Decrease in soil quality from blasting residues
- Decrease in soil quality from dust and air emissions

Net effects were predicted for the soil distribution indicator:

- Decrease in soil distribution from changes to hydrology
- Decrease in soil distribution from blasting

The magnitude of all the net effects was determined to be negligible. The geographic extent of the net effects ranges from the Project footprint to local. The duration/irreversibility of the net effects ranges from short-term/reversible to permanent/irreversible.

The predicted net effects on terrain and soils are not anticipated to result in a change to ecosystem diversity, and the soil productivity and abundance to maintain agriculture and forest capability that will alter the sustainability of the criteria beyond a manageable level. The permanent loss of terrain and soil resources is less than 1 percent of the Project study areas, therefore, the predicted net effects on terrain and soil are assessed as not significant.

Cumulative Effects Assessment

Geology, terrain and soils was not carried forward for assessment of cumulative effects because the net effects were considered not likely to additively or synergistically contribute to measurable effects from other past, present, or reasonably foreseeable developments to terrain and soils criteria based on the level of change from the Project compared to baseline conditions.

Surface Water

Baseline Conditions

The Project study areas are located in the Northwestern and Northeastern Lake Superior secondary watersheds and are composed of the following seven tertiary watersheds: 2AC-Black Sturgeon, 2AD-Nipigon, 2AE-Jackpine, 2BA-Little Pic, 2BB-Pic, 2BC-White, and 2BD-Michipicoten-Magpie. The surficial geology of the watersheds is dominated by bedrock with instances of glaciolacustrine deposits, glaciofluvial deposits, and till, while land cover in the catchments is characterized by mostly forest and moderate relief (ranging on average from 200 to 250 metres).

The Project crosses 101 river systems that drain generally southwards and discharge directly into Lake Superior. These water bodies range from first- to eighth-order streams, with catchment areas of approximately 0.31 to 25,000 square kilometres. Surface water flows and water levels at the river systems crossed by the Project are largely controlled by snowmelt- and rainfall-generated runoff patterns. The spring and fall hydrographs are typically characterized by high flows in response to the annual snowmelt event in April–May and fall rains in October–November, while hydrographs during the summer and winter months are marked by mostly low to moderate flows (due to comparatively dry or frozen conditions). Mean annual surface water yields were shown to vary from 263 to 517 millimetres based on data from the Ontario Flow Assessment Tool Version 3 and Water Survey of Canada. These surface water yields generally increased from west to east, corresponding to increasing precipitation.

A total of 31 Permits To Take Water are active within and in close proximity to the Project study areas. The majority of these are related to construction. Sixteen (16) hydropower generating stations are located near the Project.

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Based on available data from the Ministry of the Environment and Climate Change and the Lakehead Region Conservation Authority, surface water quality in the Project study areas generally meets relevant guideline values, except in a number of cases for some metals (i.e., aluminium, cadmium, and iron), phosphorus, Total Suspended Solids, and turbidity. Observed Total Suspended Solids varied on average from 1.3 to 25.5 milligrams/Litre, while turbidity ranged from 1.2 to 17.0 Nephelometric Turbidity Units.

Net Effects

The criterion identified for surface water is surface water. The indicators identified for surface water are surface water quantity and surface water quality.

Surface Water

Net effects were predicted for the surface water quantity indicator:

- Reduction to streamflows and/or water levels at water bodies from short-term water takings (direct or indirect)
- Increase in streamflow and/or water levels at receiving water bodies from short term discharges of construction water, wastewater or wash
- Increase in runoff rates and runoff volumes, and, in turn, increase in streamflows, water levels, and erosion-sedimentation processes at receiving water bodies due to changes to land cover
- Increase or reduction in streamflows, water levels and erosion-sedimentation processes during installation and removal of water body crossing structures and associated short-term water diversions
- Change to channel hydraulics at water body crossings with the potential for localized increases or reductions to flow velocities, shear stresses, water levels, and erosion sedimentation processes at locations upstream and downstream of the crossing

Net effects were predicted for the surface water quality indicator:

- Increase to the concentrations of suspended solids and chemical constituents in receiving water bodies from short-term discharges of construction water, wastewater or wash water
- Increase to the concentrations of suspended solids in receiving water bodies due to increased rates of erosion, transport and delivery of organic debris and sediments from disturbed and exposed areas
- Increased opportunities for sediment erosion and transport in receiving water bodies (with associated increases to the concentrations of suspended solids) due to changes to land cover
- Increase to the concentrations of suspended solids and chemical constituents in water bodies during installation and removal of water body crossing structures and associated short-term water diversions
- Change to channel hydraulics at water body crossing with the potential for increases or reductions to the concentrations of suspended solids at locations downstream of the crossing (due to the corresponding changes to erosion-sedimentation processes in the vicinity of the crossing)

All of the predicted net effects on surface water were identified as negligible in magnitude (a small change that is expected to be within the range of baseline conditions or guideline values, or, more generally, within the range of natural variability) and local in spatial extent (confined to the Project footprint or extending into the local study area). In addition, the majority of the predicted net effects were shown to include a short-term duration (limited to the duration of the construction activities). Any of the net effects that were predicted to have a long-term duration (the effect occurs during construction and/or operation and persists into operation) are anticipated to be reversible. Based on the above, the predicted net effects on surface water were assessed as not significant.

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Cumulative Effects Assessment

Surface water was not carried forward for assessment of cumulative effects because the net effects were predicted to be not likely to occur (likelihood of occurrence was assessed as unlikely or possible) or the net effects were considered not likely to additively or synergistically contribute to measurable effects from other past, present, or reasonably foreseeable developments to terrain and soils criteria based on the level of change from the Project compared to baseline conditions.

Groundwater

Baseline Conditions

Regionally, groundwater flow is generally southward from the higher elevation areas north of the Project study areas toward Lake Superior. Local groundwater flow likely parallels surface topography, particularly adjacent to major river valleys such as the Nipigon River. Recharge of the shallow overburden and bedrock aquifers in the Project study areas is likely from precipitation and surface streams or rivers in areas where coarse sand and gravel is exposed at surface. Recharge would also occur through areas of fractured and jointed exposed bedrock.

A review of the Ministry of the Environment and Climate Change water well record database revealed 199 wells, drilled between 1954 and 2017, located in the Project study areas. A review of the Permit To Take Water database identified eight active permits in the Project study areas. Four of the Permits To Take Water are identified as groundwater takings.

The majority of the Project study areas is not serviced by municipal water supply. It is anticipated that many residences and businesses in the Project study areas depend on groundwater for domestic purposes, such as drinking water supply.

The western portion of the Project (approximately 35 kilometres) is located in the Lakehead Source Protection Area. Private groundwater wells are the sole source of residential water supplies for most residents in the Lakehead Source Protection Area, beyond the areas serviced by municipal drinking water systems. The Project study areas are in Groundwater Protection Zone II and Groundwater Protection Zone III designated by the Town of Marathon. The Town of Marathon currently uses five municipal wells located south of the Project study area.

The Ministry of the Environment and Climate Change conducted a study of regional groundwater quality. This study included the western end of the Project study area. Groundwater quality samples in the study often exceed Ontario Drinking Water Standards for mineral content due to the nature of the geology and the concentrations of naturally occurring minerals. This groundwater quality is considered typical for the geology of the area.

A query of the Ministry of the Environment and Climate Change water well database revealed that of the 199 wells identified in the Project study areas, 116 wells (58 percent) listed the water quality as fresh, and 1 well (0.5 percent) listed the water quality as mineral. The remaining 82 wells in the Ministry of the Environment and Climate Change water well database in the Project study areas were listed as either untested or no data were provided.

Net Effects

The criterion identified for groundwater is groundwater. The indicators identified for groundwater are groundwater quantity and groundwater quality.

Groundwater

Net effects were predicted for the groundwater quantity indicator:

- Lowering of groundwater levels from dewatering of foundation excavations
- Increased groundwater levels due to vegetation clearing

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- Reduced groundwater recharge from hardening of surfaces
- Lowering of groundwater levels from blasting
- Lowering of groundwater levels from operation of construction camp water supply wells
- Reduced groundwater quality from foundation pouring
- Reduced groundwater quality from blasting
- Reduced groundwater quality from herbicide leaching into soil

No net effects were predicted for the groundwater quality indicator.

The magnitude of the predicted net effects on groundwater was assessed as negligible (small change that is expected to be within the range of baseline or guideline values, or within the range of natural variability) for all net effects except for reduced groundwater quantity and groundwater quality from blasting. The net effects were assessed as direct, and local (confined to the groundwater local study area). Except for the net effect of reduced groundwater quantity from blasting, the net effects were assessed as medium-term and reversible. The net effect for reduced groundwater quantity from blasting was considered to be permanent and irreversible.

The predicted net effects on groundwater (when considering groundwater quantity and quality together) are reversible and therefore do not result in permanent changes the groundwater resource. Therefore, the predicted net effects on groundwater are assessed as not significant.

Cumulative Effects Assessment

Groundwater

A net cumulative effect was predicted for the groundwater quantity indicator:

- Blasting may increase the permeability of the rock near the blast holes which could lower the groundwater levels

The contribution of the Project and other reasonably foreseeable developments to cumulative effects on groundwater quantity in the 50 metres from the Project footprint was assessed as not having an effect on the overall functionality of groundwater resources as they currently exist. The magnitude of the cumulative effect was assessed as moderate. The groundwater level change was expected to be beyond the baseline values but once the other projects cease operation the water levels will return to baseline. The extent of this effect was considered to be local. The water table over the long-term is anticipated to return to baseline conditions and therefore the cumulative effect was considered reversible. The lowering of the water table is expected to be continuous but the likelihood of this cumulative effect due to the scale of the water lowering of the reasonably foreseeable developments are large compared to the Project effects therefore very unlikely for this cumulative effect to occur. Considering these factors, the cumulative effect of groundwater lowering is considered to be not significant.

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Air Quality

Baseline Conditions

Sources of emissions in the Project study areas include vehicles on roadways, long-range transboundary air pollution such as industrial sources in the United States, and small regional sources such as local industry. Monitoring data indicate that background air quality surrounding the Project is below the relevant provincial and federal ambient air quality guidelines, criteria, and standards for all indicator compounds.

Net Effects

The criterion identified for air quality is air quality. The indicators identified for air quality are: predicted ambient concentrations of suspended particulate matter; predicted ambient concentrations of particulate matter; predicted ambient concentrations of carbon monoxide; predicted ambient concentrations of nitrogen dioxide; and predicted ambient concentrations of sulphur dioxide.

Air Quality

The same net effect was predicted for all of the air quality indicators:

- Change to ambient concentrations from CAC and fugitive dust emissions

The magnitude of the effect at receptors located greater than a 100-m distance from the right-of-way was assessed as moderate to low. The net effect at all locations was assessed as direct, and local. The net effect was anticipated to be reversible over the short-term.

The predicted net effect on air quality is not anticipated to result in a concentration of the indicator compound above levels considered to be representative of good air quality. Therefore, the predicted net effect on air quality was assessed as not significant.

Cumulative Effects Assessment

The magnitude of the net effect for air quality was predicted to be moderate to high for receptors within 100 m of the Project footprint; however, the likelihood of occurrence of the effect was considered possible (the effect may occur but is not likely) based on mitigation and conservatism in the assessment. Net effects assessed as 'unlikely' and 'possible' are not considered to likely contribute to cumulative effects, and are not carried forward to the cumulative effects assessment. Considered with the limited geographic extent of the net effect, short duration, intermittent frequency and the evaluated likelihood of occurrence, this effect is not expected to have potential to act cumulatively. Therefore, a cumulative effects assessment was not completed for this net effect.

Greenhouse Gases

Baseline Conditions

The primary sources of greenhouse gas emissions in Canada and Ontario are from anthropogenic sources that include the transportation sector and large industrial activities. In 2014, 732 megatons of carbon-dioxide equivalent emissions were reported nationally. Ontario was accountable for 23 percent of these emissions.

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Net Effects

The criterion identified for greenhouse gases is greenhouse gases. The indicators identified for greenhouse gases are: predicted ambient concentrations of carbon dioxide; predicted ambient concentrations of methane; and predicted ambient concentrations of nitrous oxide.

Greenhouse Gases

The same net effect was predicted for all of the greenhouse gas indicators:

- Increase in federal and provincial annual greenhouse gas emissions

The magnitude of the predicted net effect on greenhouse gas emissions was assessed as negligible (<0.1 percent of the provincial emission levels), direct, and beyond regional. The net effect is anticipated to be irreversible when the atmospheric lifetime of greenhouse gases are considered. The project greenhouse gas emissions are not anticipated to result in a meaningful change to the provincial and federal emission inventory totals. Therefore, the predicted net effects on greenhouse gas emissions was assessed as not significant.

Cumulative Effects Assessment

The magnitude of the net effect was predicted to be negligible and this net effect was not considered likely to additively or synergistically contribute to measurable effects from other past, present, or reasonably foreseeable developments to the greenhouse gases criteria based on the level of change from the Project compared to baseline conditions. Therefore, a cumulative effects assessment was not completed for this negligible net effect.

Acoustic Environment

Baseline Conditions

Baseline sound levels in the Project study areas are expected to be dominated by anthropogenic activities and sounds of nature. Baseline noise levels at potential points of reception are expected to be approximately 45 A-weighted decibels during the daytime period (07:00 to 19:00) and one-hour equivalent noise level and 40 A-weighted decibels during the evening/nighttime periods (19:00 to 07:00) and one-hour equivalent noise level. These levels are in accordance with the Ministry of the Environment and Climate Change Noise Pollution Control Guideline 300.

Net Effects

The criterion identified for acoustic environment is noise. The indicators identified for the acoustic environment are Project construction-related change in daytime equivalent noise level and Project operation-related one-hour equivalent noise level.

Noise

A net effect was predicted for the Project construction-related change in daytime equivalent noise level indicator:

- Noise emissions from construction activities could increase existing noise levels at potential point of receptors that results in a change that is greater than 3 decibels

No net effects were predicted for the Project operation-related one-hour equivalent noise level indicator.

The net effect on the acoustic environment is not anticipated to result in a disturbing change in the daytime equivalent noise level during construction activities. This effects is short-term, reversible and local in geographic extent. Therefore, the predicted net effect on noise is not significant.

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Cumulative Effects Assessment

The net effect was assessed as possible. Considered with the limited geographic extent of potential effects, short duration, intermittent frequency, this net effect (noise emissions from construction activities could increase existing noise levels at potential points of reception that results in a change that is greater than 3 decibels is not expected to have potential to act cumulatively. Therefore, a cumulative effects assessment was not completed for this effect.

Biological Environment

Vegetation and Wetlands

Baseline Conditions

The majority of the landscape across the Project study areas is composed of coniferous, hardwood, and mixed-wood forests, and smaller amounts of scattered grass and meadows, rock outcrops, talus slopes, prairies/savannahs, and alder and brush shrublands. The age of forests across the Project study areas is variable. The most commonly found age is the mature (81 to 110 years) seral stage. Rare vegetation communities are scattered across the Project study areas.

Available information indicates that upland, wetland, and riparian ecosystem composition has likely been altered by historical disturbances and developments in the Project study areas since the late 1800s due to forest harvesting, roads, rail, mining, and recreational activities.

Most uplands are expected to have the capacity to adapt and be resilient to existing natural and human-related disturbances and associated variations in availability and distribution. However, some specific upland ecosites such as Red Pine (C12), Talus or Steep Slope (NW05), and Prairie/Savannah (NW10) are uncommon on the landscape and would likely be less resilient to negative changes in availability. Anthropogenic disturbances may have affected upland composition through adjacency or edge effects. Insects and diseases, including spruce budworm, have reduced the volume of timber, creating stands that are not suitable for harvest.

Wetlands are abundant across the vegetation and wetland study area. Most wetlands are expected to have the capacity to adapt and be resilient to existing natural and human-related disturbances and associated variations in availability and distribution. However, some specific wetland ecosites (i.e., NW43, NW47, and NW50) and PW types (i.e., bogs) are uncommon on the landscape and would be likely less resilient to negative changes in availability. Resilience in wetlands is also a function of soil type, as mineral-based wetlands can be reclaimed and contribute to reversing adverse effects, while there is less confidence in reclaiming peat-bog type wetlands when soils have been disturbed. Two rare plant species tracked by the Natural Heritage Information Centre were documented within wetland ecosystems during 2016 baseline surveys: floating marsh marigold, a provincially imperilled (S2) species, and eastern few-fruited sedge, a provincially vulnerable (S3) species. Wetland ecosystems can be particularly sensitive to invasive species, and changes in species composition can affect local wetland structure and function. One noxious weed species, bull thistle, was identified during 2014 baseline surveys in the Meadow Marsh: Organic-Mineral Soil (NW46) ecosite. It is predicted that wetland ecosystem function is maintained in the Project study areas and wetland composition at the Base Case is within the resilience and adaptability limits of this criterion.

Riparian ecosystems are distributed throughout the Project study areas and are associated with streams, rivers, and lakeshores. There have been historical losses to riparian areas; however, changes to ecosystem availability appear to be within the resilience and adaptability limits of this criterion. An extensive network of streams, rivers, and wetlands is surrounded by riparian vegetation in the Project study areas. Riparian ecosystems remain well distributed and connected over the Project study areas. Therefore, changes to riparian habitat distribution are predicted to be within the resilience and adaptability limits of this criterion. The riparian habitats in the Project study areas have maintained overall function in terms of ability to support the variety of wildlife that use them for foraging,

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nesting, and dispersal. Therefore, changes to the condition of riparian habitat are predicted to be within the resilience and adaptability limits of this criterion.

Net Effects

The criteria identified for vegetation and wetlands are: upland ecosystems; wetland ecosystems; and riparian ecosystems. The indicators identified for vegetation and wetlands are ecosystem availability and distribution and ecosystem composition.

Upland Ecosystems

Net effects were predicted for the upland ecosystems availability and distribution indicator:

- Loss or alteration of ecosystem availability and distribution
- Decrease in soil quality and quantity and revegetation success reduces ecosystem availability and distribution
- Alterations to hydrology decrease ecosystem availability and distribution
- Herbicide application on soils reduce ecosystem availability and distribution
- Dust and air emissions reduce ecosystem availability and distribution
- Introduction and spread of noxious and invasive plant species reduce ecosystem availability and distribution

Net effects are predicted for the uplands ecosystems composition indicator:

- Loss or alteration of ecosystem composition
- Decrease in soil quality and quantity and revegetation success reduces ecosystem composition
- Alterations to hydrology decrease ecosystem composition
- Herbicide application on soils reduce ecosystem composition
- Dust and air emissions reduce ecosystem composition
- Introduction and spread of noxious and invasive plant species reduce ecosystem composition

For the vegetation and wetlands criteria, magnitude was defined as the intensity of the effect or a measure of the degree of change from existing (baseline) conditions expected to occur in the criterion. For the loss or alteration of ecosystem availability and distribution predicted net effect, there was a predicted loss of approximately 2,486 hectares (1.8 percent of the local study area at baseline) and no predicted loss to uncommon ecosites C12, NW05, NW10, NW24 and NW30. Predicted loss to upland ecosystems is primarily associated with the preferred route right-of-way and new permanent access roads creating a more fragmented distribution of upland ecosystems. However, upland ecosystems remain well connected in areas surrounding the Project. For the loss or alteration of ecosystem composition predicted net effect, the edge effects and potential introduction of invasive species may alter upland species abundance and richness. The magnitude of all other predicted net effects for upland ecosystems were determined to be negligible. The geographic extent of the net effects ranged from the Project footprint to local. The duration of the net effects ranged from short-term and reversible to permanent and irreversible.

The incremental contribution of the Project to combined effects from previous and existing development on upland ecosystems in the Project study areas is not expected to change the self-sustaining and ecologically effective status of upland ecosystems. Consequently, the predicted net effects on upland ecosystems are not significant.

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Wetland Ecosystems

Net effects were predicted for the wetland ecosystems availability and distribution indicator:

- Loss or alteration of ecosystem availability and distribution
- Decrease in soil quality and quantity and revegetation success reduces ecosystem availability and distribution
- Alterations to hydrology decrease ecosystem availability and distribution
- Herbicide application on soils reduce ecosystem availability and distribution
- Dust and air emissions reduce ecosystem availability and distribution
- Introduction and spread of noxious and invasive plant species reduce ecosystem availability and distribution

Net effects were predicted for the wetland ecosystems composition indicator:

- Loss or alteration of ecosystem composition
- Decrease in soil quality and quantity and revegetation success reduces ecosystem composition
- Alterations to hydrology decrease ecosystem composition
- Herbicide application on soils reduce ecosystem composition
- Dust and air emissions reduce ecosystem composition
- Introduction and spread of noxious and invasive plant species reduce ecosystem composition

For the loss or alteration of ecosystem availability and distribution predicted net effect, there was a predicted loss of approximately 279 hectares using Forest Resource Inventory data (1.9 percent of the local study area at baseline) and less than 1 hectare predicted loss to NW 47 (less than 0.1 of the local study area at baseline). Using Provincial Wetlands data, there was a predicted loss of approximately 201 hectares (1.8 percent of the local study area at baseline). Wetlands are disrupted by the preferred route right-of-way and access roads crossings, however, patches of wetlands remain connected in areas surrounding the Project footprint. There is a small disruption to the uncommon NW47 wetland. For the loss or alteration of ecosystem composition predicted net effect, small changes in water quality and flow and potential introduction of invasive species may alter wetland species abundance and richness. The magnitude of all other wetland ecosystem predicted net effects were determined to be negligible.

The geographic extent of the net effects ranges from the Project footprint to local. The duration of the net effects ranges from short-term and reversible to permanent and irreversible.

The incremental contribution of the Project to effects from previous and existing developments in the Project study areas is not expected to change the self-sustaining and ecologically effective status of wetland ecosystems. Consequently, the combined predicted net effects on wetland ecosystems are not significant.

Riparian Ecosystems

Net effects were predicted for the riparian ecosystems availability and distribution indicator:

- Loss or alteration of ecosystem availability and distribution
- Decrease in soil quality and quantity and revegetation success reduces ecosystem availability and distribution
- Alterations to hydrology decrease ecosystem availability and distribution

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- Herbicide application on soils reduce ecosystem availability and distribution
- Dust and air emissions reduce ecosystem availability and distribution
- Introduction and spread of noxious and invasive plant species reduce ecosystem availability and distribution

Net effects were predicted for the riparian ecosystems composition indicator:

- Loss or alteration of ecosystem composition
- Decrease in soil quality and quantity and revegetation success reduces ecosystem composition
- Alterations to hydrology decrease ecosystem composition
- Herbicide application on soils reduce ecosystem composition
- Dust and air emissions reduce ecosystem composition
- Introduction and spread of noxious and invasive plant species reduce ecosystem composition

For the loss or alteration of ecosystem availability and distribution predicted net effect, there was a predicted loss of approximately 2,486 hectares (1.8 percent of the local study area at baseline) and no predicted loss to uncommon ecosites C12, NW05, NW10, NW24 and NW30. Predicted loss to upland ecosystems is primarily associated with the preferred route right-of-way and new permanent access roads creating a more fragmented distribution of upland ecosystems. However, upland ecosystems remain well connected in areas surrounding the Project. For the loss or alteration of ecosystem composition predicted net effect, small changes in water quality and flow and potential introduction of invasive species may alter wetland species abundance and richness. The magnitude of all other predicted net effects for riparian ecosystems were determined to be negligible.

The geographic extent of the net effects ranges from the Project footprint to local. The duration of the net effects ranges from short-term and reversible to permanent and irreversible.

The Project is not predicted to change the self-sustaining and ecologically effective status of riparian ecosystems identified at baseline. Consequently, incremental and combined net effects from the Project and past and present developments on riparian habitat are not significant.

Cumulative Effects Assessment

Upland Ecosystems

A cumulative effect was predicted for the upland ecosystems availability and distribution indicator:

- Cumulative loss or alteration of ecosystem availability and distribution

A cumulative effect was predicted for the upland ecosystems composition indicator:

- Cumulative loss or alteration of ecosystem composition

In the cumulative effects assessment, the Project and other reasonably foreseeable developments would contribute to negative changes in upland ecosystem availability, distribution, and condition; however, these changes were predicted to be within the resilience limits and adaptive capacity of upland ecosystems. Relative to baseline conditions, most upland ecosystems remain abundant, intact and well distributed across the vegetation and wetlands regional study area with consideration of cumulative effects. The contribution of the Project and other reasonably foreseeable developments to cumulative effects on upland ecosystems in the vegetation and wetlands regional study area is not expected to change the self-sustaining and ecologically effective status of this criterion. Consequently, cumulative effects on upland ecosystems were predicted to be not significant

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Wetland Ecosystems

A cumulative effect was predicted for the wetland ecosystems availability and distribution indicator:

- Cumulative loss or alteration of ecosystem availability and distribution

A cumulative effect is predicted for the wetland ecosystems composition indicator:

- Cumulative loss or alteration of ecosystem composition

The combined evidence regarding wetland ecosystem availability, distribution, and condition in the vegetation and wetlands regional study area indicates that this ecosystem is predicted to continue to be self-sustaining and ecologically effective with consideration of cumulative effects. Consequently, cumulative effects on wetland ecosystem were predicted to be not significant.

Riparian Ecosystems

A cumulative effect was predicted for the riparian ecosystems availability and distribution indicator:

- Cumulative loss or alteration of ecosystem availability and distribution

A cumulative effect was predicted for the riparian ecosystems composition indicator:

- Cumulative loss or alteration of ecosystem composition

Overall, changes in riparian ecosystems indicators from the cumulative effects of reasonably foreseeable development are not predicted to exceed the limits of resilience and adaptability of riparian ecosystems in the vegetation and wetlands regional study area. Relative to baseline conditions, riparian ecosystems remain abundant, intact, and well distributed across the Project study areas with consideration of cumulative effects. The Forest Resource Inventory indicates about 96.2 percent of riparian ecosystems in the vegetation and wetlands regional study area remains naturally vegetated after consideration of cumulative effects, which is within the resource management criterion of a minimum 75 percent naturally vegetated stream length recommended by Environment Canada (2013) to prevent degradation of these ecosystems. The weight of evidence indicates that cumulative effects from the Project, and past, present, and reasonable foreseeable developments on riparian ecosystems in the vegetation and wetlands regional study area were predicted to be not significant.

Fish and Fish Habitat

Baseline Conditions

The majority of the water bodies in the Project study areas have potential fish habitat, and as a result, may support a variety of fish species. Lake Superior supports approximately 93 fish species, including the four criteria species (Brook Trout, Northern Pike, Walleye, and Lake Sturgeon). The fish community is diverse, consisting of many species important for commercial, recreational, and Aboriginal fishing, and also includes forage fish, sport fish, and species of conservation concern. The water bodies in the Project study areas are known to be productive from a fisheries perspective, and it is likely that fish are present in the majority of the water bodies. Brook Trout are documented throughout the Project study areas, while Northern Pike and Walleye are more common in the eastern portion of the Project study areas. Lake Sturgeon are less common in the Project study areas due to their habitat requirements for lakes or larger watercourses. Spawning habitat is prevalent for Brook Trout and Northern Pike. The lakes in the Project study areas may provide spawning habitat for Walleye. Spawning habitat for Lake Sturgeon in the Project study areas is limited, as these fish typically spawn in larger water bodies in relatively shallow, fast-flowing water (usually below waterfalls, rapids, or dams) with gravel and boulders at the bottom, or on shoals in large rivers with strong currents.

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The aquatic ecosystems in the fish and fish habitat contain lower trophic organisms (i.e., bacteria, fungi, benthic invertebrates, phytoplankton, zooplankton), aquatic plants, and fish. Lower trophic organisms are plentiful in the Project study areas and are often the primary food source for fish communities.

Eight federally and/or provincially protected species of conservation concern were identified to have potential to occur in the Project study areas. Lake Sturgeon, Northern Brook Lamprey, Silver Lamprey, American Eel, and Shortjaw Cisco have reasonable potential to occur in the water bodies in the Project study areas based on known habitat requirements and geographic distributions.

Net Effects

The criteria identified for fish and fish habitat are: Brook Trout; Northern Pike; Walleye; Lake Sturgeon; and aquatic ecosystems. The indicators identified for fish and fish habitat are habitat availability, abundance and distribution and community composition.

Brook Trout, Northern Pike, Walleye

Net effects were predicted for the habitat availability indicator:

- Alteration to habitat availability from physical alteration of water bodies
- Alteration to habitat availability from changes in riparian vegetation
- Alteration to habitat availability from change to hydrology or groundwater
- Alteration to habitat availability from the release of sediment into a water body
- Alteration to habitat availability from placement of crossing structures affecting channel morphology

Net effects were predicted for the abundance and distribution indicator:

- Alteration of abundance or distribution from changes to habitat availability
- Alteration to abundance and distribution of fish from placement of crossing structures affecting access to habitat
- Alteration to fish abundance from changes to public access to recreational angling areas

The magnitude of net effects ranges from negligible to low. The geographic extent of the net effects ranges from the Project footprint to regional. The duration of the net effects ranges from short-term and reversible to permanent and irreversible.

The predicted combined net effects on Brook Trout, Northern Pike, and Walleye are not anticipated to result in permanent adverse changes to survival or reproduction at a population level such that self-sustaining and ecologically effective populations cannot be maintained. Any changes to the availability of habitat are anticipated to be relatively minor at the watershed-scale across the regional study area. The net effects on Brook Trout, Northern Pike, and Walleye were assessed as not significant.

Lake Sturgeon

Net effects were predicted for the habitat availability indicator:

- Alteration to habitat availability from the release of sediment into a water body
- Alteration to habitat availability from placement of crossing structures affecting channel morphology

Net effects were predicted for the abundance and distribution indicator:

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- Alteration of abundance or distribution from changes to habitat availability

The magnitude of net effects are negligible. The geographic extent of the net effects is local. The duration of the net effects ranges from short-term and reversible to permanent and irreversible.

The predicted combined net effects on Lake Sturgeon are not anticipated to result in permanent adverse changes to survival or reproduction at a population level such that self-sustaining and ecologically effective populations cannot be maintained. Any changes to the availability of habitat are anticipated to be relatively minor at the watershed-scale across the Project study areas. The net effects on Lake Sturgeon were assessed as not significant.

Aquatic Ecosystems

Net effects were predicted for the habitat availability indicator:

- Alteration to habitat availability from physical alteration of water bodies
- Alteration to habitat availability from changes in riparian vegetation
- Alteration to habitat availability from change to hydrology or groundwater
- Alteration to habitat availability from the release of sediment into a water body
- Alteration to habitat availability from placement of crossing structures affecting channel morphology
- Alteration of abundance or distribution from changes to habitat availability

A net effects was predicted for the community composition indicator:

- Alteration to aquatic ecosystem community composition from changes to habitat availability

No net effects were predicted for the abundance and distribution indicator.

The magnitude of net effects was negligible. The geographic extent of the net effects ranged from the Project footprint to local. The duration of the net effects ranges from short-term and reversible to permanent and irreversible.

The predicted combined net effects on aquatic ecosystems are not anticipated to result in permanent adverse changes to survival or reproduction at a population level such that self-sustaining and ecologically effective populations cannot be maintained. Any changes to the availability of habitat are anticipated to be relatively minor at the watershed-scale across the Project study areas. The net effects on aquatic ecosystems were assessed as not significant.

Cumulative Effects Assessment

Brook Trout, Northern Pike, Walleye

Cumulative effects were predicted for the habitat availability indicator:

- Alteration to habitat availability from physical alteration of water bodies
- Alteration to habitat availability from changes in riparian vegetation (criteria: Brook Trout)

A cumulative effect was predicted for the abundance and distribution indicator for two criteria (i.e. Brook Trout and Walleye):

- Alteration to fish abundance and distribution from changes to public access to recreational angling areas

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The magnitude of the predicted cumulative effects on fish and fish habitat are generally negligible; however, the magnitude was considered to be negligible to low for Brook Trout and Walleye for the cumulative effect of alteration to fish abundance from changes to public access to recreational angling areas. The geographic extent of cumulative effects were assessed as regional, and the likelihood of occurrence of cumulative effects as possible.

The predicted cumulative effects on Brook Trout, Northern Pike, and Walleye are not anticipated to result in permanent adverse changes to survival or reproduction at a population level such that self-sustaining and ecologically effective populations of criteria fish species cannot be maintained. Any changes to the availability of habitat from the Project and other reasonably foreseeable developments will be relatively minor across the regional study area.

The cumulative effects are expected to be temporary and well within the predicted resilience limits and adaptive capacity of the criteria species, and populations would remain self-sustaining and ecologically effective. The cumulative effects on Brook Trout, Northern Pike, and Walleye were assessed as not significant

Lake Sturgeon

Net effects from the Project on Lake Sturgeon were determined to have negligible magnitude with an unlikely or possible likelihood of occurrence. This criteria was not considered to have been significantly affected by previous and existing developments at baseline conditions and is not expected to have potential to act cumulatively. Therefore, a cumulative effects assessment was not completed for these effects.

Aquatic Ecosystems

Net effects from the Project on aquatic ecosystems were determined to have negligible magnitude with an unlikely or possible likelihood of occurrence. This criteria was not considered to have been significantly affected by previous and existing developments at baseline conditions and is not expected to have potential to act cumulatively. Therefore, a cumulative effects assessment was not completed for these effects.

Wildlife and Wildlife Habitat

Baseline Conditions

Woodland Caribou

Current availability of habitat likely represents a decline in suitable habitat relative to what was historically available for this species, as development activities have influenced the amount and quality of habitat since the late 1800s. Effects from declining habitat availability and increasing disturbance at baseline characterization (31.2 percent disturbed) are likely approaching the resilience limits and adaptive capacity of the Lake Superior Coast Range population. At baseline characterization, the Lake Superior Coast Range caribou population is at low abundance and unstable. Most of the available habitat for survival and reproduction (Category 1 habitat) is limited to the Slate Islands, Pic Island, and Michipicoten Island. Overall, the lines of evidence indicate that effects from changes in survival and reproduction in the baseline characterization have likely exceeded the limits of resilience and adaptive capacity of the Lake Superior Coast Range population.

Moose

There is a large amount of moderate and high suitability moose habitat in the Project study areas at baseline characterization. Moose are highly mobile, have large home ranges, can use many different habitat types, and can access suitable habitat and food resources even in highly fragmented landscapes. Moose are long-lived ungulates with relatively high adult survival rates. Moose densities in Wildlife Management Units overlapping the Project study areas, except for Wildlife Management Units 13 and 35, are within or above the Ministry of Natural Resources and Forestry's desired ecological density range. Moose display life history traits (e.g., large home ranges, high reproductive rates, ability to eat many types of plants) that provide flexibility to adapt to changes from

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human development. Therefore, it is expected that changes in survival and reproduction in the baseline characterization are within the resilience and adaptability limits for this criterion.

American Marten

American marten are strongly associated with coniferous forests with high structural complexity, but may also use second growth forests and cutblocks that provide adequate structural complexity across their range. There is a large amount of moderate and high suitability marten habitat in the Project study areas at baseline characterization, and marten are highly mobile, have large home ranges, and can use many different habitat types. Available evidence indicates marten habitat is well connected in the Project study areas in the baseline characterization, despite increased habitat fragmentation from anthropogenic disturbances compared to historical conditions. Habitat connectivity is not a limiting factor for this species given its ability to disperse long distances across various habitat types, and combined changes from natural and human-related disturbance in the baseline characterization are expected to be within the resilience and adaptability limits of this species. American marten are common and widespread throughout central and northern Ontario. Marten are capable of rapid population growth and are relatively resilient to harvesting pressure given suitable habitat conditions and their strong dispersal capabilities. Mortality levels in the baseline characterization are expected to be within the resilience and adaptability limits of this species.

Little Brown and Northern Myotis

Five active and 24 candidate hibernacula are present in the wildlife and wildlife habitat local study area and an additional seven active and two candidate hibernacula are present in the myotis regional study area at baseline characterization. An additional 247 hectares (less than 1 percent) of the wildlife and wildlife habitat local study area has been identified as cliffs, rock barrens or talus slopes that may provide minor hibernacula for little brown myotis and northern myotis in the baseline characterization. A total of approximately 54,891 ha (29.6 percent) of suitable maternity roosting habitat is estimated to be present in the wildlife and wildlife habitat local study area at baseline characterization. In the myotis regional study area, an estimated 214,573 ha (30.9 percent) of suitable maternity roosting habitat is available at baseline characterization. While conversion of forests to agriculture and other land uses has likely reduced maternity roosting habitat availability in the myotis regional study area, most of the myotis regional study area remains forested in the baseline characterization.

Little brown myotis are not habitat specialists and have been documented in a wide variety of coniferous and deciduous forest types. By contrast, northern myotis is more of a forest specialist because it prefers intact forest for roosting and foraging, and is less likely to roost in man-made structures. Winter hibernacula are likely more limiting than summer maternity roosting habitat because specific physiological requirements limit the number of sites that provide suitable overwintering habitat. Nevertheless, habitat is not a limiting factor in the baseline characterization and the little brown myotis is inherently resilient to habitat changes because it is highly mobile and well adapted to human disturbance, using human structures for both hibernation and summer maternity roosting. Northern myotis is less resilient to habitat changes due to its reliance on intact forest.

Overall, the changes to the amount of suitable habitat available in the baseline characterization have not exceeded the adaptability or resilience limits of little brown myotis and northern myotis populations that overlap with the myotis regional study area because maternity roosting habitat remains abundant, and winter habitat has not likely decreased relative to what was historically available in the myotis regional study area (i.e., pre-mining disturbance). The habitat mapping results and an understanding of these species' biology indicate a clustered distribution of hibernacula in the wildlife and wildlife habitat local study area and myotis regional study area and a broader distribution of maternity roosting habitat in the study areas. Existing disturbances in the study areas do not function as dispersal barriers for these species in the baseline characterization because bats are highly mobile. Therefore, changes to habitat distribution in the baseline characterization are predicted to be well within the resilience or adaptability limits of little brown myotis and northern myotis.

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Bald Eagle

Bald eagle typically nest in areas of low human disturbance; however, they exhibit some flexibility in their selection of breeding habitat and there is increasing evidence of their tolerance to habitat disturbance by humans. The provincial management plan for bald eagle predicted that approximately 76 percent of the Lake Superior shoreline has potential to provide bald eagle nesting habitat. Available evidence does not suggest that habitat availability is a limiting factor for this species in the Project study areas at baseline characterization.

Suitable breeding habitat for bald eagle was mapped along the cliffs and shoreline of Nipigon Bay, between Jackfish Channel and the Town of Marathon and near Obatanga Provincial Park. Forests have become more fragmented in recent years due to policies that favour creating several smaller clear-cut areas that are scattered throughout the forest; however, bald eagle are likely not negatively influenced by this fragmentation because they are highly mobile and forest tract size may be unimportant if the tract is isolated from human development. Existing disturbances in the Project study areas likely do not function as dispersal barriers for this species in the baseline characterization.

Bald eagle can be sensitive to changes in survival and reproduction because they are long-lived top predators with low reproductive rates. Bald eagle populations that overlap with the Project study areas are likely smaller relative to those historically present, but Ontario populations are experiencing positive growth rates, based on the population status, trends, and abundance estimates derived for the Project study areas. Therefore, changes to survival and reproduction are expected to be within the resilience or adaptability limits of this criterion at baseline characterization.

Bobolink

Habitat availability is low in the Project study areas at baseline characterization and is considered a limiting factor for this species. However, bobolink have adapted well to anthropogenic habitats (pastures, hayfields) and as a result are likely more abundant in the Project study areas than they were historically before European settlement. Existing disturbances in the Project study areas do not likely function as dispersal barriers for this highly mobile species in the baseline characterization, and some agricultural disturbances have resulted in positive changes to habitat distribution. Bobolink populations that may overlap with the Project study areas are likely larger than those historically present. Changes to survival and reproduction are considered to be within the resilience and adaptability limits of this species at baseline characterization.

Canada Warbler

It is currently unknown whether breeding habitat is limiting Canadian populations of Canada warbler. Habitat mapping suggests that breeding habitat is not a limiting factor for Canada warbler populations that overlap with the Project study areas at baseline characterization. Habitat fragmentation from mineral exploration and linear disturbances present in the Project study areas at baseline characterization may have negatively affected Canada warbler habitat distribution since this species is an interior forest species that avoids edge habitat. However, habitat does not appear to be a limiting factor for Canada warbler at baseline characterization, and this species is highly mobile and can establish territories in unoccupied areas. Overall, habitat is well distributed and connected in the Project study areas, and existing disturbance in the Project study areas does not likely function as dispersal barriers for this species in the baseline characterization. Canada warbler survival and reproduction in the baseline characterization are considered to be within the resilience and adaptability limits of this species.

Eastern Whip-poor-will

Suitable habitat for eastern whip-poor-will in the Project study areas is likely greater than what was historically available for this species because post-harvest areas of 0 to 15 years stand age can provide suitable habitat for whip-poor-will and forest management policies have favoured the development of smaller clear-cuts, which may increase eastern whip-poor-will habitat. Suitable habitat for eastern whip-poor-will occurs in numerous discrete

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patches throughout the Project study areas. Habitat distribution is patchy and not well connected in the Project study areas. The species is highly mobile and existing disturbances do not likely function as dispersal barriers in the baseline characterization. Eastern whip-poor-will were likely never abundant in the Project study areas due to a historical lack of naturally available suitable habitat. Changes to whip-poor-will survival and reproduction in the baseline characterization are considered to be within the resilience and adaptability limits of this species.

Olive-sided Flycatcher

Suitable breeding habitat estimated to be present in the Project study areas at baseline characterization likely represents a decline in suitable habitat relative to what was historically available for this species because the amount of old growth forest has decreased during the 20th century. Available evidence does not suggest that habitat availability is a limiting factor for this species in the Project study areas at baseline characterization. Suitable breeding habitat for olive-sided flycatcher is distributed throughout the Project study areas, with larger patches of contiguous habitat located near Black Sturgeon Provincial Park, the Steel River, and south of Obatanga Provincial Park between the Township of White River and the Municipality of Wawa. Suitable breeding habitat is abundant and well distributed and connected in the Project study areas at baseline characterization, and individuals can fly over and around disturbances. Existing disturbances in the Project study areas likely do not function as dispersal barriers for this species in the baseline characterization.

Net Effects

The criteria identified for wildlife and wildlife habitat are: woodland caribou; moose; American marten; little brown myotis and northern myotis; bald eagle; bobolink; Canada warbler; eastern whip-poor-will; and olive-sided flycatcher. The indicators identified for wildlife and wildlife habitat are habitat and survival and reproduction.

Woodland Caribou

Net effects were predicted for the habitat indicator:

- Reduced or degraded caribou habitat from loss or alteration of vegetation and topography
- Reduced or degraded caribou habitat from sensory disturbance
- Reduced or degraded caribou habitat from changes to hydrology
- Reduced or degraded caribou habitat from dust and air emissions
- Reduced or degraded caribou habitat from herbicide application

Net effects were predicted for the survival and reproduction indicator:

- Reduced caribou survival and/or reproduction from loss or alteration of vegetation and topography
- Reduced caribou survival and/or reproduction from sensory disturbance
- Reduced caribou survival and/or reproduction from use of linear corridors and converted habitat by prey and predators
- Reduced caribou survival and/or reproduction from collisions with Project vehicles
- Increase in public access could increase injury or mortality of caribou due to vehicle strikes

The net effects for woodland caribou were assessed as permanent/irreversible in duration and local to possibly regional geographic extent.

Magnitude was defined with a numeric quantification for the reduced or degraded caribou habitat from loss or alteration of vegetation and topography net effect:

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- Category 1 (nursery areas): 140 hectares nursery areas affected (0.7 percent of available in Lake Superior Coast Range), including 140 hectares that overlaps with winter use areas.
- Category 1 (winter use areas): 140 hectares winter use areas affected (0.7 percent of available in Lake Superior Coast Range), including 140 hectares that overlaps with nursery areas.
- Category 1 (travel corridors): 7 hectares in one delineated corridor within the Lake Superior Coast Range affected (less than 0.1 percent available in Lake Superior Coast Range). One movement corridor affected (Neys/Killala linkage) in the discontinuous range.
- Winter habitat: approximately 92 hectares (0.3 percent of available in Lake Superior Coast Range);
- Refuge habitat: approximately 215 hectares (0.2 percent of available in Lake Superior Coast Range);
- Category 3 (remaining areas in the range): approximately 284 hectares (0.1 percent of available in Lake Superior Coast Range) and 1,741 hectares (0.1 percent of available in discontinuous range);
- Disturbance: proportion of Lake Superior Coast Range disturbed increases from 31.2 percent to 31.3 percent. Proportion of discontinuous range remains at 65.8 percent.
- Increase in linear feature density from approximately 0.24 km/km² to approximately 0.28 km/km² in Lake Superior Coast Range and approximately 0.59 km/km² to approximately 0.60 km/km² in the discontinuous range
- Caribou habitat remains well-connected in high-use areas on islands; small reduction in movements among habitat patches on mainland

Magnitude was defined with a numeric quantification for the reduced or degraded caribou habitat from sensory disturbance net effect:

- 500 metre buffer around Project footprint affects 8,804 hectares and 27,512 hectares in the Lake Superior Coast Range and discontinuous range, respectively. Function habitat affected includes 2,136 hectares each of nursery and winter use areas, all but 1 hectares overlaps completely. Effects will be limited in most areas because the majority of these areas occur in proximity to existing disturbance.

The magnitude was defined using a narrative for the reduced caribou survival and/or reproduction from loss or alteration of vegetation and topography net effect:

- Displacement of a few individuals with home ranges that overlap the wildlife and wildlife habitat local study area

The magnitude was defined using a narrative for the reduced caribou survival and/or reproduction from sensory disturbance net effect:

- Detectable increase in stress hormones and displacement of a few individuals with home ranges that overlap the wildlife and wildlife habitat local study area

The magnitude was defined using a narrative for the reduced caribou survival and/or reproduction from use of linear corridors and converted habitat by prey and predators net effect:

- Incremental increase in predation risk

The magnitude was defined using a narrative for the reduced caribou survival and/or reproduction from collisions with Project vehicles net effect:

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- Injury or mortality of zero to a few individuals over the life of the Project

The magnitude was defined using a narrative for the Increase in public access could increase injury or mortality of caribou due to vehicle strikes net effect:

- Injury or mortality of zero to a few individuals

The magnitude of all other predicted net effects for woodland caribou were determined to be negligible.

- Caribou in the caribou regional study area are considered as not likely to be self-sustaining in the baseline characterization; therefore, combined effects from the Project and previous and existing developments were predicted to be significant despite the small incremental changes caused by the Project.

Moose

Net effects were predicted for the habitat indicator:

- Reduced or degraded caribou habitat from loss or alteration of vegetation and topography
- Reduced or degraded moose habitat from sensory disturbance
- Reduced or degraded moose habitat from changes to hydrology
- Reduced or degraded moose habitat from dust and air emissions
- Reduced or degraded moose habitat from herbicide application

Net effects are predicted for the survival and reproduction indicator:

- Reduced moose survival and/or reproduction from loss or alteration of vegetation and topography
- Reduced moose survival and/or reproduction from sensory disturbance
- Reduced moose survival and/or reproduction from use of linear corridors and converted habitat by prey and predators
- Reduced moose survival and/or reproduction from collisions with Project vehicles
- Reduced moose survival and/or reproduction from attraction of wildlife to the Project
- Reduced moose survival and/or reproduction from an increase in public access

The net effects for moose were assessed as short-term/reversible to permanent/irreversible in duration and Project footprint to local in geographic extent.

Magnitude was defined with a numeric quantification for the reduced or degraded moose habitat from loss or alteration of vegetation and topography net effect:

- Direct loss of approximately 2,197 hectares of moderate to high suitability habitat (1.9 percent of the wildlife and wildlife habitat local study area baseline characterization, 0.05 percent of the moose regional study area baseline characterization)
- Small reduction in movements among habitat patches due to fragmentation of suitable habitat

The magnitude was defined using a narrative for the reduced or degraded moose habitat from sensory disturbance net effect:

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- Reduced quality of habitat and possible avoidance in the wildlife and wildlife habitat local study area from sensory disturbance during construction and reclamation

The magnitude was defined using a narrative for the reduced moose survival and/or reproduction from loss or alteration of vegetation and topography net effect:

- Small increase in mortality after implementation of mitigation measures

The magnitude was defined using a narrative for the reduced moose survival and/or reproduction from sensory disturbance net effect:

- Small increase in mortality after implementation of mitigation measures

The magnitude was defined using a narrative for the reduced moose survival and/or reproduction from use of linear corridors and converted habitat by prey and predators net effect:

- Small increase in mortality after implementation of mitigation measures

The magnitude of the other predicted net effects on moose were determined to be negligible.

Moose populations in the Project study areas are anticipated to remain self-sustaining and ecologically effective after considering the net effects assessment. Incremental and combined effects from the Project and previous and existing developments on moose are predicted to be not significant.

American Marten

Net effects were predicted for the habitat indicator:

- Reduced or degraded American marten habitat from loss or alteration of vegetation
- Reduced or degraded American marten habitat from sensory disturbance
- Reduced or degraded American marten habitat from changes to hydrology
- Reduced or degraded American marten habitat from dust and air emissions
- Reduced or degraded American marten habitat from herbicide application

Net effects were predicted for the survival and reproduction indicator:

- Reduced American marten survival and/or reproduction from loss or alteration of vegetation
- Reduced American marten survival and/or reproduction from sensory disturbance
- Reduced American marten survival and/or reproduction from use of linear corridors and converted habitat by prey and predators
- Reduced American marten survival and/or reproduction from destruction during denning
- Reduced American marten survival and/or reproduction from collisions with Project vehicles
- Reduced American marten survival and/or reproduction from attraction of wildlife to the project
- Reduced American marten survival and/or reproduction from increase in public access

The net effects for American marten were assessed as short-term/reversible to permanent/irreversible in duration and Project footprint to local in geographic extent.

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Magnitude was defined with a numeric quantification for the reduced or degraded American marten habitat from loss or alteration of vegetation and topography net effect:

- Direct loss of approximately 918 hectares of moderate and high suitability habitat (2.0 percent of the wildlife and wildlife habitat local study area baseline characterization; 0.5 percent of the marten regional study area baseline characterization)
- Small reduction in movements among habitat patches due to increased linear disturbance

Magnitude was defined using a narrative for the reduced or degraded American marten habitat from sensory disturbance net effect:

- Reduced quality of habitat and possible avoidance in the wildlife and wildlife habitat local study area from sensory disturbance during construction and reclamation

Magnitude was defined using a narrative for the reduced American marten survival and/or reproduction from loss or alteration of vegetation net effect:

- Small increase in mortality after implementation of mitigation measures

Magnitude was defined using a narrative for the reduced American marten survival and/or reproduction from sensory disturbance net effect:

- Small increase in mortality after implementation of mitigation measures
- Magnitude was defined using a narrative for the reduced American marten survival and/or reproduction from use of linear corridors and converted habitat by prey and predators net effect:
- Small increase in mortality after implementation of mitigation measures

The magnitude of the other predicted net effects on American marten were determined to be negligible.

Marten populations that overlap the Project study areas are anticipated to remain self-sustaining and ecologically effective at the net effects assessment, and the incremental and combined effects from the Project and previous and existing developments were predicted to be not significant.

Little Brown Myotis and Northern Myotis

Net effects were predicted for the habitat indicator:

- Reduced or degraded bat habitat from loss or alteration of vegetation and topography
- Reduced or degraded bat habitat from sensory disturbance
- Reduced or degraded bat habitat from blasting
- Reduced or degraded bat habitat from changes to hydrology
- Reduced or degraded bat habitat from dust and air emissions
- Reduced or degraded bat habitat from herbicide application

Net effects were predicted for the survival and reproduction indicator:

- Reduced bat survival and/or reproduction from loss or alteration of vegetation and topography
- Reduced bat survival and/or reproduction from sensory disturbance
- Reduced bat survival and/or reproduction from destruction of roosting or hibernating bats (incidental take)

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- Reduced bat survival and/or reproduction from collision with Project vehicles
- Reduced bat survival and/or reproduction from increase in public access

The net effects for little brown myotis and Northern myotis were assessed as short-term/reversible to permanent/irreversible in duration and Project footprint to local in geographic extent.

Magnitude was defined with a numeric quantification for the reduced or degraded bat habitat from loss or alteration of vegetation and topography net effect:

- Encroachment on the 400 m setback of ten candidate hibernacula. No disturbance to active hibernacula, including a 400 m setback buffer
- Direct loss of approximately 5 hectares of potential minor hibernacula (i.e., cliff, talus slope and rock barren) in the wildlife and wildlife habitat local study area.
- Direct loss of approximately 1,001 hectares of suitable maternity roosting habitat in the wildlife and wildlife habitat local study area (0.5 percent in myotis regional study area)
- Small loss of foraging habitat due to predicted loss of 1.9 percent of wetland ecosystems in the local study area (0.5 percent in RSA)
- Small change in northern myotis movements among habitat patches due to increased linear disturbance

Magnitude was defined using a narrative for the reduced or degraded bat habitat from sensory disturbance net effect:

- Negligible – degradation of active hibernacula due to sensory disturbance by adhering to setbacks and restricted activity timing windows
- Reduced quality of roosting and foraging habitat and possible avoidance in the wildlife and wildlife habitat local study area from sensory disturbance during construction and reclamation

Magnitude was defined using a narrative for the reduced or degraded bat habitat from blasting net effect:

- Potential loss or degradation of candidate hibernacula if blasting is required in close proximity

Magnitude was defined using a narrative for the reduced bat survival and/or reproduction from loss or alteration of vegetation and topography net effect:

- Small increase in mortality after implementation of mitigation measures

Magnitude was defined using a narrative for the reduced bat survival and/or reproduction from sensory disturbance net effect:

- Small increase in mortality after implementation of mitigation measures

Magnitude was defined using a narrative for the reduced bat survival and/or reproduction from destruction of roosting or hibernating bats (incidental take) net effect:

- Small increase in mortality after implementation of mitigation measures

Magnitude was defined using a narrative for the reduced bat survival and/or reproduction from collisions with Project vehicles net effect:

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- Injury or mortality of zero to a few individuals

Magnitude was defined using a narrative for the reduced bat survival and/or reproduction from increase in public access net effect:

- Injury or mortality of zero to a few individuals

The magnitude of the other predicted net effects on little brown myotis and northern myotis were determined to be negligible.

With effective implementation of mitigation, the Project is predicted to have a small but negative effect on little brown myotis and northern myotis habitat, and survival and reproduction. These populations are expected to continue to decline in the net effects assessment due to white-nose syndrome and the small incremental changes due to the Project may temporarily compromise the ability of little brown myotis and northern myotis population(s) that overlap with the myotis regional study area to recover. Subsequently, little brown myotis populations that overlap the myotis regional study area continue to be considered as not likely self-sustaining and not ecologically effective in the net effects assessment; combined effects in the net effects assessment are predicted to be significant. However, the Project would contribute little to the combined effects on little brown myotis and northern myotis, after implementation of effective mitigation.

Bald Eagle

Net effects were predicted for the habitat indicator:

- Reduced or degraded bald eagle habitat from loss or alteration of vegetation and topography
- Reduced or degraded bald eagle habitat from sensory disturbance
- Reduced or degraded bald eagle habitat from changes to hydrology
- Reduced or degraded bald eagle habitat from dust and air emissions
- Reduced or degraded bald eagle habitat from herbicide application

Net effects were predicted for the survival and reproduction indicator:

- Reduced bald eagle survival and/or reproduction from loss or alteration of vegetation and topography
- Reduced bald eagle survival and/or reproduction from sensory disturbance
- Reduced or degraded bald eagle habitat from collision with the transmission line
- Reduced bald eagle survival and/or reproduction from collisions with Project vehicles
- Reduced bald eagle survival and/or reproduction from attraction of wildlife to the project
- Reduced bald eagle survival and/or reproduction from increase in public access

The net effects for bald eagle were assessed as short-term/reversible to permanent/irreversible in duration and Project footprint to local in geographic extent.

Magnitude was defined with a numeric quantification for the reduced or degraded bald eagle habitat from loss or alteration of vegetation and topography net effect:

- Direct loss of approximately 658 hectares (1.9 percent of wildlife and wildlife habitat local study area baseline characterization; 0.6 percent of bald eagle regional study area baseline characterization)
- Small reduction in movements among habitat patches due to increased linear disturbance

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Magnitude was defined using a narrative for the reduced or degraded bald eagle habitat from sensory disturbance net effect:

- Reduced quality of nesting and roosting habitat and possible avoidance in the wildlife and wildlife habitat LSA from sensory disturbance during construction and reclamation

Magnitude was defined using a narrative for the reduced bald eagle survival and/or reproduction from loss or alteration of vegetation and topography net effect:

- No reduction in productive capacity in the wildlife and wildlife habitat local study area, from direct loss of habitat

Magnitude was defined using a narrative for the reduced bald eagle survival and/or reproduction from sensory disturbance net effect:

- Reduced carrying capacity in the wildlife and wildlife habitat local study area from avoidance due to sensory disturbance during construction and reclamation

The magnitude of the other predicted net effects on bald eagle were determined to be negligible.

Overall, the incremental changes from the Project to habitat, and survival and reproduction rates are expected to be within the resilience and adaptability limits of bald eagle. Consequently, the incremental and combined effects from the Project and previous and existing developments on bald eagle populations that overlap the Project study areas are predicted to be not significant.

Bobolink

Net effects were predicted for the habitat indicator:

- Reduced or degraded bobolink habitat from loss or alteration of vegetation and topography
- Reduced or degraded bobolink habitat from sensory disturbance
- Reduced or degraded bobolink habitat from changes to hydrology
- Reduced or degraded bobolink habitat from dust and air emissions
- Reduced or degraded bobolink habitat from herbicide application

Net effects were predicted for the survival and reproduction indicator:

- Reduced bobolink survival and/or reproduction from loss or alteration of vegetation and topography
- Reduced bobolink survival and/or reproduction from sensory disturbance
- Reduced bobolink survival and/or reproduction from collisions with the transmission line
- Reduced bobolink survival and/or reproduction from collisions with Project vehicles
- Reduced bobolink survival and/or reproduction from attraction of wildlife to the Project
- Reduced bobolink survival and/or reproduction from increase in public access

The net effects for bobolink were assessed as short-term/reversible to permanent/irreversible in duration and Project footprint to local in geographic extent.

Magnitude was defined with a numeric quantification for the reduced or degraded bobolink habitat from loss or alteration of vegetation and topography net effect:

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- Direct loss of approximately 1 hectares (less 1 percent loss of habitat in both wildlife and wildlife habitat local study area and bobolink regional study area from baseline characterization)
- Small reduction in movements among habitat patches due to increased linear disturbance

Magnitude was defined using a narrative for the reduced or degraded bobolink habitat from sensory disturbance net effect:

- Reduced quality of nesting habitat and possible avoidance in the wildlife and wildlife habitat local study area from sensory disturbance during construction and reclamation

Magnitude was defined using a narrative for the reduced bobolink survival and/or reproduction from loss or alteration of vegetation and topography net effect:

- Reduced carrying capacity in the wildlife and wildlife habitat local study area from direct loss of habitat

Magnitude was defined using a narrative for the reduced bobolink survival and/or reproduction from sensory disturbance net effect:

- Reduced carrying capacity in the wildlife and wildlife habitat local study area from avoidance due to sensory disturbance during construction and reclamation
- Reduced ability to hear predators and intraspecific vocalizations may affect survival and reproduction

The magnitude of the other predicted net effects for bobolink were determined to be negligible.

The loss of bobolink habitat would be experienced continuously during construction of the Project, but would be temporary, and functional early successional habitat would become available in one to three years following completion of construction. Sensory disturbance during construction of the Project is expected to be frequent, but it would be isolated and of short duration across the Project study areas due to construction being completed sequentially down the line. Consequently, the incremental and combined effects from the Project and previous and existing developments on bobolink populations that overlap the Project study areas are predicted to be not significant.

Canada Warbler

Net effects were predicted for the habitat indicator:

- Reduced or degraded Canada warbler habitat from loss or alteration of vegetation and topography
- Reduced or degraded Canada warbler habitat from sensory disturbance
- Reduced or degraded Canada warbler habitat from changes to hydrology
- Reduced or degraded Canada warbler habitat from dust and air emissions
- Reduced or degraded Canada warbler habitat from herbicide application

Net effects were predicted for the survival and reproduction indicator:

- Reduced Canada warbler survival and/or reproduction from loss or alteration of vegetation and topography
- Reduced Canada warbler survival and/or reproduction from sensory disturbance
- Reduced Canada warbler survival and/or reproduction from use of linear corridors and converted habitat by prey and predators

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- Reduced Canada warbler survival and/or reproduction from collisions with the transmission line
- Reduced Canada warbler survival and/or reproduction from collisions with Project vehicles
- Reduced Canada warbler survival and/or reproduction from attraction of wildlife to the Project
- Reduced Canada warbler survival and/or reproduction from increase in public access

The net effects for Canada warbler were assessed as short-term/reversible to permanent/irreversible in duration and Project footprint to local in geographic extent.

Magnitude was defined with a numeric quantification for the reduced or degraded Canada warbler habitat from loss or alteration of vegetation and topography net effect:

- Direct loss of approximately 2,128 hectares (2.0 percent from wildlife and wildlife habitat local study area baseline characterization; 0.6 percent from warbler regional study area baseline characterization)
- Small reduction in movements among habitat patches due to increased linear disturbance

Magnitude was defined using a narrative for the reduced or degraded Canada warbler habitat from sensory disturbance net effect:

- Reduced carrying capacity in the wildlife and wildlife habitat local study area from direct loss of habitat

Magnitude was defined using a narrative for the reduced Canada warbler survival and/or reproduction from loss or alteration of vegetation and topography net effect:

- Reduced quality of nesting habitat and possible avoidance in the wildlife and wildlife habitat local study area from sensory disturbance during construction and reclamation

Magnitude was defined using a narrative for the Reduced Canada warbler survival and/or reproduction from sensory disturbance net effect:

- Reduced carrying capacity in the wildlife and wildlife habitat local study area from avoidance due to sensory disturbance during construction and reclamation
- Reduced ability to hear predators and intraspecific vocalizations may affect survival and reproduction

The magnitude of the other predicted net effects for Canada warbler were determined to be negligible.

Overall, the incremental changes from the Project to Canada warbler habitat and survival and reproduction rates are expected to be within the resilience and adaptability limits of Canada warbler. Consequently, the incremental and combined effects from the Project and previous and existing developments on Canada warbler populations that overlap the Project study areas are predicted to be not significant.

Eastern Whip-Poor-Will

Net effects were predicted for the habitat indicator:

- Reduced or degraded eastern whip-poor-will habitat from loss or alteration of vegetation and topography
- Reduced or degraded eastern whip-poor-will habitat from sensory disturbance
- Reduced or degraded eastern whip-poor-will habitat from changes to hydrology
- Reduced or degraded eastern whip-poor-will habitat from dust and air emissions
- Reduced or degraded eastern whip-poor-will habitat from herbicide application

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Net effects were predicted for the survival and reproduction indicator:

- Reduced eastern whip-poor-will survival and/or reproduction from loss or alteration of vegetation and topography
- Reduced eastern whip-poor-will survival and/or reproduction from sensory disturbance
- Reduced eastern whip-poor-will survival and/or reproduction from collisions with the transmission line
- Reduced eastern whip-poor-will survival and/or reproduction from collisions with Project vehicles
- Reduced eastern whip-poor-will survival and/or reproduction from attraction of wildlife to the Project
- Reduced eastern whip-poor-will survival and/or reproduction from increase in public access

The net effects for eastern whip-poor-will were assessed as short-term/reversible to permanent/irreversible in duration and Project footprint to local in geographic extent.

Magnitude was defined with a numeric quantification for the reduced or degraded eastern whip-poor-will habitat from loss or alteration of vegetation and topography net effect:

- Direct loss of approximately 580 hectares (1.7 percent of wildlife and wildlife habitat local study area baseline characterization and 0.5 percent of whip-poor-will regional study area baseline characterization), including approximately 25 hectares of protected habitat around three identified nests
- Small reduction in movements among habitat patches due to increased linear disturbance

Magnitude was defined using a narrative for the reduced or degraded eastern whip-poor-will habitat from sensory disturbance net effect:

- Reduced quality of nesting habitat and possible avoidance in the wildlife and wildlife habitat local study area from sensory disturbance during construction and reclamation
- Potential disuse of identified nests in subsequent breeding seasons

Magnitude was defined using a narrative for the reduced eastern whip-poor-will survival and/or reproduction from loss or alteration of vegetation and topography net effect:

- Reduced carrying capacity in the wildlife and wildlife habitat local study area from direct loss of habitat

Magnitude was defined using a narrative for the reduced eastern whip-poor-will survival and/or reproduction from sensory disturbance net effect:

- Reduced carrying capacity in the wildlife and wildlife habitat local study area from avoidance due to sensory disturbance during construction and reclamation
- Potential disuse of identified nests in subsequent breeding seasons
- Reduced ability to hear predators and intraspecific vocalizations may affect survival and reproduction

The magnitude of the other predicted net effects for eastern whip-poor-will were determined to be negligible.

With effective implementation of mitigation, the incremental changes to eastern whip-poor-will survival and reproduction (productivity) due to the Project were predicted to be small and mostly reversible following construction and reclamation activities. Consequently, the incremental and combined effects from the Project and previous and existing developments on eastern whip-poor-will populations that overlap the Project study areas were predicted to be not significant.

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Olive-Sided Flycatcher

Net effects were predicted for the habitat indicator:

- Reduced or degraded olive-sided flycatcher habitat from loss or alteration of vegetation and topography
- Reduced or degraded olive-sided flycatcher habitat from sensory disturbance
- Reduced or degraded olive-sided flycatcher habitat from changes to hydrology
- Reduced or degraded olive-sided flycatcher habitat from dust and air emissions
- Reduced or degraded olive-sided flycatcher habitat herbicide application

Net effects were predicted for the survival and reproduction indicator:

- Reduced olive-sided flycatcher survival and/or reproduction from loss or alteration of vegetation and topography
- Reduced olive-sided flycatcher survival and/or reproduction from sensory disturbance
- Reduced olive-sided flycatcher survival and/or reproduction from collisions with the transmission line
- Reduced olive-sided flycatcher survival and/or reproduction from collisions with Project vehicles
- Reduced olive-sided flycatcher survival and/or reproduction from attraction of wildlife to the Project
- Reduced olive-sided flycatcher survival and/or reproduction from increase in public access

The net effects for olive-sided flycatcher were assessed as short-term/reversible to permanent/irreversible in duration and Project footprint to local in geographic extent.

Magnitude was defined with a numeric quantification for the reduced or degraded olive-sided flycatcher habitat from loss or alteration of vegetation and topography net effect:

- Direct loss of approximately 1,123 hectares (2.0 percent of wildlife and wildlife habitat local study area baseline characterization and 0.5 percent of olive-sided flycatcher regional study area baseline characterization)
- Small reduction in movements among habitat patches due to increased linear disturbance

Magnitude was defined using a narrative for the Reduced or degraded olive-sided flycatcher habitat from sensory disturbance net effect:

- Reduced quality of nesting habitat and possible avoidance in the wildlife and wildlife habitat local study area from sensory disturbance during construction and reclamation

Magnitude was defined using a narrative for the reduced olive-sided flycatcher survival and/or reproduction from loss or alteration of vegetation and topography net effect:

- Reduced carrying capacity in the wildlife and wildlife habitat local study area from direct loss of habitat

Magnitude was defined using a narrative for the reduced olive-sided flycatcher survival and/or reproduction from sensory disturbance net effect:

- Reduced carrying capacity in the wildlife and wildlife habitat local study area from avoidance due to sensory disturbance during construction and reclamation
- Reduced ability to hear predators and intraspecific vocalizations may affect survival and reproduction

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The magnitude of the other predicted net effects for olive-sided flycatcher were determined to be negligible.

The combined evidence concerning habitat and survival and reproduction indicates that olive-sided flycatcher populations are expected to continue to be self-sustaining and ecologically effective in the net effects assessment. Consequently, the incremental and combined effects from the Project and past and existing developments on olive-sided flycatcher were predicted to be not significant.

Cumulative Effects Assessment

Woodland Caribou

Cumulative effects were predicted for the woodland caribou criterion:

- Cumulative effects can reduce or degrade caribou habitat (habitat indicator)
- Cumulative effects can adversely affect caribou survival and reproduction (Survival/ reproduction)

In the cumulative effects assessment, caribou continued to be considered as not likely to be self-sustaining. Therefore, incremental and cumulative effects from the Project and other past, present, and reasonably foreseeable developments on caribou were predicted to remain significant in the cumulative effects assessment. The Project was predicted to contribute little to the cumulative effects on caribou, after mitigation. Ecological effectiveness was predicted to be compromised in the cumulative effects assessment but was not expected to be lost.

Moose

Cumulative effects were predicted for the moose criterion:

- Cumulative effects can reduce or degrade moose habitat (habitat indicator)
- Cumulative effects can adversely affect moose survival and reproduction (Survival/ reproduction)

Moose display life history traits (e.g., high reproductive and effective dispersal rates, ability to eat many types of plants) that provide flexibility to adapt to different ecozones and rates of development across North America. The most recent surveys of moose populations by Ministry of Natural Resources and Forestry indicate that Wildlife Management Units that intersect the Project, except for Wildlife Management Units 13 and 35, have moose densities within desired ecological goals. That current moose densities meet ecological goals is a reflection of their ability to absorb effects from the Trans-Canada Highway and other disturbances that exist at baseline characterization. The combined evidence concerning the cumulative effects on moose habitat, and survival and reproduction from baseline characterization to cumulative effects assessment indicates that moose populations would continue to be self-sustaining in the Project study areas, although possibly at a lower abundance. Reductions of habitat, and survival and reproduction are not expected to affect the ecological effectiveness of moose in the Project study areas or beyond the Project study areas. Consequently, effects on moose in the cumulative effects assessment are predicted to be not significant.

American Marten

Cumulative effects were predicted for the American Marten criterion:

- Cumulative effects can reduce or degrade marten habitat (habitat indicator)
- Cumulative effects can adversely affect marten survival and reproduction (Survival/ reproduction)

The combined evidence concerning the cumulative changes to marten habitat, and survival and reproduction in the marten regional study area from baseline characterization to cumulative effects assessment indicate that marten populations that overlap the marten regional study area would continue to be self-sustaining and

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ecologically effective, although possibly at a lower abundance. Consequently, cumulative effects on marten in the cumulative effects assessment were predicted to be not significant.

Little Brown Myotis and Northern Myotis

Cumulative effects were predicted for the little brown myotis and northern myotis criterion:

- Cumulative effects can reduce or degrade bat habitat (habitat indicator)
- Cumulative effects can adversely affect bat survival and reproduction (Survival/ reproduction)

Incremental changes due to the Project are predicted to contribute to a small adverse, effect on little brown myotis and northern myotis populations that overlap with the myotis regional study area; however, mitigation associated with habitat enhancement (e.g., installation of bat boxes) will help avoid and/or offset habitat loss. Myotis populations are expected to continue to decline in the future due to white-nose syndrome. Subsequently, little brown myotis and northern myotis populations that overlap the myotis regional study area continue to be considered as not likely self-sustaining and not ecologically effective in the net effects assessment; combined effects in the net effects assessment are predicted to be significant, even though the Project would contribute no to little cumulative effects on little brown myotis, after mitigation. Reasonably foreseeable developments in the myotis regional study area have the potential to accelerate the declining trend in little brown myotis populations through changes in habitat and survival and reproduction. It is expected that reasonably foreseeable developments, in conjunction with the Project, will be required to implement mitigation that will limit cumulative effects on this species. Nevertheless, incremental and cumulative effects of the Project and other past, present, and reasonably foreseeable developments on little brown myotis are predicted to remain significant in the cumulative effects assessment.

Bald Eagle

Cumulative effects were predicted for the bald eagle criterion:

- Cumulative effects can reduce or degrade bald eagle habitat (habitat indicator)
- Cumulative effects can adversely affect bald eagle survival and reproduction (Survival/ reproduction)

The combined evidence concerning the cumulative changes to habitat availability distribution, and survival and reproduction in the bald eagle regional study area from baseline characterization to cumulative effects assessment indicates that bald eagle populations are expected to continue to be self-sustaining and ecologically effective. Consequently, net effects from past and present developments, the Project, and other reasonably foreseeable developments on bald eagle in the cumulative effects assessment were predicted to be not significant.

Bobolink

Cumulative effects were predicted for the bobolink criterion:

- Cumulative effects can reduce or degrade bobolink habitat (habitat indicator)
- Cumulative effects can adversely affect bobolink survival and reproduction (Survival/ reproduction)

Available evidence indicates that bobolink populations that overlap the bobolink Regional Study area are predicted to remain self-sustaining and ecologically effective in the cumulative effects assessment. Consequently, cumulative effects from the Project and other past, present, and reasonably foreseeable developments on bobolinks are predicted to be not significant.

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Canada Warbler

Cumulative effects were predicted for the Canada warbler criterion:

- Cumulative effects can reduce or degrade Canada warbler habitat (habitat indicator)
- Cumulative effects can adversely affect Canada warbler survival and reproduction (Survival/ reproduction)

Available evidence indicates that Canada warbler populations that overlap the Canada warbler regional study area were predicted to remain self-sustaining and ecologically effective in the cumulative effects assessment. Consequently, cumulative effects from the Project and other past, present, and reasonably foreseeable developments on Canada warbler were predicted to be not significant.

Eastern Whip-poor-will

Cumulative effects were predicted for the eastern whip-poor-will criterion:

- Cumulative effects can reduce or degrade eastern whip-poor-will habitat (habitat indicator)
- Cumulative effects can adversely affect eastern whip-poor-will survival and reproduction (Survival/ reproduction)

Overall, the weight of evidence predicts that changes to eastern whip-poor-will habitat and survival and reproduction are within the resilience and adaptability limits of the species. Populations that overlap the eastern whip-poor-will regional study area remain self-sustaining and ecologically effective in the cumulative effects assessment. Consequently, cumulative effects from the Project and other past, present, and reasonably foreseeable developments on eastern whip-poor-will were predicted to be not significant.

Olive-sided Flycatcher

Cumulative effects were predicted for the olive-sided flycatcher criterion:

- Cumulative effects can reduce or degrade olive-sided flycatcher habitat (habitat indicator)
- Cumulative effects can adversely affect olive-sided flycatcher survival and reproduction (Survival/ reproduction)

The combined evidence on habitat and survival and reproduction in the olive-sided flycatcher regional study area indicates that olive-sided flycatchers are expected to continue to be self-sustaining and ecologically effective in the cumulative effects assessment. Consequently, cumulative effects on olive-sided flycatcher are predicted to be not significant.

Socio-economic Environment

Archaeological Resources

Baseline Conditions

Pre-historical and historical settlements in the region have been few and dispersed. Due to the general acidity of the soil on the Canadian Shield, which leads to a lack of organic preservation, the absolute number of known archaeological resources and the area of archaeological potential in northwestern Ontario is low relative to the size of the region. The relatively low number of known archaeological resources and relatively small area of archaeological potential in northwestern Ontario, and more specifically in the Project study areas, is also a reflection on the low number of archaeological surveys that have taken place in the region.

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Areas of archaeological potential were identified through desktop study of lands in the Project study areas. Field investigations to identify potential archaeological resources have not yet been undertaken.

A total of 19 archaeological sites were identified in the Project study areas.

Net Effects

No net effects are predicted for archaeological resources as a result of the Project with effective implementation of mitigation. Therefore, no further assessment or characterization of net effects, including assessment of significance, is required.

Cumulative Effects Assessment

No net effects are predicted for archaeological resources as a result of the Project. Consequently, the archaeological resources criterion is not carried forward for assessment of cumulative effects.

Cultural Heritage Resources

Baseline Conditions

There are no known federally recognized cultural heritage resources in the Project study areas. There is one provincially recognized cultural heritage resource in the Project study areas, the Terry Fox Mile Post 3339. This is a commemorative plaque located along Highway 17 east of the City of Thunder Bay that recognizes where Terry Fox ended his *Marathon of Hope*, and celebrates the 25th anniversary of the Terry Fox Run for Hope (1980-2005).

Desktop assessment determined that the Project study areas contain the following sites that contain buildings or structures that are 40 or more years old:

- Angler Camp World War II Internment Camp (1941 to 1946);
- Gananoque Vein Gold Mine (1897 to 1899);
- Molybdenite Lake Prospect (1905-1964);
- Angler Granite Quarry/ Petrunka (1929 to 1960s);
- Halonen Fluorite Mine (1974-1986);
- Mackenzie Quarry (1880s); and,
- Bishop Lead Occurrence (unknown date of operation).

Of these, only the Gananoque Vein Gold Mine is in the Project footprint.

The desktop assessment determined that the Project study areas contain, in addition to the sites listed above, the following sites with potential cultural heritage resources:

- eighteen former mining sites;
- unknown proportion of the 760 standing buildings identified in the Project study areas; and
- potential association with Group of Seven cultural heritage landscapes.

Net Effects

No net effects are predicted for cultural heritage resources as a result of the Project with effective implementation of mitigation. Therefore, no further assessment or characterization of net effects, including assessment of significance, is required.

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Cumulative Effects Assessment

No net effects are predicted for cultural heritage as a result of the Project. Consequently, the cultural heritage resources criterion is not carried forward for assessment of cumulative effects.

Indigenous Current Use of Lands and Resources for Traditional Purposes

Baseline Conditions

The Project study areas have historically, and continue to be, used by Indigenous peoples for traditional activities such as hunting, trapping, fishing, plant harvesting, and other cultural uses.

An extensive number of traditional land and resource use features were identified by Indigenous communities, and further information was available from publicly available and Project-specific sources to provide a general overview of the regional and local patterns of Indigenous land and resource use in the Project study areas. NextBridge recognizes that information was not available from all potentially affected Indigenous communities and is committed to working with those communities in the identification of land and resource use sites that have the potential to be affected by the Project.

Net Effects

The criteria identified for Indigenous current use of lands and resources for traditional purposes are First Nation traditional wildlife harvesting, First Nations traditional fish harvesting, First Nations traditional plant and material harvesting, First Nations use of culturally important sites and areas, Métis way of life, and Métis harvesting.

First Nations Traditional Wildlife Harvesting

A net effect is predicted for the resource availability indicator:

- Reduction in the availability of wildlife for harvesting

A net effect is predicted for the sites and areas indicator:

- Loss or alteration of currently available wildlife harvesting sites or areas

Net effects are predicted for the access indicator:

- Loss or alteration of land access routes
- Loss or alteration of water access routes

Net effects are predicted for the environmental conditions indicator:

- Change in the visual environment
- Change in acoustic environment
- Change in air quality

The net effects for First Nations traditional wildlife harvesting were assessed as low to moderate in magnitude, short-term/reversible to permanent/irreversible in duration, and local regional in geographic extent. Net effects were assessed as not significant.

First Nations Traditional Fish Harvesting

A net effect is predicted for the resource availability indicator:

- Reduction in the availability of fish for harvesting

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A net effect is predicted for the sites and areas criteria:

- Loss or alteration of currently available fish harvesting sites or areas

Net effects are predicted for the access criteria:

- Loss or alteration of land access routes
- Loss or alteration of water access routes

Net effects are predicted for the environmental conditions indicator:

- Change in the visual environment
- Change in acoustic environment
- Change in air quality

The net effects for First Nations traditional fish harvesting were assessed as low to moderate in magnitude, short-term/reversible to permanent/irreversible in duration, and Project footprint to regional in geographic extent. Net effects were assessed as not significant.

First Nations Traditional Plant and Material Harvesting

A net effect is predicted for the resource availability indicator:

- Reduction in the availability of vegetation for harvesting

A net effect is predicted for the sites and areas indicator:

- Loss or alteration of currently available plant or material harvesting sites or areas

Net effects are predicted for the access criteria:

- Loss or alteration of land access routes
- Loss or alteration of water access routes

Net effects are predicted for the environmental conditions indicator:

- Change in the visual environment
- Change in acoustic environment
- Change in air quality

The net effects for First Nations traditional plant or material harvesting were assessed as negligible to moderate in magnitude, short-term/reversible to permanent/irreversible in duration, and local in geographic extent. Net effects were assessed as not significant.

First Nations Use of Culturally Important Sites and Areas

A net effect is predicted for the sites and areas indicator:

- Loss or alteration of culturally important sites or areas

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Net effects are predicted for the access indicator:

- Loss or alteration of land access routes
- Loss or alteration of water access routes

Net effects are predicted for the environmental conditions indicator:

- Change in the visual environment
- Change in acoustic environment
- Change in air quality

The net effects for First Nations use of culturally important sites and areas were assessed as negligible to moderate in magnitude, short-term/reversible to permanent/irreversible in duration, and Project footprint to local in geographic extent. Net effects were assessed as not significant.

Métis Way of Life

Net effects are predicted for the environmental conditions indicator:

- Loss or alteration of land access routes
- Loss or alteration of water access routes

Net effects are predicted for the land use conflicts with familial or community teaching and transmission practices and qualitative disconnect from areas or sites of Métis tradition indicator:

- Change in the visual environment
- Change in acoustic environment
- Change in air quality

A net effect is predicted for the damage or loss of key spiritual areas to Métis way of life indicator:

- Loss or alteration of culturally important sites or areas

The net effects for Métis way of life were assessed as low to moderate in magnitude, short-term/reversible to permanent/irreversible in duration, and local in geographic extent. Net effects were assessed as not significant.

Métis harvesting

Net effects are predicted for the reduced access to preferred locations of harvest indicator:

- Loss or alteration of currently available wildlife harvesting sites or areas
- Loss or alteration of currently available fish harvesting sites or areas
- Loss or alteration of currently available plant or material harvesting sites or areas
- Loss or alteration of land access routes
- Loss or alteration of land access routes
- Loss or alteration of water access routes

Net effects are predicted for the loss or alteration of key cultural species harvested indicator:

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- Reduction in the availability of wildlife for harvesting
- Reduction in the availability of fish for harvesting
- Reduction in the availability of vegetation for harvesting

Net effects are predicted for the changes to known harvesting conditions required for harvest indicator:

- Change in the visual environment
- Change in acoustic environment
- Change in air quality

The net effects for Métis harvesting were assessed as low to moderate in magnitude, short-term/reversible to permanent/irreversible in duration, and local to regional in geographic extent. Net effects were assessed as not significant.

Cumulative Effects Assessment

First Nations Traditional Wildlife Harvesting

Cumulative effects were predicted for the First Nations traditional wildlife harvesting criteria:

- Disturbance, both direct and indirect may result in changes on resource availability (wildlife or vegetation) relied on by First Nations harvesters (resource availability indicator)
- Disturbance may remove currently available lands or site-specific locations that are relied on for First Nations harvesting (sites and areas indicator)
- Development of activities may result in a loss of access routes used in harvesting (access indicator)
- Development or activities may result in visual disturbance that could affect First Nations land users while undertaking land use activities (changes in the environment indicator)

The cumulative effects for First Nations traditional wildlife harvesting were assessed as low to moderate magnitude, medium-term/reversible to permanent/irreversible in duration, and regional to beyond regional in geographic extent. Cumulative effects were assessed as not significant.

First Nations Traditional Fish Harvesting

Cumulative effects were predicted for the First Nations traditional fish harvesting criteria:

- Disturbance, both direct and indirect may result in changes on resource availability (fish) relied on by First Nations harvesters (resource availability indicator)
- Disturbance may remove currently available lands or site-specific locations that are relied on for First Nations harvesting (sites and areas indicator)
- Development of activities may result in a loss of access routes used in harvesting (access indicator)
- Development or activities may result in visual disturbance that could affect First Nations land users while undertaking land use activities (changes in environmental conditions indicator)

The cumulative effects for First Nations traditional fish harvesting were assessed as negligible to moderate magnitude, medium-term/reversible to permanent/irreversible in duration, and local to regional in geographic extent. Cumulative effects were assessed as not significant.

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First Nations Traditional Plant and Material Harvesting

Cumulative effects were predicted for the First Nations traditional plant and material harvesting criteria:

- Disturbance, both direct and indirect may result in changes on resource availability (wildlife or vegetation) relied on by First Nations harvesters (resource availability indicator)
- Disturbance may remove currently available lands or site-specific locations that are relied on for First Nations harvesting (sites and areas indicator)
- Development of activities may result in a loss of access routes used in harvesting (access indicator)
- Development or activities may result in visual disturbance that could affect First Nations land users while undertaking land use activities (changes in environmental conditions indicator)

The cumulative effects for First Nations traditional plant and material harvesting were assessed as low to moderate magnitude, medium-term/reversible to permanent/irreversible in duration, and local to beyond regional in geographic extent. Cumulative effects were assessed as not significant.

First Nations Use of Culturally Important Sites and Areas

Cumulative effects were predicted for the First Nations use of culturally important sites and areas criteria:

- Disturbance may remove currently available lands or site-specific locations that are relied on for First Nations harvesting (sites and areas indicator)
- Development or activities may result in a loss of access routes used to visit sites and areas (access indicator)
- Development or activities may result in visual disturbance that could affect First Nations land users while undertaking land use activities (changes in environmental conditions indicator)

The cumulative effects for First Nations use of culturally important sites and areas were assessed as low to moderate magnitude, medium-term/reversible to permanent/irreversible in duration, and local to regional in geographic extent. Cumulative effects were assessed as not significant.

Métis Way of Life

Cumulative effects were predicted for the Métis way of life criteria:

- Development or activities may result in disruption or loss access routes critical to Métis mobility (disruption or loss of areas or routes critical to Métis mobility indicator)
- Development or activities may result in visual disturbance that would result in a conflict with Métis familial or community teaching and transmission (land use conflicts with familial or community teaching and transmission indicator)
- Direct disturbance or avoidance of development may result in a loss of cultural or spiritual areas that are key to Métis way of life (damage or loss of key spiritual areas to Métis way of life indicator)

The cumulative effects for Métis way of life were assessed as low to moderate magnitude, medium-term/reversible to permanent/irreversible in duration, and local to regional in geographic extent. Cumulative effects were assessed as not significant.

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Métis Harvesting

Cumulative effects were predicted for the Métis harvesting criteria:

- Disturbance, both direct and indirect may result in the loss, alteration or avoidance of Métis harvesting sites or access routes (reduce access to preferred locations of harvest indicator)
- Development or activities may result in visual disturbance that could affect Métis land users while undertaking land use activities (changes to known harvesting conditions required for continued harvest indicator)
- Disturbance, both direct and indirect may result in changes on resource availability (wildlife or vegetation) relied on by Métis harvesters (loss or alteration of key cultural species harvested indicator)

The cumulative effects for Métis harvesting were assessed as negligible to moderate magnitude, medium-term/reversible to permanent/irreversible in duration, and local to beyond regional in geographic extent. Cumulative effects were assessed as not significant.

Socio-economics

Baseline Conditions

The population of the Districts of Thunder Bay and Algoma has declined in recent years from 150,860 and 118,567 (respectively) in 2001 to 146,057 and 115,870 in 2011. The Indigenous population of the Districts of Thunder Bay (17,130) and Algoma (13,145) represents 11.6 percent of the total population of the combined districts. The Indigenous communities in the Project study areas are small (i.e., populations of less than 1,000) but are typically experiencing an increase in population. Most of the Indigenous communities in the Project study areas have experienced population growth of over 10 percent between 2001 and 2011. In the District of Thunder Bay, Métis make up 18 percent (3,050) of the total Indigenous population (17,130). The Métis population of the District of Algoma (3,540) is larger, representing 27 percent of the total district Indigenous population.

The labour force in the Project study areas decreased between 2006 and 2011. In 2011, the Districts of Thunder Bay and Algoma had an Indigenous labour force of 12,490. In 2011, the majority (80 percent to 85 percent) of employment in the communities in the Project study areas was in service producing occupations that are largely within the tertiary sector of the economy. Goods producing occupations accounted for the remaining 15 percent to 20 percent of employment in 2011.

There is a diverse range of industrial activity in the Districts of Thunder Bay and Algoma, with companies supplying goods and services to residents, industrial, commercial, and construction operations and projects in the region. The mining and forestry industries have been the primary drivers of regional economic development, and were established in Northwestern Ontario in the late 1800s. The service industry and labour market in the Project study areas have developed in response to demand created by these industries. The City of Thunder Bay is northwestern Ontario's main commercial, public services, and government administration centre. While its economy historically has had a large natural resource industry presence, the city has been moving towards a diversified, knowledge-based economy in recent decades.

Most housing in the communities in the Project study areas is owned, with less than 15 percent of the total private dwellings operating as rental units. The exceptions to this are the Municipality of Wawa and Township of Schreiber, where rental accommodations account for nearly a quarter of private dwellings. There are a number of hotels, motels, and inns along the preferred route.

Average Annual Daily Traffic on Highway 17 between the City of Thunder Bay and Municipality of Wawa is low compared to sections near larger urban centres. There are several small airports, heliports, and airstrips in the Project study areas.

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Fire services are available in the Project study areas through both paid and volunteer fire departments. Regional emergency medical services are available throughout the Project study areas. At the eastern end of the Project study areas, emergency medical services are provided by the Algoma District Paramedic Service, while Superior North services communities in the western portion of the Project study areas. The Ontario Provincial Police provide policing services through the Project study areas, with detachments in many of the communities. The Anishinabek Police Service polices the Pic Mobert First Nation, Biigtigong Nishnaabeg, Fort William First Nation, Biinjitiwaabik Zaaging Anishinaabek First Nation (Rocky Bay), and Ginoogaming First Nation, while the Lake Helen Police Department serves the Red Rock Indian Band. Along with the Ontario Provincial Police, the Thunder Bay Police Service provides protective, investigative, and court services to the City of Thunder Bay.

Recreation services are abundant throughout the Project study areas, including recreation centres, places of worship, arenas, golf courses, and various sporting facilities.

Net Effects

The criteria identified for socio-economics are labour market, economic development, government finances, temporary accommodations, services and infrastructure, and community well-being.

Labour Market

A net effect was predicted for employment and incomes indicator:

- Generation of employment and incomes

The net effects for labour market were assessed as low magnitude, short-term/reversible duration, and local to regional in geographic extent. Net effects were assessed as not significant.

Economic Development

A net effect was predicted for contracting and procurement indicator:

- Generation of business opportunities and revenues

The net effects for economic development were assessed as low magnitude, short-term/reversible duration, and local to regional in geographic extent. Net effects were assessed as not significant.

Government Finances

A net effect was predicted for the taxes, rents and other revenue streams indicator:

- Change in government revenues

The net effects for government finances were assessed as low magnitude, long-term/reversible duration, and local to regional in geographic extent. Net effects were assessed as not significant.

Temporary Accommodations

A net effect was predicted for the availability of temporary accommodations indicator:

- Increase in demand for temporary accommodation

The net effects for temporary accommodations were assessed as negligible magnitude, short-term/reversible duration, and local in geographic extent. Net effects were assessed as not significant.

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Services and Infrastructure

A net effect was predicted for the capacity of emergency and protective services indicator:

- Increase in demand on emergency and protective services

A net effect was predicted for the road traffic volumes and operating capacity indicator:

- Increase in use of transportation infrastructure

A net effect was predicted for the capacity of air and shipping services indicator:

- Increase in use of transportation infrastructure

A net effect was predicted for the capacity of water, waste and energy services (taking into consideration change in demand with respect to available supply) indicator:

- Increase in demand for water, waste and energy infrastructure

The net effects for services and infrastructure were assessed as negligible to low in magnitude, short-term/reversible duration, and local in geographic extent. Net effects were assessed as not significant.

Community Well-Being

A net effect was predicted for the air quality indicator:

- Nuisance effects from changes in air quality

A net effect was predicted for the ambient noise levels indicator:

- Nuisance effects from changes in ambient noise levels

A net effect was predicted for the Exposure of workers and the public to physical hazards and accidents indicator:

- Risks to worker and public safety

The net effects for community well-being were assessed as negligible magnitude, short to long-term/reversible duration, and local in geographic extent. Net effects were assessed as not significant.

Cumulative Effects Assessment

Labour Market

A cumulative effect was predicted for the labour market criteria:

- The Project combined with other developments may create employment opportunities (employment and incomes indicator)

The cumulative effect for labour market was assessed as low magnitude, short-term/reversible duration, and local to regional in geographic extent. Cumulative effects were assessed as not significant.

Economic development

A cumulative effect was predicted for the economic development criteria:

- The Project combined with other developments may create business opportunities (contracting and procurement indicator)

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The cumulative effect for economic development was assessed as low magnitude, short-term/reversible duration, and local to regional in geographic extent. Cumulative effects were assessed as not significant.

Government Finances

A cumulative effect was predicted for the government finances criteria:

- The Project combined with other developments may create government revenue streams (taxes, rents and other revenue streams indicator)

The cumulative effect for government finances was assessed as low magnitude, long-term/reversible duration, and regional in geographic extent. Cumulative effects were assessed as not significant.

Services and Infrastructure

Cumulative effects were predicted for the services and infrastructure criteria:

- The Project combined with other developments may increase traffic volume on Highway 17 (Road traffic volumes and operating capacity indicator)
- The Project combined with other developments may support air and port shipping services (capacity of air and shipping services indicator)
- The Project combined with other developments may increase demand for water, waste and energy infrastructure (capacity of water, waste and energy services indicator)

The cumulative effects for services and infrastructure were assessed as negligible to moderate magnitude, short-term/reversible duration, and local in geographic extent. Cumulative effects were assessed as not significant.

Community Well-being:

Cumulative effects were predicted for the community well-being criteria:

- The Project combined with other developments may generate dust, odours and noise impacting sensitive receptors (air quality and ambient noise levels indicator)

The cumulative effect for community well-being was assessed as negligible to moderate magnitude, short-term/reversible duration, and local in geographic extent. Cumulative effects were assessed as not significant.

Non-traditional Land and Resource Use

Baseline Conditions

The Ministry of Natural Resources and Forestry is responsible for managing all provincial Crown lands and administering Crown Land Use Policy Atlas land use direction, guidance, management plans and management statements for parks and protected areas.

The Project footprint crosses, from west to east, the Municipality of Shuniah, the Township of Dorion, the Township of Red Rock, the Township of Nipigon, Pays Plat First Nation, the Township of Schreiber, the Township of Terrace Bay, the Town of Marathon, Michipicoten First Nation, the Township of White River and the Municipality of Wawa. Lands and resources within the boundaries of municipalities are managed through municipal Official Plans and land use designation schedules identifying permitted activities, while First Nation communities are managed by their respective Band Councils (with Indigenous and Northern Affairs Canada providing land management services and retaining legal title). No publicly available land use plans outlining specific designations were publicly established at time of writing by Michipicoten or Pays Plat First Nations.

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The Project footprint crosses five provincial parks and three conservation reserves: Lake Superior National Marine Conservation Area, Black Sturgeon River Provincial Park, Pukaskwa River Provincial Park, Nimoosh Provincial Park, Ruby Lake Provincial Park, the Gravel River Provincial Nature Reserve, Kwinkwaga Ground Moraine Uplands Conservation Reserve, Kama Cliffs Conservation Reserve, and Gravel River Conservation Reserve. One Candidate ANSI (the Magpie River/Terraces), two Enhanced Management Areas (the Northeast Superior Recreation Access Area and the Lake Superior Shoreline), the Kwinkwaga Ground Moraine Uplands Forest Reserve, and five research plots are crossed by the Project footprint.

The preferred route ROW parallels the existing Hydro One East-West Tie and an existing 115 kV transmission line for 326.2 kilometer (73.1 percent of the length). The total preferred route right-of-way, and therefore, the Project footprint intersects 28 active utility line segments, defined as “linear utility features for providing services for power, water, communications, or heating fuel” (e.g., communication lines, distribution lines, natural gas pipelines, water pipelines, and transmission lines), and 10 railway segments.

The Project is in Ministry of Natural Resources and Forestry regulated Wildlife Management Units, Bear Management Areas, trapline areas, and Fishery Management Zones and Bait Harvest Areas. Fishing, hunting, trapping and guided outfitting are actively and extensively practiced, in the Project study areas. Lodges and outpost camps for guided fishing are common throughout the Project study areas.

Canoe route, portage, snowmobile/all-terrain vehicles, and hiking trail infrastructure is extensive and represents a key recreational and tourism resource in the non-commercial and commercial (consumptive and non-consumptive) study areas. Five Ontario Trail Network and 70 non- Ontario Trail Network trail segments are also transected by the Project footprint. Aquatic recreation, motorized recreation, and camp, cabin, and cottage sites are common in the Project study areas. The commercial (consumptive and non-consumptive) land and resource use study areas also overlap the 13b and 13c regional tourism organizations established by the Ministry of Tourism Culture and Sport.

Forestry, mining, aggregate extraction, and waterpower represent key commercial industry land uses occurring in the Project study areas. Eight forestry management units, one active mine, and 103 active mining claims are transected by the Project footprint.

Net Effects

The criteria identified for non-traditional land and resource use are parks and protected areas, non-commercial recreational land and resource use, and commercial land and resource use.

Parks and Protected Areas

A net effect is predicted for the parks and protected areas access and use indicator:

- Reduction and increase to access to parks and protected areas

A net effect is predicted for the parks and protected areas environmental setting indicator:

- Change to environmental setting due changing environmental conditions

A net effect is predicted for the natural, cultural and recreational values of parks and protected areas indicator:

- Change to natural, cultural and recreational features which could affect natural, cultural and recreational values within parks and protected areas

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The net effects for parks and protects areas were assessed as negligible to moderate magnitude, short-term/reversible to permanent/irreversible duration, and local in geographic extent. The net effects for parks and protects areas were assessed as not significant.

Non-Commercial Recreational Land and Resource Use

A net effect is predicted for the non-commercial recreational land and resource use and access indicator:

- Reduction and increase to access to non-commercial recreation areas

A net effect is predicted for the non-commercial recreational environmental setting indicator:

- Change to environmental setting due changing environmental conditions

A net effect is predicted for the non-commercial recreational fish and wildlife harvest levels indicator:

- Reduction or increase to harvest levels due to changes in wildlife and fish abundance and distribution

The net effects for non-commercial recreational land and resource use were assessed as negligible to moderate magnitude, short-term/reversible to permanent/irreversible duration, and local to regional in geographic extent. The net effects for non-commercial recreational land and resource use were assessed as not significant.

Commercial Land and Resource Use

A net effect is predicted for the commercial industrial land and resource use and access indicator:

- Reduction or alteration to access to commercial industry areas

A net effect is predicted for the commercial recreational land and resource use and access indicator:

- Reduction and increase to access to commercial recreation areas

A net effect is predicted for the commercial recreational environmental setting indicator:

- Change to environmental setting due changing environmental conditions

A net effect is predicted for the commercial recreational fish and wildlife harvest levels indicator:

- Loss or alteration of wildlife and fish resource harvest due to changes in wildlife and fish abundance and distribution

A net effect is predicted for the commercial forestry land and resource use and access indicator:

- Reduction in production forest area due to area being unavailable for timber production.

The net effects for commercial recreational land and resource use were assessed as negligible to moderate magnitude, short-term/reversible to permanent/irreversible duration, and local to regional in geographic extent. The net effects for commercial recreational land and resource use were assessed as not significant.

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Cumulative Effects Assessment

Parks and Protected Areas

Cumulative effects were predicted for the parks and protected area criteria:

- The Project combined with other developments may act to change access and use of provincial parks and protected areas (change to access and use of parks and protected areas indicator)
- The Project combined with other developments may act to change the visual environment, acoustic environment, or air quality environment to affect park and protected areas users' experience (change to parks and protected area experience due to changes in environmental conditions [e.g., noise, air quality, visual resources] indicator)

The cumulative effects on parks and protected area criteria ranged negligible to low magnitude, permanent/irreversible duration, and regional geographic extent. Cumulative effects were assessed as not significant.

Non-commercial Recreational Land and Resource Use

Cumulative effects were predicted for the non-commercial recreational land and resource use criteria:

- The Project combined with other developments may act to reduce and/or expand lands available for recreational land and resource use (Change to non-commercial recreational land and resource access and use indicator)
- The Project combined with other developments may act to change the visual environment, acoustic environment, or air quality environment to adversely affect recreational land and resource use experience (Change to non-commercial recreational experience due to changes in environmental conditions [e.g., visual resources, noise, air quality] indicator)

The cumulative effects on non-commercial recreational land and resource use criteria ranged from negligible to low magnitude, short-term/reversible to permanent/irreversible duration, and regional geographic extent. Cumulative effects were assessed as not significant.

Commercial Recreational Land and Resource Use

Cumulative effects were predicted for the commercial land and resource use criteria:

- The Project combined with other developments may act to reduce and/or expand lands available for commercial (consumptive and non-consumptive) land and resource use (change to commercial (consumptive and non-consumptive) land and resource use and access indicator)
- The Project combined with other developments may act to change the visual environment, acoustic environment, or air quality environment to affect commercial (consumptive or non-consumptive) land user experience (change to commercial experience due to changes in environmental conditions [e.g., noise, air quality, visual resources] indicator)
- The Project combined with other developments will result in a reduction in production forest area in the Kenogami Forest Management Unit (commercial forestry land and resource use and access indicator)

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The cumulative effects on commercial recreational land and resource use criteria ranged from negligible to low magnitude, long-term/reversible to permanent/irreversible duration, and regional geographic extent. Cumulative effects were assessed as not significant.

Visual Environment

Baseline Conditions

The regional setting of the Project is characterized by northern Ontario's Boreal Shield ecozone along the northern shore of Lake Superior. The topography of this area consists of generally rolling, hilly terrain and rugged steep topography with depressions and deposits that form the region's numerous lakes, ponds, and wetlands. This physiography is covered by dense boreal forest at various stages of post-disturbance succession and consists of a repeating mosaic of mixed coniferous and deciduous forest and wetland communities. Mining, forestry, transmission infrastructure, and hydroelectric power generation are evident land uses in the area. Settlement patterns occur primarily along Highway 17 at the communities of Thunder Bay, Nipigon, Schreiber, Terrace Bay, Marathon, White River, and Wawa. Recreational and tourism activities are available in the region's numerous provincial parks, recreation areas, and waterways.

A number of viewing opportunities are found in the Project study areas, with publicly frequented and accessible locations situated along or near Highway 17. Highway 17 travels west–east generally along the northern shoreline of Lake Superior and is a popular travel and tourist route (i.e., the Trans-Canada Highway) with a number of scenic viewpoints looking toward Lake Superior. The communities of Thunder Bay, Dorion, Nipigon, Schreiber, Marathon, White River, and Wawa are located along Highway 17 as well as numerous unincorporated communities and rural residences.

Views of the natural landscape features in the Project study areas include generally undulating to hilly terrain and distinct topographical features, such as steep-cliff rock formations in landscape units 4W and 3W west of the Town of Marathon. The rugged shoreline of Lake Superior, which includes numerous bays and flat outwash plains, and areas that include more distinct landforms or water features such as steep cliffs or flowing rivers, result in localized areas of high scenic quality. Gentler rolling or flat relief scattered with broken ground moraine features and smaller lakes characterize the terrain east of Marathon in landscape units 3E and 4E. Mixed coniferous forest and patterns of existing land use related to mining, timber harvesting, agriculture, and transmission and transportation corridors are evident throughout the Project study areas.

A concentration of settlements, parks, and recreation sites exist between Marathon and Thunder Bay that have opportunities for panoramic views of distinct landscape features and Lake Superior. This results in a generally high sensitivity to visual change in this area that has been expressed during consultation. The area between the Town of Marathon and the Municipality of Wawa features fewer settlements and fewer recreational or tourism-related viewing opportunities. The preferred route right-of-way is also located in more remote portions of the landscape. Overall, residents, recreational users, and tourists are likely to have moderate sensitivity to visual effects in this area.

Net Effects

The criterion identified for visual environment is visual quality. The indicators identified for visual environment are visibility of the Project and visual contrast of the Project relative to the existing landscape.

Visual Quality

A net effect is predicted for the visibility of the Project indicator:

- Visibility of disturbance to the existing visual quality

A net effect is predicted for the visual contrast of the Project relative to the existing landscape indicator:

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- Contrast with the existing visual quality

The net effects for visual quality were assessed as low magnitude, permanent/irreversible duration, and local in geographic extent. Net effects were assessed as not significant.

Cumulative Effects Assessment

Visual Quality

A cumulative effects was predicted for the visibility of the project indicator:

- Visibility of disturbance to the existing visual quality

A cumulative effect was predicted for the Visual contrast of the Project relative to the existing landscape indicator:

- Contrast with the existing visual quality

Cumulative effects for visual quality were assessed as low to moderate in magnitude, permanent/irreversible duration, and local in geographic extent. Cumulative effects were assessed as not significant.

Human Health

Baseline Conditions

Air quality, groundwater and surface water quality baseline conditions within the Project study areas were considered in the human health baseline characterization based on their known potential to contribute to changes in human health, and the possibility that the Project may affect these environmental components.

Surface water quality in the Project study area generally meets relevant guideline values, with the exception in a number of cases for some metals (i.e., aluminium, cadmium, and iron), phosphorus, total suspended solids, and turbidity. Groundwater quality often exceeds Ontario Drinking Water Standards for the parameters available from Ministry of Environment and Climate Change; however groundwater quality is considered typical for the geology of the area.

Air quality monitoring data indicate that background air quality surrounding the Project is below the relevant provincial and federal ambient air quality guidelines, criteria and standards.

A detailed description of existing conditions for human health as it relates to air quality is provided in the Human Health Risk Assessment, and is summarized below:

- Potential human health risks from contaminant of potential concern in air with available background concentrations were considered to be negligible (i.e., hazard quotients were less than one; hazard quotients = 0.17 for oxides of nitrogen (NO_x) [as nitrogen dioxide {NO₂}] for the 1-hour averaging period, hazard quotients = 0.28 for particulate matter less than 10 micrometre in diameter (PM₁₀) for the 24-hour averaging period).
- For diesel particulate matter for the annual averaging period, potential human health risks could not be determined because background air concentrations were not available.

Net Effects

The criterion identified for human health is human health. The indicator identified for human health is Changes in environmental quality, including surface water, groundwater, and air quality, and specifically contaminant concentrations in these media that could affect human health.

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Human Health

A net effect is predicted for the changes in environmental quality, including surface water, groundwater, and air quality, and specifically contaminant concentrations in these media that could affect human health indicator:

- Reduced air quality may affect human health

The net effects for human health were assessed as negligible magnitude, short-term/reversible duration, and local in geographic extent. Net effects were assessed as not significant.

The predicted net effect on human health is not anticipated to result in a change to the criteria that will alter the sustainability of the criterion beyond a manageable level and the net effects do not result in changes that are not in accordance with provincial and federal guidelines. Therefore, the predicted net effect on human health is assessed as not significant.

Cumulative Effects

The net effect on human health from a reduction in air quality was predicted to be unlikely, therefore, a cumulative effects assessment was not completed for this net effect

Summary of Predicted Effects

A tabular summary is provided of the results of the Project net effects assessment (Table 22-1) and cumulative effects assessment (Table 22-2).

Monitoring, Commitments, and Environmental Protection Planning

A preliminary construction monitoring program is proposed for geology, terrain and soils, surface water, air quality, vegetation and wetlands, fish and fish habitat, wildlife and wildlife habitat, and traditional land and resource use. Monitoring programs may be required if archaeological or cultural heritage resources are identified and mitigation by avoidance and protection is undertaken.

A plan for how and when commitments made in the amended Environmental Assessment Report will be fulfilled, and how NextBridge will report to the Ministry of the Environment and Climate Change regarding compliance, is provided.

Summary and Conclusions

The incremental effects associated with the Project can be effectively mitigated by standard and specific environmental protection measures based on the findings of the amended Environmental Assessment and implementation of planned mitigation measures.

Adverse net effects associated with the Project, in combination with past, existing, certain/planned, and reasonably foreseeable developments, have been determined to be significant for two wildlife and wildlife habitat criteria: woodland caribou and little brown myotis and northern myotis. Other adverse net environmental effects associated with the Project are predicted to be not significant.

Development of the Project is expected to result in economic benefits in the form of potential job creation, contracts, business opportunities, and the purchase of goods and services.