August 2017

UPDATED PROJECT DESCRIPTION

Pikangikum Distribution Line Project

Submitted to:
Wataynikaneyap Power L.P.

REPORT

Project Number: 1657738

Distribution:

1 e-copy - Wataynikaneyap Power L.P.
1 e-copy - Ministry of Natural Resources and Forestry
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1.0 INTRODUCTION

Wataynikaneyap Power Limited Partnership (Wataynikaneyap) is proposing to construct, operate and maintain a 44 kV and 25 kV distribution line, the Pikangikum Distribution Project (the Project). The Project will provide a distribution connection between Pikangikum First Nation and the existing transmission system from Red Lake, Ontario. The Project is located in northwestern Ontario (Figure 1).

The Pikangikum First Nation successfully completed a federal environmental screening assessment under the previous *Canadian Environmental Assessment Act* (CEAA) (1992); and a screening under the Ministry of Natural Resources and Forestry Class Environmental Assessment Resource Stewardship and Facility Development (MNRF RSFD) screening under Category B in 2009. The 2009 federal screening environmental assessment (EA) concluded no significant impacts and received approval under Section 16 of CEAA. The Project has not yet commenced. Wataynikaneyap, as the new Project proponent, has developed a revised Project design, based on engagement results, First Nation community preference and design engineering (Figure 2).

More than five years have elapsed since the EA Statement of Completion was issued by the MNRF in August 20, 2009. Therefore, under the MNRF RSFD Class EA there is a requirement to provide an updated Project Description (PD). In addition, the Project crosses dedicated protected areas (DPAs) that were not identified or in force in 2009. Therefore, the MNRF Class EA for Provincial Parks and Conservation Reserves (PPCR) now also applies.

This updated PD has been prepared for submission to the MNRF in accordance with the content requirements for an updated PD identified in the MNRF letter dated October 27, 2016 (Appendix A), scope clarification meetings with the MNRF during engagement and the requirements of the PPCR Class EA. This PD includes the following main components:

- Project purpose and rationale;
- Project proponent;
- Environmental assessment regulatory requirements;
- Project details, including highlighting Project detail revisions since the 2009 Statement of Completion issuance;
- Existing baseline overview, effects assessment and mitigation;
- Summary of potential permits and approvals;
- Species at Risk Report (Appendix B);
- Aboriginal Engagement Plan (Appendix C); and
- Stage 1 Archaeology Assessment (Appendix D).

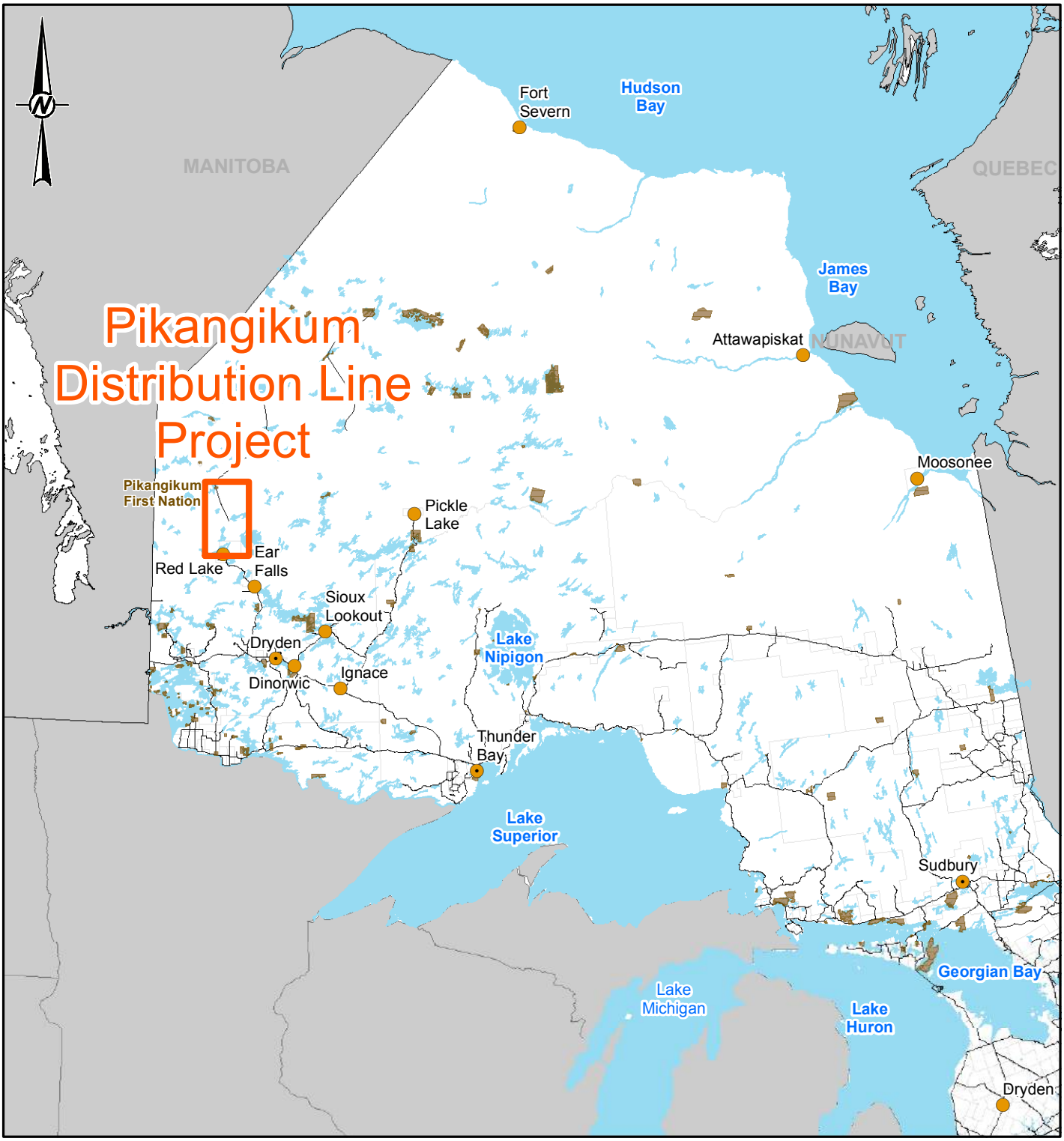
2.0 PROJECT PURPOSE AND RATIONALE

Pikangikum First Nation (Pikangikum) is a remote settlement approximately 100 km north of Red Lake in Northwestern Ontario (MNRF Red Lake District). The community has a reserve land base of 1,808 ha with no year-round road access. The purpose of the Project is the construction and operation and maintenance of a power line and associated distribution station (substation) that will connect Pikangikum with the provincial electrical grid at Red Lake; thereby meeting one of the priorities identified in Ontario's *Long-Term Energy Plan* (LTEP) (Ministry of Energy 2013).

Pikangikum currently relies upon a diesel generating station to provide electricity to the community. It frequently operates near, at, or above rated capacity, thereby constraining basic infrastructure such as sewage and running water, as well as housing growth in accordance with a growing population. This diesel generation has proven over time to be unreliable; the outcomes of a system failure are inconvenient and costly. Fuel costs have increased in recent years and the resulting high cost to the community has a net effect of reducing funds available for the maintenance of other community infrastructure assets. An additional Project benefit is the reduction of greenhouse gases (GHG) as a result of reduced reliance on diesel generator. The Project will also serve to mitigate risks and costs associated with the existing generating system by providing access to more affordable and consistent electricity while providing additional power to meet future increases in electrical load, thereby supporting Pikangikum's socio-economic growth.

3.0 PROJECT PROPONENT

Wataynikaneyap is the proponent for this Project. Wataynikaneyap is a transmission company equally owned by 22 First Nations communities in partnership with FortisOntario Inc. The company will develop, own, and operate new transmission facilities in Northwestern Ontario in order to connect 17 remote First Nation communities currently powered by diesel generation. On August 4, 2016, Pikangikum First Nation joined Wataynikaneyap and mandated Wataynikaneyap to develop the Pikangikum Distribution Line Project on an expedited basis.



LEGEND

- City
- Town
- Highway
- First Nation Reserve Land
- Waterbody

0 100 200
1:7,500,000 KILOMETERS

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
PROJECT LOCATION

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-09-14
DESIGNED	JMC
PREPARED	JMC
REVIEWED	KS
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1544751	####	####	1

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Pikangikum First Nation
Peekahchekahmeewee Sahkaheekahn Pikangikum Lake
Peekwatahmaewee Sahkaheekahn
BEEKAHNCHEEKAHMEENG DEEBAHNCHEEKAYWEEHN EENAHOHNAHNUHN
Throat River
Berens River
Berens River
B2
200m
Pahkayyahkahmahk Silcox Lake
B1
500m
Murfitt Lake
Kavanagh Lake
Peekwatahmaewee Sahkaheekahn/Berens Lake
BEEKAHNCHEEKAHMEENG DEEBAHNCHEEKAYWEEHN EENAHOHNAHNUHN
Wyman Lake
Dowling River
Prideaux Lake
Hornblendite Lake
Dowling Lake
Wagin River
Boughton Lake
Stormer Lake
SAHKEESUHKUH WEESUHKAHEEGAHN
500m
Storey Lake
WEESKAYJAHK OHTAHZHOGANEENG
Wagin Lake
Harding Lake
Wahshaykahmeesheeng Kirkness Lake
BEEKAHNCHEEKAHMEENG DEEBAHNCHEEKAYWEEHN EENAHOHNAHNUHN
e Lake
Stormer Lake
K1
200m
Philp Lake
Pedlar Lake
Stormer Wilderness Camp Ltd.
K2
200m
Woodey Lake
Ooshkahtahkahwee Sahkaheekahn Nungesser Lake
Kirkness Creek
Teeple Lake
Openshaw Lake
Farrer Lake
Borel Lake
200m
Hanton Lake
Kotyk Lake
Phillips Lake
Odin Lake
Zimring Lake
WOODLAND CARIBOU PROVINCIAL PARK
Reigate Lake
Hakala Lake
Trough Lake
KAHNAHMAYKOOSAYSEEKAHK
Little Vermilion Lake
Coli Lake
Sidace Lake
200m
100m
Kahnahmaykoosaysensikahk Valhalla Lake
30m
Anderson Lake
Nungesser River
N1
200m
Rathouse Lake
N2
Trout Lake
Corallen Lake
Alford Lake
Walsh Lake
TROUT LAKE PROVINCIAL PARK
Otter Lake
Hammell Lake
Para Lake
Balmer Lake
Ranger Lake
Troutlake River
Little Trout Lake
Red Lake
Parker Lake
Red Lake
Chukuni River
Gullrock Lake

LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Recreation Point
- Tourism Establishment Area
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- 2009 Proposed Distribution Line Route
- Pikangikum Distribution Study Corridor - Current Route
- Pikangikum Distribution Study Corridor - Option A
- Pikangikum Distribution Study Corridor - Option B
- Substation Area
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Dedicated Protected Area
- Provincial Parks

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. IMAGERY: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY, AND LIDAR PROVIDED BY RES
3. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
4. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
5. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
6. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 5 10
1:270,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
REVISED PROJECT DESIGN AND PREVIOUS ALIGNMENT

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-06-15
DESIGNED	JMC
PREPARED	JMC
REVIEWED	BT
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
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4.0 ENVIRONMENTAL ASSESSMENT REGULATORY REQUIREMENTS

4.1 Provincial

4.1.1 Ministry of Natural Resources and Forestry Class Environmental Assessment for Resource Stewardship and Facility Development

In 2009, a screening matrix under the MNRF Class EA for RSFD was completed (Appendix A) and included in the federal screening document compiled for the project (INAC 2009). Since more than five years have passed since the Statement of Completion was issued by the MNRF in 2009, Section 5.7 “Proceeding with Projects – After Statement of Completion of the MNRF RSFD” and Section 5.8 “Modification to Project Files or ESRs” apply. Under these sections, the MNRF is required to review and document any changes that may have taken place since the initial Statement of Completion was issued on August 20, 2009. Section 8.0 provides an assessment of effects of changes that have taken place since the initial Notice of Completion of the project was issued (i.e., environmental conditions, new government policies, changes in the project design).

4.1.2 Ministry of Natural Resources and Forestry Class EA for Provincial Parks and Conservation Reserves

A portion of the Project crosses the Beekahncheekahmeeng Deebahncheekayweehn Eenahohnahnuhn DPA (BDE DPA) which was regulated under the *Provincial Parks and Conservation Reserves Act* (*PPCRA*) (2006) in 2011. The BDE-DPA was regulated after the Statement of Completion under RSFD Class EA was filed. Therefore, the project is now subject to the requirements of the PPCR Class EA. Section 8.2 provides an assessment of the Project effects to the DPA; and includes an alternatives analysis, which is a requirement under this Class EA and the *PPCRA.*

4.2 Canadian Environmental Assessment Act

The *Canadian Environmental Assessment Act, 2012* (CEAA) (Agency 2012) came into force on July 6, 2012. According to the *Regulations Designating Physical Activities* under CEAA 2012, a federal EA is to be undertaken for transmission projects that:

- include construction, operation, decommissioning and abandonment of a transmission line in a wildlife area (as defined under the *Wildlife Area Regulations*) or migratory bird sanctuary (as designated under the *Migratory Bird Sanctuary Regulations*); or
- include construction, operation, decommissioning and abandonment of a transmission line with a voltage of 345 kV or more that is 75 km or more in length on a new right-of-way (ROW).

The Project is not captured by the Regulations Designating Physical Activities as the voltage of the transmission line is below 345 kV and the preliminary proposed corridor or corridor alternatives are not located within a wildlife area, as defined under the *Wildlife Area Regulations,* or migratory bird sanctuary, as designated under the *Migratory Bird Sanctuary Regulations*.

A portion of the Project is located on the Pikangikum First Nation Reserve land; and is subject to Section 67 of the *Canadian Environmental Assessment Act* which states:

> *"An authority must not carry out a project on federal lands, or exercise any power or perform any duty or function conferred on it under any Act of Parliament other than this Act that would permit a project to be carried out, in whole or in part, on federal lands, unless:*
>
> *1) the authority determines that the carrying out of the project is not likely to cause significant adverse environmental effects; or*
>
> *2) the authority determines that the carrying out of the project is likely to cause significant adverse environmental effects and the Governor in Council decides that those effects are justified in the circumstances under subsection 69(3)."*

5.0 PROJECT DETAILS

The Project includes the construction, operation and maintenance of a 44 kV and 25 kV power line that will connect Pikangikum to the provincial power grid. The line will originate from an existing 44kV feeder on the Nungesser Road, approximately 2 km from its intersection with Highway 125, and travel north to Pikangikum First Nation community. Construction is anticipated to begin in August 2017, after acquisition of required permits and approvals; and may take up to 14 months depending on environmental conditions and restrictions, and equipment procurement lead times.

5.1 Project Components

The following main project components will be constructed, operated and maintained:

Power Line and Associated Structures

The power line includes approximately 97 km of 44 kV and 18 km of 25 kV of overhead single circuit line and associated components. The northern approximately 91 km of the 44 kV portion of the line will be designed and built to be able to operate at 115 kV, in the future should separate approvals be obtained for such higher voltage operation. Line structures will be a combination of single-pole, double-pole (H-frame), and/or triple-pole (possible at sharp corners, water crossings, or long spans). Poles may be wood, metal, concrete, resin, or a hybrid concrete-steel hybrid.

Subject to surveying, geotechnical analysis, preliminary design, and a land rights assessment, approximately 32 km of the southern-most section of line is expected to be constructed on single poles in and/or adjacent to the existing Nungesser Road ROW. A major portion of the power line structures and associated conductors and anchors will be installed within or adjacent to the road ROWs. The limits of work for the power line is identified on Figure 2. Any requirements for poles or anchors outside of the power line ROW will be appropriately dealt with as they occur in the field during detailed design.

The limits of work were identified taking into account environmental constraints (e.g., known woodland caribou habitat use areas), available traditional land and resource use information and engagement input.

Access Roads

Existing access options are relatively abundant and their utilization will be maximized in the final Project design as a means of minimizing potential Project effects. Primary access will be from Nungesser Road, the Pikangikum All-Season Road, and any newly cleared portions of all-season roads that are planned to be constructed under the Whitefeather Forest Management Plan. Approved Whitefeather Forest Management Plan all-season roads or clearings will be utilized (if constructed) to access the existing utility clearing on the north side of the Berens River and the proposed substation area. An ice crossing across the Berens River may also be utilized should ice conditions permit. No new access apart from the Project ROW clearing are anticipated to be constructed for the Project.

Substation

A distribution station (substation) is proposed to be located south of the Berens River (Figure 2). The location is proposed to avoid having to transport materials and equipment across the Berens River and/or along the existing utility clearing running east out of Pikangikum First Nation; and therefore reduce environmental effects to the river, and risks to the Project schedule. The substation will have an approximately 70 m x 80 m footprint.

Helicopter Landing Pad and Staging Area

A helicopter landing pad and a permanent equipment staging area may be required at the substation location. A helicopter landing pad would have a minimum area of approximately 30 m x 30 m, subject to terrain and vegetation conditions as well as aeronautical approval requirements. In total, the staging area and helicopter pad require approximately 100 m x 100 m of cleared area in addition to the substation fenced area above.

Additional Temporary Project Components

Additional temporary Project components will be required during construction, which will include the following:

- **Aggregate Sources** – subject to geotechnical and engineering analysis, substation foundations and pole foundation backfill may consist of either native soil (if deemed suitable), or contain concrete and/or aggregate. Aggregate will be sourced from regulated (permitted or licenced) aggregate pits or will be taken from a new hole dug near the pole foundation hole for the purposes of swapping subgrade with the pole foundation hole. Concrete will likely be sourced from supplier(s) in Red Lake, or will be brought to the site in dry format and mixed in small quantity near each foundation hole using water provided from off-site delivery trucks.
- **Construction Worker Housing** – Construction workers may be housed in existing private accommodations such as the Stormer Lake Camp owned by Pikangikum First Nation, and / or in the Municipality of Red Lake, and/or in Pikangikum First Nation.

  If necessary, temporary accommodations may be established and separately permitted by the selected constructor. Should this be the case, the following activities are assumed:

  - Power source is anticipated to be a portable diesel generating station;
  - Water will be sourced from either off-site delivery trucks or separately permitted local source; and
  - All liquid and solid waste will be appropriately stored onsite and transported to facilities licensed to dispose of the waste. There will be no discharge of liquid waste from the temporary accommodation unless separately permitted and approved.

All applicable permits and approvals will be acquired for any temporary accommodation, should it be required.

- **Laydown Areas** – apart from the substation area, temporary laydown areas for the storage of materials and equipment will be located on existing cleared areas within the limits of work, or areas reachable by existing roads originating within the limits of work, with appropriate set back distances from sensitive environmental features (see Section 8.0).
- **Watercourse Crossing** – It is anticipated that there will not be a requirement for new watercourse crossings for Project construction as the ROW follows existing and planned roads or existing ROW area. If the planned Whitefeather Forest Management Plan roads are not constructed prior to construction timing of the Project, or the Whitefeather Forest Community Resource Management Authority is unable to construct the roads in accordance with their approvals; there may be a requirement for new watercourse crossings. If required, mitigation measures including minimizing removal of bank stabilizing vegetation where possible, will be employed during construction of the watercourse crossings considering MNRF's Environmental Guideline for Access Roads and Water Crossings (1990).
- **Refueling Areas** – refuelling areas will be located in the Municipality of Red Lake, the Pikangikum First Nation community, or other private facility unless separate permits are obtained for a temporary construction camp.

5.2 Changes to the Project Design Since 2009

Figure 2 illustrates the Project screened in 2009 and the current proposed Project (as well as current environment and land use). The primary revisions to the Project since the MNRF screening are as follows:

- The northernmost section of the current proposed power line has been revised based on feedback from Pikangikum Chief and Council, community Elders, and consultation with MNRF. Both the community and MNRF have indicated a preference to align the routing with existing impacted areas and plans for future infrastructure, such as existing utilities corridors and roads (Whitefeather FMP). This re-alignment follows an existing utility corridor on the north side of the Berens River, and eliminates a submarine cable that was part of the previous design. Wataynikaneyap abides by a Chief's directive to the community forbidding the implementation of submarine cables due to concerns of impacts to aquatic habitat.
- The previous assessment considered a 10-m-wide ROW clearing with larger areas cleared at corners. To avoid excessive line outages, damage repair, and vegetation trimming, the revised effects assessment conservatively assumes:
  - up to a 20 m wide expansion of the existing cleared road ROW for 1/3 length of the line that is south of the Berens River; and
  - a ROW width of up to 20 m from centre-line for the balance of the corridor that is not located within or adjacent to existing ROW.
- The substation is proposed to be at a different location (Figure 2). This location accommodates the new alignment of the northern portion of the route. Noise emissions associated with the substation are not anticipated to be substantially different from the original substation.

- There is no permanent in-water work associated with the power line; all power line watercourse crossings will be overhead.
- Construction housing at the Stormer Lake Camp (if elected by a constructor), in the Municipality of Red Lake, ON, in the Pikangikum First Nation, and/or temporary construction accommodation.
- The Project has been designed to avoid and minimize potential effects to identified traditional land and resource use activities and sites as have been identified during Aboriginal engagement (see separate Aboriginal Record of Engagement), built heritage and cultural heritage landscape (Section 8.4) and archaeology resources (Section 8.5).

5.3 Operations and Maintenance Activities

Upon commissioning, the Project will operate on a continuous basis. Maintenance activities will include regular inspection of the power line and associated infrastructure (including the substation), and any necessary repairs and vegetation management along the ROW. All operation and maintenance activities will be conducted in accordance with permits and regulations, as well as standards adopted by the Independent Electricity System Operator (IESO) which generally mirror those set by the North American Electric Reliability Corporation.

Operation of the Project involves the transfer of electricity through the conductors between the existing 44kV feeder on the Nungesser Road that marks the point of connection to the existing grid and the substation, where voltage will be stepped down to 25 kV, then from the substation to the connection to the existing distribution system in Pikangikum First Nation. The electrical equipment and facility systems will be remotely monitored and controlled using a Supervisory Control and Data Acquisition (SCADA)/Operational Data System.

The line will be inspected for signs of physical damage (e.g., broken or missing insulators), loose or eroded parts (e.g., bolts) and condition of the conductors (e.g., frayed or areas of reduced clearance) at intervals prescribed by the IESO using access along existing or planned roads as well as the ROW itself. The power line ROW will be patrolled at intervals prescribed by the IESO to identify any trees that could pose a risk to the line. Likewise, the substation will undergo an inspection program that meets the minimum requirements of the IESO.

Typical power line maintenance activities include minor adjustments and replacements (e.g., replacement of insulators). However, more extensive repairs may be required that could involve the replacement of poles, conductors, anchors, and/or guy wires, necessitating the use of heavy equipment such as backhoes, boom trucks, tracked off-road equipment, and/or cranes. Other maintenance to a lesser degree includes station service and protection re-verification, as well as grounds maintenance and snow removal. Emergency maintenance may be required in the event of bad weather or power outages.

It is expected that vegetation management will be conducted every three to eight years during Project operation for any given line segment, or as required for safety purposes. Vegetation will be controlled by mechanical cutting where minimum powerline height clearances are being encroached on. Vegetation management will also be applied at the substation, as required.

6.0 ABORIGINAL ENGAGEMENT AND TRADITIONAL LAND AND RESOURCE USE DATA

Details of the approach to engagement can be found in the Aboriginal Engagement Plan (Appendix C). Aboriginal engagement completed by Wataynikaneyap, including methods and results of traditional land and resource use (TLRU) data and information collection, is provided in a separate Aboriginal Record of Engagement. Cultural values are also discussed in the archaeology assessment section (Section 8.5). An assessment of potential effects of the Project on TLRU and Aboriginal values are addressed through Project design and avoidance, as identified in the screening table below (Section 9.0, Table 11).

7.0 EXISTING BASELINE OVERVIEW

The following section provides an overview of baseline conditions based on a review of existing data and information. Figure 3 illustrates existing environment and land use with respect to the Project. Further baseline characterization detail is provided under the disciplines identified in the sections below and supporting appendices (e.g., Appendix B - Wildlife Species at Risk Assessment).

7.1 Air Quality and Climate

There are no ambient monitoring stations within hundreds of kilometres of the proposed Project. Air quality is generally unimpaired due to the remoteness of the area from major urban centres or heavy industry. The largest cause of negative air quality is smoke from periodic forest fires.

The climate in the study area is typical of the mid-Boreal climatic zone with warm summers (ranging from 6.1 to 37.8 degrees Celsius) and cold winters (ranging from 9.3 to-46.1 degrees Celsius). Average annual precipitation is 716 mm (Environment Canada).

7.2 Aquatic Environment

The Project is located within the Hudson Bay drainage basin and more specifically, the Chikuni and Upper Berens tertiary watersheds within the English and Eastern Winnipeg secondary watersheds.

The proposed Project crosses the BDE (formerly Cultural Landscape Waterways) DPA, which is a regulated provincial park. This DPA is particularly associated with the waterways that the Project is proposed to cross, which includes the Berens River, Kirkness River and Nungesser River.

Degree of development in the area of the Project is limited and rivers and lakes are considered to be in their natural state. No identified provincially significant wetlands are crossed by the Project. The proposed line crosses Abalard Creek, Rindar Creek, Kirkness Creek, Nungesser River, Berens River and several small unnamed creeks.

A review of available information based on historical ranges and habitat requirements indicates there are at least 40 fish species known to inhabit the waterbodies and watercourses of the study area (Eakins 2012; Scott and Crossman 1973). These species include northern pike (*Esox lucius*), Walleye (locally known as Pickerel) (*Sander vitreus*), Sauger (*Sander canadensis*), Lake Trout (*Salvelinus namaycush*), Lake Whitefish (*Coregonus clupeaformis*) and Yellow Perch (*Perca flavescens*). All have wide distribution throughout the province of Ontario and are considered common to the region (Scott and Crossman 1973).

As per the MNRF letter dated April 7, 2016 regarding re-activation of the Class EA, Lake Sturgeon could potentially interact with the Project as they are present in both the Berens River and Pikangikum Lake. Lake Sturgeon (northwestern population) is listed as Threatened under the provincial ESA. The removal of the submarine crossing from the previous Project proposal has reduced the potential to affect this species.

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Pikangikum First Nation

BEEKAHNCHEEKAHMEENG DEEBAHNCHEEKAYWEEHN EENAHOHNAHNUHN

Peekwatahmaewee Sahkaheekahn

Peekahchekahmeewee Sahkaheekahn Pikangikum Lake

Dowling River

Hornblendite Lake

Dowling Lake

Wagin River

Prideaux Lake

Boughton Lake

Stormer Lake

WEESKAYJAHK OHTAHZHOGANEENG

Harding Lake

Wagin Lake

Wahshaykahmeesheeng Kirkness Lake

Pedlar Lake

Woodey Lake

Teeple Lake

Openshaw Lake

Ooshkahtahkahwee Sahkaheekahn Nungesser Lake

Borel Lake

Nungesser River

Odin Lake

WOODLAND CARIBOU PROVINCIAL PARK

Reigate Lake

Trough Lake

KAHNAHMAYKOOSAYSEEKAHK

Kahnahmaykoosaysensikahk Valhalla Lake

Little Vermilion Lake

Rathouse Lake

Corallen Lake

Alford Lake

Walsh Lake

TROUT LAKE PROVINCIAL PARK

Otter Lake

Hammell Lake

Para Lake

Balmer Lake

Ranger Lake

Troutlake River

Little Trout Lake

Red Lake

Parker Lake

Red Lake

Chukuni River

Gullrock Lake

Zimring Lake

Throat River

Berens River

Berens River

B2

200m

Pahkayyahkahmahk Silcox Lake

B1

500m

Murfitt Lake

Kavanagh Lake

Peekwatahmaewee Sahkaheekahn/Berens Lake

Wyman Lake

SAHKEESUHKUH WEESUHKAHEEGAHN

500m

Storey Lake

Pringle Lake

Stormer Lake

Philp Lake

K1

200m

Stormer Wilderness Camp Ltd.

K2

200m

Kirkness Creek

Farrer Lake

200m

Hanton Lake

Kotyk Lake

Phillips Lake

Hakala Lake

Coli Lake

Sidace Lake

200m

100m

30m

Anderson Lake

Nungesser River

N1

200m

N2

Trout Lake

Legend

- City
- Town
- Wataynikaneyap Power Community
- First Nation Community
- Tower
- Water Wells
- Mine
- Active Aggregate Sites
- Abandoned Mines
- Recreation Point
- Tourism Establishment Area
- Forest Research Area
- Unknown Raptor Nesting Site
- Aquatic Feeding Area
- Heliport
- Seaplane Base
- Major Roads and Highways
- Winter Road
- Trail
- 2009 Proposed Distribution Line Route
- Pikangikum Distribution Study Corridor - Current Route
- Pikangikum Distribution Study Corridor - Option A
- Pikangikum Distribution Study Corridor - Option B
- Substation Area
- Existing Electrical Transmission Line
- Railway
- Far North Boundary
- First Nation Reserve Land
- Active Mining Claims Areas
- MTO Aggregate Sites
- Kirkness Aggregate Expansion
- Kirkness Aggregate Expansion - Work
- Caribou Nursery Area
- Wildlife Travel Corridor
- Spawning Area
- Fish Nursery Area
- Conservation Reserve
- Dedicated Protected Area
- Provincial Parks
- Whitefeather Forest Management Unit

Waterbody Thermal Regime

- Unknown
- Cold
- Cool
- Warm

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. IMAGERY: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY, AND LIDAR PROVIDED BY RES
3. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
4. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
5. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
6. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 5 10

1:270,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
EXISTING ENVIRONMENT AND LAND USE

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-06-15
DESIGNED	JMC
PREPARED	JMC
REVIEWED	BT
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:

25mm

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7.3 Terrestrial Environment

The Project traverses typical glaciated Northern Ontario Precambrian shield terrain, characterized by boreal forest, relatively shallow surficial soils over bedrock and irregular drainage systems. Vegetation is typical of the boreal forest with tree species including white birch (*Betula papyrifera*), jack pine (*Pinus banksiana*), white spruce (*Picea glauca)*, black spruce (*Picea mariana*), trembling aspen (*Populus tremeloides*), balsam poplar (*Populus balsamifera*) and black ash (*Fraxinus nigra*) (Ontario Parks and Whitefeather Forest Management Corporation 2012).

An initial list of the commonly occurring mammals in the Project areas includes woodland caribou (*Rangifer tarandus caribou*), black bear (*Ursus americanus*), gray wolf (*Canis lupus*), moose (*Alces alces*), lynx (*Lynx canadensis*), pine marten (*Martes Americana*), ermine (*Mutela erminea*), fisher (*Martes pennanti*), mink (*Neovison vison*), beaver (*Castor canadensis*), red squirrel (*Tamiasciurus hudsonicus*), woodchuck (*Marmota monax*) and snowshoe hare (*Lepus americanus*) (Environment Canada 2010). Typical bird species include spruce grouse (*Falcipennis canadensis*), sharp-tailed grouse (*Tympanuchus phasianellus*), ruffed grouse (*Bonasa umbellus*), herring gull (*Larus argentatus*), double-crested cormorant (*Phalacrocorax auritus*), bald eagle (*Haliaeetus leucocephalus*), great horned owl (*Bubo virginianus*), red-tailed hawk (*Buteo jamaicensis*), American black duck (*Anas rubripes*), wood duck (*Aix sponsa*), hooded merganser (*Lophodytes cucullatus*), pileated woodpecker (*Dryocopus pileatus*) and turkey vulture (*Cathartes aura*) (Environment Canada 2010). Several species of amphibians, reptiles and insects are likely to inhabit the study areas and include boreal chorus frog (*Pseudacris maculate*), central newt (*Notophthalmus viridescens louisianensis*), eastern gartersnake (*Thamnophis sirtalis sirtalis*), western painted turtle (*Chrysemys picta bellii*), American emerald (*Cordulia shurtleffi*) and Canada darner (*Aeshna canadensis*).

As per the MNRF letter dated April 7, 2016 regarding re-activation of the Class EA, the following species at risk could potentially interact with the Project:

- Woodland caribou – the Project is located within the Berens range (Figure 3). Throughout the distribution of this species in Canada, local population declines have occurred due to alteration of their habitat (i.e., fragmentation, loss, degradation) which increases predation pressure (Environment Canada 2012). Federal recovery initiatives for this species focus on achieving self-sustaining populations by limiting habitat alteration (Environment Canada 2012). The MNRF published an Integrated Range Assessment for Woodland Caribou and their Habitat: Berens Range (MNRF 2014), a quantitative analysis of past and present caribou occupancy and range condition. It is used to guide management decisions that support the conservation of caribou and their habitat within the Berens Range.
- Wolverine are listed as threatened on the Species at Risk in Ontario (SARO) list and the species and its habitat are protected under the ESA.
- Eastern whip-poor-will are listed as threatened on the SARO list and protected under the ESA. There was evidence of Eastern whip-poor-will documented within 20 km northeast of Red Lake during field surveys undertaken in 2016 (Appendix B).
- Bank swallow are listed as threatened on the SARO list and protected under the ESA. Aggregate pits are often used for nesting. Consideration will be given to any pits adjacent to the proposed route.

Little brown myotis and Northern long-eared myotis bats are listed as endangered and afforded species and habitat protection under the ESA. A description of baseline conditions and an assessment of effects of the Project on Species at Risk are included in Appendix B. Bald eagle, provincially of special concern under SARO, as well as horned grebe and Canada warbler, listed as of special concern under SARO and SARA are also considered. Federal SARA species including common nighthawk (threatened) and olive-sided fly-catcher have also been considered in the assessment of effects to wildlife Species at Risk in Appendix B.

7.4 Socio-Economic Environment

The proposed Project is within the District of Kenora which has a land area of approximately 407,213 km^2 and a population of 57,607, 37% of whom self-identify as having Aboriginal origins. The Municipality of Red Lake is the single incorporated community within the vicinity of the project.

Economic development in the area is severely limited by the current power supply infrastructure, and many of the First Nation communities, including Pikangikum First Nation are at capacity. This limited power supply contributes to numerous challenges within the communities ranging from constraints to new economic development opportunities and inability to develop large renewable energy projects, to overcrowding in houses due to an inability to connect new homes to the existing distribution network, lack of consistent access to community infrastructure including communications, water systems, the grocery store, fuel supplies, and school from frequent power outages caused by an unreliable power system. Connecting to the provincial transmission system would establish a reliable power supply system that could foster economic development and improve living conditions within these communities (SENES 2014).

Northwestern Ontario, including the Project area, is characterized by an economic base historically dependent on natural resources, including forestry and mining. The closest mine to the study area is Goldcorp's Red Lake Gold Mine and there are several other mines in its vicinity.

7.5 Land and Resource Use

Natural resources are an important part of the recreation and tourism industry in the study areas. Common outdoor recreational activities include fishing, hunting, recreational boating, snowmobiling, camping, canoeing and hiking (McKenzie Forest Products Inc. 2011). Recreational users enjoy the isolated wilderness aesthetic provided by the region's expansive forests, lakes and waterways. In 2010, there were over 1,837,000 person visits to the Northern Ontario Tourism Region – North West (Region 13c), with related visitor spending of over $454 million (MTCS 2012). This visitor spending supported nearly 5,200 direct, indirect and induced jobs (MTCS 2014). There are eight identified recreational points in close proximity to the proposed line: three commercial boat caches, two private boat caches, two access points and a designated camping site (Figure 3). There are four tourism establishments in close proximity to the Project including the Red Lake and Area Golf and Country Club, Coli Lake Campground, Stormer Wilderness Camp Ltd., and McNeely Boat Club (Figure 3). MNRF has land use plans for docks and vehicular parking at the Nungesser River also.

There are three active permitted aggregate pits (Figure 3) in close proximity to the Project, belonging to Dale Butterfield, Red Lake Gold Mines and the Whitefeather Economic Development Corporation. There are a further two surrendered aggregate pit sites previously belonging to Whitefeather Economic Development Corporation. There are three MTO aggregate pits overlapping the limits of work for the project also. One south of the Nungesser River to the east of the road, one north of the Kirkness Creek on the east side of the road and the Kirkness Aggregate Expansion area including an area on each side of the road east of Kirkness Lake.

The power line originates within 1.6 km of Red Lake Airport Runway 08/26. An Aeronautical Construction Clearance Form was previously submitted to Transport Canada who reviewed and approved pole heights and locations, when the routing originated closer to the runway at the southern end of Nungesser Road. Transport Canada approval is expected to be re-obtained if required using the revised and presumably lower-aviation-impact design. As well, a Bell communications tower is located approximately 350 m west of the Nungesser Road north of Kirkness Creek.

Various First Nations employ traditional land-based activities including hunting, fishing, trapping, gathering and harvesting. These land based activities represent an important supplement with respect to food sources, additional income, and quality of life. Traditional activities go well beyond the boundaries of the First Nation Reserves.

The Project is located within the Whitefeather Forest for which a land use strategy was developed jointly by Pikangikum First Nation (through the Whitefeather Forest Management Corporation) and the MNRF. Keeping the Land: A Land Use Strategy for the Whitefeather Forest and Adjacent Areas (Pikangikum First Nation and Ontario Ministry of Natural Resources 2006) is deemed to be an approved community based land use plan under Section 9(21) of the Far North Act (2010) and includes the following land use designations: General Use Areas, Enhanced Management Areas and DPA. There are five Cheemuhnuhcheecheekuhtaykeehn (DPAs) identified under the LUS. The proposed line crosses the BDE DPA (formerly Cultural Landscape Waterways) for which a series of management proposals were put forward in 2013 (Figure 3).

The Whitefeather Forest Land Use Strategy Implementation Team (WFLUSIT) provides direction on land use decision making within the Whitefeather Land Use Strategy planning area. Similarly, the Whitefeather Forest Initiative Steering Group (WFISG) provides direction on land use decision making in the context of forest management planning, and the Whitefeather Forest Community Resources Management Authority (WFCRMA) is the holder of the Sustainable Forest Licence for the Whitefeather Forest. Wataynikaneyap is engaging with these groups on the Project, including alternative locations for crossing the DPA and to discuss consistency with existing knowledge and strategic direction.

8.0 EFFECTS ASSESSMENT AND MITIGATION

The focus of this assessment is on Project changes since the initial Statement of Completion of the project was issued in 2009. This includes potential effects of the Project to the BDE (formerly Cultural Landscape Waterways) DPA regulated under the *Provincial Parks and Conservation Reserves Act* (*PPCRA*) (2006) in 2009; new regulations affording species and habitat protection under the *Endangered Species Act, 2007*, new species additional to the *Species at Risk List in Ontario,* and potential effects to cultural heritage resources in relation to any routing or other changes proposed for the Project.

Two key Project changes considered in this report are the new route in the northern section of the line, and an additional clearing width required. A summary of the 2009 assessment and applicability of mitigations recommended is provided in Table 11 (Section 9.0). Additionally, mitigations recommended to address potential effects as a result of the Project changes are also provided in Table 11 (Section 9.0).

8.1 Assessment Method

The general steps in the environmental assessment are summarized below:

- Describing the Project;
- Identifying components of the environment that may interact with the Project to focus the assessment, done in engagement with Aboriginal people, government agencies, and other interested parties;
- Defining the spatial and temporal boundaries for the assessment, and the assessment cases used to assess the effects of the Project;
- Describing existing conditions;
- Identifying potential Project-environment interactions;
- Predicting and characterizing net effects of the Project (Project Case);
- Predicting and characterizing cumulative effects of the predicted Project Case net effects in combination with past, present and reasonably foreseeable future activities (Reasonably Foreseeable Development Case);
- Determining the significance of the net effects of the Project Case and the Reasonably Foreseeable Development Case;
- Identify key factors influencing confidence in effects predictions and how uncertainty is managed so that effects are not underestimated;
- Identifying monitoring and follow-up to confirm predictions and address uncertainty; and
- Presenting overall conclusions with regard to the results of the assessment for each assessed criterion.

Assessment Boundaries

Spatial Boundaries

Defining the geographic extent of study areas is a key step in the environmental assessment process. Spatial boundaries are selected for the assessment using the following factors:

- physical extent of the Project;
- physical extent of anticipated Project-related effects; and
- physical extent of key environmental systems (e.g., watershed boundary of potentially affected streams).

Study areas generally defined for the Project include:

- **Project footprint** – established to identify areas of direct disturbance (i.e., the physical area required and cleared for Project construction and operation). The Project footprint includes the up to 40-m-wide ROW and substation. The specific footprint for this project has not been fully defined and is conservatively assessed in this report considering the up to 40-m-wide ROW within the limits of work representing the most sensitive area defined for a specific environmental component.

- **Local Study Area** –The local study area (LSA) is meant to encompass the area where most effects of the Project are likely to be measurable, including the Project footprint; and therefore the focus of data collection to characterize the existing environment. The LSA for the disciplines includes the limits of work (between 200 m and 500 m width; see Figure 2) where most of the Project components are expected to be located; and therefore most of the Project effects are expected to occur.
- **Regional Study Area** – The regional study area (RSA) includes areas outside of the LSA used to measure broader-scale existing environment conditions, and provide regional context for the maximum predicted geographic extent of effects from the Project (e.g., changes to downstream water quality, caribou ranges, or changes to regional employment and incomes). Cumulative effects from the Project in combination with past, present, and reasonably foreseeable developments are typically assessed at this larger spatial scale.

Temporal Boundaries

The environmental assessment is designed to evaluate the short- and longer-term changes from the Project and associated effects on the physical, biological and socio-economic environments. Temporal (time) boundaries considered for this Project include:

- **Construction Phase** – Construction is expected to commence in the late-summer of 2017, to meet an in-service date of fall 2018.
- **Operations and Maintenance Phase** – The Project is expected to operate indefinitely.

Assessment Cases

- **Project Case** – This scenario represents predictions of the existing conditions (Base Case) combined with the effects that may result from the Project. This case is used to identify incremental changes that are predicted to occur from the Project.
- **Reasonably Foreseeable Development Case** – This scenario characterizes cumulative effects associated with past and present developments, the Project Case plus additional reasonably foreseeable developments in the region that have not yet been approved or are approved but not yet constructed. Developments and activities that are currently under application review, have officially entered a regulatory application process, are considered reasonably foreseeable.

Determination of Significance

The net effects characterization of primary pathways and the associated predicted changes in indicators provide the foundation for determining the significance of incremental (i.e., Project Case), and cumulative effects from the Project and other past, present, and reasonably foreseeable developments on criteria assessment endpoints (i.e., the Reasonably Foreseeable Development Case). The characterization of net effects and the determination of significance are completed for assessment of the Project. The key factors considered in the determination of significance of effects to criteria are:

- Results from the net effects characterization.

- Context, magnitude, geographic extent, duration and reversibility are the primary factors used to determine significance. Frequency and timing are modifiers for determining significance, where applicable.
- Where uncertainty is high and the effect might be either significant or not significant, the assessment would use a precautionary approach and identified the effect as significant and provided additional follow-up actions to reduce uncertainty.

8.2 Parks and Protected Areas

This section presents the parks and protected areas baseline characterization and effects assessment and mitigation. This section also provides an alternatives analysis, as required under the MNRF Class EA PPCR and the *Provincial Parks and Conservation Reserves Act (2006) (PPCRA)*.

8.2.1 Study Areas

One study area, the LSA, is the limits of work at the BDE DPA.

8.2.2 Baseline Characterization

On April 18, 2011 the majority of the Whitefeather DPA were regulated as provincial parks without classification under the *PPCRA*. The proposed Project crosses the BDE DPA, which is regulated under the *PPCRA*.

Cultural Landscape Waterways are described as: “a special land use category to enhance the value of waterways to visitors who wish to enjoy the land through recreation and tourism activities. These areas are in most cases a combination of Dedicated Protected Areas and Enhanced Management Areas”. This DPA category recognizes these waterways as having an important place in the culture and history of Pikangikum people; as cultural landscapes, they are the living result of Pikangikum people’s historical customary stewardship role in the Whitefeather planning area. This land use category also enhances opportunities for recreation and eco-cultural tourism activities (Pikangikum First Nation and Ontario Ministry of Natural Resources 2006).

The boundaries of this DPA follow ecosystem features and natural and cultural feature boundaries. There are no critical landform vegetation within the DPA that could be affected by the Project.

The *PPCRA* provides the legislative framework for the formal protection of provincial parks and conservation reserves, allowing the MNRF (generally through Ontario Parks) to manage these areas. Development is generally prohibited or limited in Ontario’s parks and protected areas; however, Section 20(2) of the Act does permit utility corridors, stating that “subject to the policies of the Ministry and the approval of the Minister, with or without conditions, utility corridors, including but not limited to utility corridors for electrical transmission lines, are permitted in provincial parks and conservation reserves” (Government of Ontario 2006). Section 21 of the Act states that in approving a utility corridor under Section 20, the Minister must be satisfied that “there are no reasonable alternatives; that the lowest cost is not the sole or overriding justification; and that environmental impacts have been considered and all reasonable measures will be undertaken to minimize harmful environmental impact and to protect ecological integrity” (Government of Ontario 2006).

The Whitefeather LUS provides direction on access with regards to the BDE DPA and associated enhanced management areas, which is as follows:

> *"There will be no road access within this area with the possible exception of access provisions for major crossings. Waterway crossings required to provide road access for a variety of purposes including northern communities' access, mineral exploration and development, and forest management will be accommodated and determined through appropriate planning processes (Pikangikum First Nation and Ontario Ministry of Natural Resources 2006).*

Land use direction from Keeping the Land: A Land Use Strategy for the Whitefeather Forest and Adjacent Areas (a community based land use plan under the Far North Act) is reflected in Ontario's Crown Land Use Policy Atlas (CLUPA) which lists new energy transmission and communications corridors as possible permitted uses within the DPA:

> *"In certain circumstances such as for a major energy transmission and communications corridor, provisions for access and water crossings will be made through a planning process, considering the intent and values of the area." (Queens Printer for Ontario 2014).*

8.2.3 Project Alternatives

As required under the PPCR Class EA, an evaluation of alternatives is required including alternatives to the Project and alternative methods for carrying out the Project. Section 20 (2) of the *PPCRA* permits utility corridors in provincial parks (subject to policies of the Ministry and approval of the Minister). Section 21 of the *PPCRA* lists conditions for approval that must be met when approving a utility corridor. They are:

- There are no reasonable alternatives;
- Lowest cost is not the sole or overriding justification; and
- Environmental impacts have been considered and all reasonable measures will be undertaken to minimize harmful environmental impact and to protect ecological integrity.

This section provides the analysis and results of the alternative methods for carrying out the Project. The alternatives to the Project was completed and included in the 2009 federal screening EA; and therefore will not be addressed in this document.

Alternatives Analysis

The proposed power line will cross the aforementioned DPA in three locations: Nungesser River, Kirkness Creek, and the Berens River/Lake. Two alternatives have been identified for each crossing, which are described below. The two alternative locations for the Kirkness Creek and Berens River / Lake are identified on Figure 2:

- **Nungesser River –** Alternative N1 proposes to cross the Nungesser River as close to the 30 m Nungesser Road ROW as is technically reasonable (but still intersecting part of the DPA). Alternative N2 is the crossing location in Nungesser that had been approved in 2009 and is completely within the DPA. This crossing is approximately 1 km west of Nungesser Road. There is no in-water work planned for either alternative.

- **Kirkness Creek –** Alternative K1 will predominantly be located outside the DPA following the ROW for the existing Nungesser Road; however, the alternative may require some project activities within the DPA boundary. The power line would clear span Kirkness Creek. Alternative K2 uses an existing previously cleared corridor within the DPA, and the power line would clear span Kirkness Creek. There is no in-water work planned for either alternative. The crossings are of a similar length (approx. 30 m).
- **Berens River/Lake –** Alternative B1 proposes to cross Berens Lake in the DPA at a location adjacent to where a bridge is proposed to be constructed; and Alternative B2 proposes to cross the Berens River in a narrower area of the DPA where the crossing distance is minimized.

Table 1 provides a summary of the key factors for the alternatives analysis for the Nungesser River, Kirkness Creek and Berens River/Lake DPA crossings related to DPA values, environmental considerations, social and environment considerations, Aboriginal and non-Aboriginal cultural considerations, and cost and constructability. The key factors considered in the assessment are based on the screening criteria identified in the PPCR Class EA. Where screening criteria have not been identified as key factors, they are not judged to mark a distinguishing characteristic between the alternatives (i.e., the project is not expected to affect permafrost within or adjacent to the DPA; release of contaminants in soils and sediments will be managed through best management practices for all alternatives; the project will have a high positive effect for the Pikangikum First Nation under all alternatives). See Table 11 in Section 9.0 for consideration of other screening criteria and identified mitigation. Mitigation measures summarized for the Project in Section 9.0 are applicable in all work areas, including within and adjacent to the DPA.

Table 1: Project Alternatives Analysis

Key Factors	Project Alternatives		Preferred Alternative and Rationale
	Nungesser River		
	N1 (current line)	N2 (original project)	
Values for which the provincial park or conservation reserve was established (including Aboriginal values, land use and resource management considerations)	The BDE DPA is recognized as having an important place in the culture and history of the Pikangikum people; and the designated land use category also enhances opportunities for remote recreation and eco-cultural tourism activities. Both alternatives may have a low negative effects on park user experience due to the visual aspect of the power line. There will be potential effects to noise during construction of the Project, but this will be short-term. Neither of these effects are predicted to be significant. The operation and maintenance of the power line does not result in any limit of access of land or water in or to the DPA for cultural or recreational purposes. Wildlife and fish resource populations are not predicted to be significantly affected by the Project; thereby not affecting use of these resources in the DPA. North of Nungesser River there is timing restriction during April and November along a wildlife travel corridor, as per MNRF. All activities at Nungesser River crossing of the BDE DPA are subject to a timing restriction to minimize sensory disturbance from July 15 to September 15 up to 10 km from a defined area of woodland caribou nursery habitat.		No discernable difference

Table 1: Project Alternatives Analysis

Key Factors	Project Alternatives		Preferred Alternative and Rationale
	Nungesser River		
	N1 (current line)	N2 (original project)	
	There are no new permanent access roads associated with the Project in the DPA. No construction waste associated with the Project will be permitted within the DPA.		
Natural environment considerations	The cleared area adjacent to the existing Nungesser Road is not wide enough to accommodate the Project infrastructure and adjacent tree clearing requirements along the crossing of Nungesser River DPA. Based on the position of the road within its defined ROW, vegetation clearing for the Project ROW will extend beyond the road ROW and require clearing within the DPA boundary.	There will be a need for a new separate ROW up to 20 m in width from the centre-line for the construction and operation and maintenance approximately 1 km west of the Nungesser Road.	N1 is preferred to be adjacent to an existing previously cleared corridor (Nungesser Road), to reduce cumulative effects such as visual disturbance, noise, and habitat fragmentation within the DPA.
	<u>Vegetation and Habitat Linkages</u> There will be vegetation clearing required for a new ROW adjacent to the existing road. No rare vegetation communities are identified within the limits of work. The ROW will overlap with the existing road ROW to the degree possible, but some clearing will be required within the DPA. As noted above, timing restrictions for work are in place in this area relative to use by woodland caribou. Vegetation and habitat linkages are not predicted to be significantly affected.	<u>Vegetation and Habitat Linkages</u> There will be vegetation clearing required for a new ROW. No rare vegetation communities are identified within the limits of work. The ROW would represent a new clearing in an area of undeveloped habitat within the DPA. As noted above, timing restrictions for work are in place in this area relative to use by woodland caribou. A new ROW would introduce potential for effects such as visual disturbance, noise and habitat fragmentation not currently present within this area of the DPA.	
Social and economic considerations (including tourism values)	The power line (visually resembling a 115 kV transmission line) will result in visual effects. The power line will be able to be viewed by persons using Nungesser River for recreational and commercial activities at the Nungesser Road; and may be visible from a tourist operator lodge located on the opposite side of the Nungesser Road (east side) from the planned N1 location. The power line will be located adjacent to the road on the west side with primary access to the river on the east side of the road.	There will be a visual effect to cultural and recreational use due to the new power line structure in an undeveloped section of the DPA. There are no commercial sensitive viewpoints associated with this alternative.	Neither N1 nor N2 is preferred as both result in potential visual effects to cultural and recreational use within the DPA. N1 includes commercial and recreational users who currently access the Nungesser River at a developed location (adjacent to existing Nungesser Road, established boat launch). Development at N2 represents disturbance to a currently undeveloped area.

Table 1: Project Alternatives Analysis

Key Factors	Project Alternatives		Preferred Alternative and Rationale
	Nungesser River		
	N1 (current line)	N2 (original project)	
Aboriginal and non-Aboriginal cultural considerations (including archaeology, built heritage, sacred or traditional use sites)	<u>Archaeology</u> Archaeological potential has been identified at this crossing location. A Stage 2 archaeological assessment is required prior to development. Should archaeological resources be identified, pole location and frozen ground timing restrictions may be implemented, or a Stage 3 and potentially a Stage 4 archaeological assessment may be required. With the implementation of mitigation measures through the Ministry of Tourism, Culture and Sport (MTCS) staged assessment process, this alternative is not predicted to result in significant effects to known archaeological resources.	<u>Archaeology</u> Archaeological potential has been identified at this crossing location. A Stage 2 archaeological assessment is required prior to development. Should archaeological resources be identified, pole location and frozen ground timing restrictions may be implemented, or a Stage 3 and potentially a Stage 4 archaeological assessment may be required. With the implementation of mitigation measures through the MTCS staged assessment process, this alternative is not predicted to result in significant effects to known archaeological resources.	No discernable difference
	<u>Built Heritage and Cultural Heritage Landscape</u> There is no built heritage within the limits of work. There will be ROW clearing required within the DPA that will affect the cultural heritage landscape within the DPA. However, the Project clearing is adjacent to an existing road that has already created a linear corridor intrusion into the cultural heritage landscape. In addition, the building of a power line through the landscape is reversible as the corridor can be removed and the area returned to its original state. No irreversible effects to the cultural heritage landscape is predicted.	<u>Built Heritage and Cultural Heritage Resources</u> There is no built heritage within the limits of work. There will be ROW clearing required within the DPA that will affect the cultural heritage landscape within the DPA. The building of a power line through the landscape is reversible as the corridor can be removed and the area returned to its original state. No irreversible significant effects to the cultural heritage landscape is predicted.	
	<u>Sacred or traditional use sites; spiritual, ceremonial or cultural sites</u> There were no sacred or traditional use sites; spiritual, ceremonial or cultural sites identified within the limits of work in the DPA.	<u>Sacred or traditional use sites; spiritual, ceremonial or cultural sites</u> There were no sacred or traditional use sites; spiritual, ceremonial or cultural sites identified within the limits of work in the DPA.	

Table 1: Project Alternatives Analysis

Key Factors	Project Alternatives		Preferred Alternative and Rationale
	Nungesser River		
	N1 (current line)	N2 (original project)	
Preferred Alternative	***N1***		

Table 1: Project Alternatives Analysis

Key Factors	Project Alternatives		Preferred Alternative and Rationale
	Kirkness Creek		
	K1	K2	
Values for which the provincial park or conservation reserve was established (including Aboriginal values, land use and resource management considerations)	The BDE DPA is recognized as having an important place in the culture and history of the Pikangikum people; and the designated land use category also enhances opportunities for remote recreation and eco-cultural tourism activities. Both alternatives may have a low negative effects on park user experience due to the visual aspect of the power line. There will be potential effects to noise during construction of the Project, but this will be short-term. Neither of these effects are predicted to be significant. The operation and maintenance of the power line does not result in any limit of access of land or water in or to the DPA for cultural or recreational purposes. Wildlife and fish resource populations are not predicted to be significantly affected by the Project; thereby not affecting use of these resources in the DPA. There are no new permanent access roads associated with the Project in the DPA. No construction waste associated with the Project will be permitted within the DPA.		No discernable difference
Natural environment considerations	The cleared area adjacent to the existing Nungesser Road is not wide enough to accommodate the Project infrastructure along the crossing of Kirkness Creek. Based on the position of the road within its defined ROW, vegetation clearing for the Project ROW may extend beyond the road ROW and require limited clearing within the DPA boundary.	The power line will make use of an existing previously cleared corridor within the DPA. There will be some requirement for clearing of vegetation regrowth within the corridor, and a widening to accommodate the power line.	K2 is preferred to make use of an existing previously cleared corridor, which will mitigate but not remove the effect of ROW clearing.

Table 1: Project Alternatives Analysis

Key Factors	Project Alternatives		Preferred Alternative and Rationale
	Kirkness Creek		
	K1	K2	
	Vegetation and Habitat Linkages There will be vegetation clearing required for a new ROW adjacent to the existing road. No rare vegetation communities are identified within the limits of work. The ROW will overlap with the existing road ROW to the degree possible, but clearing may be required within the DPA. Vegetation and habitat linkages are not predicted to be significantly affected.	Vegetation and Habitat Linkages There will be clearing of vegetation regrowth within the existing previously cleared ROW in the DPA, and a widening to accommodate the power line. No rare vegetation communities are identified within the limits of work. Vegetation and habitat linkages are not predicted to be significantly affected.	
Social and economic considerations (including tourism values)	The power line (visually resembling a 115 kV transmission line) will result in visual effects. The power line will be able to be viewed by persons using Stormer Lake for recreational and commercial activities; be viewed from Stormer Wilderness Camp Ltd. accessed on the west side of the Nungesser Road approximately 250 m south of the crossing of Kirkness Creek; and viewed by cultural and recreational users in the DPA.	There will be a visual effect to cultural and recreational use due to the new power line structure in the DPA. There are no commercial sensitive viewpoints associated with this alternative.	K2 is preferred as the potential visual effects are less than K1. K1 includes commercial and recreational users that experience a remote lake and wilderness camp that may be affected by the addition of a power line along the lake shore and directly adjacent to the wilderness camp.
Aboriginal and non-Aboriginal cultural considerations (including archaeology, built heritage, sacred or traditional use sites)	Archaeology Archaeological potential has been identified at this crossing location. A Stage 2 archaeological assessment is required prior to development. Should archaeological resources be identified, a Stage 3 and potentially a Stage 4 archaeological assessment will be required. With the implementation of mitigation measures through the Ministry of Tourism, Culture and Sport (MTCS) staged assessment process, this alternative is not predicted to result in significant effects to known archaeological resources.	Archaeology Archaeological potential has been identified at this crossing location. A Stage 2 archaeological assessment is required prior to development. Should archaeological resources be identified, a Stage 3 and potentially a Stage 4 archaeological assessment will be required. With the implementation of mitigation measures through the MTCS staged assessment process, this alternative is not predicted to result in significant effects to known archaeological resources.	No discernable difference

Table 1: Project Alternatives Analysis

Key Factors	Project Alternatives		Preferred Alternative and Rationale
	Kirkness Creek		
	K1	K2	
	Built Heritage and Cultural Heritage Landscape There is no built heritage within the limits of work. There will be ROW clearing required within the DPA that will affect the cultural heritage landscape within the DPA. However, the Project clearing is adjacent to an existing road that has already created a linear corridor intrusion into the cultural heritage landscape. In addition, the building of a power line through the landscape is reversible as the corridor can be removed and the area returned to its original state. No irreversible effects to the cultural heritage landscape is predicted.	Built Heritage and Cultural Heritage Resources There is no built heritage within the limits of work. The Project will use an existing ROW, which has already created a linear corridor intrusion into the cultural heritage landscape. In addition, the building of a power line through the landscape is reversible as the corridor can be removed and the area returned to its original state. No irreversible significant effects to the cultural heritage landscape is predicted.	
	Sacred or traditional use sites; spiritual, ceremonial or cultural sites There were no sacred or traditional use sites; spiritual, ceremonial or cultural sites identified within the limits of work in the DPA.	Sacred or traditional use sites; spiritual, ceremonial or cultural sites There were no sacred or traditional use sites; spiritual, ceremonial or cultural sites identified within the limits of work in the DPA.	
Preferred Alternative	***K2***		

Table 1: Project Alternatives Analysis

Berens River / Lake			
Key Factors	**B1**	**B2**	**Preferred Alternative and Rationale**
Values for which the provincial park or conservation reserve was established (including Aboriginal values, land use and resource management considerations)	The DPA is recognized as having an important place in the culture and history of the Pikangikum people; and the designated land use category also enhances opportunities for remote recreation and eco-cultural tourism activities. Both alternatives may effects on park user experience due to the visual aspect of the power line. There will be potential effects to noise during construction of the Project, but this will be short-term. Neither of these effects are predicted to be significant. The operation and maintenance of the power line does not result in any limit of access of land or water in or to the DPA for cultural or recreational purposes. Wildlife and fish resource populations are not predicted to be significantly affected by the Project; thereby not affecting use of these resources in the DPA. There are no access roads associated with the Project in the DPA; the B1 alternative would be located adjacent to the planned Berens River bridge, which would connect two sides of a planned road approved in the Whitefeather Forest Management Plan. Construction and maintenance access to the B2 alternative would be through the corridor itself. No waste associated with the Project will be permitted within the DPA.		No discernable difference
Natural environment considerations	The power line will be located adjacent to a planned road ROW. A smaller area of vegetation clearing is required for the power line ROW where the Project can be located adjacent to the planned Whitefeather Forest Road ROW.	There will be a need for a new separate ROW up to 20 m in width from the centre-line for the construction and operation and maintenance of the power line, approximately 1 km downstream of the planned Berens River bridge location.	B1 is preferred as a smaller area of vegetation clearing may be required for the power line ROW where the Project can be located adjacent to the planned Whitefeather Forest Road ROW. Additionally, given plans for a future bridge with a large truss structure in the vicinity of B1, the aerial collision hazard of power line is expected to be partially reduced.
	<u>Vegetation and Habitat Linkages</u> A smaller area of vegetation clearing may be required for the power line ROW where the Project can be located adjacent to the planned Whitefeather Forest Road ROW. No rare vegetation communities are identified within the limits of work. The ROW will overlap with the planned road ROW to the degree possible, but clearing will be required within the DPA. Vegetation and habitat linkages are not predicted to be significantly affected.	<u>Vegetation and Habitat Linkages</u> There will be vegetation clearing required for a new ROW. No rare vegetation communities are identified within the limits of work. Vegetation and habitat linkages are not predicted to be significantly affected.	

Table 1: Project Alternatives Analysis

Berens River / Lake			
Key Factors	**B1**	**B2**	**Preferred Alternative and Rationale**
Social and economic considerations (including tourism values)	The power line will clear span Berens Lake adjacent to the planned Berens River bridge location. There will be a visual effect to cultural and recreational use due to the new power line structure in the DPA; however, the contribution of the power line compared with the cumulative visual effect of the power line and the bridge is not predicted to be significant. There are no commercial sensitive viewpoints associated with this alternative.	The power line through the DPA will be a new structure approximately 1 km downstream from the planned Berens River bridge location. There will be a visual effect to cultural and recreational use due to the new power line structure in the DPA. There are no commercial sensitive viewpoints associated with this alternative.	B1 is preferred as the power line will be near to the planned bridge structure.
Aboriginal and non-Aboriginal cultural considerations (including archaeology, built heritage and cultural heritage landscapes, sacred or traditional use sites; spiritual, ceremonial or cultural sites	Archaeology One identified archaeological site and archaeology potential have been identified within the limits of work. A Stage 2 archaeological assessment is required prior to development. Should archaeological resources be identified a Stage 3 and potentially a Stage 4 archaeological assessment will be required. With the implementation of mitigation measures through the Ministry of MTCS's staged assessment process, this alternative is not predicted to result in effects to archaeological resources.	Archaeology There is archaeology potential within the limits of work. A Stage 2 archaeological assessment is required prior to development. Should archaeological resources be identified a Stage 3 and potentially a Stage 4 archaeological assessment will be required. With the implementation of mitigation measures through the MTCS's staged assessment process, this alternative is not predicted to result in effects to archaeological resources.	B2 is preferred as there is an identified archaeological site within the limits of work for B1.

Table 1: Project Alternatives Analysis

Berens River / Lake			
Key Factors	**B1**	**B2**	**Preferred Alternative and Rationale**
	Built and Cultural Heritage Landscapes There is no built heritage within the limits of work. There will be ROW clearing required within the DPA that will affect the cultural heritage landscape within the DPA. However, the Project clearing is adjacent to the proposed Whitefeather Road ROW to minimize the linear corridor intrusion into the cultural heritage landscape. In addition, the building of a power line through the landscape is reversible as the corridor can be removed and the area returned to its original state. No irreversible significant effects to the cultural heritage landscape is predicted.	Built and Cultural Heritage Landscapes There is no built heritage within the limits of work. There will be ROW clearing required within the DPA that will affect the cultural heritage landscape within the DPA. However, the Project clearing is adjacent to the proposed Whitefeather Road ROW to minimize the linear corridor intrusion into the cultural heritage landscape. In addition, the building of a power line through the landscape is reversible as the corridor can be removed and the area returned to its original state. No irreversible significant effects to the cultural heritage landscape is predicted.	
	Sacred or traditional use sites; spiritual, ceremonial or cultural sites There are no known sacred or traditional use sites; spiritual, ceremonial or cultural sites identified within the limits of work in the DPA.	Sacred or traditional use sites; spiritual, ceremonial or cultural sites There are no known sacred or traditional use sites; spiritual, ceremonial or cultural sites identified within the limits of work in the DPA.	
Preferred Alternative	***B1***		

Cost was not included in the alternatives evaluation above as there is no discernable difference between each pair of alternatives, given the coarse nature of estimations at this stage of the Project. Therefore, cost was not a factor in identifying the preferred alternative.

Based on the analyses completed above, N1, K2, and B1 have been identified as the preferred alternatives to cross the DPAs. These preferred alternatives were carried into the effects assessment described in the next section, which includes recommended impact mitigation measures.

8.2.4 Effects Assessment and Mitigation

Project Case

The Project has been designed to avoid effects to any known archaeological sites, built heritage, sacred sites or traditional use sites in the DPA where possible. One archaeological site is identified within the limits of work for the B1 crossing alternative in the area of the planned Berens River Bridge. Compliance with the findings of further archaeological investigations (e.g., MTCS Stage 2) will guide specific design in this area. No significant effects to

known archaeological sites, sacred sites or traditional use sites in the DPA are predicted for any of the alternatives considered. Significant effects to fish and wildlife populations, which may be used for cultural and recreational resources, are not predicted.

During construction, site preparation activities, such as vegetation clearing for the power line ROW, tower foundation preparation and erection of towers may temporarily limit access in the DPA during the construction period; and result in an increase in noise disturbance that could affect use of the DPA by wildlife and for cultural, recreational or commercial use by people in the area of construction. There will be emissions associated with construction equipment and machinery that may have localized effects to air quality. However, these potential effects will be short-term, limited to the timeframe of construction through the DPA. Temporary access restrictions at the location of construction through the DPA may be required during the construction period. The construction period is anticipated to be up to three months in the DPA.

The Project has been designed to follow or use existing and planned ROWs where possible with the intent to limit the requirement for vegetation clearing, including areas within the DPA. For the Nungesser River crossing, the power line ROW will require vegetation clearing to the water's edge within the DPA adjacent to the existing Nungesser Road. Primary access for construction, operation and maintenance will be via the Nungesser Road. There will be no in-water work in the DPA. A riparian buffer regrowth to 30 m from the high water mark will be implemented post-construction with consideration for the safe operation of the power line. The up to 40 m wide ROW overlaps approximately 2 ha of the BDE DPA and up to 6 poles are expected to be required within this area.

For the Kirkness Creek crossing, Wataynikaneyap will use a previously cleared ROW in the DPA for access and construction of the power line. There will be a requirement for clearing of vegetation that has overgrown this ROW. A riparian buffer regrowth to 30 m from the high water mark will be implemented post-construction with consideration for the safe operation of the power line. The up to 40 m wide ROW will overlap approximately 1.2 ha of the BDE DPA and up to 4 poles are expected to be required within this area.

For the Berens River crossing, the power line ROW will require vegetation clearing in the DPA; but will align with the planned Whitefeather Forest Road ROW. Access during construction will use the existing road or clearing, depending on its construction status, and may include temporary access along the ROW where road construction is not complete along the Whitefeather Forest road. An ice crossing across the Berens River may also be utilized should ice conditions permit. Vegetation clearing for the power line ROW will be to water's edge; however there will not be a requirement for any in-water work in the DPA. A riparian buffer regrowth to 30 m from the high water mark will be implemented post-construction; with consideration of the safe operation of the power line. There are no new access roads associated with the Project in the DPA. No construction waste associated with the Project will be permitted within the DPA. After construction, all construction materials will be removed and the area rehabilitated, as required. The up to 40 m wide ROW overlaps approximately 5 ha of the BDE DPA ground surface and up to 15 poles are expected to be required within this area.

No construction waste associated with the Project will be permitted at any of the proposed DPA crossings. After construction, all construction materials will be removed and the area will be rehabilitated in manner consistent with best utility practice.

Maintenance and operation of the power line ROW will require routine mechanical clearing. Riparian vegetation regrowth will be permitted along the Berens River, Kirkness Creek and Nungesser River crossings, such that the vegetation does not interfere with the safe operation of the power line. The power line structure will result in a

change of view in the DPA. At the Kirkness Creek crossing K2; there is no current structure through the DPA. At the Berens Lake crossing B1, there is no current structure; however, the power line location will align with the proposed bridge location, which will minimize potential visual effects of the Project. At the Nungesser River crossing N1, there is no current structure; however the power line location will align with the current Nungesser Road and bridge plans within the DPA; which will minimize potential visual effects of the Project. The power lines will not reduce access in or to the DPA, and are predicted to have a negligible effect to park users and sense of remoteness.

Mitigation measures that will be implemented by Wataynikaneyap include the following:

- no new permanent access roads associated with the Project in the DPA;
- no construction waste associated with the Project will be permitted within the DPA;
- install signs on the ROW during construction indicating the DPA boundary;
- no burning of merchantable timber in the DPA;
- minimize number of towers in the DPA;
- clean equipment before moving it between the DPA and other non-protected area land;
- no laydown areas permitted in the DPA; and
- at all waterbodies maintain a minimum 30 m vegetated buffer post-construction.

With the Project design and mitigation described above, it is not predicted that the Project will result in a significant effects to parks and protected areas. In addition, the Project is not anticipated to result in a significant effect to the cultural and recreational values and resources associated with the DPA. The Project will not result in permanent loss of access in or to the DPA for cultural or recreational purposes, and will result in negligible effects to park users and sense of remoteness due to the presence of the power line structure in the DPA.

Reasonably Foreseeable Development Case

For the Berens River crossing, a bridge and planned Whitefeather Forest Road will be constructed. The power line would be located adjacent to the bridge and the Whitefeather Forest Road to minimize cumulative effects with projects that have already been planned and located.

The Wataynikaneyap Phase 2 Project ROW is likely to overlap the Project limits of work at the Berens River crossing. North of the planned substation for the Project, including the Berens River crossing, Phase 2 Project will require construction of a separate transmission line ROW operating at 115 kV. This line is currently planned to twin the Project and Whitefeather Forest Road alignments from the substation location to the point where the Project follows an existing clearing west toward the Pikangikum First Nation community. Through Project design and locating the Phase 2 ROW next to and paralleling existing cleared corridors, the area required to be cleared to provide an up to 40-m-wide ROW for Phase 2 transmission line can be minimized, additional clearing for access roads reduced, and visual effects limited to one location.

With the Project and Phase 2 being co-located with existing and planned disturbances in the Berens River crossing in the DPA; the reasonably foreseeable development case and incremental changes in the DPA is predicted to not results in significant effects to the DPA.

8.2.5 Prediction Confidence in the Assessment

Confidence that there will be no predicted significant effects on parks and protected areas is high based on the location of the Project crossings in the DPA, use of existing ROWs for construction and access, limit clearing for the ROW and mitigation measures to minimize potential effects to park users, resources and the values identified for the DPA.

8.2.6 Follow-up, Inspection, and Monitoring

No follow-up, inspection or monitoring is required.

8.2.7 Conclusions

With the implementation of identified mitigation measures, no significant effects to parks and protected areas are predicted from the Project.

8.3 Species at Risk

Correspondence from the MNRF (Appendix A) identified the following Species at Risk be addressed:

- Woodland caribou
- Eastern whip-poor-will
- Wolverine
- Bank swallow
- Little brown myotis and northern long-eared myotis
- Lake sturgeon.

Appendix B provides a detailed baseline characterization, effects assessment, and proposed mitigation for all the terrestrial species above. Findings are summarized in this section and in Table 6 of Section 9.0 Summary and Conclusions, along with proposed mitigation.

For terrestrial SAR species, except for bats and woodland caribou, the Project Case and the RFD Case are not predicted to result in significant effects with the implementation of identified mitigation.

The little brown myotis population at Base Case is predicted to be significantly affected. However with effective implementation of mitigation, the Project is predicted to have a small but negative effect on the bats, and have no to little contribution to the combined effects from the Base Case. No significant effects are predicted from the Project Case. The RFD Case is conservatively predicted to be significant due to uncertainty associated with future forestry activities, climate change, and population demographic rates. However, the Project is expected to contribute little to the significance of RFD Case.

No significant effects to woodland caribou are predicted from the Project Case. The RFD Case is conservatively predicted to be significant due to uncertainty associated with future forestry activities, climate change, and population demographic rates. However, the Project is expected to contribute little to the significance of RFD Case.

Lake Sturgeon (northwestern population) is listed as Threatened under the provincial ESA, Endangered under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) evaluation and are present in the Berens River and Pikangikum Lake. The removal of the submarine crossing from the previous Project proposal has reduced the potential to affect this species. Potential to cause adverse effects to Lake Sturgeon as a result of the current Project are consistent with those identified for aquatic SAR at aerial water crossings identified in the previous 2009 EA approval (Appendix A), and associated use of temporary crossing structures during construction, namely through damage to shoreline or riparian vegetation, disturbance to or erosion of banks from construction activities, sediment entrainment, and deposition within the water body, and potential for fuel spillage.

Where the Project crosses the Berens River, the approved Whitefeather Forest Management Plan all-season road paths will be utilized to access the north side of the Berens River and also the proposed substation area to the south. An ice crossing across the Berens River may also be utilized should ice conditions permit. For the construction of the ice crossing, no new temporary or permanent soil fill will be placed below the high water mark). As Lake Sturgeon occur in the bottom areas of lakes and large rivers (Nelson and Paetz 1992), the riparian area is not part of the critical habitat of Lake Sturgeon, and removal of riparian vegetation can occur following Fisheries and Oceans Canada (DFO) *Measures to Avoid Causing Harm to Fish and Fish Habitat including Aquatic Species at Risk* (DFO 2016).

The Project will implement mitigations identified in the 2009 EA approval (Appendix A) to control sediment and erosion to the Berens River and Pikangikum Lake, as well as potential releases from spills to water bodies spanned by the Project. In addition, the Project will follow DFO's *Measures to Avoid Causing Harm to Fish and Fish Habitat Including Aquatic Species at Risk* (e.g., no clearing of vegetation during the timing window[1] if there is open water; allowing riparian vegetation below the ordinary high water mark to regrow, if any is required to be removed during construction; when practicable, pruning or topping the vegetation instead of grubbing/uprooting) and MNRF's *Environmental Guidelines for Access Roads and Water Crossings.* Specific mitigations are summarized in Table 6 (Section 9.0).

Considering the design of the Project (aerial water crossings and use of temporary crossing structures with no work below the high water mark) and implementation of proposed mitigations, there are no predicted significant effects of the Project to Lake Sturgeon.

8.4 Built Heritage Resources and Cultural Heritage Landscapes Assessment

This section describes and summarizes a preliminary screening and assessment of the effects of the Project on built heritage resources and cultural heritage landscapes (termed heritage resources for remaining text). As defined in the *Provincial Policy Statement, 2014* (PPS 2014), built heritage resources are "a building, structures,

[1] At Peekwatahmaewee Sahkaheekahn/Berens Lake, based on the thermal regime designation (cool), the restricted activity timing window for work would be April 1 to July 15. Based on MNRF information, species specific timing would be: September 15 to June 30 (Cisco [October 1 to May 31], Lake Whitefish [September 15 to May 31], Lake Sturgeon [May 1 to June 30] plus spring spawning species [e.g., Walleye, Northern Pike]). Confirmation with MNRF and/or DFO on required timing would be obtained if clearing of vegetation under open water conditions was determined to be required below the ordinary high water mark.

monuments, installations, or any manufactured remnant that contributes to a property's cultural heritage value or interest as identified by a community, including an Aboriginal [Indigenous] community". A cultural heritage landscape is "a defined geographical area that may have been modified by human activity and is identified as having cultural heritage value or interest as identified by a community, including an Aboriginal [Indigenous] community" (PPS 2014). The area "may involve features such as structures, spaces, archaeological sites, or natural elements that are valued together for their interrelationship, meaning or association" (PPS 2014). Examples of cultural heritage landscapes include: heritage conservation districts designated under Part V of the *Ontario Heritage Act*; cemeteries, trailways, viewsheds, natural areas, and industrial complexes of heritage significance; villages, parks, gardens, battlefields, mainstreets, and neighbourhoods; and areas recognized by federal or international designation authorities, such as a National Historic Site or a UNESCO World Heritage Site (PPS 2014). Keeping the Land: A Land Use Strategy for the Whitefeather Forest and Adjacent Areas (Pikangikum First Nation and Ontario Ministry of Natural Resources 2006) defines specific cultural landscapes within the Whitefeather Forest portion of the Project area.

The Province of Ontario, through the MTCS, has developed a series of products to advise municipalities, organizations, and individuals on heritage protection and conservation. Identifying the presence of heritage resources within a project area is aided by the MTCS *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes: A Checklist for the Non-Specialist* (2015), while more detailed guidance on other aspects of heritage evaluation and conservation provided in the *Ontario Heritage Tool Kit* series.

The screening for this project is being conducted under the Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects and the Class Environmental Assessment for Provincial Parks and Conservation Reserves. This process is managed by the MNRF which provides guidance for the assessment of Built Heritage and Cultural Heritage Landscapes through their *Technical Guideline for Cultural Heritage Resources for Projects Planned Under the Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects and the Class Environmental Assessment for Provincial Parks and Conservation Reserves* (2006). Further guidance from the MNRF in Forestry Management areas comes from their *Forest Management Guide for Cultural Heritage Values* (2007).

If the potential for heritage resources in a LSA is identified when completing the MTCS or MNR *Checklist*, further investigation as part of a Cultural Heritage Evaluation Report (CHER) or Heritage Impact Assessment (HIA) is required. In both a CHER and HIA the heritage value or interest of listed properties or newly identified resources is evaluated using the *Ontario Regulation 9/06 Criteria for Determining Cultural Heritage Value or Interest* (O. Reg. 9/06 and O. Reg. 10/06). The effects of a development or site alteration on known or newly identified built heritage resources or cultural heritage landscapes are assessed as part of a HIA. In this EA report, heritage resources are represented by two key indicators: known heritage resources (resources already protected under formal or informal government policy or legislation), and potential heritage resource (resources which could be considered for protection under formal or informal government policy or legislation). These key indicators have been identified to assess the effects of the Project on the heritage resources in the study area. The criterion, rationale and indicators are summarized in Table 2.

Table 2: Heritage Resources Criteria and Indicators

Criteria	Rationale	Indicators
Built Heritage and Cultural Heritage Landscapes	■ Built heritage remains are a non-renewable resource that could be affected by Project activities ■ Cultural heritage landscapes are a non-renewable resource that could be affected by Project activities ■ Heritage resources and cultural heritage landscapes have spiritual and symbolic meaning for First Peoples and to Canadians ■ Heritage resources and cultural heritage landscapes are protected under the *Ontario Heritage Act*	■ Number, type and location of identified and potential built heritage resources and cultural heritage landscapes

8.4.1 Study Area

One study area, a LSA, has been identified for Built Heritage Resources and Cultural Heritage Landscapes. The LSA is the limits of work shown on Figure 2, plus a 50 m buffer.

8.4.2 Baseline Characterization (Base Case)

8.4.2.1 Methods

Historic research was conducted using archival and secondary materials including historic atlases and topographic maps, local histories, and government reports. A review of government registers was conducted to determine the presence of municipally, provincially, and federally recognized heritage resources in the study area. Analysis of historic mapping material also provided a context from which to determine the location of known heritage resources in the study area.

8.4.2.2 Results

8.4.2.2.1 Known Heritage Resources

The following provides a preliminary understanding of known built heritage and cultural heritage landscapes in the LSA that are already protected under formal or informal government policy or legislation.

Federally Recognized Heritage Resources

Federally-recognized built heritage resources are those properties, buildings, and places that have been designated under a form of federal legislation such as the *Canada National Parks Act* or the *Heritage Railway Stations Protection Act*. Federal heritage designations can include national historic sites, persons and events of national historic significance, heritage railway stations, federal heritage buildings, and heritage lighthouses. Only a proportion of these are directly administered by Parks Canada but the agency provides heritage conservation advice and support whether the asset is privately owned or the responsibility of a provincial or federal department.

Parks Canada manages the Canadian Register of Historic Places (CRHP), which is a database of recognized heritage properties. A search of the CRHP database on March 14, 2017 found no recognized federal sites in the LSA. Of note, the Pikangikum First Nation have stated in their *Land Use Strategy* for the Whitefeather forest that

they intend to pursue a National Historic Site proposal for Kirkness Lake in close proximity to the LSA (Pikangikum 2006).

The study area also crosses a small portion of the area formerly included in a UNESCO World Heritage Nomination, called Pimachiowin Aki. Pimachiowin Aki included an area of 33,499 square kilometres of land and water spanning both Manitoba and Ontario. The nomination was a collaboration between five Anishinaahe First Nations groups, including Pikangikum. In 2016, Pikangikum First Nation withdrew from the Project.

A bid for nomination was submitted in 2017 including a smaller geographic area, which is outside of the study area of this project. The federal agency, Parks Canada, is the Government of Canada's representative for the UNESCO World Heritage Convention. While the nominated area is not federal, Parks Canada does retain interest in any area under a UNESCO World Heritage Nomination and would be responsible for ensuring the planning mechanisms in place to protect and conserve the site are upheld should its Nomination be successful (Parks Canada 2016).

Provincially Recognized Properties of Heritage Value or Interest

Protection and conservation of properties of heritage value or interest in Ontario is primarily achieved under the *Ontario Heritage Act,* which empowers municipalities to recognize and protect built heritage resources and cultural heritage landscapes. Although the MTCS also has the authority to designate properties of heritage value or interest under the *Ontario Heritage Act*. Other provincial acts such as the *Funeral, Burial and Cremation Services Act, 2002* and the *Provincial Parks and Conservation Reserves Act, 2006* also serve to protect heritage resources. Provincial parks are administrative areas set aside as reserves for the purpose of protecting the natural environment within their boundaries. There are seven different classes of parks including wilderness, nature reserve, cultural heritage, natural environment, waterway, recreational, and aquatic. All seven classes of parks can include heritage resources within their boundaries, which are to be protected by implementing administrative controls carried out by each park's staff and the MNRF.

Provincially-recognized heritage resources include properties, plaques, and monuments that have been recognized by the provincial government and provincial agencies through the use of registers, plaque programs, monuments and conservation easements, agreements, and covenants. The MTCS and the Ontario Heritage Trust (OHT), a provincial government agency, maintain a list of these resources, and the OHT also manages the *Ontario Heritage Act Register*, which includes information on properties designated under the *Ontario Heritage Act.* Management of these provincially-recognized heritage resources is guided by the *Standards and Guidelines for the Conservation of Provincial Heritage Properties* (MTCS 2010).

The desktop review of provincial heritage inventories indicated that three designated or listed heritage properties are located in the LSA. These designated properties are in a regulated provincial park; (BDE DPA), of which the project crosses at three points: Berens River, Kirkness Creek; and the Nungesser River.

The DPA was created in 2011. This park was created from part of the cultural landscape area identified within the *Land Use Strategy for the Whitefeather Forest and Adjacent areas* a planning document created through collaboration between the Pikangikum First Nations and the Ontario Ministry of Natural Resources in 2006.

The following is a brief summary of the Pikangikum First Nations understanding of their cultural heritage landscapes with common elements shared by all three waterways. This is followed by some distinctions for the three waterways which are crossed by the project. All three waterways were part of the former UNESCO World Heritage Nomination completed for the area (Pimachiowin Aki Corporation 2016). The following description of the three cultural landscapes is taken primarily from the Whitefeather Land Use Strategy (Pikangikum 2006) and the UNESCO World Heritage Nomination (Pimachiowin Aki Corporation 2016).

Cultural Landscapes as Defined by Pikangikum First Nation

The Pikangikum First Nations have defined their cultural heritage landscapes as "the living result of Pikangikum people's historical customary stewardship role" (Pikangikum 2006). This stewardship role is expressed through the spiritual beliefs of the Anishinaabeg people:

> "Anishinaabeg understand the Creator put them on the land, providing them with all the physical and spiritual resources they need to survive and prosper. In acknowledgement of the gift of life, Anishinaabeg uphold a sacred trust with the Creator to care for *aki*, the land and all its life. This sacred trust entails a duty to work with other beings in a respectful way, a way that honours creation, with the understanding that all beings are united under the Creator, *Gaa-debenjiged* or *Gizhe-Manidoo* (Great Spirit). (Pimachiowin Aki Corporation 2016).

The Anishinaabeg people uphold their sacred trust through Ji-ganawendamang Gidakiiminaan:

> *"Ji-ganawendamang Gidakiiminaan* is a set of beliefs, values, knowledge, and practices that guide relations with the land and all life placed on the land by the Creator; these are the *aadizookewin* ("teachings") passed down through the generations through oral traditions in *Anishinaabemowin* (the Ojibwe language). (Pimachiowin Aki Corporation 2016).
>
> The Anishinaabe tradition of *Ji-ganawendamang Gidakiiminaan* is not about transforming the landscape, it is about living within the opportunities and limits presented by the boreal forest environment of Pimachiowin Aki. Anishinaabe *akiing ondaaji'idizowin* (customary livelihood practices) entail the harvest of plants, animals, and other forms of life in a manner that ensures the continuity of the Creator's gifts. Every being, everything on the land, has a purpose for being and its own relationship with the Creator that must be respected, even if that relationship is not well understood by human beings. (Pimachiowin Aki Corporation 2016).

The cultural landscapes within the LSA are:

> "an exceptional expression of the cultural tradition of *Ji-ganawendamang Gidakiiminaan*. A complex network of interlinked sites, routes, and areas make up the attributes that span the nominated area, providing testimony to the beliefs, values, knowledge, and practices that constitute Keeping the Land. While the material remains of Anishinaabe use and occupation are generally impermanent and often difficult to observe for an untrained eye, the evidence of *Ji-ganawendamang Gidakiiminaan* is pervasive within the nominated area and can be understood through Anishinaabe knowledge and oral traditions. (Pimachiowin Aki Corporation 2016).

Key attributes with the cultural landscapes which reflect the cultural tradition of *Ji-ganawendamang Gidakiiminaan* include harvesting sites, habitation and processing sites, travel routes, named places, sacred and ceremonial sites, and trapline areas:

> At harvesting sites, Anishinaabeg of Pimachiowin Aki honour the Creator's gifts through the harvest of plants, animals, and other forms of life in a manner that ensures continuity of all life on the land. Habitation and processing sites in Pimachiowin Aki enable Anishinaabeg to focus harvesting efforts in areas where resources are most abundant. Travel routes, especially waterways, and the named places that serve as landmarks along those travel routes, support the shifting use of this vast landscape as people respond to the uneven and changing distribution of resources. Sacred and ceremonial sites are important nodes on the Pimachiowin Aki cultural landscape where Anishinaabeg acknowledge dependence on the Creator and observe respectful behaviour toward other beings. Trapline areas within Pimachiowin Aki enable shared use of the land while also acknowledging that extended family groups are responsible for stewardship of specific areas, based on their established histories of trapping, hunting, and fishing. (Pimachiowin Aki Corporation 2016).

Nungesser River (Ohshkahtohkahweeseebee) – Cultural Heritage Landscape

The Nungesser River connects Nungesser Lake with Little Vermillion Lake. The former UNESCO World Heritage Nomination notes a number of important features in association with this cultural heritage landscape:

- habitation sites at the mouth of the Nungesser River on Nungesser Lake approximately 3 km from the Project crossing of the Nungesser River. Archaeological sites data states that a site is located there under Borden number EiKk-1 (Pimachiowin Aki Corporation 2016).
- Extensive hunting and trapping sites along its route (Pimachiowin Aki Corporation 2016).
- A significant waterway travel route (Pimachiowin Aki Corporation 2016).

Kirkness Creek/Stormer Lake – Cultural Heritage Landscape

Kirkness Creek connects Kirkness Lake/Stormer Lake with Shining in the Distance Lake/Nungesser Lake. This cultural heritage landscape is located in the LSA. The location of the proposed Project is at the mouth of Kirkness Creek on Stormer Lake. Stormer Lake is directly connected with Kirkness Lake to the west. Kirkness Lake (Wahshaygahmesshiing) is an important lake as a historical location of a summer village for the Pikangikum people and a historical crossroads for the Pikangikum people and the fur trade (Pikangikum 2006).

Important aspects noted near the LSA within the cultural heritage landscape include:

- An important significant waterway travel route (Pimachiowin Aki Corporation 2016).
- Extensive hunting and trapping sites within the area (Pimachiowin Aki Corporation 2016).
- Manoomin (Northern Wild Rice) harvest area identified within 500 m to the east of the LSA (Pimachiowin Aki Corporation 2016).

Berens Lake/Berens River (Kitchee Zeebee) – Cultural Heritage Landscape

Berens Lake/Berens River is the major watercourse through the region which eventually drains into Lake Winnipeg to the west. The LSA is located at a crossing of the Berens River at the outlet of Berens Lake. Pikangikum Lake is located to the west along the waterway and numerous significant areas are located up river including Silcox Lake, Throat River, Owl River, and Mamakwash Lake.

The Land Use Strategy for the Whitefeather Forest describes the Berens River as the “heart of the Pikangikum cultural landscape” (Pikangikum 2006). Important aspects noted near or in the LSA within the cultural heritage landscape include:

- A significant waterway travel route (Pimachiowin Aki Corporation 2016).
- Extensive hunting and trapping sites within the area (Pimachiowin Aki Corporation 2016).
- A number of cabins and campsites are located along the shores of Berens Lake (Pimachiowin Aki Corporation 2016). All noted locations are not in close proximity to the LSA.
- A set of rapids (Pimachiowin Aki Corporation 2016) are located within the LSA.
- An archaeological site is registered within the LSA and the cultural heritage landscape; EkKk-4, Berens Lake Portage (Hamilton and Taylor-Hollings 2010).

Where the project crosses these cultural heritage landscapes, the power line design seeks to parallel existing and planned road crossings to the degree possible.

Municipally Recognized Built Heritage and Cultural Heritage Landscapes

Municipally recognized built heritage and cultural heritage landscapes are primarily designated or listed properties and protected under by-laws enabled by Part IV and V of the *Ontario Heritage Act*; and other forms including informally recognized plaques, monuments and parks.

The only municipality within the LSA is the Municipality of Red Lake. The Official Plan of the Municipality of Red Lake indicates that there are currently no identified built heritage or cultural heritage landscapes within the Municipality (Red Lake 2015).

8.4.2.2.2 Potential Heritage Resources

According to MTCS guidelines (MTCS 2005), any resources (i.e., buildings or structures) older than 40 years can be considered potential heritage resources. These properties are not listed or designated properties and currently have no associated controls or heritage by-laws, but could be protected for their heritage value should any level of government deem them significant heritage resources.

Based on the preliminary desktop research, one potential resource was identified within the LSA close proximity to the LSA with potential heritage value: the Leemac Occurrence (Gold Mine) location, identified through review of the Abandoned Mines Information System (AMIS). The Ministry of Northern Development and Mines (MNDM) AMIS database record MDI52N04SE00006 indicates this location represents a gold deposit tested in the 1940s and 1950s. The recorded point within the AMIS database is located approximately 60 m east of the limits of work boundary; as the extent of the site is not documented, features associated with the testing could be located within the LSA. Where the project crosses this potential heritage resource, the power line design seeks to parallel the existing Nungesser Road which will further increase the setback distance to the recorded point in the AMIS database.

8.4.3 Effects Assessment and Mitigation

Project Case

As noted in Section 8.4.2, known and potential heritage resources within the LSA were identified based on historic research using archival and secondary materials, a review of government registers, analysis of historic mapping material, historic survey, aerial photography, LIDAR, and topographical maps.

The potential interactions with Project activities, the potential effects from the Project, the need for mitigation, and the predicted residual environmental effects are presented in Table 3 for the two key indicators, known heritage resources and potential heritage resources identified to assess the effects of the Project on Built Heritage Resources and Cultural Landscapes.

Table 3: Potential Effects, Mitigation and Residual Effects for the Environment on the Project

Indicators	Project Component or Activity	Effect Pathway	Mitigation Measures	Description of Net Effect
Known heritage resources and potential heritage resources	Project activities during the construction stage, including clearing and grubbing of vegetation along the power line alignment right-of-way, and other construction areas	Alteration of a heritage resource from vibration of construction equipment during construction, clearing and grubbing of vegetation along the power line alignment right-of-way and other construction areas	Consultation with the MNRF to determine best practice for the protection of identified heritage resources. Existing roads and trails will be used where possible. Implement mitigation measures identified in the 2009 INAC screening report to minimize for potential indirect effects from water quality, for example, to heritage resources. Identified heritage resources near the Project footprint and their associated setbacks will be staked or flagged. ▪ Project personnel will avoid areas that are flagged or fenced and abide by restrictions on in/out privileges that are implemented in areas requiring special protection due to environmentally sensitive features. In the event that heritage resources not previously identified are suspected or encountered unexpectedly during construction, implement a Chance Find Procedure. ▪ In the event that a previously unidentified heritage resource is suspected or encountered, Wataynikaneyap will contact the applicable First Nation, heritage or archaeology resource specialist, municipality and MTCS, as applicable. ▪ Suspend activity at that location if it has the potential to damage or affect a heritage feature. Work at that location will not resume until permission is granted by Wataynikaneyap in engagement with appropriate regulators, as required. ▪ The resource specialist may deem it necessary to visit the site and will, regardless of whether a site visit is required, develop an appropriate mitigation plan in engagement with Wataynikaneyap, applicable First Nation and the MTCS.	Not significant

Potential effects on heritage resources are most likely to occur during the construction of the Project. Specifically, negative effects related to heritage resources can occur as a result of any alteration, relocation, or demolition of heritage resources. Avoidance of heritage resources during the design and routing phases of the Project will minimize any potential effects on the heritage resources.

When undertaking projects that may result in the demolition, alteration, or relocation of a heritage resource, mitigation measures are recommended to avoid or minimize adverse effects on the resources. Typically, strategies are implemented to avoid and retain a resource in situ, relocate the resource to a suitable location or, if those options are not feasible, document the resource prior to or during its demolition. By successfully carrying out these mitigation strategies effects of the Project on heritage resources will be mitigated.

To the extent feasible, temporary workspace will be established in a manner that accommodates the identified heritage resources (including the features of the cultural heritage landscapes identified at the water crossings for the Nungesser River, Kirkness Creek and Berens River) to avoid demolition or alteration of their features. Consultation with the MNRF will be undertaken to ensure best practice for the conservation of heritage features and determine next steps to be completed.

No residual effects on heritage resources are predicted as a result of the Project construction (Table 3). Likewise, no interaction between the Project and heritage resources is anticipated during operation. Consequently, Built Heritage Resources and Cultural Heritage Landscapes was not carried forward in the assessment for evaluation of significance or considered under the reasonably foreseeable development case assessment.

Reasonably Foreseeable Development Case

No significant effects are predicted for the Project case; therefore a reasonably foreseeable development case assessment was not completed.

8.4.4 Prediction Confidence in the Assessment

Confidence in the prediction of no significant effects on heritage resources is moderate. The investigation of heritage resources to be completed for the Project complies with the best practices identified in the *Technical Guideline for Cultural Heritage Resources for Projects Planned Under the Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects and the Class Environmental Assessment for Provincial Parks and Conservation Reserves* (MNR 2006).

8.4.5 Follow-up, Inspection, and Monitoring

Consultation with the MNRF will be undertaken to ensure best practice for the conservation of heritage features and determine next steps to be completed including possible follow-up, inspection or monitoring to address Built Heritage and Cultural Heritage Landscapes for this project.

8.5 Archaeological Resources Assessment

This section describes and summarizes the archaeological study undertaken for the Project, and presents an assessment of the effects of the Project on archaeological resources. Archaeological resources include known and undiscovered archaeological objects, material or physical features that may have cultural heritage value or interest, and are protected under the *Ontario Heritage Act*.

The screening for this project is being conducted under the Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects and the Class Environmental Assessment for Provincial Parks and Conservation Reserves. This process is managed by the MNRF which provides guidance for the assessment of archaeological resources through their *Technical Guideline for Cultural Heritage Resources for Projects Planned Under the Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects and the Class Environmental Assessment for Provincial Parks and Conservation Reserves* (2006) (MNRF Technical Guide for Cultural Heritage Resources). Further guidance from the MNRF in Forestry Management areas comes from their *Forest Management Guide for Cultural Heritage Values* (2007).

In addition, the archaeological studies undertaken for the Project are in accordance with the *Ontario Heritage Act*, and the *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011).

One criterion (archaeological resources) has been identified to assess the effects of the Project on the archaeological resources. The rationale and key indicators are summarized in Table 4.

Table 4: Archaeological Resources Criterion, Rationale and Indicators

Criterion	Rationale	Indicators
Archaeological resources	■ Archaeological resources are a non-renewable resource that could be affected by Project activities ■ Archaeological resources have spiritual and cultural importance to First Peoples and to Canadians ■ Archaeological sites are protected under the *Ontario Heritage Act*	■ Number, type and location of known archaeological resources ■ Area of archaeological potential

The archaeology resources assessment focuses on the following types of archaeological resources

- **Known archaeological resources:** Known archaeological sites are those that have been previously registered with the MTCS. The known archaeological resources are protected under the Ontario *Heritage Act*.
- **Potential archaeological and cultural resources:** Potential archaeological and cultural resources include any type of site that contains evidence of past human occupation which may be considered by some level of authority as worthy of protection under a relevant archaeological protection method but has not yet been evaluated or given formal recognition or protection by a governmental approval agency.

The *Ontario Heritage Act* provides the provincial government and municipalities the power to preserve and protect heritage properties and archaeological sites on non-federally owned land within Ontario including both privately and publically owned lands. Under the *Ontario Heritage Act*, the MTCS is responsible for the “administration of the Act and may determine policies, priorities and programs for the conservation, protection and preservation of the heritage of Ontario”. Prior to any construction activities, a letter of compliance from the MTCS is required which states that no further archaeological work is required for the Project.

The *Ontario Heritage Act* defines archaeological resources and the term may also refer to artifacts and archaeological sites. These are defined as follows:

- archaeological resource: an object, material or physical feature that may have cultural heritage value or interest;
- archaeological site: any property that contains an artifact or any other physical evidence of past human use or activity that is of cultural heritage value or interest; and
- artifact: any object, material or substance that is made, modified, used, deposited or affected by human action and is of cultural heritage value or interest.

Archaeological sites take the form of objects, constructs and landscape changes which have the potential to yield information on the cultural history of human activities. Sites can take a variety of forms, but generally consist of artifacts (e.g., pottery and projectile points), soil impressions or alterations identified as features (e.g., postholes and building footprints) and landscape changes (e.g., construction of mounds and removal of natural forest for farming). Cultural deposits are typically layered and can be relatively dated (the deeper the deposit, the older its date) assuming that they have not been previously disturbed. These layers can range in depth from less than a centimetre to several metres. The excavation of these deposits by an experienced archaeologist will result in an understanding of the site's cultural history through the analysis of the spatial distribution of artifacts, including their relationship to identified cultural features, the nature of a site's assemblage and the comparison of the site to similarly dated sites in the region.

Terrestrial archaeology assessment in Ontario involves a multi-stage process to identify and protect archaeological resources as directed by the *Ontario Heritage Act* and outlined in the *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011). The process followed to meet provincial requirements involves the completion of a Stage 1 Archaeology Assessment. Based on the results of the Stage 1, the need to complete a Stage 2 Archaeology Assessment, which includes field surveys, will be completed. The Stage 2 assessment will be required in areas identified as having archaeological potential in the Stage 1 assessment. Stage 3 assessments are required when an archaeological site is identified but the Cultural Heritage Value or Interest (CHVI) is not known. Stage 4 mitigation is required when an archaeological site with CHVI has been identified, Stage 4 mitigation can take the form of block excavation and documentation of the entire site limits that will be impacted; or, it can mitigated through avoidance and protection.

Underwater archaeology assessment in Ontario involves a permitting process designed to fit the Project parameters and protect archaeological resources as directed by the *Ontario Heritage Act* and the MTCS or Parks Canada, where federal lands such as historic canals are involved. If deemed appropriate, based on discussions with the MTCS, a marine archaeologist will design a program of background research and field survey, and submit the program to the MTCS for approval.

8.5.1 Study Area

The LSA which is the limits of work (defined in Section 8.1 and shown on Figure 2) is identified as the study area for assessing archaeological resource. The LSA is sufficient to address potential direct effects (e.g., destruction or alteration) and indirect effects (e.g., water quality) from the Project to these resources. Archaeological resources outside of this study area were also reviewed to provide more of a regional context.

8.5.2 Baseline Characterization (Base Case)

This section provides a summary of the existing environment for archaeological resources based on the desktop Stage 1 Archaeology Assessment (Stage 1) completed for the Project.

Methods

Information for the archaeological resources Base Case was collected from review of the following sources:

- Reports from previously completed archaeological assessments and surveys;
- MTCS's Archaeological Sites Database, which provides information on known archaeological sites in the Province provided to Golder on 3 May 2017;
- MTCS *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011);
- Ministry of Natural Resources and Forestry *Technical Guideline for Cultural Heritage Resources for Projects Planned Under the Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects and the Class Environmental Assessment for Provincial Parks and Conservation Reserves* (MNR 2006);
- MNRF *Forest Management Guide for Cultural Heritage Values* (MNR 2007);
- Published environmental and topographic literature and maps;
- Published document and books related to previous land uses;
- Archival documents and secondary sources; and
- Aerial imagery.

This baseline characterization follows the process of a preliminary screening using the checklist provided in the MNRF Technical Guide for Cultural Heritage Resources (MNR 2006), as well as any additional checklist metrics identified in the MTCS *Criteria for Evaluating Potential for Archaeological Potential: A Checklist for the Non-Specialist* (2015). The purpose of the checklist is to determine, through desktop study, whether known or potential archaeological resources are present in the Project area, and determine if the Project area has potential for as of yet undiscovered archaeological resources. In addition to the checklists, the MTCS *Standards and Guidelines for Consultant Archaeologist* (2011) provides detailed standards and guidelines for determining archaeological potential. The general criteria for archaeological resources potential is proximity to known archaeological sites, elevated and well drained topography such as drumlins, eskers, and ancient beach ridges, navigable water ways (rivers, lakes streams), burial sites or cemeteries, and Aboriginal or local knowledge of historically documented evidence of past human land use within a given area (resource procurement locations, areas of spiritual significance, areas along migration corridors, etc.).

A Stage 2 Archaeological Assessment (Stage 2) to determine whether archaeological sites are located within the Project footprint will be required within all identified areas of archaeological potential outline in the Stage 1 Following the requirements of the MTCS *Standards and Guidelines for Consultant Archaeologists*, the Stage 2 will consist of test pit survey within the environment of the project. Test pit survey involves systematically walking the

property along regularly spaced transects, excavating small pits by hand at regular intervals and examining their contents.

8.5.3 Results

Known Archaeology Resources

The primary source of information regarding known archaeological sites in the LSA is the MTCS's archaeological sites database; available land use planning documentation, and engagement with Pikangikum First Nation, Wabauskang First Nation and Lac Seul First Nation.

The results indicate that there are four registered archaeological sites within or in close proximity to the study area. Two sites are located over 2 km from the LSA (EjKl-4 and EgKk-6), one site is located over 1 km from the LSA (EhKj-1), and one site, EkKk-4, is located within the LSA at the proposed Berens River crossing (Alternative B1). These sites are further described below.

- **Outside the LSA:**
  - **EgKk-3** – Pre-contact Laurel tradition campsite containing 4 Hudson Bay Lowland chert artifacts and broken scraper situated on the east side of and island between McKenzie and Bruce Channels on Red Lake.
  - **EhKj-1: Coli Lake Cabin** – Site of unknown period located on the east side of a long northwest facing peninsula on Coli Lake across from two small islands.
  - **EjKl-4: Kirkness Area 6** – A large multi-component pre-contact and historic site located on a raised terrace near the outlet to Stormer Lake into Kirkness Lake. The site contained 103 artifacts associated with the Blackduck, Laurel and Selkirk traditions, as well as Euro-Canadian material.
- **Within the LSA:**
  - **EkKk-4: Berens Lake Portage –** Site of unknown age or cultural affiliation located at the western end of Berens Lake. The site was first identified by Pollock in 1980 during an assessment of the Berens River watershed. A small lithic scatter was observed on the surface of a heavily utilized portage trail. No subsurface testing was conducted but it has been intimated that the additional Pre-Contact Aboriginal cultural material remains intact below the surface.

Potential Archaeological Resources

Numerous criteria are used to determine the potential for Pre-Contact Aboriginal and historical Euro-Canadian archaeological sites. Key indicators of archaeological potential include proximity to navigable water-courses, where well-drained soils are present, along glacial features such as drumlins, eskers, moraines, and glacial beach ridges, railway infrastructure, glacial shorelines, early transportation routes and known archaeological sites as outlined in the MNRF Technical Guide for Cultural Heritage Resources (MNR 2006) Section 2.2 and Appendix 2*;* MNRF *Forest Management Guide for Cultural Heritage Values* (MNR 2007) Section 3.3 and MTCS Standards and Guidelines Section 1.3.1 (2011). Section 1.3.3 of the Standards and Guidelines identifies areas in the Canadian Shield that are distinct from the surrounding environment such as sand and clay plains possess a higher degree of archaeological potential (MTCS 2011).

Potential archaeological resources that could be found within the study area include:

- Aboriginal sites such as campsites, portage areas, canoe spills (i.e., where cargo from canoe was spilt and not recovered) caches, sacred sites, resource extraction areas and burial sites.
- Potential archaeological resources related to historical Euro-Canadian sites, such as logging associated infrastructure, mining associated infrastructure, early domestic settlement, early industrial infrastructure, religious centres (e.g., missionary related), cemeteries, single isolated burials, canoe spills, caches, fur trade associated infrastructure and early recreational infrastructure (e.g., related to tourism).
- Petroglyphs, pictographs, petroforms, and guideposts used by both Aboriginal peoples and Euro-Canadian settlers.

Areas exhibiting low archaeological potential include areas at a distance removed from a feature of archaeological potential, or those areas where the likelihood of someone actively using the area for subsistence, resource activities, habitation or spiritual means has been determined to be low; in the Canadian Shield, areas in excess of 150 m from a feature of archaeological potential are generally considered to exhibit low archaeological potential (MTCS 2011).

There is a cultural heritage value identified in a communication by the MNRF (Appendix A) that is outside the LSA where the project ROW has been designed to avoid the value. The cultural heritage value has been identified as a Thunderbird nest and was photo documented as part of a site visit completed by Wataynikaneyap representative on August 24, 2016.

The *Whitefeather Forest and Adjacent Areas Land Use Strategy* identify that Kirkness Lake “is a very special lake that is the historical location of a summer village for the Pikangikum people” (June 2006). The land use strategy further identifies that on Kirkness Lake there is evidence for old cabins and tent frames and that archaeological work guided by Elders have uncovered artifacts dating back thousands of years. In addition, there are accounts of Thunderbird nests located near the shores of Kirkness Lake. No exact information was provided on the location of these cultural resources, however the importance of this lake as the summer location for the Pikangikum people indicates that archaeological resources are probable to be found in close association to the Project area along Kirkness Creek. Mapping within the land use strategy does not identify Stormer Lake separately from Kirkness Lake.

Using the sources noted above, in conjunction with a review of LiDAR imagery, MNRF Stream Order and archaeological potential data and applying MTCS Standards 1.3.3, 1.3.4, and 2.1.5, the Stage 1 Archaeological Assessment identified a number of areas of archaeological potential that were recommended for Stage 2 Archaeological Assessment. The primary areas requiring Stage 2 Archaeological Assessment are Pindar Creek, the Nungesser and Kirkness Rivers, and the Berens River crossing at Dog Rib Rapids. In addition to larger creeks and rivers, there are small sections of Coli and Prideaux Lakes as well as some unnamed ponds where the outside limits of the LSA overlap with areas of archaeological potential.

8.5.4 Effects Assessment and Mitigation

Project Case

A summary of the potential interactions with Project activities, the potential effects from the Project, recommended mitigation and the predicted significance of the potential effect to archaeology resources and cultural values is presented in Table 5.

Table 5: Potential Effects, Mitigation and Net Effects for the Environment on the Project

Indicator	Project Component or Activity	Effect Pathway	Mitigation Measures	Description of Net Effect
Archaeological Resources Sites	Site clearing, soil stripping, grading, distribution line installation and post installation site remediation works and maintenance	Loss of or damage to archaeological resource sites	Completion of Stage 2 (and Stage 3 and 4 if required) archaeology assessment on areas identified in the Stage 1 assessment within the Project footprint to determine whether archaeological sites are present and to recommend appropriate mitigation measures should archaeological resources be identified. Existing roads and trails will be used where possible. Implement mitigation measures identified in the 2009 INAC screening report to minimize for potential indirect effects from water quality, for example, to archaeology resources. Identified archaeological resources near the Project footprint and their associated setbacks will be staked or flagged. ▪ Project personnel will avoid areas that are flagged or fenced and abide by restrictions on in/out privileges that are implemented in areas requiring special protection due to environmentally sensitive features. No clearing or construction activity within flagged or fenced areas that contain archaeological resources. In the event that archaeological resources not previously identified are suspected or encountered unexpectedly during construction, implement a Chance Find Procedure. ▪ In the event that a previously unidentified archaeological resource is suspected or encountered, Wataynikaneyap will bring in a resource specialist and contact the potentially affected First Nation community and the MTCS. ▪ Suspend activity at that location. Work at that location will not resume until permission is granted by Wataynikaneyap in engagement with appropriate regulators as required. ▪ The resource specialist may deem it necessary to visit the site and will, regardless of whether a site visit is required, develop an appropriate mitigation measures plan in engagement with Wataynikaneyap and, if necessary, the appropriate regulatory agencies. **Collection of archaeological resources by Project personnel is prohibited. Project personnel will be provided guidance prior to construction.**	Not significant

The potential effect on archaeological resources is expressed as the loss or damage to archaeological resources potentially affected by the Project. As archaeological resources could affect knowledge of regional history and in compliance with the *Ontario Heritage Act*, appropriate mitigation measures were identified where potential effects were anticipated.

Alteration of the landscape can result in damage or destruction of archaeological resources. These alterations often involve displacement of artifacts resulting in the loss of valuable contextual information. Or alternation of the landscape may result in the complete destruction of artifacts and features leading to complete loss of ability for additions to cultural analysis and to First Nations history. Any activity with the potential to cause ground disturbance may affect archaeological resources unless appropriate steps are taken in advance to identify and either protect or have the resource properly excavated by a licensed consultant archaeologist, following the recommended measures in the *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011).

As described above in Section 8.5.3, areas of archaeological potential, and previously recorded archaeological sites identified as being culturally important to the people of the Pikangikum First Nation are located within the LSA. Avoidance and protection of archaeological resource sites is the preferred approach as per the 2011 *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011). Direct effects can be avoided by identifying and avoiding archaeological resources prior to ground disturbance, and by increasing the awareness of Project personnel about archaeological resources in proximity to the Project footprint. Thus, prior to any ground disturbance, a Stage 2 will be completed on the archaeology sites and areas of archaeology potential to be disturbed by the Project prior to the start of construction, with the exception of lands that do not retain archaeological potential or lands previously subject to Stage 1 or 2 archaeological assessments that have been entered into the public registry. The results of the Stage 2 assessment will be used to identify archaeological resources and to develop a strategy to mitigate potential direct effects of the Project on these archaeological resources.

A Stage 3 archaeological assessment will be undertaken if a site of cultural heritage value or interest is identified as outlined in the MTCS Standards and Guidelines Section 2.2. Stage 3 is a site-specific assessment undertaken to determine whether the resource warrants protection under the *Ontario Heritage Act*. A Stage 4 archaeological assessment will be undertaken if a resource is determined to have cultural heritage value or interest that warrants protection and cannot be avoided by relocating the Project infrastructure. Stage 4 involves mitigation of development impacts to conserve the resource. All required archaeological assessments will be undertaken and clearance for the Project under the *Ontario Heritage Act* will be obtained prior to any ground disturbance.

The archaeological resource site-specific mitigation summarized in Table 5 and the completion of Stage 2 (or Stage 3 and 4) and additional mitigation measures identified from these additional stages will be implemented to avoid and minimize the potential for both direct effects (i.e., loss or damage) and indirect effects on archaeological resource sites in the archaeological resources in the limits of work. Given the Project planning and recommended mitigation strategies to minimize direct and indirect effects, significant net effects on archaeological resources are not predicted as a result of the Project.

At this stage of Project design, there are no Project components currently planned below the high water mark. However, should design requirements change, the MTCS *Criteria for Evaluating Marine Archaeological Potential: A checklist for Non-Marine Archaeologists* will be completed. If the results of the checklist identify that marine archaeological potential exists within the limits of work; compliance with the *Ontario Heritage Act* and with the

MTCS *Standards and Guidelines for Consultant Archaeologists* will need to be met through the completion of a Marine Archaeological Assessment.

Reasonably Foreseeable Development Case

No significant effects are predicted for the Project case; therefore a reasonably foreseeable development case assessment was not completed.

8.5.5 Prediction Confidence in the Assessment

The confidence in the prediction of residual environmental effects on archaeological resources is high, based on the available information from existing data sources. Confidence in the mitigation for archaeological resources is also high given that the mitigation and monitoring identified in Table 13, is based on accepted and proven best management practices identified in the *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011) and will be approved by the MTCS.

8.5.6 Follow-up, Inspection, and Monitoring

A Stage 2 (or Stage 3 and 4) archaeology assessment will be required as discussed above. There may be a requirement for monitoring to follow the mitigation recommendation that would be identified in the Stage 4 report, if required.

8.5.7 Conclusions

There are no predicted significant effects to archaeology resources from the Project assuming any additional mitigation identified in the Stage 2 (or Stage 3 and 4) archaeology assessments are implemented by Wataynikaneyap.

9.0 SUMMARY AND CONCLUSIONS

As discussed earlier in this report, an INAC Screening EA Report and MNRF RSFD screening criteria table were completed in 2009. This updated PD has focussed on revisions to Project design and resulting potential effects to the environment, where it differs from the 2009 assessment results; and the scope of the updated PD based on input from the MNRF. As such, Table 6 provides an updated MNRF criteria table. The table notes where the assessment results remain the same, assuming implementation of mitigation identified in the 2009 report and additional mitigation identified in this report.

Table 6: Update to Potential Effects as Compared to Previous Proposal, and Proposed Mitigation

Environment	Potential Effects as Compared with Previous Proposal	Proposed Mitigation
Natural Environment Considerations		
Air quality	▪ New substation location is not located near sensitive receptors, such as a community. ▪ No change in effects from previous Project proposal. ▪ Positive benefit from decreased reliance on diesel electricity generation at First Nation communities; thereby decreasing air emissions and greenhouse gases.	▪ As per previous Project proposal.
Water quantity or quality	▪ No change in effects from previous Project proposal. ▪ Decrease in potential negative effect to water quality due to elimination of submarine crossing of the Berens River. All watercourse crossings will be overhead. ▪ Positive benefit of decreased risk of accidental spills of diesel that could affect water quality.	▪ As per previous Project proposal. ▪ If required, access roads or water crossings would be constructed in accordance with MNR's Environmental Guidelines for Access Roads and Water Crossings (1990). ▪ Follow DFO Measures to Avoid Causing Harm to Fish and Fish Habitat Including Aquatic Species at Risk (DFO 2016).

Table 6: Update to Potential Effects as Compared to Previous Proposal, and Proposed Mitigation

Environment	Potential Effects as Compared with Previous Proposal	Proposed Mitigation
Species at risk (SAR) or their habitat	▪ Positive benefit with the removal of the submarine crossing of the Berens River reduces potential direct habitat impact to Lake Sturgeon. Potential temporary crossing at different location on the Berens River. Implementation of the mitigation measures identified under Water Quality and Fish and Aquatic Species reduce potential impacts to Lake Sturgeon. ▪ Wataynikaneyap will implement the identified mitigation measures that resulted in a low negative effect rating in the MNRF screening and determination of no significance in the federal EA. ▪ See Appendix B for Species At Risk report for baseline, effects assessment and mitigation for terrestrial species. ▪ For SAR species, except for bats and woodland caribou, the Project Case and the RFD Case are not predicted to result in significant effects with the implementation of identified mitigation. ▪ Bats - The population at Base Case is predicted to be significantly affected. However with effective implementation of mitigation, the Project is predicted to have a small but negative effect on the bats, and have no to little contribution to the combined effects from the Base Case. No significant effects are predicted from the Project Case. The RFD Case is conservatively predicted to be significant due to uncertainty associated with future forestry activities, climate change and population demographic rates. However, the Project is expected to contribute little to the significance of RFD Case. ▪ Woodland Caribou - No significant effects are predicted from the Project Case. The RFD Case is conservatively predicted to be significant due to uncertainty associated with future forestry activities, climate change and population demographic rates. However, the Project is expected to contribute little to the significance of the RFD Case.	Mitigation measures that will be implemented by Wataynikaneyap include the following: ▪ Minimize footprint. ▪ Where possible, avoid areas of sensitive wildlife habitat (e.g., calving, rearing, denning). ▪ Where possible, implement construction timing windows to avoid sensitive lifecycle periods (e.g., rearing). (See last bullet). ▪ Where possible, use or follow existing disturbances. The preliminary proposed corridor follows existing and planned all season roads to the extent practical and will utilize the existing empty utility corridor on the north side of Berens River. ▪ Revegetation of any temporary construction areas to wildlife end use objectives. ▪ Limits effects of noxious and invasive plants on natural vegetation. ▪ Limit traffic speed for vehicles during construction. ▪ Use of wildlife-proof waste receptacles. ▪ If required, complete appropriately timed nest and den surveys in advance of construction clearing. Additional details on mitigation relevant to terrestrial species are provided in Appendix B Species At Risk report. Additional details on mitigation relevant to Lake Sturgeon are provided under *fish or other aquatic species, communities, populations or their habitat* heading.
Significant earth or life science features	None identified within the limits of work.	

Table 6: Update to Potential Effects as Compared to Previous Proposal, and Proposed Mitigation

Environment	Potential Effects as Compared with Previous Proposal	Proposed Mitigation
Fish or other aquatic species, communities, populations or their habitat	▪ Potential temporary crossing at Berens River. ▪ Decrease to negative effects due to elimination of submarine crossing of the Berens River that could affect fish and other aquatic organisms. ▪ Decreased risk of accidental spills of diesel that could affect water quality thereby affecting fish and other aquatic organisms.	▪ As per previous Project proposal for aerial water crossings; including measures for sediment and erosion control, as well as spills prevention and response (this Project will not include fording of waterbodies or watercourses). ▪ If required, access roads or water crossings would be constructed in accordance with MNR's Environmental Guidelines for Access Roads and Water Crossings (1990). ▪ If required, implement Department of Fisheries and Oceans (DFO) Measures to Avoid Causing Harm to Fish and Fish Habitat Including Aquatic Species at Risk (DFO 2016). ▪ For temporary access during construction, use existing crossing structures or open an ice crossing at the Berens River to avoid work below the high water mark. The restricted activity timing windows are not applicable if all work is completed above the high water mark, or if the waterbody is frozen and an ice crossing is constructed. Restricted activity timing windows are assigned to avoid work during sensitive life history periods or life stages for all fish that may be present in each waterbody, including movements to spawning areas, spawning and egg incubation, or eggs and newly hatched fry. ▪ Minimize clearing of vegetation along the ROW where possible, especially below the high water mark of the water body. The high water mark will be determined and marked. Clearing of vegetation below the high water mark may need to follow the restricted activity timing window for the water body. ▪ Install and remove the ice crossing in a manner that protects the banks from erosion. ▪ Other than crossing with the ROW, maintain a buffer (30 m) around water bodies, watercourses and wetlands to the degree possible.
Land subject to natural or human-made hazards	Not applicable to the Project	

Table 6: Update to Potential Effects as Compared to Previous Proposal, and Proposed Mitigation

Environment	Potential Effects as Compared with Previous Proposal	Proposed Mitigation
Recovery of a species under a special management program (e.g., elk restoration)	▪ Woodland caribou, boreal population is under a federal recovery strategy, Recovery Strategy for the Woodland Caribou, Boreal population (*Rangifer tarandus caribou*) in Canada (Environment Canada 2012). ▪ Potential effects to woodland caribou and mitigation are provided in Section B Species at Risk report. No significant effects are predicted from the Project Case. The RFD Case is conservatively predicted to be significant due to uncertainty associated with future forestry activities, climate change and population demographic rates. However, the Project is expected to contribute little to the significance of RFD Case.	▪ Mitigation measures for this Project specific to woodland caribou identified above under Species At Risk and provided in Appendix B Species At Risk report.
Ecological integrity	▪ No predicted change in effects from previous Project proposal.	▪ As per previous Project proposal ▪ Additional mitigation measures referenced above under Species At Risk and provided in Appendix B Species At Risk report related to limiting effects of noxious and invasive plant species (e.g., cleaning and inspection of vehicles and equipment prior to Project site entry/movement to weed free areas; locating and managing cleaning locations on the Project site).
Terrestrial wildlife (including numbers, diversity and movement of resident or migratory species)	▪ No predicted change in effects from previous Project proposal. ▪ Terrestrial species at risk discussed above and in Appendix B Species At Risk report.	▪ As per previous Project proposal. ▪ Mitigation measures specific to species at risk identified above under Species At Risk and provided in Appendix B Species At Risk report.
Natural vegetation and terrestrial habitat linkages or corridors through fragmentation, alteration and/or critical loss	▪ No predicted change in effects from previous Project proposal. ▪ No vegetation species at risk located in the limits of work. Terrestrial species at risk habitat addressed under Appendix B Species At Risk Report.	▪ As per previous Project proposal. ▪ Mitigation measures identified above under Species At Risk and provided in Appendix B Species At Risk report.
Permafrost	No predicted change in effects from previous Project proposal.	

Table 6: Update to Potential Effects as Compared to Previous Proposal, and Proposed Mitigation

Environment	Potential Effects as Compared with Previous Proposal	Proposed Mitigation
Soil and sediment quality	No predicted change in effects from previous Project proposal.	▪ As per previous Project proposal. ▪ If required, access roads or water crossings would be constructed in accordance with MNR's Environmental Guidelines for Access Roads and Water Crossings (1990). ▪ Follow DFO Measures to Avoid Causing Harm to Fish and Fish Habitat Including Aquatic Species at Risk (DFO 2016).
Drainage and flooding	Does not apply to Project.	
Sediment or erosion	No predicted change in effects from previous Project proposal.	▪ As per previous Project proposal. ▪ If required, access roads or water crossings would be constructed in accordance with MNR's Environmental Guidelines for Access Roads and Water Crossings (1990). ▪ Follow DFO Measures to Avoid Causing Harm to Fish and Fish Habitat Including Aquatic Species at Risk (DFO 2016)
Release of contaminants in soils or sediments	No predicted change in effects from previous Project proposal.	
Natural heritage features (e.g., areas of natural and scientific interest, provincially significant wetlands)	None located within the limits of work.	
Land Use, Resource Management Considerations		
Access to trails or inaccessible areas (land or water)	No predicted change in effects from previous Project proposal.	▪ As per previous Project proposal. ▪ Discussions with Whitefeather Forest Land Use Strategy Implementation Team (WFLUSIT) and WFISG will provide consistency between proposed Project and existing strategic direction.
Or obstruct navigation	Does not apply to Project.	
Traffic patterns or traffic infrastructure	No predicted change in effects from previous Project proposal.	

Table 6: Update to Potential Effects as Compared to Previous Proposal, and Proposed Mitigation

Environment	Potential Effects as Compared with Previous Proposal	Proposed Mitigation
Recreational importance – public or private	No predicted change in effects from previous Project proposal.	
Or create excessive waste materials	No predicted change in effects from previous Project proposal.	
Or commit a significant amount of a non-renewable resource (e.g., aggregates, agricultural land)	Does not apply to the Project.	
Noise levels	▪ New substation location is not located near a sensitive receptor, such as a community. ▪ No predicted change in effects from previous Project proposal.	As per previous Project proposal.
Views or aesthetics	The Project crosses the DPA, which results in alteration of view that is not predicted to result in significant effects.	▪ Parallel existing or planned structures to minimize visual effects.
Or be a precondition or justification for implementing another project	The Pikangikum Project is a precondition for implementing the Wataynikaneyap Phase 2: Connecting 17 Remote First Nation communities.	
Adjacent or nearby uses, persons or property	No predicted change in effects from previous Project proposal.	
Land Use	▪ Potential effects to the BDE DPA not addressed in previous assessment. ▪ Potential effects of crossing the DPA are discussed in Section 8.2. No significant effects on the DPA are predicted from the Project Case and RFD Case. ▪ No predicted change in effects to other land use from previous Project proposal.	▪ As per previous Project proposal. ▪ Project right-of way aligned to follow existing or proposed right-of-way and structure through the DPA to minimize potential effects.

Table 6: Update to Potential Effects as Compared to Previous Proposal, and Proposed Mitigation

Environment	Potential Effects as Compared with Previous Proposal	Proposed Mitigation
Social, Cultural and Economic Considerations		
Cultural heritage resources – including archaeological sites, built heritage, and cultural heritage landscapes	▪ A Stage 1 Archaeology Assessment has been completed and is included in Appendix D and summarized in Section 8.5. With the implementation of mitigation measures through the staged assessment process, no significant effects are predicted from the Project Case. ▪ Potential effects to built heritage and cultural heritage landscapes are addressed in Section 8.4. There is no built heritage within the limits of work. There will be Project clearing required within the DPA that will affect the cultural heritage landscapes within the DPA. However, the Project clearing will be adjacent to existing or proposed right-of-way minimize the linear corridor intrusion into the cultural heritage landscape. No significant effects to the cultural heritage landscapes are predicted from the Project Case.	Mitigation measures that will be implemented by Wataynikaneyap include the following: ▪ Complete Stage 2 (or Stage 3 and 4) archaeology assessments. ▪ Project clearing will be adjacent to existing or proposed right-of-way minimize the linear corridor intrusion into the cultural heritage landscape. ▪ Implement a Chance Find Procedure during construction. ▪ Continue to engage with First Nation communities during construction.
Or displace people, businesses, institutions, or public facilities	Not applicable to the Project.	
Community character, enjoyment of property, or local amenities	No predicted change in effects from previous Project proposal.	
Or increase demands on government services or infrastructure	Not applicable to the Project.	
Public health or safety	No predicted change in effects from previous Project proposal.	
Local, regional or provincial economics or businesses	No predicted change in effects from previous Project proposal.	

Table 6: Update to Potential Effects as Compared to Previous Proposal, and Proposed Mitigation

Environment	Potential Effects as Compared with Previous Proposal	Proposed Mitigation
Tourism values (e.g., resource-based tourist lodge)	No predicted change in effects from previous Project proposal.	
Aboriginal Considerations		
First Nation Reserves or Aboriginal communities	No predicted change in effects from previous Project proposal.	As per previous Project proposal.
Sacred, spiritual or ceremonial sites Traditional land or resources used for harvesting, activities Aboriginal values	▪ Wataynikaneyap engaged with First Nation communities to identify traditional land and resource use activities, site or values within the limits of work that could be affected by the Project (see Section 8.5 Archaeology and Record of Engagement). ▪ Through design changes and proposed mitigation, potential effects of the Project on identified activities and sites have been avoided or minimized. ▪ No significant effects are predicted from the Project case.	▪ Wataynikaneyap incorporated traditional land and resource use activities, sites and values into Project design to avoid or minimize potential effects. ▪ A sensitive site was identified by a member of Wabauskang First Nation within the limits of work. Wataynikaneyap has worked with this community member to identify and implement appropriate mitigation to avoid potential effects to this site. ▪ A member of Lac Seul First Nation expressed their desire to have the power line shift to the opposite side of the road in a particular area. Wataynikaneyap evaluated the request and was unable to make the requested change. Wataynikaneyap remains open to discussion with the community member. ▪ Wataynikaneyap will continue to engage with First Nations to incorporate Project design changes, to the extent practical, should additional traditional land and resource use activities, sites or values be identified within the limits of work that could be affected.
Lands subject to land claims	Not applicable to the Project.	

10.0 POTENTIAL PERMITS AND APPROVALS

Table 7 provides a summary of potential permits and approvals.

Table 7: Summary of Potential Permits and Approvals from Provincial and Federal Agencies and Other Organizations

Agency	Applicability to the Project
Provincial	
Ministry of the Environment and Climate Change (MOECC)	▪ *Ontario Water Resources Act*: Water Taking Regulation O. Reg. 387/04 Permit to Take Water if Project construction requires taking more than 50,000 litres (L) in a day from a lake, stream, river or groundwater source. ▪ *Ontario Water Resources Act*: Section 53 Environmental Compliance Approval (ECA) for Industrial Sewage Works. An ECA may be required for the wastewater treatment systems (leaching beds) at the temporary camps. ▪ *Environmental Protection Act*: Section 9 ECA for Waste Disposal. An ECA may be required for the storage, transportation and disposal of domestic and industrial wastes, including sewage, from the temporary construction camps. ▪ *Environmental Protection Act*: Section 9 or Section 27 Environmental Compliance Approval (ECA) for Noise and Vibration may be required for operation of the substation. ▪ A Generator Registration Number is required under O. Reg. 347 of the *Environmental Protection Act* in the event Hazardous and Liquid Industrial Wastes are generated during Project construction.

Table 7: Summary of Potential Permits and Approvals from Provincial and Federal Agencies and Other Organizations

Agency	Applicability to the Project
Provincial	
Ministry of Natural Resources and Forestry (MNRF)	▪ Permit under Section 17 of the *Endangered Species Ac*t, 2007 if the project affects a listed species or its habitat. ▪ Authorization under the *Fish and Wildlife Conservation Act, 1997* in the event Project construction/operation is anticipated to destroy the nests or eggs of birds, a beaver dam, or the den of a black bear or some furbearing mammals, or interfere with a black bear in its den. Fish and Wildlife Scientific Collector permits for pre-construction surveys to relocate if needed. ▪ Forest Resource Licence (Cutting Permit) is required to harvest and/or cut timber on Crown land under the *Crown Forest Sustainability Act, 1994*. A discussion with the Whitefeather Forest Community Resource Management Authority will determine if Crown timber cleared under the FRL can be sent to a processing facility. ▪ Burn Permit under the *Forest Fires Prevention Act* (1990) to enable burning of materials from forest clearing, if required. ▪ Work Permits under the *Public Lands Act* (1990) to authorize works on public lands and/or shore lands including geotechnical investigations, construction/upgrade of access roads and trails, culverts/bridges, and distribution lines. ▪ Land Use Permits required for distribution line, access roads (to and within the Project site) and for temporary laydown and/or spoil areas. The holder of Land Use Permits will be Wataynikaneyap Power L.P. ▪ Approval under Section 20 of the Provincial Parks and Conservation Reserves Act (2006). ▪ Work permits and land use permits under the *Provincial Parks and Conservation Reserves Act* (2006) for any activities noted in the Act, regardless of whether lands are occupied under the authority of a lease, land use permit or licence of occupation. ▪ Aggregate Permit under the *Aggregate Resources Act* (1990) to extract aggregate on all Crown Land. ▪ Licence of Occupation under the *Public Lands Act* (1990) as construction works are to occur on Crown lands. ▪ Crown Lease may be required under the *Public Lands Act* (1990) for proposed transformer station. This will require Ontario Crown Land Surveyor engagement and survey instructions from Red Lake office.
Ontario Ministry of Transportation (MTO)	▪ Under the *Public Transportation and Highway Improvement Act*, the following permits may be required: – An Entrance Permit is required for any entrance onto a provincial highway, including a temporary entrance to construct or service such a proposed development; – A Building and Land Use Permit is required for any development/construction occurring within 45 metres (m) of the right-of-way (ROW) limit of any provincial highway, within 180 m of the intersection of a side road and a “King’s” highway; within 395 m of a controlled access highway; and for any power or distribution line within 400 m of a controlled access highway; – An Encroachment Permit is required for any work within, under, or over a provincial highway ROW; – A Sign Permit is required for all signage erected within 400 m of the limit of a provincial highway; and – Permit/Agreement to occupy the ROW.

Table 7: Summary of Potential Permits and Approvals from Provincial and Federal Agencies and Other Organizations

Agency	Applicability to the Project
Provincial	
Ontario Ministry of Labour	▪ Notice of Project under Section 23(2) of the *Occupational Health and Safety Act* (1990).
Ontario Ministry of Tourism, Culture and Sport (MTCS)	▪ Archaeological assessment, to be conducted by a licensed archaeologist as part of the EA under the *Ontario Heritage Act* (1990) and submitted to the Ontario Public Register of Archaeological Reports. Built heritage and cultural heritage landscape screening and, where required, heritage impact assessments (HIAs) submitted to the MTCS for review under Ontario's *Environmental Assessment Act*.
Ontario Energy Board (OEB)	▪ Approval of Leave to Construct application may be required.
Federal	
Environment Canada	▪ Permit under Section 73 of the *Species at Risk Act* (2002) should any Project activities occur on federal lands (including First Nations Reserve lands) and affect a species listed under the *Species at Risk Act*, or its habitat.
Fisheries and Oceans Canada (DFO)	▪ Authorization under the Section 35 of the *Fisheries Act* (1985) for harmful alteration, disruption and/or destruction of fish and fish habitat, related to in-water works such as blasting, cofferdam construction and/or diversion of water flows. – Self-Assessment completed by Wataynikaneyap Power to determine if the project is likely to affect a Commercial, Recreation or Aboriginal Fisheries and therefore subject to a Project Review or Authorization.
Transport Canada	▪ Lighting and marking requirements under the Canadian Aviation Regulations Standard 621 – Obstruction Marking and Lighting in the event the distribution line is located in the vicinity of an airport and could interfere with air navigation.
Indigenous and Northern Affairs Canada (INAC)	▪ Section 67 of the *Canadian Environmental Assessment Act, 2012*. ▪ Indigenous and Northern Affairs Canada (INAC) must authorize activities on First Nations Reserve lands by means of Section 28(2) of the I*ndian Act* whereby: "*The Minister may by permit in writing authorize any person for a period not exceeding one year, or with the consent of the council of the band for any longer period, to occupy or use a reserve or to reside or otherwise exercise rights on a reserve*."
Other	
Local Municipality	▪ Building Permits in accordance with *Building Code Act* (1992) and by-laws of relevant municipality. ▪ Municipality of Red Lake - By-Law No. 1083-08 - Noise Exemption if construction work for the Project is expected to make noise between 9 pm and 7 am, a noise by-law exemption will be required.

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Report Signature Page

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https://golderassociates.sharepoint.com/sites/10323g/shared documents/project description/1657738-r-reva-2017may31-pd-pikangikum distribution line project.docx

APPENDIX A

CEAA Screening and MNRF Screening Matrix for the Pikangikum Distribution Line (2009) and Ministry of Natural Resources and Forestry Correspondence

Version 1.3

Indian and Northern Affairs Canada - Ontario Region

Environmental Screening Report

CANADIAN ENVIRONMENTAL ASSESSMENT ACT

This form, when completed in full, constitutes an environmental screening report intended to meet the requirements of s. 16 of the *Canadian Environmental Assessment Act* (CEAA). It contains the following sections:

1) PROJECT IDENTIFICATION
2) LOCATION OF RESERVE & PROJECT
3) PROJECT JUSTIFICATION
4) PROJECT DESCRIPTION
5) PUBLIC AND AGENCY CONSULTATION
6) EXISTING ENVIRONMENT
7) ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES
8) CUMULATIVE EFFECTS ASSESSMENT
9) CONCLUSION AND SCREENING DECISION
10) KEY REFERENCES & SOURCES
11) LIST OF ATTACHMENTS

RECEIVED
DEC - 7 2009
INDIAN AFFAIRS

The table below will be completed by INAC Ontario Region staff. The proponent should complete the sections that follow, starting with "1. PROJECT IDENTIFICATION" on page 2.

For INAC Use Only

Project Reference	4315-208
Section 5 Triggers	5.1(b) funding
CEAA/MOU	
FEAI Number	CEAR# 08-01-40935
Lead RA	INAC
Supporting RAs	
Other FAs	DFO, TC, EC
Area	Sioux Lookout
EO	Robin Beveridge
RO	Robin Beveridge
RCM	Richard Earl, Capital North

1) PROJECT IDENTIFICATION

FIRST NATION	Pikangikum First Nation
Project Title	Pikangikum First Nation Electrical Grid
Proponent(s)	Pikangikum First Nation

2) LOCATION OF RESERVE & PROJECT

RESERVE Location *(relative to the nearest town, highway, lake, etc.)*	Pikangikum First Nation is a remote settlement of 1,971 people located in the Sioux Lookout District of Northwestern Ontario. It is situated on the eastern shores of Pikangikum Lake at the Berens River, 100 kilometers north of the town of Red Lake, at latitude 51°N48', longitude 93°W59'. The Community has a land base of 1,808 ha (4,467.5 acres) and holds an INAC remoteness classification of Zone 4 - Special Access. This classification acknowledges the community has no year-round road access to a service centre.

YES	**Part of the project** is occurring **ON** federal First Nation Reserve land. (YES/NO)

Definition of Project Area

The geographical extent of the project & areas affected during construction.
For example:
- key transportation routes for equipment and materials
- staging & refueling areas
- main activity/ construction zone, etc.

Geographical Extent

The tie-in location for the proposed power line is at the intersection of the Nungessor Road and Highway 125 located within the Municipality of Red Lake. The power line will then extend northwards 80 km following the Nungessor Road before deviating and continuing the remaining 23 km on the all-weather road to Pikangikum. Drawings G1, G2, and G3 in Appendix A illustrate the proposed route for the power line.

Transportation Routes

The primary transportation routes are as follows:

- Highway 125 to Cochenour and Balmertown:
  This route will primarily be used to mobilize crew, equipment and materials to the Nungessor Road.
- Highway 105 to Red Lake:
  This route will primarily be used to mobilize crew, equipment and materials to the Nungessor Road.
- Nungessor Road:
  This route is the primary construction route which will be used for the first 80 km of construction.
- Pikangikum All Weather Road:
  This route will be the primary construction route which will be used for the final 23 km of construction.

Staging and Refueling Areas

Refueling of equipment will likely occur within the Municipality of Red Lake or through the purchasing of fuel from Pikangikum First Nation as construction progresses northwards. In addition portable slip tanks in half ton trucks will be used to fuel equipment as required along the route of construction.

Distribution Station

A Distribution Station will also be constructed 700 m south of the Berens River. The Distribution Station will include two pad mount 5 MVA transformers, two pad mount reclosers, one pad mount double switch and a modular control trailer. There will be no fuel storage at the Distribution Centre.

Helicopter Landing Pad & Take-Off Area

In order to facilitate rapid maintenance response by Hydro One crews a helicopter landing and take-off area will be constructed at the Distribution Station location approximately 700 m south of the Berens River. A 20 m diameter clearing will be planned near the Distribution Station for this purpose.

Adjacent Lands or Features *(North, East, South, West of project)*	N	Pikangikum First Nation
	E	Crown Land
	S	Municipality of Red Lake
	W	Crown Land

3) PROJECT JUSTIFICATION

Need for the Project *(Rationale: e.g. what problem is the project going to solve or what opportunity is the project going to provide?)*	The existing diesel generating station has been continually worked on over the years to maintain its aging and outdated components. Since 2002 INAC and Eshkotay Wayab, the community's power authority, have expended approximately $3.1 million on diesel plant upgrades, repairs and unit overhauls to maintain power in the community. Despite this diligent effort to maintain the reliability of the station there is a very high risk of a major station failure. Failures with these types of stations will typically occur during the winter months when electrical load peaks. An extended electrical outage during the winter months can be catastrophic The loss of electrical power in the winter results in the stoppage of building heating equipment which in turn causes plumbing fixtures to freeze, rupture and flood. Such an occurrence is costly in terms of repair expenditures and an extreme inconvenience to the community residents. The 2007/08 community electrical peak load was 1220 kW which is closing in on the plant's capacity of 1300 kW. To meet the new loads that will be added by the upcoming community projects the diesel generating station will be required to run at full capacity. Due to diesel fuel price increases since 2004 the economic viability of the local power authority is becoming jeopardized. Fuel now costs in the order of $2.2 million annually which represents approximately 80% of billable revenue. The infrastructure customer rate (e.g. school facilities, water and sewer facilities) of $1.30/kWh is 9 to 10 times the provincial rates charged to similar facilities. This high energy charge has a net effect of reducing the funds available for maintenance of community infrastructure assets. The fuel subsidy funded by INAC will need to be maintained under diesel generation station scenario. By meeting the objective of this project (connection to the provincial grid) the aforementioned project risks and costs will be mitigated. Furthermore the connection to the provincial grid will provide the power to meet the electrical load forecast which cannot be met by the diesel generating station.
Purpose of the Project	The primary goal of the project is to connect Pikangikum First Nation to

(What is going to be achieved by carrying out the project?)	the provincial electrical grid. The connection to the provincial grid will replace the aging diesel generating station that currently powers the community's electrical distribution system and provide adequate power for future growth within the community. This will benefit the community in terms of access to a more affordable, consistent energy source and support socio-economic growth of the First Nation by providing enough energy for future development. The existing diesel generator will be maintained for backup purposes and will be decommissioned along with the associated storage tanks, piping, pumps and other related infrastructure in a future project.
Alternatives Considered *(different ways to meet the project need and achieve the project purpose)*	**Do Nothing Alternative** An alternative option would be a null option, which is unacceptable to Pikangikum First Nation. Continued use of the diesel generation plant will result in costly federally funded repairs and upgrades. In addition as the cost of fuel continues to rise, a greater strain will be placed on the First Nation budget which could result in funding cuts to operation and community programs ultimately increasing the socio-economic strain on the community. The do-nothing alternative is null as the diesel generating station in Pikangikum is operating at 94% capacity and an energy solution is required for sustainability of the community. **Route & Operating Voltage Alternatives** The Acres International *(now Hatch Energy)* report[1] completed a preliminary review of alternate route options and operating voltages. The two options viewed as feasible for this project include a 44 kV power line and a 115 kV power line. A comparison of these alternatives is discussed in Section 3.1 of the Design Brief (available under separate cover) prepared by Keewatin-Aski Ltd. in September of 2007.

[1] "Engineering Audit & Assessment of Pikangikum Grid Extension Project", Acres International, June 2005.

4) PROJECT DESCRIPTION

Proposed Start Date: *(year-month-day, if known)*	November, 2009	**Projected Completion Date:**	November, 2010
Estimated Total Cost	$14,448,000		
Description of Project *(with supporting material attached or referenced as required)*	The project is to connect Pikangikum First Nation to the provincial power grid through the construction of a 44 kV power line from the intersection of Highway 125 and the Nungessor Road northwards to Pikangikum. In summary the route will track the following alignment: • Segment 1: 44 kV line from Hydro One Networks 44 kV feeder located at the intersection of Highway 125 and the Nungessor Road. This initial southern section of the line would be single pole structure construction with poles spotted 2.5 m from the MTO ROW. The total length of this section is approximately 32 km. Two kilometers of this section will require additional pole height for future 25 kV under-build and telephone line as requested by Hydro One Networks. This section of the line will be constructed with the poles and conductor previously procured under the original project. No vegetation clearing and grubbing are anticipated for this segment of the route. • Segment 2: The middle section starting at coordinates 457365.35E 5682732.95N would follow the survey section of the original project (approximately 47.9 km) utilizing the materials previously procured. Vegetation clearing and grubbing are required for this segment. • Segment 3: The final section begins at the intersection of the Nungessor Road and the "all-weather" road to Pikangikum. This section runs for 19.7 km and terminates at the proposed distribution station (DS). The first 11.7 km of this section will generally follow the existing Pikangikum "all-weather" road and the remaining 8 km will follow the winter road. Previously procured materials (poles, conductors and hardware) would be employed. Vegetation clearing and grubbing are required for this segment. • Segment 4: From the DS a short 0.7 km 25 kV overhead line would run to the south shore of Berens River / Pikangikum Lake. Vegetation clearing and grubbing are required for this segment. • Segment 5: At the south shore a transition to submarine cable (28 kV rated, 4 cables) would be required for 1.2 km to reach the north shore.		

- Segment 6: The final segment of this route is 1.4 km of overhead 25 kV line to connect at existing pole #14 in the community. To maintain system voltage stability three single phase voltage regulators will be installed on each phase. Some vegetation clearing and grubbing are required for this segment.

DFO Review of Crossings

Fisheries & Oceans Canada was also consulted regarding the cable crossings along the proposed route. Two Operational Statements were provided: Underwater Cables and Overhead Line Construction (see Appendix D). Both documents are applicable since there is a submarine cable under the Berens River as well as 16 aerial crossings of several small creeks and waterways, including the Nungesser River. Fisheries & Oceans Canada correspondence indicates that as long as the conditions and measures outlined in the Operational Statements are met then a review by Fisheries & Oceans Canada is not required. Refer to correspondence in Appendix C. To this end fish protection measures will be specified as per the Operational Statement for Underwater Cables.

Transport Canada Review of Crossings

There are a total of 17 water crossings along the proposed transmission line route. 15 of these crossings are classified as "minor works" according to the Navigable Waters Protection Act (NWPA), with navigable widths less than 15 m measured from the high water mark. There is also the submarine crossing of the Berens River as well as the aerial crossing of the Nungesser River,

The Nungesser River is a small river approximately 51 km north of Red Lake that is 39 km long which flows between Nungesser Lake and Little Vermillion Lake. It is a very remote watercourse located approximately 51 km north of the Municipality of Red Lake and is located entirely on Crown land. It exhibits characteristics typical to other small north western Ontario boreal forest rivers - it is shallow, marshy and often quite narrow at many locations along its length. The crossing location is approximately 1 km west of the Nungesser Road right of way at UTM coordinates 448991.73 E, 5697978.40 N. The proposed aerial crossing has been designed by a professional electrical engineer licensed to practice in the Province of Ontario and the clearances and guying of the poles have been designed in compliance with CAN/CSA-C22.3 No 1-06.

A Request for Project Review application was submitted to Transport Canada for the Nungesser River aerial crossing and

a 5(3) approval was issued, under the NWPA, dated 2009/11/13.

Transport Canada was also consulted regarding the submarine crossing of the Nungesser River. Transport Canada provided direction (refer to Appendix C) for CEAA triggers under the Navigable Waters Protection Act (NWPA). The proposed cable conforms to Transport Canada's definition of a "minor work" in which the cable is to be laid on the bed of the waterway resting on the natural contours of the bed between points of entry and exit. Thus, as per Transport Canada correspondence provided in Appendix C, the proposed submarine cable will not trigger the CEAA under the NWPA and will not require an exemption. The proposed submarine cable will adhere strictly to the definition of "minor work" as provided by the NWPA Policy for Submarine Cables provided in Appendix E.

A Distribution Station will also be constructed 700 m south of the Berens River. The Distribution Station will include two pad mount 5 MVA transformers, two pad mount reclosers, one pad mount double switch and a modular control trailer. There will be no fuel storage at the Distribution Station.

In order to facilitate rapid maintenance response by Hydro One crews a helicopter landing and take-off area will be constructed at the Distribution Station location. A 20 m diameter clearing will be planned near the Distribution Station for this purpose. For flight controllability purposes within ground effects, the landing and take-off area will not exceed a longitudinal or lateral slope of 2 percent. There will be no fuel storage at the helicopter landing and take-off area.

The existing diesel generator in the community will be maintained for backup purposes and will be decommissioned along with the associated storage tanks, piping, pumps and other related infrastructure in a future project.

Project Management Team Members & Affiliation

Pikangikum First Nation

Chief Dean Owen and Council

Consultant

Project Engineer	Norm Lawrence, P.Eng., Keewatin-Aski Ltd.
Junior Engineer	Joe Cospito, B.Eng., Keewatin-Aski Ltd.

Advisors

Ed Hoshizaki, Ed Hoshizaki Consulting
John Mann, Eshkotay Wayab

5A) AGENCY CONSULTATION

Agency	Key Contact(s)	Nature of Consultation & Input Received
Ministry of Transportation	Ross McAneeley Property Supervisor	- MTO project requirements (See Appendix C for correspondence)
Ministry of the Environment	Stephanie Barnes Environmental Planner/EA Coordinator	- Project Classification under the Regulation 116/01 Electricity Projects (See Appendix C for correspondence)
Environment Canada	Sheelagh Hysenaj Environmental Assessment Officer	- CEAA Environmental Review Expert
Ministry of Natural Resources	Mike Schillemore Senior Lands & Waters Technical Specialist	- MNR project requirements. (See Appendix C for correspondence)
Hydro One Networks Inc.	Oren Ben-Shlomo	- Consultation for tie in location to provincial grid. - Distribution station consultation
Transport Canada	Craig Coughlin Navigable Waters Protection Keith Reilly Civil Aviation Safety Inspector	- CEAA Triggers, Underwater cable crossing review. - Obstruction clearance review for power line adjacent to Red Lake Airport.
Fisheries and Oceans Canada	Neville Ward Senior Habitat Biologist	- Berens River DFO crossing requirements. (See Appendix C for correspondence)
Indian and Northern Affairs Canada	Rachel Speller Environmental Officer Robin Beveridge Environmental Officer	- CEAA consultation

5B) PUBLIC CONSULTATION (Including First Nation Community Members)

Public Consulted	Consultation Method(s)	Date(s)	Details/Issues Raised/Outcome
Pikangikum First Nation	Community meetings.	Ongoing in council and public information meetings beginning circa 1999 when planning first began up until present.	Pikangikum public is behind the project and has made the project a community priority.
General Public	Environmental Assessment Public Consultation including a 30 day advertising period.	June 18, 2008 – July 18, 2008.	Interest in the project has been positive. Various property owners along the Nungessor have expressed support in the project as it brings them one step closer to having power on their properties. The Municipality of Red Lake responded and fully supports the project as it will encourage economic growth in their region.

6) EXISTING ENVIRONMENT

COMPONENT	DESCRIPTION *(describe features, and indicate sensitivity to disturbance)*
6.1 PHYSICAL FEATURES - VALUED ECOSYSTEM COMPONENTS	
Climate *(general)*	The climatic zone for Pikangikum is typical of the mid-Boreal climatic zone experiencing warm summers and cold winters. Environment Canada data (Sioux Lookout Region) indicates summer temperatures ranging from 6.1 to 37.8°C and winter temperatures range from 9.3 to -46.1 °Celsius, with an annual average precipitation of 716 mm.
Topography/Terrain	The proposed alignment traverses typical glaciated Northern Ontario Precambrian shield terrain, characterized by Boreal forest, relatively shallow surficial soils over bedrock, and irregular drainage systems.
Soil *(type & quality)*	The soils along the proposed alignment typically are shallow surficial soils underlain by bedrock.
Geology *(bedrock)*	The site terrain is typical of mid-Canadian Precambrian Shield. Most of the present surface features are a result of glaciation. This event produced a landscape of hummocky topography that drains to west.
Distance to Surface Water *(from closest project activity, in metres)*	The proposed power line will cross the Berens River via an underwater cable just south of Pikangikum. The length of the crossing is 1.2 km.
Surface Water *(presence & quality)*	Pikangikum is situated on Pikangikum Lake in the heart of northern Ontario and is surrounded by a vast network of lakes and rivers comprising the Hudson Bay Drainage Basin. Population and development in this region other than First Nation communities is non-existent and rivers and lakes are considered to be in a natural state. The river closest to Pikangikum is the Berens River which will be crossed via a 1.2 km long submarine cable.
Sediment/Substrate *(type & quality)*	The proposed power line only crosses one body of water, the Berens River. The sediment and substrate characteristics of the river at the crossing point are unknown. However, since there will be no construction in the river only the laying of an underwater cable, the composition of the river bottom will be neither affected or altered in any way.
Groundwater *(local use & quality)*	Groundwater is not used locally as a source of water.
Air Quality *(any pollution issues)*	The area is remote from any major urban centres or concentrations of heavy industry. Air quality in the area is generally unimpaired.

COMPONENT	DESCRIPTION *(describe features, and indicate sensitivity to disturbance)*
6.2 BIOLOGICAL FEATURES – VALUED ECOSYSTEM COMPONENTS	
Vegetation *(trees, ground cover, aquatic vegetation)*	Vegetation along the route is typical northern boreal forest containing mixed stands of spruce, poplar and birch.
Wetlands *(e.g. bogs, fens, marshes)*	While the route does not traverse any marshes or other types of wetlands, there are the typical small marshes which extend from the shores of the many surrounding lakes in the area.
Fish & Fish Habitat	The proposed transmission line crosses Abalard Creek, Rindar Creek, Kirkness Creek, the Nungesser River, the Berens River as well as several small unnamed creeks. In total, there are 17 water crossings along the proposed transmission line route. 15 of these crossings are classified as "minor works" according to the NWPA, with navigable widths less than 15 m measured from the high water mark. There is also the submarine crossing of the Berens River as well as the aerial crossing of the Nungesser River. The Nungesser River aerial crossing has received a section 5(3) approval, issued on 2009/11/13, under the NWPA. The Berens River is the major water body encountered by the proposed project Fish species within the Berens River are primarily northern pike and walleye. No aquatic species at risk have been identified at the proposed underwater cable crossing location. Should an aquatic species at risk be observed at any of the crossing locations, whether during installation of aerial or submarine cable, all work shall cease and Fisheries and Oceans Canada shall be consulted immediately for protection advice.
Birds	Bird species in the area are those common to the boreal forest in Northwestern Ontario, which typically includes raptor nest sites such as eagles, ospreys, hawks, owls and herons. There are no construction activities which are expected to disturb any of the nesting sites for the above listed species.
Mammals	No significant negative impacts to mammals or mammal habitat are expected as a result of the proposed power line. The surrounding area of the undertaking is predominantly bush, marsh and lakes. The area is sparsely populated and development is minimal. Habitat for wildlife in the area is vast and available. The environmental effect of the undertaking on mammals, in general, is expected to be non-existent. No known terrestrial species at risk are known to inhabit the area surrounding the proposed power line. Should a terrestrial species at risk be observed, encountered or impacted at any time during construction operations Environment Canada shall be consulted immediately for protection advice.

Special Habitat Areas *(special designations or identified sensitive zones)*	Pikangikum First Nation is working closely with the Ontario Ministry of Natural Resources in the Red Lake District. The OMNR is conducting an internal Environmental Assessment of the project which includes evaluating any special habitat areas within the vicinity of the project. Please refer to Appendix B for a summary of the OMNR EA process and any special habitat areas considered in that process.

COMPONENT	DESCRIPTION *(describe features, and indicate sensitivity to disturbance)*
6.3 OTHER FEATURES	
Residential/Sensitive Areas *(e.g. hospitals, schools)*	The power line traverses uninhabited boreal forest north of the Community of Red Lake. The proposed line does not pass near any sensitive areas such as hospitals, schools, or residential areas. As such no negative effects are expected from the construction or operation of the proposed power line. The proposed power line passes within 1.325 km of Red Lake Airport Runway 08/26. To insure there are no clearance issues with pole heights an Aeronautical Obstruction Clearance Form was submitted to Transport Canada who reviewed and approved pole heights and locations. A copy of the approved clearance form can be found in Appendix E.
Traditional Economic/ Cultural Activities, Resource-based Tourism Operations *(e.g. trapping, fishing, collection of medicinal plants, lodges)*	The MNR public consultation process revealed that the proposed power line intersects trap line #63 – one which covers a vast area north of Red Lake. The size of the trap line makes re-routing impossible due to cost and design feasibility. The trap line belongs to a resident of Pikangikum First Nation. Chief and Council were not able to resolve this issue internally with the resident of the First Nation as the monetary demands of the resident were beyond the fiscal ability of the First Nation to handle. The Ministry of Natural Resources posted a "Notice of Completion" on June 17, 2009 which marked the beginning of the 30 day comment period. During the comment period, a Part II Order was not requested by the resident of the Ministry of the Environment (MOE) and the MOE had no comments or objections during or after the 30-day comment period. Mike Schillemore, Senior Lands & Waters Technical Specialist looking after the MNR requirements for this project corresponded with the MOE during the comment period and no issues were brought up during that time.
Cultural Land Use *(e.g. pow wow grounds)*	The proposed power line has been reviewed by the First Nation and does not interfere with any cultural land use.
Archaeological Resources *(recorded, or potential for them to exist)*	The proposed power line does not cross any identified archaeological sites. The route chosen follows the Nungessor Road right of way and then the existing winter road for Pikangikum. By virtue of routing, the power line is traversing primarily already disturbed land which has seen construction and as such the threat of disturbing any archaeological sites is essentially none.
Special Designations *(parks, protected areas)*	No negative effects from the proposed power line are anticipated on any specially designated environmental areas.

7) ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

The next table summarizes the following:

List of Project Activities
Key project activities and their locations, scheduling details, and estimates of their magnitude or scale.

Potential Environmental Effect(s)
The positive or negative effects on the environment that may potentially be caused by the project activities.

Mitigation Measures Mitigation measures are intended to prevent or reduce any potentially negative effects.

Determination of Significance
A determination of the significance of the environmental effects, taking into account appropriate mitigation measures if applicable. The abbreviations used are:

N/S - effect not significant, or rendered insignificant with mitigation
SP - significant positive effect
SN - significant negative effect
U - outcome unknown or cannot be predicted, even with mitigation.

ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES - SUMMARY

	(A) Key Project Activities	(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
1	Mobilization of Construction Materials and Equipment.	(i) Potential for accidents during mobilization, including spillage of fuel.	(i) Re-fueling of heavy equipment will be conducted away from all bodies of water, and in accordance with the fuel handling act. All heavy equipment as well as vehicles driven by Supervisors and vehicles transporting fuel will be equipped with mini spill kits. A large spill kit will be maintained on site and contractors shall be trained in its use. Report spills to INAC and the Ontario Ministry of Environment Spills Action Centre (1-800-268-6060) immediately and document the event with an incident report. The determination of the extent of the contamination and the excavating and handling of the contaminants during remediation will be supervised by a qualified Environmental Consultant using methodologies as per CCME Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites (1993).	N/S
2	Clearing and Grubbing of Right of Way for Power Line. Clearing for Site Access and Equipment Staging. Clearing and grubbing for construction of aerial lines over a water body.	(i) Removal of area vegetation, erosion during rainfall events, impacts to habitat and species; noise, vibration and human presence will disturb birds, small mammals and insects Potential for soil/water contamination due to spills/leaks. (ii) Disturbance and possible harm to wildlife migration, staging, nesting, breeding, hibernation or nursing. Adverse effects	(i) Limit vegetation removal to the identified clearance boundaries. For areas requiring re-vegetation following the completion of the project, use seed mixes and/or tree saplings of native species of plants which are adapted to the local climate and conditions that will further enhance the plant community. Salvage/reuse cut timber; limit disturbance to other areas; employ tree protection measures; Provide regular maintenance and repair of equipment. Have designated refueling sites	N/S

(A) Key Project Activities	(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
	to breeding migratory birds through disturbance or direct mortality (of individuals or destruction of nests). (iii)Potential to cause adverse effects to terrestrial species at risk through construction operations. (iv)Change in the environment on the current use of land and resources for traditional purposes by aboriginal persons include impacts on traditional harvesting activities	prepared a minimum of 100 metres from any surface water source. Re-fueling of heavy equipment will be conducted away from all bodies of water, and in accordance with the fuel handling act. All heavy equipment as well as vehicles driven by Supervisors and vehicles transporting fuel will be equipped with mini spill kits. A large spill kit will be maintained on site and contractors shall be trained in its use. Report spills to INAC and the Ontario Ministry of Environment Spills Action Centre (1-800-268-6060) immediately and document the event with an incident report. The determination of the extent of the contamination and the excavating and handling of the contaminants during remediation will be supervised by a qualified Environmental Consultant using methodologies as per CCME Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites (1993). (ii) If migratory birds are known to breed in the area, any required clearing should be conducted outside the nesting season. To avoid significant adverse effects on migratory birds in this region of Ontario, clearing and grubbing activities, site access and equipment staging should be timed to occur outside the breeding season which is generally from the timeframe of May 16 to July 31st. (iii) No known terrestrial species at	N/S

(A) Key Project Activities	(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
		risk are known to inhabit the area surrounding the proposed power line. Should a terrestrial species at risk be observed, encountered or impacted at any time during construction operations Environment Canada shall be consulted immediately for protection advice.	N/S
		(iv) Minimize vegetation removal in the portion of the route which crosses the trap line area and minimize the construction footprint. The trap line is approximately 40 km long and 15 km wide. With the appropriate minimization of the construction footprint and vegetation removal, the effect on the vast area of the trap line by clearing a 25 m right of way for the transmission route will be insignificant. The MNR has suggested that the introduction of a remote "fringe" forest environment such as a power line right-of-way often encourages increased animal activity by providing a travelling path, grazing areas and additional feeding opportunities for predatory species. Drawing P1 in Appendix 'A' illustrates the proposed transmission line route underlain by the area encompassed by trap line #63.	N/S
		Fisheries and Oceans Canada Requirements *Overhead cable will be laid in accordance with Fisheries and Oceans Canada Operational Statement for Overhead Lines, Version 3.0. See Appendix D for Operational Statement.*	

(A) Key Project Activities	(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
		Mitigation measures which will be employed in the construction of any aerial crossing of a water body shall be as follows: *1) Design and construct approaches so that they are perpendicular to the watercourse wherever possible to minimize loss or disturbance to riparian vegetation.* *2) Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or overhead line structures.* *3) Wherever possible, locate all temporary or permanent structures, such as poles, sufficiently above the HWM to prevent erosion.* *4) The removal of any vegetation should be kept to a minimum and within the road or utility right-of way.* *5) Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use.* *6) If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.* *7) Grading of the stream banks for the approaches should not occur.* *8) If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation is likely to occur as a result of equipment fording, then a*	

(A) Key Project Activities	(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
		temporary crossing structure or other practice should be used to protect these areas. *9) Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the Ontario In-Water Construction Timing Windows).* *10) Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.* *11) Operate machinery on land and in a manner that minimizes disturbance to the banks of the watercourse.* *12) Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.* *13) Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.* *14) Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.* *15) Restore banks to original condition if any disturbance occurs.* *16) Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the watercourse. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.* *17) Avoid work during wet, rainy conditions or use alternative techniques such as aerial methods (i.e., helicopter) to install overhead lines.* *18) Stabilize any waste materials removed from the work site to prevent them from entering the*	

	(A) Key Project Activities	(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
			watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs. *19) Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.* *20) Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.*	
3	Construction of the Distribution Station and Helicopter Landing Pad.	(i) Removal of area vegetation, loss of natural habitat area, vibration and human presence will disturb birds, small mammals and insects. (ii) Potential for soil/water contamination due to spills/leaks. (iii) Increased runoff and potential for erosion during rainfall events.	(i) Limit vegetation removal to the identified clearance boundaries. The area required for clearing is quite small – the helicopter pad will have a diameter of 20m and a clearing for the distribution station will likely be about 100 m by 100 m. The distribution station will be an uninhabited installation by humans and will only be visited for maintenance purposes. Area habitat surrounding the distribution station and power line in general is vast and virtually uninhabited and the effects of construction and operation of the distribution station and helicopter pad is expected to be negligible. For areas requiring re-vegetation following the completion of the project, use seed mixes and/or tree saplings of native species of plants which are adapted to the local climate and conditions that	N/S

(A) Key Project Activities		(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
			will further enhance the plant community. (ii) Re-fueling of heavy equipment will be conducted away from all bodies of water, and in accordance with the fuel handling act. All heavy equipment as well as vehicles driven by Supervisors and vehicles transporting fuel will be equipped with mini spill kits. A large spill kit will be maintained on site and contractors shall be trained in its use. Report spills to INAC and the Ontario Ministry of Environment Spills Action Centre (1-800-268-6060) immediately and document the event with an incident report. The determination of the extent of the contamination and the excavating and handling of the contaminants during remediation will be supervised by a qualified Environmental Consultant using methodologies as per CCME Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites (1993). (iii) Implement erosion control measures such as swales and planting native shrubs or grasses as dictated by site topography. In addition, the area to be cleared is small and is surrounded by thick boreal forest which will assist in slowing runoff and promoting subsurface flow.	N/S N/S

	(A) Key Project Activities	(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
4	Aerial Crossing of the Nungesser River.	(i) Damage to shoreline vegetation. (ii) Erosion of shoreline from construction activities. (iii) Sedimentation within water body. (iv) Potential for fuel spillage. (v) Potential to cause adverse effects to aquatic species at risk through potential environmental effects listed in (i) through (iv). (vi) Disturbance to aquatic bird nesting areas. (vii) Possible adverse effects to fish spawning habitat caused by sedimentation.	(i) Minimize removal of vegetation as much as possible in vicinity of shoreline. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring. (ii) Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved. (iii) Install effective sediment and erosion control measures on land before starting work to prevent entry of sediment into the water body. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs. (iv) Re-fueling of heavy equipment will be conducted away from all bodies of water, and in accordance with the fuel handling act. All heavy equipment as well as vehicles driven by Supervisors and vehicles transporting fuel will be equipped with mini spill kits. A large spill kit will be maintained on site and contractors shall be trained in its use. Report spills to INAC and the Ontario Ministry of Environment Spills Action Centre (1-800-268-6060) immediately and document	N/S N/S N/S N/S

(A) Key Project Activities	(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
		the event with an incident report. The determination of the extent of the contamination and the excavating and handling of the contaminants during remediation will be supervised by a qualified Environmental Consultant using methodologies as per CCME Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites (1993).	
		(v) Should an aquatic species at risk be observed, encountered or impacted at any time during cable laying operations work shall cease and Fisheries and Oceans Canada shall be consulted immediately for protection advice. Mitigation measures listed in (i) through (iv) shall be implemented to reduce potential adverse effects on any aquatic life in the vicinity of cable laying operations.	N/S
		(vi) Schedule activities to avoid disturbance to aquatic bird nesting areas, if present, until after the young have fledged.	N/S
		(vii) Ensure fish spawning habitat is not affected and avoid in-water works during fish migratory and nursery periods when eggs and fry are vulnerable to sedimentation. Prior to removing sediment and erosion control measures ensure that accumulated sediments are removed and disposed of properly.	N/S
		Fisheries and Oceans Canada Requirements *Overhead cable will be laid in*	

(A) Key Project Activities		(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
			accordance with Fisheries and Oceans Canada Operational Statement for Overhead Lines, Version 3.0. See Appendix D for Operational Statement. Refer to mitigation measures 1) through 20) listed in Key Project Activity 2 under the Operational Statement for Overhead Lines. *<u>Transport Canada Requirements</u>* *A Request for Project Review has been submitted to the Navigable Waters Transport Canada office in Sarnia. A 5(3) approval was issued for the aerial crossing of the Nungesser River, under the Navigable Waters Protection Act dated 2009/11/13.*	
5	Laying of Under Water Cable Across the Berens River.	(i) Damage to shoreline vegetation. (ii) Erosion of shoreline from construction activities. (iii) Sedimentation within water body. (iv) Potential for fuel spillage. (v) Potential to cause adverse effects to aquatic species at risk through potential environmental effects listed in (i) through (iv). (vi) Disturbance to aquatic bird nesting areas. (vii) Possible adverse effects to fish spawning habitat caused by sedimentation. (viii) Possible adverse	(i) Minimize removal of vegetation as much as possible in vicinity of shoreline. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring. (ii) Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved. (iii) Install effective sediment and erosion control measures on land before starting work to prevent entry of sediment into the water body. Inspect them regularly during the course of construction and make all necessary repairs if	N/S N/S N/S

(A) Key Project Activities	(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
	effects to downstream water users due to sedimentation.	any damage occurs. (iv) Re-fueling of heavy equipment will be conducted away from all bodies of water, and in accordance with the fuel handling act. All heavy equipment as well as vehicles driven by Supervisors and vehicles transporting fuel will be equipped with mini spill kits. A large spill kit will be maintained on site and contractors shall be trained in its use. Report spills to INAC and the Ontario Ministry of Environment Spills Action Centre (1-800-268-6060) immediately and document the event with an incident report. The determination of the extent of the contamination and the excavating and handling of the contaminants during remediation will be supervised by a qualified Environmental Consultant using methodologies as per CCME Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites (1993). <u>*Fisheries and Oceans Canada Requirements*</u> *Underwater cable will be laid in accordance with Fisheries and Oceans Canada Operational Statement for Underwater Cables, Version 3.0. See Appendix D for Operational Statement. Mitigation measures which will be employed in the construction of the submarine cable shall be as follows:* *1) Use existing trails, roads, or cut lines wherever possible to avoid disturbance to the riparian vegetation.*	N/S

(A) Key Project Activities	(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
		2) *The removal of vegetation to facilitate the installation of the cable should be kept to a minimum.* 3) *Where cables are buried within 10 metres of the HWM, time the installation to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the Ontario In-Water Construction Timing Windows).* 4) *Isolate any in-water trench work to contain suspended sediment and prevent it from entering the surrounding waters.* 5) *Install effective sediment and erosion control measures on land before starting trench work to prevent entry of sediment into the water body. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.* 6) *Operate machinery on land or on water (i.e., from a barge or vessel) in a manner that minimizes disturbance to the banks or bed of the water body.* 7) *Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.* 8) *Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.* 9) *Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.* 10) *Restore banks to original condition if any disturbance occurs.* 11) *Relocate any fish trapped within an isolated area to the main water body before starting any trenching.* 12) *During dry land trenching, stockpile the material that is moved from the*	

(A) Key Project Activities	(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
		bank of the water body (below the HWM) and return it to its original location once the cable is installed. *13) If any material (e.g., rock, cobble, woody material) is moved to place the cable on the bottom, it should be relocated to a similar depth within the water body in close proximity to its original location.* *14) Restore the original contour, gradient and bottom of the water body, bank and shore. Allow sediment to fully settle inside any isolated area before removing sediment and erosion control measures.* *15) Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.* *16) Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.* *<u>Transport Canada Requirements</u>* *Transport Canada provided direction (refer to Appendix C) for CEAA triggers under the Navigable Waters Protection Act (NWPA). The proposed cable conforms to Transport Canada's definition of a "minor work" in which the cable is to be laid on the bed of the waterway resting on the natural contours of the bed between points of entry and exit. Thus, as per Transport Canada correspondence provided in*	

(A) Key Project Activities	(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
		Appendix C, the proposed submarine cable will not trigger the CEAA under the NWPA and will not require an exemption. The proposed submarine cable will adhere strictly to the definition of "minor work" as provided by the NWPA Policy for Submarine Cables provided in Appendix E.	
		(v) No aquatic species at risk have been identified at the proposed submarine cable crossing location. Should an aquatic species at risk be observed, encountered or impacted at any time during cable laying operations work shall cease and Fisheries and Oceans Canada shall be consulted immediately for protection advice. Mitigation measures listed in (i) through (iv) shall be implemented to reduce potential adverse effects on any aquatic life in the vicinity of cable laying operations.	N/S
		(vi) Schedule activities to avoid disturbance to aquatic bird nesting areas, if present, until after the young have fledged.	N/S
		(vii) Ensure fish spawning habitat is not affected and avoid in-water works during fish migratory and nursery periods when eggs and fry are vulnerable to sedimentation. Prior to removing sediment and erosion control measures ensure that accumulated sediments are removed and disposed of properly.	N/S
		(viii) Ensure that downstream water users are aware of the potential of	

	(A) Key Project Activities	(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
			increased sedimentation in the water supply.	N/S
6	Waste Disposal	(i) Construction debris aesthetic impacts; possible surface water or soil quality impacts	(i) All non-hazardous waste to be removed from job site to landfill; hazardous waste to be properly disposed off-site at a licensed facility.	N/S
7	Use and Storage of Petroleum and Other Chemical Products.	(i) Contamination of soil and water quality through runoff, spills and leaks; suitability for use, fire, accidental release	(i) Follow standard construction specifications to store all products at least 100m from the nearest surface water in bermed or contained areas; ensure firefighting equipment and staff are available, spill response equipment available on-site; monitor facilities for leaks; construction equipment refueling precautions. Re-fueling of heavy equipment will be conducted away from all bodies of water, and in accordance with the fuel handling act. All heavy equipment as well as vehicles driven by Supervisors and vehicles transporting fuel will be equipped with mini spill kits. A large spill kit will be maintained on site and contractors shall be trained in its use. Report spills to INAC and the Ontario Ministry of Environment Spills Action Centre (1-800-268-6060) immediately and document the event with an incident report. The determination of the extent of the contamination and the excavating and handling of the contaminants during remediation will be supervised by a qualified Environmental Consultant using methodologies as per CCME Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites (1993).	N/S

	(A) Key Project Activities	(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D) Sig.
8	Demobilization	(i) Impacts from improper disposal of wastes, including oil filters, waste oil, batteries, hydraulic fluids, etc.	(i) All hazardous wastes will be transported out of the project area for disposal or recycling at an authorized site. Temporary fuel storage sites will be properly decommissioned and all equipment removed.	N/S
9	Operation of Power Line	(i) Potential for fire should line be damaged.	(i) Scheduled maintenance of line to check for potential hazards. Development of a quick response plan for repairing the power line as soon as possible if damaged. Alert local fire fighting services should line become damaged.	N/S

8) CUMULATIVE EFFECTS ASSESSMENT

The natural environment is interconnected, and does not recognize project boundaries or lines on maps. The impacts caused by one project, which may be considered minor and insignificant, can combine with other environmental impacts already present in the project area, or anticipated as a result of future projects. Together, these impacts may become significant, and adverse. The consideration and assessment of these "cumulative" effects is therefore an important part of the environmental assessment process. The following table should be completed to help identify the potential for cumulative effects, and to assess their significance.

Other Current or Planned Projects Which May Interact With The Proposed Project	Potential Cumulative Effects	Mitigation Measures & Residual Adverse Impacts	
None known.	N/A	N/A	

9) SUMMARY OF ENVIRONMENTAL EFFECTS

Assuming that all mitigation measures are implemented as proposed in Sections 7 and 8, the following effects are predicted for the Valued Ecosystem Components identified in Section 6:

(N/S not significant; SP significant positive effect; SN significant negative effect; U unknown; N/A not applicable)

VALUED ECOSYSTEM COMPONENT	Summary of Effects *(check box)*					comments
	N/S	SP	SN	U	N/A	
Topography/terrain	X					
Soil/geology	X					
Aquatic sediment/substrate	X					
Surface water	X					
Groundwater	X					
Air quality	X					
Vegetation	X					
Wetlands	X					
Fish & fish habitat	X					
Migratory birds	X					
Other fauna	X					
Special habitat	X					
Sensitive areas	X					
Human health and safety	X					
Traditional land use activities	X					
Aesthetics	X					
Archaeological resources	X					
Specially-designated areas	X					

Screening Report Completed by:		
Norm Lawrence, P.Eng, Keewatin Aski Ltd. Joe Cospito, B.Eng., Keewatin-Aski Ltd.		
Name and signature: Joseph Cospito, B.Eng.		Date: Nov 20, 2009

10) **CEAA SCREENING DECISION**

☐ [00] DECISION PENDING. Assessment not final.

☑ [01] PROJECT MAY PROCEED. All potentially adverse effects are mitigable with known technology, and therefore will be rendered insignificant *(CEAA s. 20(1)(a))*.

☐ [02] PROJECT MAY NOT PROCEED. The project is likely to cause significant adverse environmental effects that cannot be justified in the circumstances *(CEAA s.20(1)(b))*.

☐ [03] ENVIRONMENTAL ASSESSMENT IS TO BE REFERRED TO THE MINISTER FOR MEDIATION OR A REVIEW PANEL, since it is uncertain whether the project is likely to cause significant adverse environmental effects *(CEAA s. 20(1)(c)(i))*; significant public concern has been raised, warranting a referral to a mediator or a review panel *(CEAA s. 20(1)(c)(ii))*; and/or public concerns warrant a reference to a mediator or a review panel *(CEAA s. 20(1)(c)(iii))*.

Reviewed and Recommended by:	
Lyle Keeper Deputy Chief Representative of Chief and Council, or designate *(name & signature)*	Nov. 19/09 Date
Robin Beveridge INAC Environmental Officer *(name & signature)* Robin Beveridge	Dec 3/09 Date
Other Federal RA(s) *(specify details)*	Date
Other Federal RA(s) *(specify details)*	Date

INAC USE ONLY

SCREENING DECISION by LEAD RESPONSIBLE AUTHORITY (enter code):	
Approved by: RICHARD BARR	
INAC Responsibility Centre Manager *(name + signature)*	Date Dec 7/09

NOV-19-2009 THU 02:50 PM KEEWATIN-ASKI SLKT. FAX NO. 807 737 3875 P. 02/02

11) KEY REFERENCES & SOURCES

Electrical Grid Project Definition, Pikangikum First Nation, May 15, 2008, Keewatin-Aski Ltd.

Electrical Grid Design Brief, Pikangikum First Nation, September 21, 2007, Keewatin-Aski Ltd.

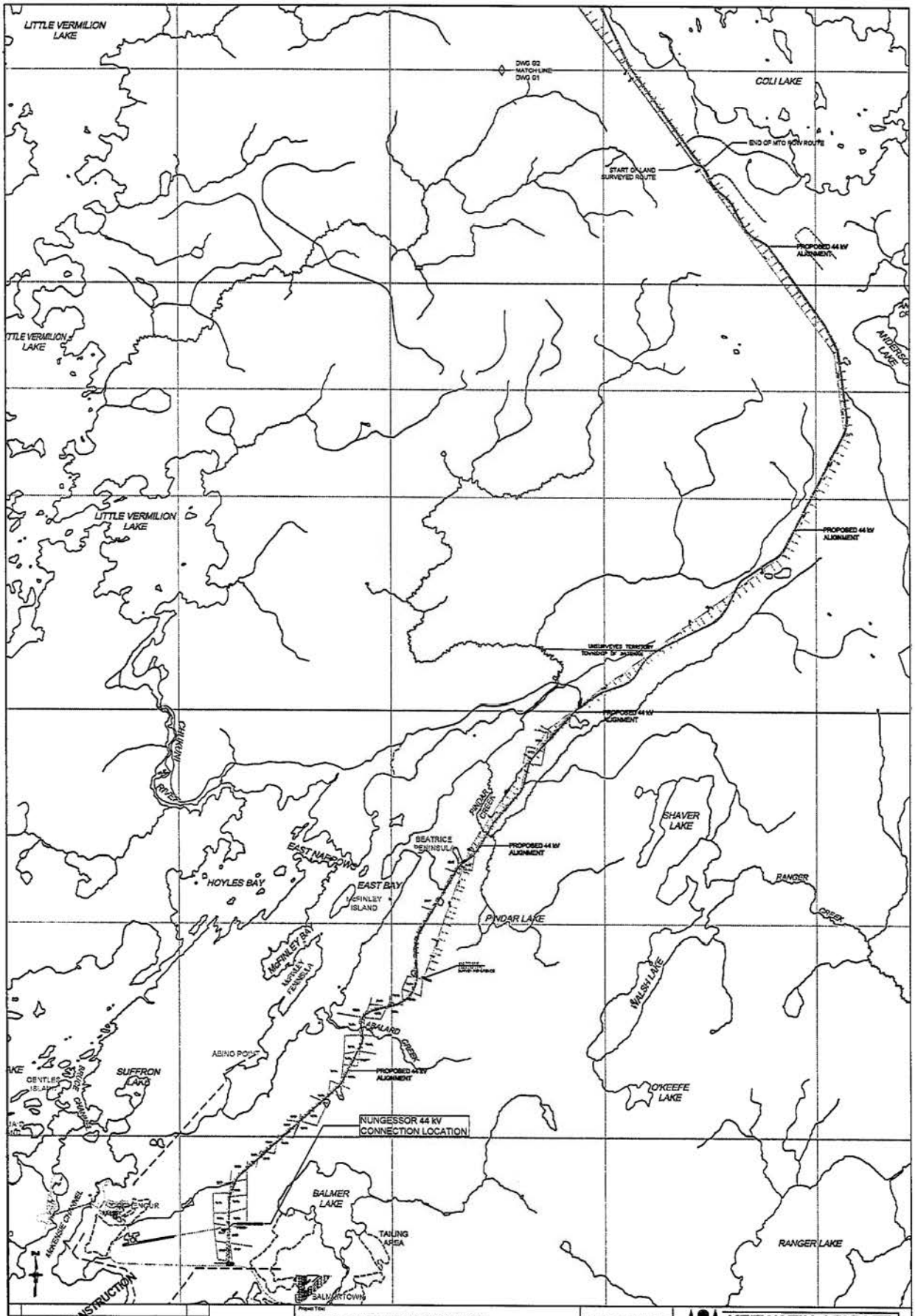
Engineering Audit & Assessment of Pikangikum Grid Extension Project", June 2005, Acres International.

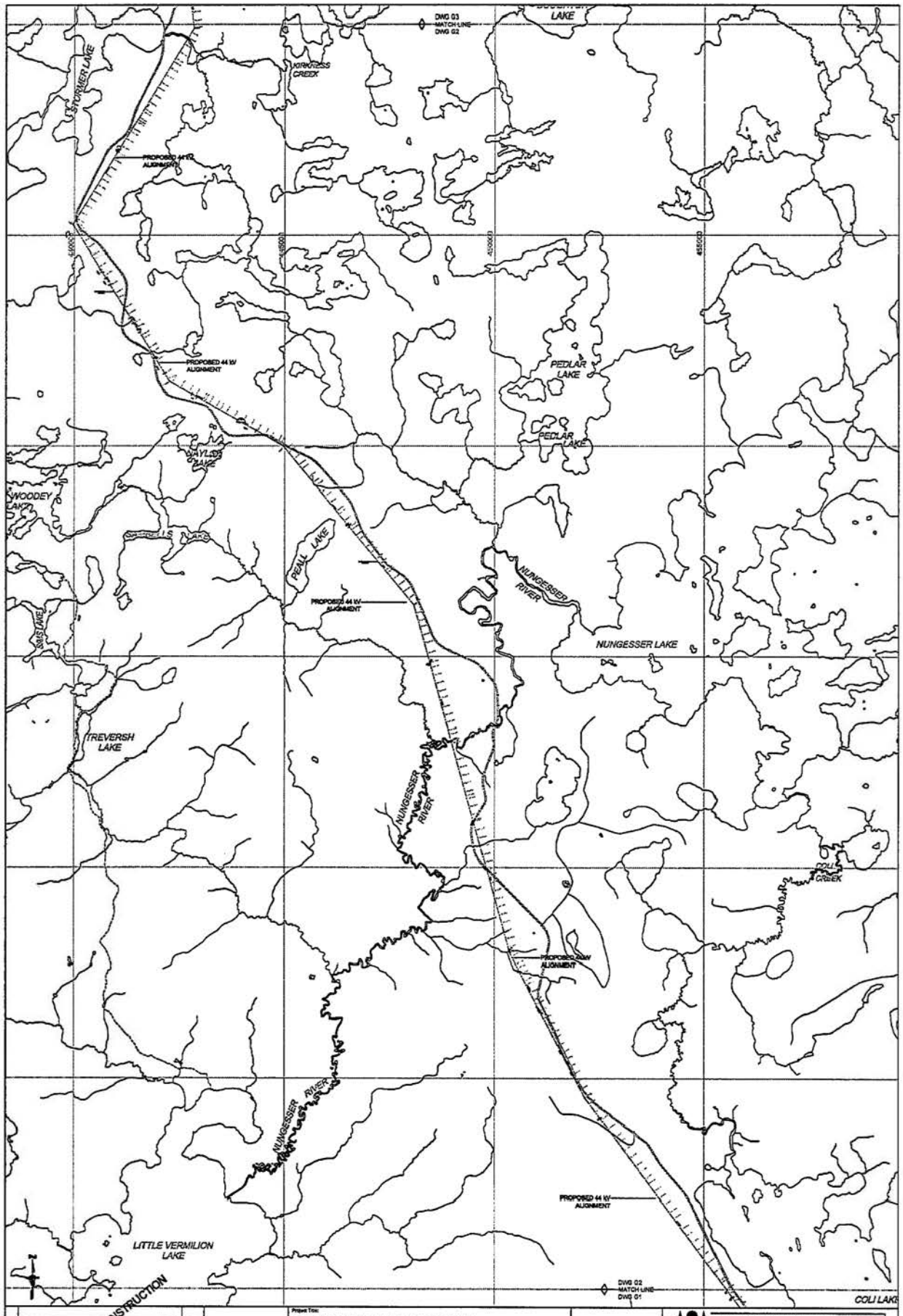
12) LIST OF ATTACHMENTS

(i) APPENDIX 'A' – Drawings
(ii) APPENDIX 'B' – MNR Resource Stewardship & Facility Development Class EA
(iii) APPENDIX 'C' – Agency Consultation
(iv) APPENDIX 'D' – DFO Operational Statements
(v) APPENDIX 'E' – Transport Canada Forms

APPENDIX 'A'

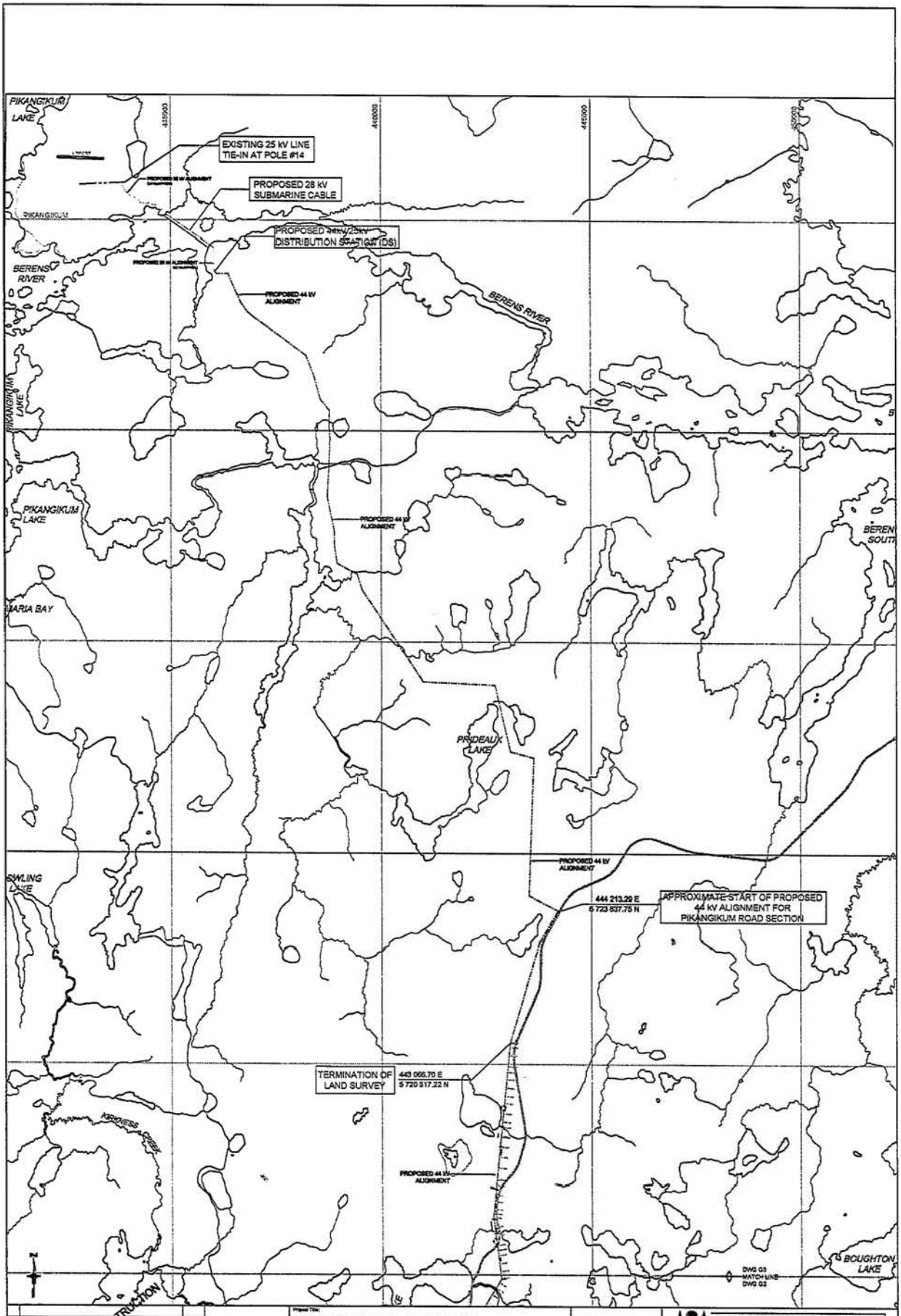
DRAWINGS

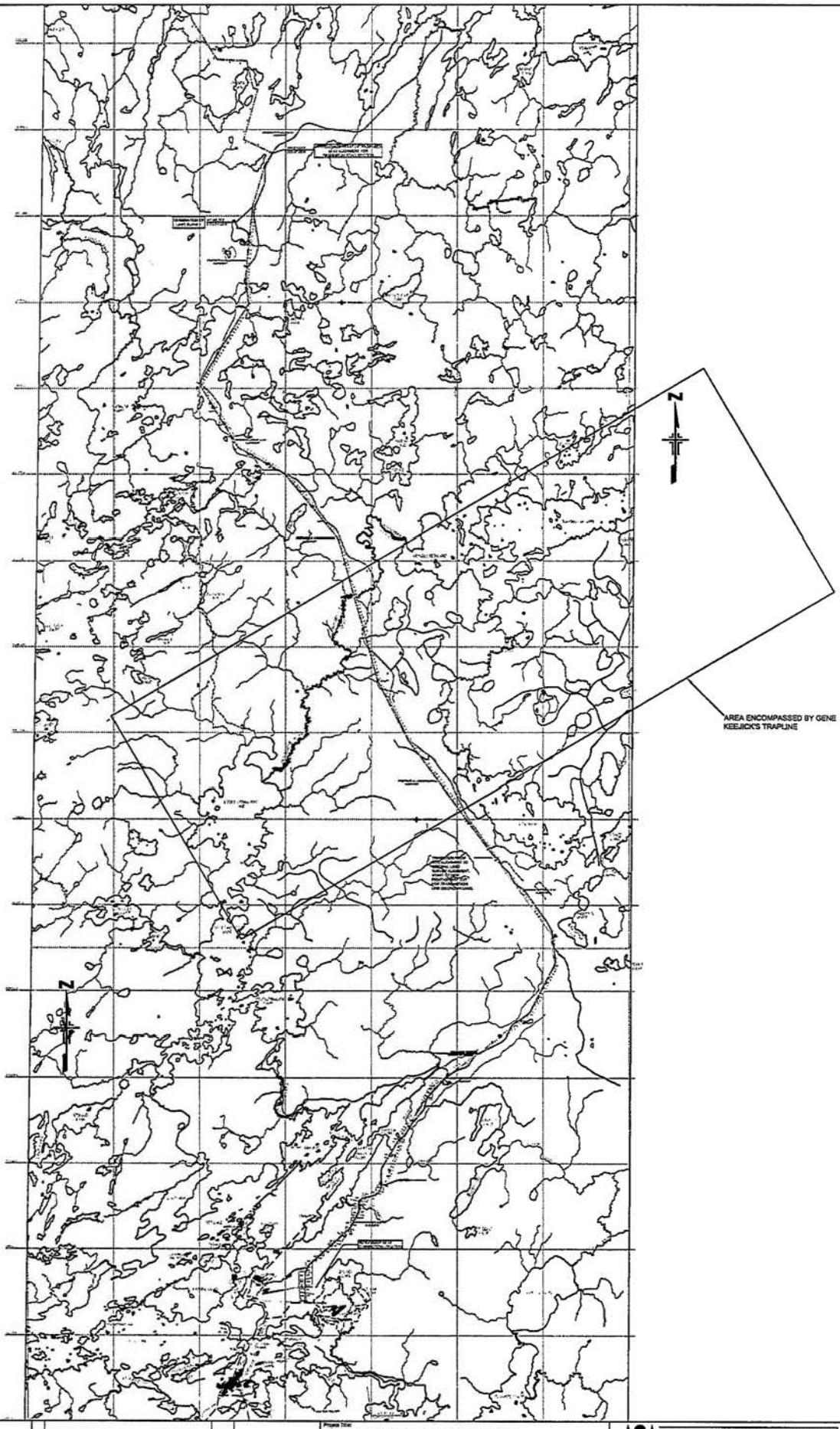

LITTLE VERMILION LAKE
DWG G2 MATCH LINE DWG G1
COLI LAKE
END OF MTO NON ROUTE
START OF LAND SURVEYED ROUTE
PROPOSED 44 kV ALIGNMENT
ANDERSON LAKE
LITTLE VERMILION LAKE
LITTLE VERMILION LAKE
PROPOSED 44 kV ALIGNMENT
UNSURVEYED TERRITORY
TOWNSHIP OF ANSTRUTHER
PROPOSED 44 kV ALIGNMENT
CHUKUNI RIVER
PINDAR CREEK
SHAVER LAKE
BEATRICE PENINSULA
PROPOSED 44 kV ALIGNMENT
EAST NARROWS
HOYLES BAY
EAST BAY
MCKINLEY ISLAND
RANGER CREEK
PINDAR LAKE
MCKINLEY BAY
MCKINLEY PENINSULA
WALSH LAKE
ABINO POINT
SUFFRON LAKE
GENTLES ISLAND
PROPOSED 44 kV ALIGNMENT
O'KEEFE LAKE
NUNGESSOR 44 kV CONNECTION LOCATION
BALMER LAKE
TAILING AREA
RANGER LAKE
SALMO TOWN
NOT FOR CONSTRUCTION
PIKANGIKUM 44kV POWER LINE
PIKANGIKUM FIRST NATION
GENERAL ALIGNMENT PLAN - SOUTH SECTION
B.J. TWORZYNSKI LTD.
CONSULTING PROFESSIONAL ENGINEERS
KEEWATIN-ASKI LTD
CONSULTING ENGINEERS & ARCHITECT
SIOUX LOOKOUT, ON
Date: APR 2008
Design:
Drawn:
Checked:
Scale: 1:40000
Dwg. No.
07062-G1



Project Title: PIKANGIKUM 44kV POWER LINE	B.J. TWORZYNSKI LTD. CONSULTING PROFESSIONAL ENGINEERS	KEEWATIN-ASKI LTD CONSULTING ENGINEERS & ARCHITECT SIOUX LOOKOUT, ON 807.737.3558 www.keewatin-aski.on.ca	
Client: PIKANGIKUM FIRST NATION			
Drawing Title: GENERAL ALIGNMENT PLAN - MIDDLE SECTION	Date: APR 2005	Dwg. No. 07D62-G2	
	Design:	Drawn:	
	Checked:	Scale: 1:40000	

No. | Revision Description | Date


PIKANGIKUM LAKE
435000
440000
445000
450000
EXISTING 25 kV LINE TIE-IN AT POLE #14
PROPOSED 28 kV SUBMARINE CABLE
PIKANGIKUM
PROPOSED 24kV/25kV DISTRIBUTION STATION (DS)
BERENS RIVER
PROPOSED 44 kV ALIGNMENT
BERENS RIVER
PIKANGIKUM LAKE
PIKANGIKUM LAKE
PROPOSED 44 kV ALIGNMENT
BEREN SOUT
MARIA BAY
PRIDEAUX LAKE
SWLING LAKE
PROPOSED 44 kV ALIGNMENT
444 213.29 E
5 723 637.75 N
APPROXIMATE START OF PROPOSED 44 kV ALIGNMENT FOR PIKANGIKUM ROAD SECTION
TERMINATION OF LAND SURVEY
443 066.70 E
5 720 517.22 N
KERNESS CREEK
PROPOSED 44 kV ALIGNMENT
DWG G3 MATCH LINE DWG G2
BOUGHTON LAKE
N
NOT FOR CONSTRUCTION
PIKANGIKUM 44kV POWER LINE
PIKANGIKUM FIRST NATION
GENERAL ALIGNMENT PLAN - NORTH SECTION
B.J. TWORZYNSKI LTD.
CONSULTING PROFESSIONAL ENGINEERS
KEEWATIN-ASKI LTD
CONSULTING ENGINEERS & ARCHITECT
SIOUX LOOKOUT, ON
Date: APR 2006
Design:
Drawn:
Checked:
Scale: 1:40000
Dwg. No.
07062-G3



N

No.	Revision Description	Date

Project Title:
PIKANGIKUM 44kV POWER LINE

Client:
PIKANGIKUM FIRST NATION

Drawing Title:
KEEJICK TRAPLINE AREA

KEEWATIN-ASKI LTD
CONSULTING ENGINEERS & ARCHITECT
SIOUX LOOKOUT, ON 807.737.3656

Date: APR 2008
Design:
Drawn:
Checked:
Scale: 1:100000

Dwg. No.
07062-P-1

APPENDIX 'B'

MNR RESOURCE STEWARDSHIP & FACILITY DEVELOPMENT CLASS EA

Screening Criteria for Determining Project Category

MNR Resource Stewardship & Facility Development Class EA

Project Name: Pikangikum 44kV Power Transmission Line

This project has the potential to affect...

Screening Criteria	Rating of Potential Net Effect								Comments/Rationale
	-H	-M	-L	Nil	Unk	+L	+M	+H	
Natural Environment Considerations									
Air quality							x		Project will connect 2000+ people to the Ontario grid, eliminating their dependence on diesel-fired generators.
Water quality or quantity (ground or surface)				x					
Species at risk or their habitat			x						Potential disruption to Woodland Caribou movement, although not a factor with similarly sized lines elsewhere
Significant earth or life science features				x					
Fish or other aquatic species, communities or their habitat (including movement of resident or migratory species)			x						Conditions will be imposed on construction that minimize working in water; submarine cable portion will follow DFO Operational Guidelines
Land subject to natural or human-made hazards				x					
Recovery of a species under a special management program (eg. elk restoration)				x					
Ecological integrity			x						Light footprint on the land but a footprint where none now exists
Terrestrial wildlife (including numbers, diversity and movement of resident or migratory species)				x					No significant impact elsewhere from this size of line
Natural Vegetation and terrestrial habitat linkages or corridors through fragmentation alteration and/or critical loss				x					
Permafrost				x					
Soils and sediment quality				x					
Drainage or flooding				x					
Sedimentation or erosion				x					
Release of contaminants in soils, sediments				x					
Natural heritage features and areas (e.g.. areas of natural and scientific interest, provincially significant wetlands)				x					
Other (specify)									

Screening Criteria	Rating of Potential Net Effect								Comments/Rationale
	-H	-M	-L	Nil	Unk	+L	+M	+H	
Land Use, Resource Management Considerations									
Access to trails or inaccessible areas (land or water)				x					
Or obstruct navigation				x					
Other resource management projects			x						Need to minimize impact on Forestry research sites adjacent to Nungessor Road via work permit conditions
Traffic patterns or traffic infrastructure				x					No change in patterns; use of part of Nungessor Road right-of-way; route generally follows existing road, winter roads and planned all-weather access roads
Recreational importance - public or private				x					
Or create excessive waste materials				x					Should not be much waste except native fill left from pole setting
Or commit a significant amount of a non-renewable resource (e.g. aggregates, agricultural land)				x					Minimal use of aggregates for pole setting
Noise levels				x					This size of line does not produce discernible noise
Views or aesthetics			x						There will be a hydro line running along Nungessor Road
Or be a precondition or justification for implementing another project				x					
Adjacent or nearby uses, persons or property						x			Coli Lake cottage subdivision; Stormer Christian Fellowship Centre; and Stormer Lake Lodge may be able to tap into hydro line
Other (specify)							x		Line will have capacity to extend service to Poplar Hill in future
Social, Cultural and Economic Considerations									
Cultural heritage resources - including archaeological sites, built heritage, and cultural heritage landscapes[1]				x					Route largely follows existing disturbances - roads; winter roads
Or displace people, businesses, institutions or public facilities				x					
Community character, enjoyment of property, or local amenities						x			Project will provide reliable source of hydro to enhance, improve local infrastructure and housing
Or increase demands on government services or infrastructure		x							Diesel plant is aging and incapable of meeting futre demands; connection to the Provincial grid will lower future costs
Public health and/or safety						x			Future provision of water & sewer systems; increased housing; new school dependent on increasing electrical supply
Local, regional or provincial economies or businesses						x			Reliable power for development of business
Tourism values (e.g. resource-based tourist lodge)						x			Potential connection to gird
Other (specify)									
Aboriginal Considerations									
First Nation reserves or communities								x	Significant impacts on Pikangikum - infrastructure; housing; business
Spiritual, ceremonial or cultural sites				x					
Traditional land or resources used for harvesting activities			x						Route crosses small portion of EMA under 'Keeping the Land'
Aboriginal values				x					
Lands subject to land claims				x					
Other (specify)			x						Consult with Lac Seul First Nation since southern portion of route within traditional use area

Completed by: Michael Schillemore Date: ####

Approved by: Date:

[1] Where projects may affect a known or suspected cultural resource, further technical heritage studies may be warranted. Ministry of Culture technical studies that may be required include items such as archaeological assessments by licensed archaeologists and built heritage studies by qualified heritage consultants if a significant built heritage structural feature is being affected.

Proposed Electrical Transmission Line
From Red Lake to Pikangikum

The Pikangikum First Nation has proposed the construction of an electrical transmission line, on Crown land, from Red Lake to Pikangikum. The line would be approximately 103 km long, originating near the intersection of Highway 125 and the Nungesser Road. The first 32 km would be constructed within the right-of-way of the Nungesser Road. The next 48 km would follow a previously surveyed route which generally parallels the Nungesser Road to the intersection with the Pikangikum 'all-weather'road. The line would follow the 'all-weather' road and the winter road for about 20 km to the south shore of Berens River/Pikangikum Lake. Approximately 1.2 km of submarine cable and another 1.4 km of overhead transmission line would complete the route into the community. The entire project would comply with Ontario Hydro Standards for the construction of transmission lines.

This project would switch the community of Pikangikum from dependence on diesel-fired generators to a clean, renewable energy source, sufficient for present and forecasted demands.

A project screening is being conducted under the Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects to assign this project to a category for evaluation. The assigned category determines the level of detail of the project planning evaluation and the amount of consultation that will be undertaken. This project has been tentatively assigned to Category B, on the basis that little public concern is anticipated with the project. MNR is requesting public input on this category assignment before proceeding further.

Comments must be received within the 30-day comment period, which expires on July 18, 2008.

If MNR decides that this is a Category B project, this notice will serve as the first of two mandatory public notices. The second notice – a Notice of Completion – will be provided only to parties who have provided input or requested further notice. MNR may proceed to implement the project without issuing a further general notice.
For more information on the project, please contact:

Norm Lawrence, P.Eng.
Keewatin-Aski Ltd.
P.O. Box 510
Sioux Lookout, ON P8T 1A8
Bus: 807-737-3858
Fax: 807-737-3875

Michael Schillemore
Ministry of Natural Resources
P.O. Box 5003
Red Lake, ON P0V 2M0
Bus: 807-727-1348
Fax: 807-727-2861

To submit comments or request further notice, please contact Michael Schillemore at the above address or at mike.schillemore@ontario.ca.

Ministry of Natural Resources

139 Forestry Road
PO Box 5003
Red Lake, ON P0V 2M0

Ministère des Richesses naturelles

PH : 807-727-2253
Fax : 807-727-2861
http://www.mnr.gov.on.ca

Ontario

June 12, 2008

Chief Dean Owen
Pikangikum First Nation
P.O. Box 323
Pikangikum, ON P0V 2L0

Subject: Proposed Hydro Transmission Line to Pikangikum First Nation

The Ministry of Natural Resources (MNR) has received an application for the construction of a 44kV hydro transmission line from the intersection of Highway 125 and Nungesser Road to your community. The proposed transmission line will connect Pikangikum to the Ontario Electrical Grid, eliminating the present dependence on diesel-fired, electricity generation. Keewatin-Aski Ltd., consulting engineers, are planning and designing the project on behalf of your community. The proposed design that we received will locate the transmission line fully within the right-of-way of the Nungessor Road from the starting point to the area of Coli Lake. The proposed route will then follow a surveyed alignment on Crown land that loosely parallels the Nungesser Road to the junction with the all-weather road to Pikangikum. From this point, the proposed route follows the Pikangikum road alignment into the community (proposed mapping attached).

A project screening is being conducted under the Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects to assign this project to a category for evaluation. The assigned category determines the level of detail of the project planning evaluation and the amount of consultation that will be undertaken. This project has been tentatively assigned to Category B, on the basis that little public concern is anticipated with the project. MNR is requesting public input on this category assignment before proceeding further.

Comments must be received within the 30-day comment period, which expires on July 18, 2008.

If MNR decides that this is a Category B project, this notice will serve as the first of the two mandatory public notices. The second notice – a Notice of Completion – will be provided only to parties who have provided input or requested further notice. MNR may proceed to implement the project without issuing a further general notice.

However, we think that it would be very helpful if we could meet with a representative of your community before we go too much further. We would like to discuss any community values along the proposed route to ensure that nothing is damaged or infringed upon unknowingly.

For more information on the project, to submit comments or to request further notice, please contact:

Michael Schillemore, Senior Lands & Waters Technical Specialist
Red Lake District MNR Office
P.O. Box 5003, 139 Forestry Road
Red Lake, ON P0V 2M0
Bus: 807-727-1348
Fax: 807-727-2861
E-mail: mike.schillemore@ontario.ca

The MNR is collecting comments and personal information under the authority of the *Environmental Assessment Act* to assist in making decisions and determining further consultation needs. All comments and opinions will be kept on file and may be available in study documentation that is made available for public review. All comments and contact (name and address) information received may also be forwarded to the project applicant unless specifically requested otherwise. For more information on the collection and use of personal information, please contact me at the addresses or numbers below.

Thank you,

Trevor Park, Planning & Information Management Supervisor
Red Lake District MNR Office
P.O. Box 5003, 139 Forestry Road
Red Lake, ON P0V 2M0
Bus: 807-727-1344
Fax: 807-727-2861
E-mail: trevor.park@ontario.ca

//ms
encl

APPENDIX 'C'

AGENCY CONSULTATION

MINISTRY OF ENVIRONMENT

From: Joe Cospito (KAL) [mailto:jcospito@keewatin-aski.on.ca]
Sent: Tuesday, February 19, 2008 2:59 PM
To: 'Barnes, Stephanie (ENE)'
Cc: nlawrence@keewatin-aski.on.ca
Subject: RE: Reg 116 question regarding EA requirements

Hello Stephanie,

Thank you for your prompt response. I will look into the additional sections you recommended to insure our project is proceeding according to any other provincial/federal regulations.

We are working closely with the MNR, MTO, and have contacted DFO in regards to the submarine cable. We will continue to work closely with these ministries to insure we meet their requirements for this specific project.

I appreciate your expertise on our inquiry, thank you Stephanie.

Sincerely,

Joe Cospito, B Eng.
Keewatin-Aski Ltd.
Ph: (807) 737-3858
Fx: (807) 737-3875
jcospito@keewatin-aski.on.ca

From: Barnes, Stephanie (ENE) [mailto:Stephanie.Barnes@ontario.ca]
Sent: February 19, 2008 2:51 PM
To: Joe Cospito (KAL)
Cc: Hudson, Erin (ENE); nlawrence@keewatin-aski.on.ca
Subject: RE: Reg 116 question regarding EA requirements

Hi Joe,

Thank you for your email. Based on the information provided in your letter dated February 13, 2008, I concur that the proposed Pikangikum Electrical Grid Reactivation Project does meet the classification of a Category A project under Regulation 116/01 Electricity Projects. Category A projects do not require approval under the *Environmental Assessment Act* (EAA); however, they are required to comply with any other applicable existing legislative requirements.

It is not clear whether the proposed transmission line will be located on private, Crown or federal land. You should contact the Ministry of Natural Resources (MNR) as there may be EA requirements under MNR's Class EA for MNR Resource Stewardship and Facility Development Projects. You may also need to contact the Department of Fisheries and Oceans and Transport Canada for authorization to proceed with the submarine cable proposed at Segment 5.

Please note that anyone can request that the Minister of the Environment make a Category A project subject to the EAA (Designation Request).

You should also note that on page 26 of the Guide to EA Requirements for Electricity Projects (MOE, March 2001), if an approval under other provincial legislation which is considered a "classified instrument" is required for the project, the approval does not qualify for an exemption from *Environmental Bill of Rights* (EBR) requirements. Applications for classified instruments for Category A projects are subject to the public participation requirements of the EBR, including posting of proposals on the Environmental Registry.

You should also read Section A.5.3 (page 15) of the Guide to determine whether any of the other approvals required for transmission projects apply to the proposed Pikangikum project.

Please contact me if you have any other questions.

Regards,

Stephanie Barnes

From: Joe Cospito (KAL) [mailto:jcospito@keewatin-aski.on.ca]
Sent: February 13, 2008 4:10 PM
To: Barnes, Stephanie (ENE)
Cc: Hudson, Erin (ENE); nlawrence@keewatin-aski.on.ca
Subject: Reg 116 question regarding EA requirements

Hello Stephanie,

Please find attached a description of the project we are involved in as well as the EA information we are seeking. I have also included several figures that are referenced. Your assistance in this matter is greatly appreciated Stephanie.

Sincerely,

Joe Cospito, B Eng.
Keewatin-Aski Ltd.
Ph: (807) 737-3858
Fx: (807) 737-3875
jcospito@keewatin-aski.on.ca

From: Barnes, Stephanie (ENE) [mailto:Stephanie.Barnes@ontario.ca]
Sent: February 12, 2008 12:19 PM
To: jcospito@keewatin-aski.on.ca
Cc: Hudson, Erin (ENE)
Subject: Reg 116 question

Hi Joe,

I understand you were speaking with Erin Hudson yesterday regarding an electricity project you are involved in and the EA requirements. Would you mind sending me a description of your project so that I can help you with the EA requirements. If you prefer, you can call me directly at the number below.

Thanks
Stephanie

Stephanie Barnes
Environmental Planner/EA Coordinator
Ontario Ministry of the Environment
Northern Region
p: 807-475-1717
f: 807-475-1754
e: stephanie.barnes@ontario.ca

MINISTRY OF TRANSPORTATION ONTARIO

-----Original Message-----
From: McAneeley, Ross (MTO) [mailto:Ross.McAneeley@ontario.ca]
Sent: Wednesday, September 19, 2007 3:54 PM
To: Joe Cospito (KAL)
Cc: Deley, Jonna (MTO)
Subject: Pikangikum & Nungesser

Joe:
Note the following comments received from our internal review of your proposal:

In accordance with ministry practice, the utility line must be located at the outermost limit of the right-of-way. In the case of the 44kv line, the ministry will allow the pole to be offset 2.5 m from the limit of the right-of-way; this will keep the infrastructure, including the tower cross-members, within our property. It would leave the guy wires, if applicable, outside of the right-of-way. In the case of 115 kv line, the cross-members are wider and the support structure is a duplex installation, with a spread of 3.8 m, and a cross-member width of 7.9 m. The plans show the cross-members beyond our right-of-way; the outermost pole should be located as close to the limit of the highway as possible (within the 2 m utility area at the limit of the right-of-way) to ensure maximum separation from the road, and minimal change for future impact from road mtce or construction activities.

Detailed plans must be submitted clearly showing the limit of the right-of-way and the location of the proposed plant, including all guy wires, cabinets, etc. for ministry review and approval.

As-constructed plans are to be prepared for ministry records.

Any deviation from the above-noted requirements require ministry approval.

Trees cut to accommodate the utility line shall be removed from the right-of-way or stacked off right-of-way, for further use as directed by MNR and in accordance with their timber management practices.

In the unlikely event of line abandonment, the infrastructure must be removed from our right-of-way.

From a property standpoint, we suggest that the proposed grantee, Hydro-One, contact us in due course to discuss the procedure for obtaining an easement to protect the facility. As mentioned earlier, we have had discussions with Kevin May regarding the extension of services form hwy 125 to the new mill on Nungesser Rd.

Ross McAneeley
Property Supervisor
MTO - Northwestern Region
615 S. James Street
Thunder Bay, ON P7E 6P6
telephone: 807 473-2057
cell: 807 474-9851

HYDRO ONE NETWORKS INC.

-----Original Message-----
From: BEN-SHLOMO Oren [mailto:oren.ben-shlomo@HydroOne.com]
Sent: Thursday, September 06, 2007 2:02 PM
To: nlawrence@keewatin-aski.on.ca
Cc: oren.ben-shlomo@HydroOne.com
Subject: Pikangikum Connection

Hi Norm

We'd like to provide the following direction:

Connection Point

At present, the connection point for your project will be approximately 0.9KM on Nungesser Rd from the intersection of Hwy 125 and Nungesser Rd. (See map below)
This connection point may change should other potential customers agree to connect before you.

Line Design

Prior to ESA approval and construction, the line design must be reviewed by Hydro One to ensure the design satisfies our requirements.
Approximately 2KM of line will require higher poles to accommodate future under build.
It is recommended that 556 AL conductor is used on the 44 kV line sections.
Further details, regarding other required equipment, conductor types and our standards will be communicated at a future date.

Station Design

Further details to follow

44kV Recloser(s)

Further details to follow

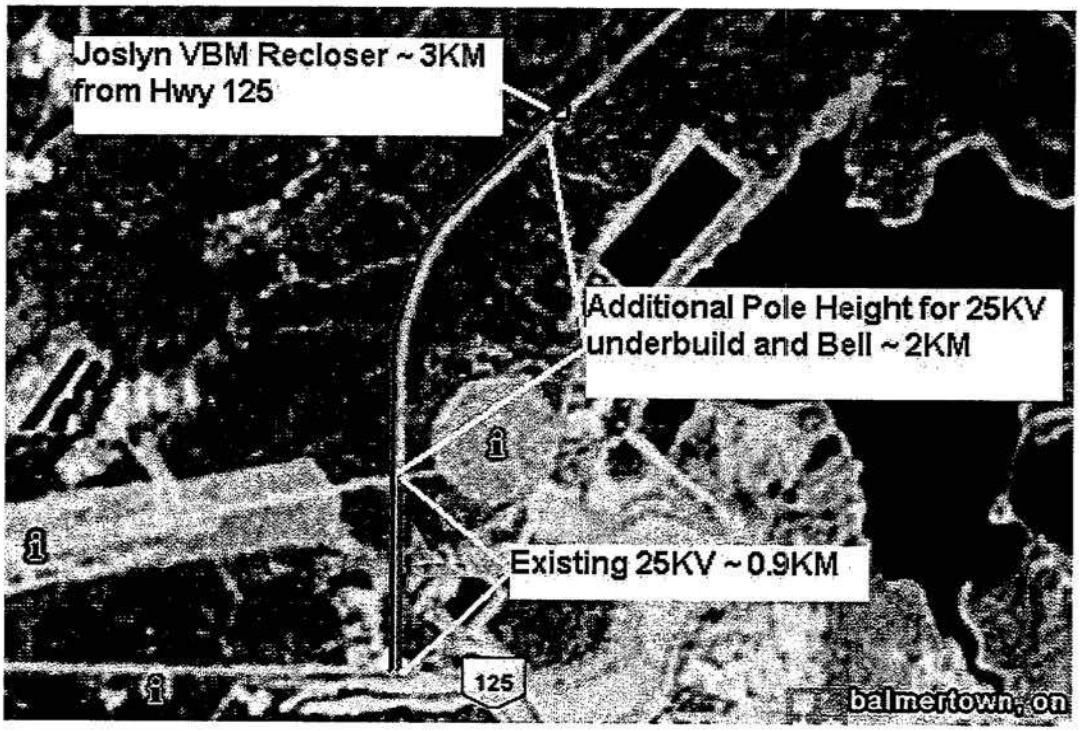
Easements/ Forestry Cutting Rights / Property Agreements

Please ensure that Hydro One is named in these documents to ensure all rights are transferred to us when we assume ownership of the line.

Field Process Initiation

Please contact Kelly Charbonneau 1-800-208-9412 x 3820 to initiate our field process. A site visit will be scheduled and some documentation will be requested.
A "Letter of Agency" will be requested. This letter should be prepared by your client authorizing you to act on their behalf. It should include the following:

> *Letter of Agency to be completed by the Owner of the Property on their letterhead "authorizing xxxxxx of Consulting/Engineering firm name to have the authority to act on their behalf, for specific project (naming or quoting the project name or number)*



Oren Ben-Shlomo
Hydro One Networks Inc.

From: oren.ben-shlomo@HydroOne.com [mailto:oren.ben-shlomo@HydroOne.com]
Sent: Tuesday, March 18, 2008 3:09 PM
To: nlawrence@keewatin-aski.on.ca; rich.baggerman@HydroOne.com
Subject: RE: Pikangikum Electrical Grid

When: Wednesday, March 19, 2008 2:00 PM-3:00 PM (GMT-05:00) Eastern Time (US & Canada).
Where: Conference Call

~~*~*~*~*~*~*~*~*

Hi Norm

We've reviewed your single line diagram and I have attached a document listing some ideas we'd like to discuss.

Please let me know if you'll be available for a conference call to discuss and clarify the document. I will tentatively schedule it for tomorrow, March 19th at 2pm (our time). If you require more time to review the document, please provide a more suitable time for us to talk.

Dial 1-866-865-5862
Code: 878-836

<<Pikangikum H1 SLD Mar 13 08.doc>>
Oren Ben-Shlomo
Hydro One Networks Inc.
Phone: (705) 790-4672

Mar 13, 2008

Response to Pikangikum DS Design

I would like to propose that the new station be of a simplified pad mount design and that equipments be ordered through Hydro One. Please find attached a Pikangikum DS Site sketch and a Pikangikum DS SLD. The consultant would draft up a station design based on the attached drawings and submit these drawing to Hydro One for a quick check of clearances and other items.

Catalogue ID s can be used to order equipment through Hydro One. It is suggested that the following equipment be ordered through Hydro One.

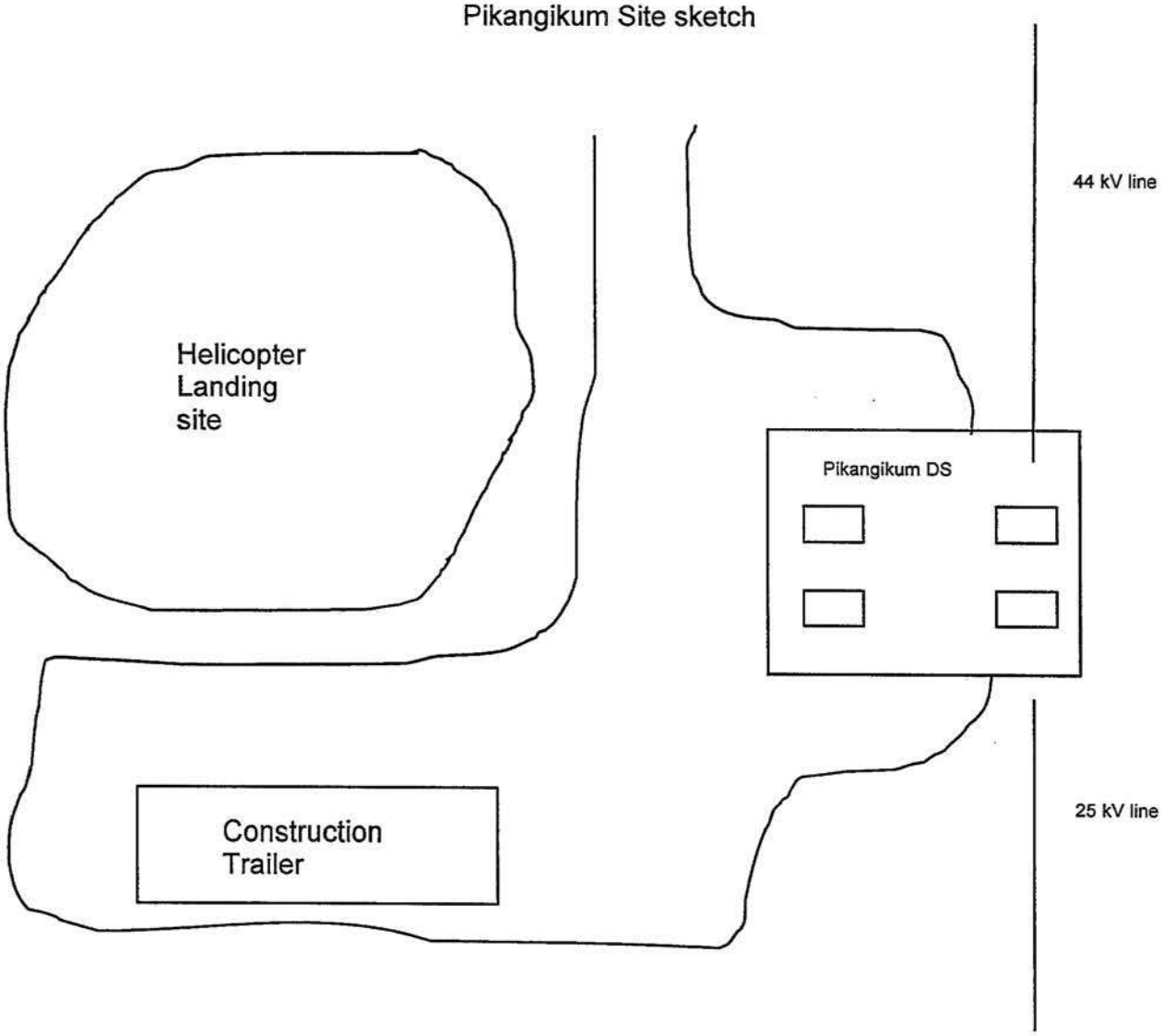
Two 5 MVA pad mount transformers
Two sets of electronic pad mounted reclosers
Two S&C 44 kV fused switches to be mounted on an entrance structure or pole
Four 44 kV fuses
One pad mount double switch

This use of standard equipment will allow Hydro One to more easily provide spares in case of DS equipment failure.

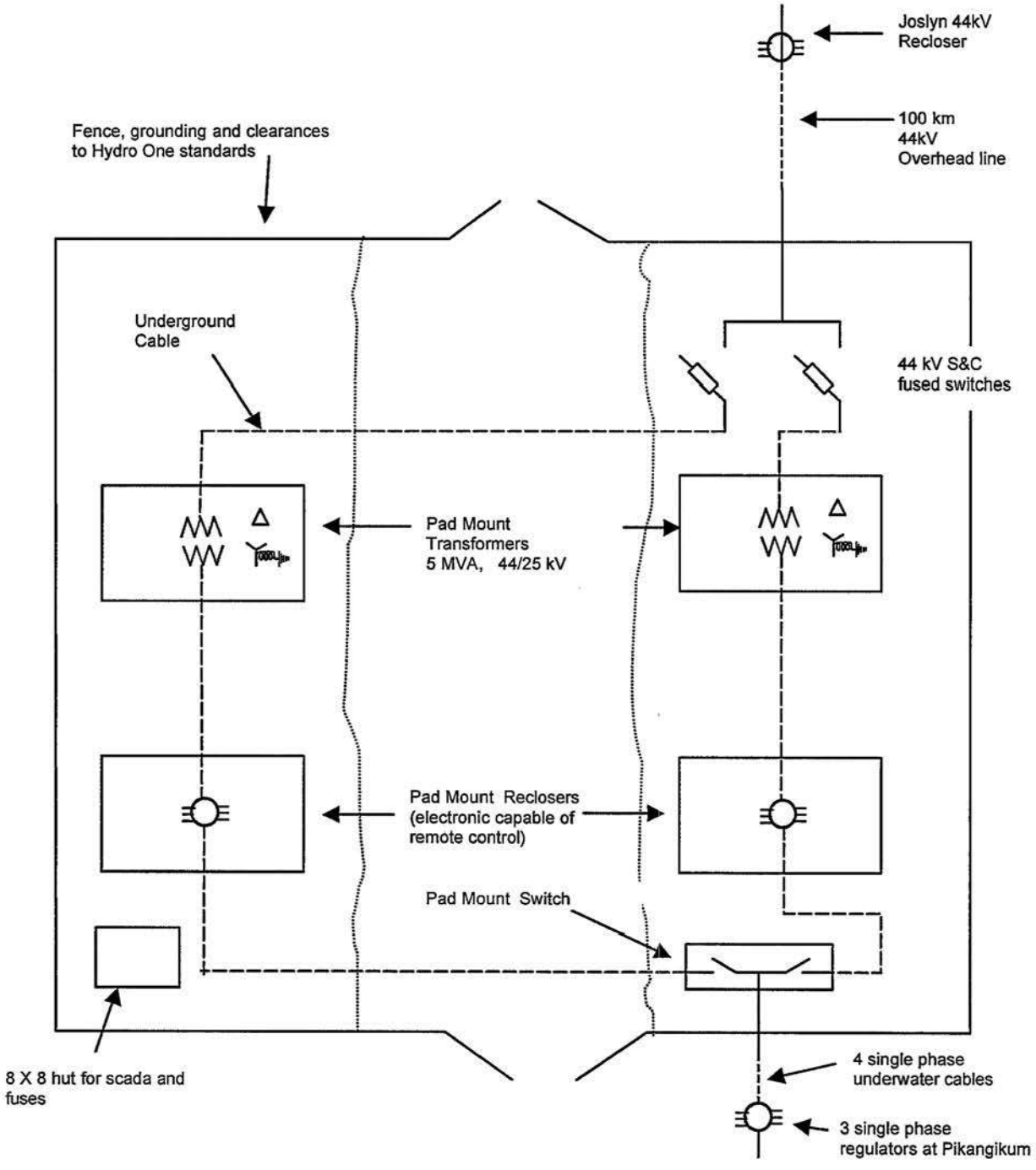
The need for SCADA needs to be reviewed considering the added cost and potential increased operational effectiveness of the station. If SCADA is required then electronic reclosers with SCADA capability will make the design efficient and functional. It is likely that an 8X8 shed will be required to house the communication/interface equipment.
This SCADA package should be designed by Hydro One and in serviced by Hydro One specialists.

It is evident that there needs to be a Hydro One agent in Pikangikum to check the DS on a weekly basis and respond to outages. In an outage situation the agent can give quick visual assessment of the station and perform simple switching operations to place the alternate transformer in service. This agent can also respond to customer outages within the Pikangikum community.

Pikangikum Site sketch



Pikangikum DS Single Line
Proposed by Hydro One (Mar 11 2008)



MINISTRY OF NATURAL RESOURCES

Ministry of Natural Resources

139 Forestry Road
PO Box 5003
Red Lake, ON P0V 2M0

Ministère des Richesses naturelles

http://www.mnr.gov.on.ca
PH : 807-727-2253
Fax : 807-727-2861

Ontario

August 31, 2007

RECEIVED
SEP 05 2007

Joe Cospito
Keewatin–Aski Engineering & Consulting Ltd.
P.O. Box 510
61 Queen Street
Sioux Lookout, ON P8T 1A8

Subject: Red Lake - Pikangikum Hydro Transmission Line

Mr. Cospito:

This letter is in response to your recent inquiry regarding the planning process for re-activating the 'Pikangikum Transmission Line' project. Apparently a great deal of work was completed on this project from 1995 to 2002; I am told that Norm Lawrence had significant involvement with it. Unfortunately, most of our files did not survive the office fire last year but you will probably have a large amount of information in your office. Hopefully, we will be able to use some of this work but essentially we will be starting over anew.

The first step for the initiation of this project has not changed from the last time that this project was worked on. We will require a detailed and comprehensive project proposal and description to do a preliminary analysis of potential environmental concerns. We will be using newer guides for this including the "Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects (2003)", available on the web at www.mnr.gov.on.ca/MNR/stewardea , and the "Guide to EA Requirements for Electricity Projects (2001)", at www.ene.gov.on.ca/envision.

I understand that the project is being funded by INAC; I am sure that you are aware that federal funding is one of the potential triggers for screening under the Canadian Environmental Assessment program. A detailed and comprehensive project proposal and description will be required for the initial federal screening also. Their requirements can be found on the Canadian Environmental Assessment Agency website at www.ceaa-acee.gc.ca/index_e.htm.

The intent of the initial planning process is to ensure that a thorough review is conducted of the proposal and that if agreement is reached to proceed, that it proceeds with due regard for the environment. The initial planning process will:

- Clearly identify the purpose and rationale for the proposal;
- Identify and evaluate all reasonable alternatives;

- Provide for consultation with affected interest groups, First Nations, government agencies, property owners and the public, as appropriate;
- Outline a development plan identifying the selected alternative and environmental mitigation measures; and
- Hold the proponent responsible for implementing the project in an environmentally acceptable manner.

If at the end of this process, a determination is made that the project will either not have significant environmental effects, or those effects can be successfully mitigated, the work will be authorized by a work permit and proper tenure for the occupation of Crown land will be provided.

It is important that the proponent meet with staff from this Ministry at the outset so that the planning process and information requirements can be agreed on.

Sincerely,

Michael A. Schillemore
Senior Lands & Waters Technical Specialist
Red Lake District

Tel: 807-727-1348
Fax: 807-727-2861

mike.schillemore@ontario.ca

Joe

From: Schillemore, Mike (MNR) [mike.schillemore@ontario.ca]
Sent: Thursday, July 10, 2008 3:22 PM
To: Joe
Subject: Pikangikum Transmission Line
Attachments: Class EA- Project Category Screening Form Dec. 2005.xls; Proposed Transmission Line Ad.doc; First Public Notice.doc

Hi, Joe;

We are conducting a screening of this project under the Class Environmental Assessment process for Ministry of Natural Resources Resource Stewardship & Facility Development projects. The attached Class EA screening form details the subjects that we initially consider and the anticipated impacts. Our public consultation for this project includes the attached newspaper ad, published June 18th, and a direct mailout (sample letter attached) to potentially effected parties in the area of the project. The mailout went to 8 different mining interests; 5 Bear Management Area licencees; 5 Trap Line holders; 13 government & First Nation agencies; 4 Baitfish Block licencees;
2 forestry companies; and 5 commercial tourism operations.

Our consultation will include 'face-to-face' meeting(s) with Pikangikum and Lac Seul First Nations to identify cultural/heritage values so we can successfully mitigate any impacts.

We expect our consultation period to end as scheduled on July 18th without any significant issues arising. To date, the only inquiries have been from people/operations along the proposed route wondering if/when/how they could connect to the line. We expect to issue our Notice of Completion as planned, and the project will be able to proceed.

At the work permit stage, if not before, we will need a very detailed route map so construction can avoid known values such as progeny sites and any values identified by the First Nations. The work permit will contain appropriate conditions to ensure that all water crossings are handled in an environmentally sound fashion.

Cheers,

Mike

Michael A. Schillemore
Senior Lands & Waters Technical Specialist
Red Lake District
Bus:(807) 727-1348
Fax:(807) 727-2861
mike.schillemore@ontario.ca

Joe

From: Schillemore, Mike (MNR) [mike.schillemore@ontario.ca]
Sent: Friday, July 24, 2009 9:34 AM
To: Edward Hoshizaki; jcospito@keewatin-aski.on.ca
Cc: Park, Trevor (MNR); Larkin, Barb (MNR); Swanwick, Graeme (MNR)
Subject: Pikangikum Transmission Line - Notice of Completion

Folks;

I finally got through to Paula Allen, the MOE staff member who would be handling any bump-up requests. She has not heard anything yet. She understands the proponent's desire to get on with things so she will e-mail the Minister's office to see if anything did come in; she will e-mail me as soon as she finds out.

Our RSFD Class EA manual recommends waiting 7 days after the closure of the 30-day public comment period to hear from MOE about any bump-up requests. The Notice of Completion closed on July 17th so I will prepare the Statement of Completion and I suggest that it be filed on July 31st, if there is still no word from Ms. Allen. After that, the project is ready to proceed.

Cheers,

Mike

Michael A. Schillemore
Senior Lands & Waters Technical Specialist
Red Lake District
Bus:(807) 727-1348
Fax:(807) 727-2861
mike.schillemore@ontario.ca

FISHERIES AND OCEANS CANADA

Joe

From: Ward, Neville [Neville.Ward@dfo-mpo.gc.ca]
Sent: Wednesday, June 25, 2008 10:34 AM
To: Joe
Subject: RE: DFO Request for Pikangikum Power Line

Joe - if your project meets the conditions and measures outlined in the attached DFO operational statement for underwater cables (version 3.0 which I believe is identical to version 2.0 which you sent but without an expiry date) then you can proceed without a DFO review. cheers Neville

Neville Ward

Senior Habitat Biologist/ *Biologiste principal de l'Habitat*
Northern Ontario District/*District du nord de l'Ontario*
Ontario - Great Lakes Area / *Secteur de l'Ontario et des Grands Lacs*
Central and Arctic Region / *Région du Centre et de l'Arctique*

Fisheries and Oceans Canada / *Pêches et Océans Canada*
Government of Canada / *Gouvernement du Canada*

807-346-8251
Fax/ *Télécopieur*: 807-346-8545
E-Mail / *Courrier électronique*: Neville.Ward@dfo-mpo.gc.ca
100 Main Street, Suite 425 / *100, rue Main, Pièce 425*
Thunder Bay, Ontario P7B 6R9 / *Thunder Bay (Ontario) P7B 6R9*

From: Joe [mailto:jcospito@keewatin-aski.on.ca]
Sent: June 25, 2008 11:06 AM
To: Ward, Neville
Subject: DFO Request for Pikangikum Power Line

Good morning Neville,

This email is in regards to the Pikangikum Grid Project our office is working on for Pikangikum First Nation. This project has been moving ahead smoothly through the design and approvals process for the last year. It involves the construction of an overhead power line from Red Lake to Pikangikum First Nation.

The power line crosses the Barrens River immediately south of Pikangikum First Nation via an underwater cable. The line is a 44 kV line and will be installed according to DFO's Ontario Operational Statement for Underwater Cables. In this document DFO states the following:

"You may proceed with your Underwater Cable project without a DFO review when you meet the following conditions:

- unconfined open trench methods, including ploughing and

water-jetting, to bury cables are not used,
underwater cables are not installed on or within known fish spawning habitat,

- cable trenching is limited to near shore areas and is to be no

greater in width than that required to accommodate the cable,

- any near shore excavation to bury the cable extends a maximum

total of 10 meters below the ordinary high water mark (see definition below), but in no case will involve more than 10% of a stream channel width (in total),

- explosives are not used to install the cable, and
- you incorporate the *Measures to Protect Fish and Fish Habitat*

when Placing Underwater Cables

All of these conditions will be met and have been incorporated into design. I have attached the Operational Statement should you be interested.

In preparation of the Environmental Assessment for this project INAC has requested that DFO confirm in correspondence that no DFO review is necessary if *the operational statement is followed.* I know this is exactly what the operational statement already says but they require us to provide a brief direct correspondence confirming it.

Would you be able to provide us with a brief email confirming the content of the operational statement? It would be much appreciated Neville.

Thanking you in advance,

Joe Cospito, B. Eng.
Keewatin-Aski Ltd.
Ph: (807) 737-3858
Fx: (807) 737-3875
jcospito@keewatin-aski.on.ca

<<07062 DFO Underwater Cable Operational Statement.pdf>>

Joe

From: Rachel Speller [spellerr@inac-ainc.gc.ca]
Sent: Friday, July 25, 2008 7:01 AM
To: jcospito@keewatin-aski.on.ca
Subject: Fwd: RE: Pikangikum Electrical Grid Project

Response from DFO.

>>> "Ward, Neville" <Neville.Ward@dfo-mpo.gc.ca> 07/24/08 5:48 PM >>>

Rachel - I have quickly reviewed the CEAA screening report you sent and in addition to the DFO operational statement on "Underwater Cables" the report should also reference the DFO operational statement on "Overhead Line Construction" version 3.0. If the conditions and measures outlined in these two operational statements can be met then DFO does not need to review the project. In this case DFO would not be a RA, but just a FA (providing advice) and thus I assume DFO would not need to sign off on the screening report. Cheers Neville

Neville Ward

Senior Habitat Biologist/ Biologiste principal de l'Habitat
Northern Ontario District/District du nord de l'Ontario
Ontario - Great Lakes Area / Secteur de l'Ontario et des Grands Lacs

Central and Arctic Region / Région du Centre et de l'Arctique

Fisheries and Oceans Canada / Pêches et Océans Canada

Government of Canada / Gouvernement du Canada

807-346-8251
Fax/ Télécopieur: 807-346-8545
100 Main Street, Suite 425 / 100, rue Main, Pièce 425
Thunder Bay, Ontario P7B 6R9 / Thunder Bay (Ontario) P7B 6R9
E-Mail / Courrier électronique: Neville.Ward@dfo-mpo.gc.ca

-----Original Message-----
From: Rachel Speller [mailto:spellerr@inac-ainc.gc.ca]
Sent: July 22, 2008 1:08 PM
To: Ward, Neville; Denise.Fell@ec.gc.ca; COUGHLC@tc.gc.ca
Cc: jcospito@keewatin-aski.on.ca
Subject: Pikangikum Electrical Grid Project

Pikangikum First Nation is planning a project to connect their community to the provincial grid. Most of the line will be along existing right-of-ways but one small portion (1.2 km) will be a submarine cable under Berens River/Pikangikum Lake. I have attached the Environmental Screening Report prepared by Keewatin-Aski for your review and comments. Until this electrical project is complete, other projects in the community (e.g. the new school) are on hold for lack of power. As such, this is a fairly time sensitive issue and I would appreciate it if you could review the document at your earliest convenience. Craig, I know Keewatin-Aski have been consulting with Keith Reilly, Civil Aviation Safety Inspector with TC, but thought you should review this document for the environmental component.

Thank-you all for your time.

Joe

From: Ward, Neville [Neville.Ward@dfo-mpo.gc.ca]
Sent: Tuesday, May 26, 2009 4:23 PM
To: Kerri Hurley
Subject: RE: PIKANGIKUM ELECTRICAL GRID CEAA APRIL 16, 2009.PDF

Kerri - I trust changes to the ESR can be made as follows:

page 6 - the operational statement (OS) for overhead lines should also apply since the power line does cross several waterbodies through the air such as Pindar creek etc. The overhead line OS addresses the approaches (clearing of vegetation, fording) and where the structure (poles) are placed. I mentioned this last year - the July 25, 2008 email is in the DFO correspondence section part of the ESR.

page 7 - indicate the number of crossings (15?) with the overhead line (add this email to App C)

page 10 - the Berens River is not the only waterbody encountered by the proposed project

page 13 - add overhead cable OS to 2 Clearing and Grubbing of ROW for power line - add appropriate mitigation measures to the table from the OS.

page 16/17 - it mentions the underwater cable OS - shouldn't mitigation measures from the OS be in the table - column C?

thanks Neville

Neville Ward

Senior Habitat Biologist/ ***Biologiste principal de l'Habitat***
Northern Ontario District/*District du nord de l'Ontario*
Ontario - Great Lakes Area / *Secteur de l'Ontario et des Grands Lacs*
Central and Arctic Region / *Région du Centre et de l'Arctique*

Fisheries and Oceans Canada / ***Pêches et Océans Canada***
Government of Canada / *Gouvernement du Canada*

807-346-8251
Fax/ *Télécopieur:* 807-346-8545
100 Main Street, Suite 425 / *100, rue Main, Pièce 425*
Thunder Bay, Ontario P7B 6R9 / *Thunder Bay (Ontario) P7B 6R9*
E-Mail / *Courrier électronique*: Neville.Ward@dfo-mpo.gc.ca

From: Kerri Hurley [mailto:Kerri.Hurley@inac-ainc.gc.ca]
Sent: May 21, 2009 9:22 AM
To: Ward, Neville; Sheelagh Hysenaj; Craig Coughlin
Cc: Dan Baxter; Linda Churchley; Robert Durante
Subject: PIKANGIKUM ELECTRICAL GRID CEAA APRIL 16, 2009.PDF

Good morning,

Please find attached the revised CEAA Environmental Screening Report for the Pikangikum Grid Project. Please provide me with your comments and we will compile all comments for the distribution to the First Nation and their consultant.

Best Regards,

Kerri

Kerri Hurley
A/ Sr. Environment Officer, Environment Unit
Ontario Regional Office
Indian and Northern Affairs Canada
100 Anemki Drive, Suite 101
Thunder Bay, ON P7J 1A5
Phone: (807) 624-1515
Fax: (807) 623-7021
New Email: kerri.hurley@inac-ainc.gc.ca

TRANSPORT CANADA

Joe

From: Rachel Speller [spellerr@inac-ainc.gc.ca]
Sent: Tuesday, July 22, 2008 2:31 PM
To: jcospito@keewatin-aski.on.ca
Subject: Fwd: RE: Submarine Cable Crossing - Pikangikum grid project



THUNDRBY-#22680
3-v1-PIKANGIKUM...

Joe,

Here's the reply from Transport Canada with the "Minor Work" attached. It sounds like TC won't need an exemption document as long as the project adheres to the "Minor Work" statement.

Rachel

>>> Coughlin, Craig 07/22/08 3:23 PM >>>
I did review the report. I could not see where I the NWPA would trigger CEAA anywhere. If you determine the Submarine Cable Crossing does not meet the requirements of a MINOR WORK, it would be a 5(2) exemption document. There is a policy for Aerial cables crossing Navigable Waters as well.

Craig Coughlin

Navigable Waters Protection / Protection des eaux navigables
Transport Canada / Transports Canada
Phone (807-468-3079) Fax 807-468-6973 1100 3rd Avenue South, Box 649,
Kenora, Ontario, P9N 3X6
coughlc@tc.gc.ca

-----Original Message-----
From: Rachel Speller
Sent: July 22, 2008 2:11 PM
To: Coughlin, Craig
Cc: o=INAC;p=GC+INAC.AINC;a=GOVMT.CANADA;c=CA;
Subject: Re: Submarine Cable Crossing

Craig,

Will you review the Environmental Screening Report too, or is this document sufficient?

Rachel

>>> Coughlin, Craig 07/22/08 3:06 PM >>>
Rachel/Joe

Here is a copy of the NWPA mirror Works Policy for Submarine Cable Crossings.

If you have any questions, please give me a call.

Craig Coughlin

Navigable Waters Protection / Protection des eaux navigables
Transport Canada / Transports Canada
Phone (807-468-3079) Fax 807-468-6973 1100 3rd Avenue South, Box 649,
Kenora, Ontario, P9N 3X6

Joe

From: Coughlin, Craig [craig.coughlin@tc.gc.ca]
Sent: Monday, July 06, 2009 2:47 PM
To: Robin Beveridge
Subject: RE: RE: PIKANGIKUM ELECTRICAL GRID CEAA ESR

Any cable crossing that does not meet the minor works will require a section 5(3) approval under the NWPA.

From: Robin Beveridge [mailto:Robin.Beveridge@inac-ainc.gc.ca]
Sent: July 6, 2009 2:43 PM
To: Coughlin, Craig
Subject: Fwd: RE: PIKANGIKUM ELECTRICAL GRID CEAA ESR

Craig,

Please see attached/below from Jos Cospito the consultant working on this project. In summary:

- there is one aerial crossing (high water river width is 15m at this point)
- there is one submarine crossing (ESR includes previous TC direction that the proposed cable conforms to TCs definition of a "minor work")

Does TC have any further comments?

Regards,

Robin

.....
Robin,

As I mentioned on the phone, the aerial cables proposed will not trigger CEAA. However approval may ne required for those that cross any navigable water ways.
Attached is the Minor Works Orders for Aerial Cables. Please conduct a self assessment of the water crossings and let me know what you find.

Robin Beveridge
Environment Officer, Environment Unit
Ontario Regional Office
Indian and Northern Affairs Canada
100 Anemki Drive, Suite 101
Thunder Bay, ON P7J 1A5
Phone: (807) 624-5907
Fax: (807) 623-7021

Joe

From: Coughlin, Craig [craig.coughlin@tc.gc.ca]
Sent: Tuesday, August 04, 2009 9:09 AM
To: jcospito@keewatin-aski.on.ca
Subject: RE: Pikangikum Transmission Line Nungesser Crossing

I would suggest you send an application with the plans to Sarnia. I would have to say the water way is larger than the minor water way.
If you require any information, let me know.

I hope you enjoyed your Vacation.

Craig Coughlin
Navigable Waters Protection / Protection des eaux navigables
Transport Canada / Transports Canada
1100 3rd Avenue South, Box 649
Kenora, Ontario
P9N 3X6
Phone (807-468-3079) Fax 807-468-6973
craig.coughlin@tc.gc.ca <mailto:craig.coughlin@tc.gc.ca>.

From: Joe Cospito [mailto:jcospito@keewatin-aski.on.ca]
Sent: August 4, 2009 9:03 AM
To: Coughlin, Craig
Subject: RE: Pikangikum Transmission Line Nungesser Crossing

Good Morning Craig,

Well, I just wandered back from vacation in the states and decided I better check up on the Pikangikum Project now that our office is finalizing the CEAA. Did you perhaps have a chance to investigate the Nungesser river crossing to see if it will require a section 5(3) approval under the Nav Waters Protection Act?

Thanks Craig!

Joe

From: Joe Cospito [mailto:jcospito@keewatin-aski.on.ca]
Sent: Wednesday, July 08, 2009 12:00 PM
To: 'Coughlin, Craig'
Subject: FW: Pikangikum Transmission Line Nungesser Crossing

Hi Craig,

Ok, I forwarded the question to the electrical engineers on the Pikangikum Transmission Line project and asked if all aerial crossings (including the Nungesser River crossing) are in compliance with CAN/CSA-C22.3 No 1-06. Peter Tworzanski confirmed that design clearances and guying of the pole structures on either side of the crossing are in compliance with CAN/CSA-C22.3 No 1-06. I have attached his response below.

I shall wait eagerly for your verdict after your field trip to the site. Thanks for looking into this Craig.

Joe

From: Peter [mailto:petert@tworzyanski.com]
Sent: Wednesday, July 08, 2009 11:52 AM
To: jcospito@keewatin-aski.on.ca
Subject: RE: Pikangikum Transmission Line Nungesser Crossing

Joe,

This crossing is designed to be in compliance with CAN/CSA-C22.3 No 1-06. This includes clearances and prescribed guying of the pole structures on either side of the crossing.

Peter Tworzyanski

From: Joe Cospito [mailto:jcospito@keewatin-aski.on.ca]
Sent: Wednesday, July 08, 2009 12:04 PM
To: petert@tworzyanski.com
Subject: Pikangikum Transmission Line Nungesser Crossing

Hi Peter,

We have a bit of an issue with our water crossing on the Pikangikum Transmission Line Project. The problem is in relation to the aerial crossing over the Nungesser River. Transport Canada, Navigable Waters Program would like to know if this crossing (and any other aerial crossing) meets the requirements of CAN/CSA-C22.3 No 1-06 for clearances over a navigable water way.

I have attached the document this requirement is referenced in. If our clearances do not meet this, Transport Canada can force the project to undergo the Navigable Waters Approval Process which is a lengthy process that takes around 2 months to secure approval.

Can you please confirm that all crossings meet the requirements of CSA for clearances over a navigable waterway and respond back as soon as it is convenient? That would be greatly appreciated.

Thanks Peter!

Joe

From: Coughlin, Craig [mailto:craig.coughlin@tc.gc.ca]
Sent: Tuesday, July 07, 2009 2:37 PM
To: jcospito@keewatin-aski.on.ca
Subject: RE: Pikangikum Transmission Line Nungesser Crossing

Joe,

I might take a run and check the Nunguesser site, this week just to be sure.
If it turns out not to fall under the Minor works, it will require a 5(3) approval which does not trigger CEAA. DO all the crossings meet the requirements of CSA for clearances over a navigable water way?

From: Joe Cospito [mailto:jcospito@keewatin-aski.on.ca]
Sent: July 7, 2009 2:14 PM
To: Coughlin, Craig
Subject: Pikangikum Transmission Line Nungesser Crossing

Good afternoon Craig,

Well it has been awhile, but our project paths cross again. I was looking for your advise on an overhead wire crossing we have on the Pikangikum Transmission line project. I believe INAC had you review the CEAA but a brief overview of the work is this:

The line will be a 44kV line placed on poles built to a 115 kV standard (to accommodate future upgrading if need be). The transmission line will stay within the Nungesser Road right of way as it winds northwards towards Pikangikum from Red Lake. We are staying within the right of way as much as possible up to the Coli Lake area to avoid the easement process through the mining claims which completely surround the Nungesser Road. However, north of Coli Lake, there are no claims and at that point we can leave the Nungesser right of way and begin cutting across crown land. A work permit for the right of way has been submitted to the MNR. I have attached the drawings of the route for your reference.

Well, we have two stream crossing in this route. The Berens river crossing will classify as a minor work, since it is a submarine cable and should not pose any problems under the Navigable Water Protection Act.

The other crossing is the aerial crossing of the Nungesser river (shown on drawing G2). This river is really remote and off the beaten trail since the crossing location is on crown land a good distance from the Nungesser Road right of way. From our scaled design drawing (attached) I have determined that the width of crossing is 15 m at the maximum of the transmission line at that point (attached).

Could you provide me with some direction on this after you have a look at the drawings? Do you interpret this crossing to meet the minor works definition and be exempt from the Nav Waters Approval process? With the CEAA on the verge of being approved, and the design work 99% complete I am a little worried about any hiccups that could delay the fall construction date, since this project has been in the works the better part of a decade.

A work permit for both crossings has been submitted to the MNR.

Any advice on how you view this aerial crossing would be great – thanks Craig! Also, if you come across any more deadly animal videos, be sure to remember me.

Sincerely,

Joe Cospito, B. Eng.
Keewatin-Aski Ltd.
Ph: (807) 737-3858
Fx: (807) 737-3875
jcospito@keewatin-aski.on.ca

<<...>> <<...>>

INDIAN AND NORTHERN AFFAIRS CANADA

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November 19, 2009

Your file - Votre référence

Our file - Notre référence
4315-208
CIDM 301286

Pikangikum First Nation
P.O. Box 328
Pikangikum, ON P0V 2L0

Attention: Chief and Council

Re: Pikangikum Grid Line Project – CEAA Screening Report

The CEAA Environmental Screening Report Version 1.3 , received September 10, 2009, has reviewed.

We are formally forwarding our Environmental Officer's comments on the document. Please refer to the attached.

Should you have any questions, please contact me at 807-624-1569.

Dan Baxter
Senior Capital Advisor
Ontario Region

Copy to: Gordon Peter, Pikangikum First Nation
Ed Hoshizaki, Edward Hoshizaki Development Consulting
Capital Projects Team, Pikangikum First Nation
John Mann, Eshkotay Wayab
Norm Lawrence, Keewatin-Aski Ltd.
Scott Boone, Capital Management Officer

Canada

Indian and Northern Affairs Canada | Affaires indiennes et du Nord Canada

INAC File #:	4315-208
CIDM #:	292590

Submission Review – Environment Unit

First Nation:	Pikangikum 208	**Document Date:**	2009-Apr-16
Document Title:	Pikangikum First Nation Electrical Grid ESR	**Version:**	Version 1.3
Author(s):	Keewatin-Aski Ltd.	**Date Received:**	2009-Sep-10
Originator(s):	D. Baxter, Capital North	**Date Reviewed:**	2009-Oct-05
Reviewed by:	R. Beveridge, ENV/LTS	**CIDM Reference:**	289037

Context

These comments reflect a review by the INAC Environment Unit of the Environmental Screening Report entitled "Pikangikum First Nation Electrical Grid", prepared for Pikangikum First Nation by Keewatin-Aski Ltd., dated September 9, 2009.

I have reviewed the above noted document and cannot recommend it for approval until the following comments have been addressed. Any questions or comments on this review should be directed to the Environment Unit, via the Sr. Capital Advisor, Dan Baxter, at 807-624-1569.

Comments

Previous Comments

A previous comment made by Fisheries and Oceans Canada in relation to Section 6.1 of the ESR was not responded to: "page 10 - the Berens River is not the only waterbody encountered by the proposed project ".

10) CEAA Screening Decision

It is noted that the representative of Chief and Council signed the ESR on April 16/09 and that the ESR was revised and then signed by the consultant on Sept 9, 2009 (page 31). Please ensure that a representative of Chief and Council signs the updated ESR.

R. Beveridge 09-10-05

Indian and Northern Affairs Canada | Affaires indiennes et du Nord Canada

INAC File #: 4315-208
CIDM #: 228472

Submission Review – Environment Unit

First Nation:	Pikangikum 208	**Document Date:**	2008-Jul-18
Document Title:	Electrical Grid Project Definition	**Version:**	Version #2
Author(s):	Keewatin-Aski Ltd.	**Date Received:**	2008-Jul-25
Originator(s):	D. Baxter, S. Burns, Capital North	**Date Reviewed:**	2008-Jul-31
Reviewed by:	R. Speller, ENV/LTS	**CIDM Reference:**	227556

Context

These comments reflect a review by the INAC Environment Unit of the document entitled "Electrical Grid Project Definition", prepared for Pikangikum First Nation by Keewatin-Aski Ltd., dated July 18, 2008.

I have reviewed the submission and recommend it be accepted with the understanding that the design cannot be approved until an updated and signed environmental screening report has been received. Any questions or comments should be directed to the Environment Unit via the Capital Management Officer, Dan Baxter, at 807-624-1569.

Comments

Canadian Environmental Assessment Agency (CEAA): Environmental Screening Report (ESR)

An Environmental Screening Report was submitted as a separate document on July 14, 2008 (CIDM #226886) and was reviewed by the environment unit on July 23, 2008 (CIDM #226885). The following comments were made at that time.

4) Project Description

The Electrical Grid Project Definition document (dated May 15, 2008) includes the installation of the distribution station and the construction of a helicopter landing site as part of the scope of work. These activities should be included in the ESR in the project description and the mitigation measures summary.

This May 15th document also includes the construction of a road to the distribution centre. This activity is not part of the initial project but may be constructed in the future. If it is included as part of this environmental screening report, another ESR will not be required prior to road construction.

7) Environmental Effects and Mitigation Measures

Please include mitigation measures for the installation of the distribution centre and the construction of the helicopter landing site.

10) CEAA Screening Decision

The final version of the Environmental Screening Report will require a signature from Chief and Council or designate before approval can be given by INAC.

Federal Coordination

Given the scope of the project, Federal Coordination is required under CEAA as there may be other Federal Departments that need to be involved in the assessment of this project, either as Responsible Authorities (duty to complete an EA, e.g. DFO, TC) or as Expert Federal Authorities (possess expert knowledge e.g. EC). This Federal Coordination gives other Departments the opportunity to provide comments and expertise on any adverse impacts related to the necessary work. Any comments received from the Department of Fisheries and Oceans, Transport Canada, and Environment Canada must be incorporated into the mitigation measures section of the Environmental Screening Report and the correspondence included in the Appendix. Please keep in mind that Federal Coordination can take six to eight weeks.

Canadian Environmental Assessment Act: Registry

This project falls within the definition of a project under CEAA. As per section 55(1) of the *Canadian Environmental Assessment Act* (CEAA), a Notice of Commencement (NOC) for this project will be posted on the Canadian Environmental Assessment Registry (CEAR) internet site for the mandatory 15 days (minimum). INAC is required to post to CEAR in order to provide public notice in a timely manner regarding any environmental assessment for which INAC is a Responsible Authority. The notification includes the name, location and a summary description of the project, and identifies the project proponent and all government agencies involved in the assessment.

R. Speller 08-07-31

Indian and Northern Affairs Canada | Affaires indiennes et du Nord Canada

INAC File #:	4315-208
CIDM #:	226885

Submission Review – Environment Unit

First Nation:	Pikangikum 208	**Document Date:**	2008-Jul-14
Document Title:	Pikangikum First Nation Electrical Grid	**Version:**	Draft ESR
Author(s):	Keewatin-Aski Ltd.	**Date Received:**	2008-Jul-14
Originator(s):	D. Baxter, K. Allan, Capital North	**Date Reviewed:**	2008-Jul-23
Reviewed by:	R. Speller, ENV/LTS	**CIDM Reference:**	226886

Context

These comments reflect a review by the INAC Environment Unit of the Environmental Screening Report entitled "Pikangikum First Nation Electrical Grid", prepared for Pikangikum First Nation by Keewatin-Aski Ltd., dated July 14, 2008.

I have reviewed the submission and cannot recommend it for approval until the following comments have been addressed. Any questions or comments should be directed to the Environment Unit via the Capital Management Officer, Dan Baxter, at 807-624-1569.

Comments

Canadian Environmental Assessment Agency (CEAA): Environmental Screening Report (ESR)

4) Project Description

The Electrical Grid Project Definition document (dated May 15, 2008) includes the installation of the distribution station and the construction of a helicopter landing site as part of the scope of work. These activities should be included in the ESR in the project description and the mitigation measures summary.

This May 15th document also includes the construction of a road to the distribution centre. This activity is not part of the initial project but may be constructed in the future. If it is included as part of this environmental screening report, another ESR will not be required prior to road construction.

7) Environmental Effects and Mitigation Measures

Please include mitigation measures for the installation of the distribution centre and the construction of the helicopter landing site.

10) CEAA Screening Decision

The final version of the Environmental Screening Report will require a signature from Chief and Council or designate before approval can be given by INAC.

Canadian Environmental Assessment Agency (CEAA): Federal Coordination

Given the scope of the project, Federal Coordination is required under CEAA as there may be other Federal Departments that need to be involved in the assessment of this project, either as Responsible Authorities (duty to complete an EA, e.g. DFO, TC) or as Expert Federal Authorities (possess expert knowledge e.g. EC). This Federal Coordination gives other Departments the opportunity to provide comments and expertise on any adverse impacts related to the necessary work. Any comments received from the Department of Fisheries and Oceans, Transport Canada, and Environment Canada must be incorporated into the appropriate section of the Environmental Screening Report and the correspondence included in the Appendix. Please keep in mind that Federal Coordination can take six to eight weeks.

R. Speller 08-07-23

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JUL 27 2009

Your file - Votre référence

Our file - Notre référence

July 22, 2009

Pikangikum First Nation
Pikangikum, ON P0V 2L0

4315-208
CIDM 282595

Attention: Kenneth Strang, Capital Project Manager

Re: Canadian Environmental Assessment Act (CEAA) Environmental Screening Report

The CEAA Environmental Screening Report submitted by Keewatin-Aski Ltd. on April 16, 2009 for the Pikangikum First Nation Electrical Grid has been reviewed.

The attached comments incorporate input from other federal agencies. The comments are attached for your information and action by your consultant.

Should clarification be required, please contact me at 807-624-1569.

Dan Baxter
Senior Capital Advisor
Ontario Region

100 Anemki Drive, Suite 101
Thunder Bay, ON P7J 1A5

Copy to: Chief and Council, Pikangikum First Nation
John Mann, Eshkotay Wayab
Ed Hoshizaki, Ed Hoshizaki Development Consulting
Travis Duncan, IFNA
Norm Lawrence, Keewatin-Aski Ltd.

Canada

Indian and Northern Affairs Canada | Affaires indiennes et du Nord Canada

INAC File #:	4315-208
CIDM #:	277092

Submission Review – Environment Unit

First Nation:	Pikangikum 208	**Document Date:**	2009-Apr-16
Document Title:	Pikangikum First Nation Electrical Grid	**Version:**	Draft ESR version 1.3
Author(s):	Keewatin-Aski Ltd.	**Date Received:**	2009-Apr-20
Originator(s):	J. Cornell, K. Allan, Capital North	**Date Reviewed:**	2009-Jul-07
Reviewed by:	R. Beveridge, ENV/LTS	**CIDM Reference:**	267752

Context

These comments reflect a review by the INAC Environment Unit of the Environmental Screening Report entitled "Pikangikum First Nation Electrical Grid", prepared for Pikangikum First Nation by Keewatin-Aski Ltd., dated April 16, 2009.

I have reviewed the above noted document and cannot recommend it for approval until the following comments have been addressed. Any questions or comments on this review should be directed to the Environment Unit, via the Capital Management Officer, John Cornell, at 807-624-1558.

Comments

2) Location of Reserve & Project

The Distribution Station and helicopter landing and take-off area proposed to be constructed 700m south of the Berens River should be included in the Definition of Project Area.

4) Project Description

Please confirm that there will be no fuel storage for use at the Distribution Station or in the helicopter area. If it is anticipated that fuel storage may occur, please include this in the Project Description (Section 4) and in the Environmental Effects and Mitigation Measures (Section 7).

It is noted that in a previous review by the Environment Unit that the "Electrical Grid Project Definition" (dated May 15, 2008, CIDM #227556) included the construction of a road to the distribution centre. As the road construction is not included in this ESR it may require a separate ESR prior to any decision to construct in the future.

Please include the location of the aerial crossing in the Project Description.

6) Existing Environment

Spill reporting is referenced under Mitigation Measures several times (refer to Key Project Activities 1, 2, 3, 4, and 6) and for consistency, spills should be reported as follows:

> Report spills to INAC and the Ontario Ministry of Environment Spills Action Center (1- 800-268-6060) immediately and document the event with an incident report. The determination of the extent of the contamination and the excavating and handling of the contaminants during remediation will be supervised by a qualified Environmental Consultant using methodologies as per CCME Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites (1993).

In Section 6.2 the Wetlands Valued Ecosystem Component (VEC) description indicates that there are no wetlands in the vicinity of the proposed work. In contrast, the Mammals VEC description indicates that the surrounding area of the project is predominately bush, marsh and lakes. Please clarify these statements.

In Section 6.3, it is noted that the proposed power line intersects trap line #63 which belongs to a resident of Pikangikum First Nation and that negotiations with this resident are currently underway. Correspondence received on June 17, 2009 (CIDM # 277428) indicates that this individual's concerns remain unresolved and that a "Notice of Completion" was posted by the Ministry of Natural Resources on June 17th, 2009 for a 30-day comment period. We look forward to learning the outcome of this process including whether or not a Part II Order (bump-up) is requested and the Ministry of the Environment's resulting decision.

7) Environmental Effects and Mitigation Measures

In Section 7.0, Key Project Activity 2, please add "change in the environment on the current use of land and resources for traditional purposes by aboriginal persons include impacts on traditional harvesting activities" (through impact on the environment in a trapping area) as a Potential Environmental Effect, identify mitigation measures and determine the significance of this effect. It may also be informative to include a map layering the proposed project and trap line #63 to clearly identify the area of concern.

If it is decided to include the construction of a road to the distribution centre in this ESR, please ensure that it is included as a "Key Project Activity" with the potential environmental effects, mitigation measures and significance determined.

Please include the aerial crossing as a key project activity and identify the potential environmental effects, mitigation measures and significance.

9) Summary of Environmental Effects

Please ensure that this section is signed in the final ESR.

10) CEAA Screening Decision

DFO, EC and TC are Expert Federal Authorities for this project, however, they are not Responsible Authorities. Please remove them from Section 10 as they are not required to officially "sign-off" on the CEAA Screening Decision.

Canadian Environmental Assessment Agency (CEAA): Federal Coordination

Given the scope of the project, Federal Coordination is required under CEAA and Environment Canada, Fisheries and Oceans Canada and Transport Canada are involved in the assessment of this project as Expert Federal Authorities. Following their review of the April 16, 2009 Environmental Screening Report, the Expert Federal Authorities provided the below comments. Please address these comments and incorporate them into the appropriate section of the Environmental Screening Report.

Environment Canada
No comments.

Fisheries and Oceans Canada
page 6 - the operational statement (OS) for overhead lines should also apply since the power line does cross several waterbodies through the air such as Pindar creek etc. The overhead line OS addresses the approaches (clearing of vegetation, fording) and where the structure (poles) are placed. I mentioned this last year - the July 25, 2008 email is in the DFO correspondence section part of the ESR.

page 7 - indicate the number of crossings (15?) with the overhead line (add this email to App C)

page 10 - the Berens River is not the only waterbody encountered by the proposed project

page 13 - add overhead cable OS to 2 Clearing and Grubbing of ROW for power line - add appropriate mitigation measures to the table from the OS.

page 16/17 - it mentions the underwater cable OS - shouldn't mitigation measures from the OS be in the table - column C?

Transport Canada
Although the aerial cables proposed will not trigger CEAA, approval may be required for those that cross any navigable water ways and do not meet the Minor Works Orders for Aerial Cables (attached). Any cable crossing that does not meet the Minor Works Orders will require a Section 5(3) approval under the Navigable Waters Protection Act.

Based on verbal communication with the consultant, it is noted that the scope of the project includes one aerial crossing at the Nungesser River which has a high water river width of 15m.

Note: On July 6, 2009 Keewatin-Aski Ltd. (Joe Cospito) was advised to contact Craig Coughlin at Transport Canada regarding obtaining a Section 5(3) approval for the aerial crossing at the Nungesser River.

R. Beveridge 09-07-07

ENVIRONMENT CANADA

Joe

From: Rachel Speller [spellerr@inac-ainc.gc.ca]
Sent: Thursday, July 31, 2008 10:13 AM
To: jcospito@keewatin-aski.on.ca
Subject: Fwd: Power line to Pikangikum Question

Hi Joe,

I just received these questions from Environment Canada about the Pikangikum Grid project. Do you have any responses? Today is actually my last day in the office before I leave for vacation (back Aug. 18) so if you could email a response directly to Sheelagh, it may speed up the process.

Thanks,

Rachel

>>> "Hysenaj,Sheelagh [Ontario]" <Sheelagh.Hysenaj@ec.gc.ca> 07/31/08 10:57 AM >>>
Hi Rachel,

I am not familiar with some of the extremes of living in Northwestern Ontario so my questions below may seem naive (if so feel free to say so):

Are other types of energy production viable instead of connecting to the grid via a power line? Where options such as hydroelectric on the Berens River (not daming the river but just using the flow as is with a turbine in place), solar, wind and geothermal previously considered and were they eliminated for various reasons prior to preparing the Environmental Screening Report? If they cannot be considered could you please help me understand the reasons so that I don't include them as suggestions in Environment Canada's response.

Will the diesel generator be kept on site and maintained to be used as back up incase of power failures in the future?

I thought it would have been better for the community to use the alternative methods mentioned above and have a more sustainable and reliable source of energy production in the future rather than connecting to the grid which at it's best in Southern Ontario is not 100% year round.

Thanks,

Sheelagh Hysenaj
Environmental Assessment Officer
Environment Canada

416-739-5910

Joe

From: Joe
Sent: Thursday, August 07, 2008 1:30 PM
To: 'Sheelagh.Hysenaj@ec.gc.ca'
Cc: Norm; Rachel Speller (E-mail)
Subject: Pikangikum Power Line EA Answers - Environment Canada

Hi Sheelagh,

I would be pleased to answer your questions regarding the Pikangikum Grid Project as forwarded to me by Rachel Speller. She directed that I could respond to you directly to assist in speeding up the EA review process. I have highlighted the answers in red for ease of reference.

Questions:

Are other types of energy production viable instead of connecting to the grid via a power line? Where options such as hydroelectric on the Berens River (not daming the river but just using the flow as is with a turbine in place), solar, wind and geothermal previously considered and were they eliminated for various reasons prior to preparing the Environmental Screening Report? If they cannot be considered could you please help me understand the reasons so that I don't include them as suggestions in Environment Canada's response.

The Pikangikum Power Line Project will utilize electricity produced locally at the Ear Falls Generation Station. This area of Northwestern Ontario benefits from abundant hydro electric power which provides electricity to the northern communities. This form of electricity is sustainable, reliable, and exceeds demand in this region of Northwestern Ontario which is largely populated by small communities spaced at relatively great distances from each other.

Will the diesel generator be kept on site and maintained to be used as back up incase of power failures in the future?

At this point due to the age, cost to operate and capacity of the existing diesel plant the plan is to decommission the plant under a separate project.

I thought it would have been better for the community to use the alternative methods mentioned above and have a more sustainable and reliable source of energy production in the future rather than connecting to the grid which at it's best in Southern Ontario is not 100% year round.

The electricity in this area of Northwestern Ontario is produced by the generation station in Ear Falls, Ontario. This source is sustainable as it taps the vast reservoir of Lac Seul. Electrical shortages in the area are not an issue as the station not only is able to meet local demand but contributes electricity to the provincial grid.

I trust these answers will assist you in your review of the project EA. Please call or email if you have any questions regarding the project.

Sincerely,

Joe Cospito, B. Eng.
Keewatin-Aski Ltd.
Ph: (807) 737-3858
Fx: (807) 737-3875
jcospito@keewatin-aski.on.ca

Environment
Canada

Environmental Protection Operations Division
4905 Dufferin Street
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Environnement
Canada

Division de protection de l'environnement
4905, rue Dufferin
Toronto, ON M3H 5T4

September 23, 2008

CEAR File Number: 08-01-40935

EC File Number: 2008-047

Rachel Speller
Environmental Officer
Indian and Northern Affairs Canada
100 Anemki Drive, Suite 101
Thunder Bay, Ontario P7J 1A5

RE: Pikangikum Electric Grid Project

Dear Ms. Speller:

This is in response to your email dated July 22, 2008 to my colleague, Dennis Fell, Environmental Assessment Section with Environment Canada – Ontario Region regarding the Pikangikum Electric Grid Project located in the Sioux Lookout District of Northwestern Ontario.

Please be advised that Environment Canada (EC) does not have any obligations as a Responsible Authority under the *Canadian Environmental Assessment Act* (CEAA) for this project proposal. However, we are able to offer the following comments and advice within the context of our role as an expert federal authority as per section 12(3) of CEAA to assist Indian and Northern Affairs Canada in completing the screening for the planned project. We have reviewed the Environmental Screening Report (dated July 2008) and have the following comments for your consideration.

Environment Canada's Interests:

Please note that EC has a regulatory interest in water quality, migratory birds, species at risk, air quality and as administrator of subsection 36(3) of the *Fisheries Act*, the *Migratory Birds Convention Act*, 1994, the *Species at Risk Act*, and the *Canadian Environmental Protection Act*, respectively. The advice in this letter does not relieve proponents from their responsibility for meeting the requirements of these and any other legislation that is applicable to the project. Information and comments should not be construed as a fettering of the federal government's ability to make decisions and/or enforce any applicable regulations.

Please refer to the attached Appendix, which provides details of the legislation and policies that give context to our comments and recommendations.

Site Specific Issues:

Purpose of the Project – It was unclear whether or not the existing diesel generator would be kept and used for back up electrical generation or decommissioned. Communication with Indian and Northern Affairs Canada confirmed that decommissioning of the old generator would be included in a future project which should also include decommissioning of the storage tank(s) and associated infrastructure (piping, pumps, etc.).

Proposed Route – It was unclear if additional vegetation clearing and grubbing was necessary along the proposed route. If additional clearing is required EC recommends avoiding these activities during sensitive periods of wildlife migration, staging, nesting, breeding, hibernation or nursing. If

migratory birds are known to breed in the area any required clearing should be conducted outside the nesting season. To avoid significant adverse effects on migratory birds in this region of Ontario, project works and activities that could result in such disturbance or destruction of nests should be timed to occur outside of the breeding season, which is generally from the timeframe of May 16 to July 31st. Environment Canada therefore recommends the environmental assessment include a consideration of the adverse effects of the project on the breeding migratory birds. Adverse effects may occur through disturbance or direct mortality (of individuals or destruction of nests) during many phases of the project including site access, clearing and equipment staging.

For areas requiring re-vegetation following the completion of the project, use seed mixes and/or tree saplings of native species of plants which are adapted to the local climate and conditions that will further enhance the local plant community.

No species at risk observations or records were identified in the screening report (version 1.3). If during the project a species at risk is observed, encountered or impacted at any time, please contact Environment Canada for protection advice for terrestrial species at risk and consult with Fisheries and Oceans Canada for aquatic species at risk.

Laying of underwater cable across Berens River:

- Schedule activities to avoid disturbance to water bird nesting areas, if present, until after the young have fledged if work is not completed by next season.

- Ensure that fish spawning habitat is not affected and avoid in-water works during fish migratory and nursery periods when eggs and fry are vulnerable to sedimentation. Prior to removing sediment and erosion control measures ensure that accumulated sediments are removed and disposed of properly.

- Ensure that downstream water users are aware of the potential of increased sedimentation in the water supply.

I trust that this information will assist you in finalizing the CEAA Screening Report for the Pikangikum Electrical Grid. If you have any questions regarding these comments, please contact me at (416) 739-5910 or by e-mail at sheelagh.hysenaj@ec.gc.ca.

Sincerely,

Sheelagh Hysenaj

Sheelagh Hysenaj
Environmental Assessment Officer

cc: R. Dobos, EC

C. Gauthier, EC

APPENDIX

Regulatory and Policy Context for Environment Canada's Comments and Advice

Environment Canada's mandate to protect the environment and to actively promote sustainable development extends beyond the Department's legislated responsibilities for undertakings that trigger the *Canadian Environmental Assessment Act*. Our review and comments are related, but not limited, to our areas of interest and expertise arising from the following legislation, policies and agreements. More information is available on-line, as indicated.

1. Legislation

Department of Environment Act

http://laws.justice.gc.ca/en/E-10/text.html

The *Department of Environment Act* provides Environment Canada (EC) with general responsibility for environmental management and protection. Its obligations extend to and include all matters over which Parliament has jurisdiction, and have not by law been assigned to any other department, board, or agency of the Government of Canada as related to: preservation and enhancement of the quality of the natural environment (e.g. water, air, soil), renewable resources including migratory birds and other non-domestic flora and fauna, water, meteorology, and coordination of policy and programs respecting preservation and enhancement of the quality of the natural environment.

The *Department of Environment Act* states that EC has a mandated responsibility to advise heads of federal departments, boards and agencies on matters pertaining to the preservation and enhancement of the quality of the natural environment. This responsibility is reinforced as per subsection 12(3) of CEAA, which states that federal departments must provide specialist and expert information or knowledge to other federal departments or review panels.

Canadian Environmental Protection Act, 1999

http://www.ec.gc.ca/CEPARegistry/subs_list/
http://www.ec.gc.ca/CEPARegistry/policies/

The Canadian Environmental Protection Act, 1999 (CEPA) contributes to sustainable development through pollution prevention and protects the environment, human life and health from the risks associated with toxic substances. Key parts of CEPA include:

- public participation;
- information gathering, objectives, guidelines and codes of practice;
- pollution prevention;
- controlling toxic substances;
- animate products of biotechnology;
- controlling pollution and managing wastes including nutrients, protection of the marine environment, disposal at sea, fuels, vehicle engine and equipment emissions, international air pollution and international water pollution, and hazardous and non-hazardous waste;
- environmental matters related to emergencies including requirements for environmental emergency plans;
- government operations - federal and aboriginal lands including regulations to close any regulatory gap between federal and provincial requirements; and,
- enforcement.

The Canadian Environmental Protection Act, 1999 enables the government to manage a toxic substance throughout its life cycle. Provisions under CEPA require Environment Canada, under

certain conditions, to develop a "regulation or preventive or control instrument" for a substance that is found to be "toxic" under the Act. CEPA further requires the virtual elimination of anthropogenic releases to the environment of substances that are declared toxic and that are bioaccumulative and persistent. CEPA also establishes the requirements for the assessment of chemicals, polymers and products of biotechnology, prior to import or manufacture of substances not on the Domestic Substances List.

Fisheries Act

http://www.ec.gc.ca/ele-ale/policies/c_and_e_fisheries_act/main_e.asp.

Environment Canada's mandate to advocate for the protection of water quality stems from the pollution prevention provisions of the *Fisheries Act*, which are administered by EC. Please be advised that the Compliance and Enforcement Policy for the Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act* states that compliance with the federal *Fisheries Act* is mandatory. Subsection 36(3) of the *Fisheries Act* specifies that, unless authorized by federal regulation, no person shall deposit or permit the deposit of deleterious substances of any type in water frequented by fish, or in any place under any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the deleterious substance, may enter any such water. Proponents should note that only a federal regulation under the *Fisheries Act* or another Act of Parliament can authorize a discharge of a deleterious substance; no federal permit, provincial, territorial or municipal regulatory permit or approval allows for exemption from the *Fisheries Act*.

In the application of the *Fisheries Act*, court cases have accepted that a discharge or effluent that is acutely lethal to fish is deleterious. In other words, results of tests designed to determine whether fish will die in an effluent or discharge within a specified time period will determine one aspect of deleteriousness. However, any substance with a potentially harmful chemical, physical or biological effect on fish or fish habitat is also deleterious. For example, substances (such as sediment) that smother nesting areas or spawning grounds, or interfere with reproduction, feeding or respiration of fish at any point in their life cycle are also considered deleterious. In general, any substance with a potentially harmful chemical, physical or biological effect on fish or fish habitat may be considered deleterious.

The act of depositing a deleterious substance should be considered a violation of the *Fisheries Act*, regardless of whether the water itself is made deleterious by the deposit. Subsection 36(3) of the *Fisheries Act* makes no allowance for a mixing or dilution zone. Any measurements or tests to determine whether something is deleterious should be done where the substance is at its highest concentration, typically at the point of discharge to the receiving water.

Migratory Birds Convention Act, 1994

http://www.cws-scf.ec.gc.ca/legislations/laws1_e.cfm

The disturbance, destruction or taking of a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird are prohibited under section 6 of the *Migratory Bird Regulations* (MBRs), under the authority of the *Migratory Birds Convention Act, 1994* (MBCA)*. "Incidental take" is the killing or harming of migratory birds due to actions, such as economic development, which are not primarily focused on taking migratory birds. No permit can be issued for the incidental take of migratory birds or their nests as a result of economic activities.

Under section 5.1 of the MBCA, no person shall deposit or permit to be deposited oil, oil wastes or any other substance harmful to migratory birds in any waters or any area frequented by migratory birds.

* Please note that amendments to the MBCA in Bill C-15 came into force on June 28, 2005. This pollution prohibition was previously contained in s.35(1) of the *Migratory Bird Regulations*, which has now been repealed and is included as s.5.1 of the amended MBCA, 1994.

Species at Risk Act
http://www.speciesatrisk.gc.ca/default_e.cfm

The *Species at Risk Act* (SARA) has resulted in a consequential amendment to CEAA that amends the definition of "environmental effect" to clarify that all federal EAs must always consider adverse effects on listed wildlife species, and the critical habitat or residences of individuals of that species. In addition, section 79(2) of SARA requires that when a federal EA is carried out on a project that may affect a listed species or its critical habitat, adverse environmental effects must be identified, mitigation measures must be taken to avoid or lessen adverse effects, and environmental effects monitoring must be conducted.

SARA was proclaimed on June 5, 2003 and is intended to provide protection for individuals of wildlife species at risk listed under Schedule 1 of the Act, their residences (dwelling places, such as a den or nest or other similar area that is occupied or habitually occupied by one or more individual during part or all of its life cycle) and critical habitat (that part of areas used or formerly used by the species to carry out their life processes that is deemed essential for survival or recovery). Critical habitat will be identified for each listed species in Recovery Strategies or Action Plans. The prohibitions under SARA came into force on June 1, 2004 and apply to listed (Schedule I) endangered and threatened species for all federally protected aquatic species and migratory birds (including their residences) found anywhere, as well as to all endangered and threatened species, when found on federal lands.

2. Policies

Federal Policy on Wetland Conservation
http://www.ramsar.org/wurc/wurc_policy_canada.htm

The Federal Policy on Wetland Conservation, 1991 is a shared federal responsibility that directs all departments to sustain wetland functions in the delivery of their programs, services or expenditures. The goals of the Policy include: maintaining the functions and values of wetlands; ensuring no net loss of wetland functions on all federal lands and waters; enhancing and rehabilitating wetlands in areas prone to degradation and loss; recognizing wetland functions in resource planning and management with regard to federal programs, policies and activities; securing significant wetlands; and recognizing and utilizing sustainable management practices to conserve wetlands.

The Federal Water Policy
http://www.ec.gc.ca/water/en/info/pubs/fedpol/e_fedpol.htm

The Federal Water Policy addresses the management of water resources, balancing water uses with the requirements of the many interrelationships within the ecosystem. The policy takes into account the needs of all Canadians in its overall objective to encourage the use of freshwater in an efficient and equitable manner consistent with the social, economic and environmental needs of present and future generations.

To manage Canada's water resources, the federal government has defined two main goals:
- to protect and enhance the quality of the water resource; and,
- to promote the wise and efficient management and use of water.

The policy stresses that government action is not enough. Canadians at large must become aware of the true value of water in their daily lives and use it wisely. We cannot afford to continue undervaluing and therefore wasting our water resources.

Other legislation, agreements and federal policies respecting environmental matters

The above list is not exhaustive; EC may have other interests in this project not identified at this time based on our review of additional information provided at a later date. For further information on EC's mandated interests, please refer to *http://www.ec.gc.ca/EnviroRegs*.

APPENDIX 'D'

DFO OPERATIONAL STATEMENTS

UNDERWATER CABLES

Version 3.0

The placement of cables on the beds of freshwater lakes and rivers is a common practice used to deliver utility services (i.e., electricity and telephone) across water bodies when overhead lines are not feasible. The placement of underwater cables is more favourable than using unconfined open trench methods, which bury the cables within the substrate of the lake or river. Placing cables on the beds of freshwater lakes or rivers typically generates less sediment and avoids the need to use machinery in the water. In some instances, however, excavation may be required as cables may need to be buried near the shoreline for operational safety reasons.

Potential impacts to fish and fish habitat include disruption of sensitive fish spawning areas (e.g., gravel, cobble, and rock rubble), erosion and sedimentation caused by disturbance to the shoreline and bed of water bodies, removal of riparian (bank) vegetation and underwater rocks and logs that provide cover, shade and food, and disruption of sensitive fish life stages.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to incorporate into your project in order to avoid negative impacts to fish habitat. You may proceed with your underwater cable project without a DFO review when you meet the following conditions:

- if working within the Thames River, Sydenham River, Ausable River, Grand River, or Maitland River, you have contacted your Conservation Authority or local DFO Office (see Ontario DFO office list) to ensure that your project will not impact Schedule 1 mussel species at risk under the federal *Species at Risk Act*, before proceeding,
- unconfined open trench methods, including ploughing and water-jetting, to bury cable are not used,
- underwater cables are not installed on or within known fish spawning habitat,
- cable trenching is limited to near shore areas and is to be no greater in width than that required to accommodate the cable,
- any near shore excavation to bury the cable extends a maximum total of 10 metres measured horizontally from the ordinary high water mark (HWM) (see definition below), but in no case will involve more than 10% of a stream channel width (in total),
- explosives are not used to trench the cable, and
- you incorporate the *Measures to Protect Fish and Fish Habitat when Placing Underwater Cables* listed below in this Operational Statement.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact your Conservation Authority, or the DFO office in your area (see Ontario DFO office list) or Parks Canada if the project is located within its jurisdiction, including the Trent-Severn Waterway and the Rideau Canal, if you wish to obtain an opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

You are required to respect all municipal, provincial or federal legislation that applies to the work being carried out in relation to this Operational Statement. The activities undertaken in this Operational Statement must also comply with the *Species at Risk Act* (**www.sararegistry.gc.ca**). If you have questions regarding this Operational Statement, please contact one of the agencies listed above.

We ask that you notify DFO, preferably 10 working days before starting your work by filling out and sending the Ontario Operational Statement notification form (**www.dfo-mpo.gc.ca/regions/central/habitat/os-eo/prov-terr/index_e.htm**) to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when Placing Underwater Cables

1. Use existing trails, roads, or cut lines wherever possible to avoid disturbance to the riparian vegetation.

2. While this Operational Statement does not cover the extensive clearing of riparian vegetation, the removal of select plants may be necessary to accommodate the cable. This removal should be kept to a minimum.

3. Where cables are buried within 10 metres of the HWM, time the installation to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).

4. Isolate any in-water trench work to contain suspended sediment and prevent it from entering the surrounding waters.

5. Install effective sediment and erosion control measures on land before starting trench work to prevent entry of sediment into the water body. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.

6. Operate machinery on land or on water (i.e., from a barge or vessel) in a manner that minimizes disturbance to the banks or bed of the water body.

   6.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
   6.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
   6.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
   6.4. Restore banks to original condition if any disturbance occurs.

7. Relocate any fish trapped within an isolated area to the main water body before starting any trenching.

8. During dry land trenching, stockpile the material that is moved from the bank of the water body (below the HWM) and return it to its original location once the cable is installed.

9. If any material (e.g., rock, cobble, woody material) is moved to place the cable on the bottom, it should be relocated to a similar depth within the water body in close proximity to its original location.

10. Restore the original contour, gradient and bottom of the water body, bank and shore. Allow sediment to fully settle inside any isolated area before removing sediment and erosion control measures.

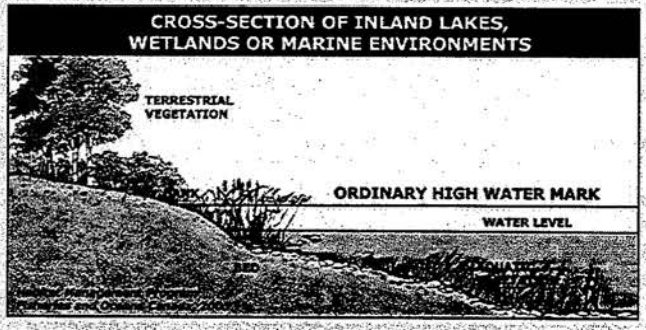
11. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

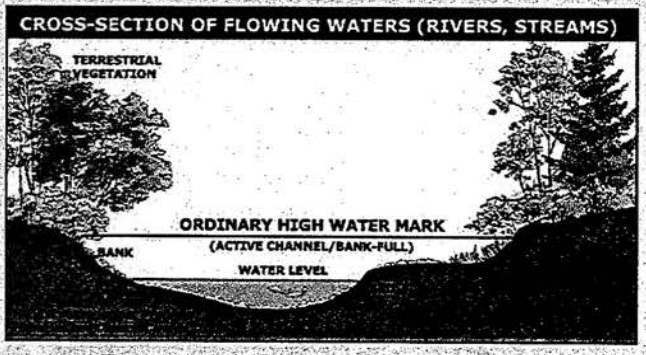
   11.1. Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.

Definition:

Ordinary high water mark (HWM) – The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In flowing waters (rivers, streams) this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In inland lakes, wetlands or marine environments it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For reservoirs this refers to normal high operating levels (Full Supply Level).

For the Great Lakes this refers to the 80th percentile elevation above chart datum as described in DFO's *Fish Habitat and Determining the High Water Mark on Lakes*.





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http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_f.asp

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OVERHEAD LINE CONSTRUCTION

Version 3.0

Overhead lines are constructed for electrical or telecommunication transmission across many watercourses that range in size from small streams and ponds to large rivers, lakes and reservoirs. This Operational Statement applies to selective removal of vegetation along the right-of-way to provide for installation and safe operation of overhead lines, and passage of equipment and materials across the water body.

Although fish habitat occurs throughout a water system, it is the riparian habitat that is most sensitive to overhead line construction. Riparian vegetation occurs adjacent to the watercourse and directly contributes to fish habitat by providing shade, cover, and spawning and food production areas. It is important to design and build your overhead line project to meet your needs while also protecting riparian areas. Potential impacts to fish and fish habitat include excessive loss of riparian vegetation, erosion and sedimentation resulting from bank disturbance and loss of plant root systems, rutting and compaction of stream substrate at crossing sites, and disruption of sensitive fish life stages.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to incorporate into your project in order to avoid negative impacts to fish habitat. You may proceed with your overhead line project without a DFO review when you meet the following conditions:

- it does not require the construction or placement of any temporary or permanent structures (e.g. islands, poles, crib works, etc.) below the ordinary high water mark (HWM) (see definition below), and
- you incorporate the *Measures to Protect Fish and Fish Habitat when Constructing Overhead Lines* listed below in this Operational Statement.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact your Conservation Authority, or the DFO office in your area (see Ontario DFO office list) or Parks Canada if the project is located within its jurisdiction, including the Trent-Severn Waterway and the Rideau Canal, if you wish to obtain an opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

You are required to respect all municipal, provincial or federal legislation that applies to the work being carried out in relation to this Operational Statement. The activities undertaken in this Operational Statement must also comply with the *Species at Risk Act* (**www.sararegistry.gc.ca**). If you have questions regarding this Operational Statement, please contact one of the agencies listed above.

We ask that you notify DFO, preferably 10 working days before starting your work by filling out and sending the Ontario Operational Statement notification form (**www.dfo-mpo.gc.ca/regions/central/habitat/os-eo/prov-terr/index_e.htm**) to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when Constructing Overhead Lines

1. Installing overhead lines under frozen conditions is preferable in all situations. On wet terrains (e.g., bogs), lines should be installed under frozen conditions, where possible, or using aerial methods (i.e., helicopter).

2. Design and construct approaches so that they are perpendicular to the watercourse wherever possible to minimize loss or disturbance to riparian vegetation.

3. Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or overhead line structures.

   3.1. Wherever possible, locate all temporary or permanent structures, such as poles, sufficiently above the HWM to prevent erosion.

4. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to accommodate the overhead line. This removal

should be kept to a minimum and within the road or utility right-of-way.

5. Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. A *Temporary Stream Crossing* Operational Statement is also available.

   5.1. If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
   5.2. Grading of the stream banks for the approaches should not occur.
   5.3. If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation is likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
   5.4. Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
   5.5. Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.

6. Operate machinery on land and in a manner that minimizes disturbance to the banks of the watercourse.

   6.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
   6.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
   6.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
   6.4. Restore banks to original condition if any disturbance occurs.

7. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the watercourse. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.

   7.1. Avoid work during wet, rainy conditions or use alternative techniques such as aerial methods (i.e., helicopter) to install overhead lines.

8. Stabilize any waste materials removed from the work site to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.

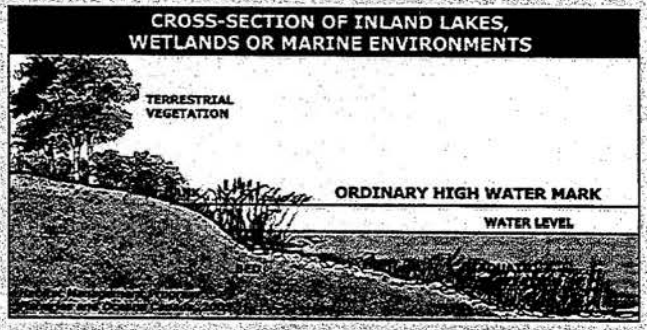
9. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

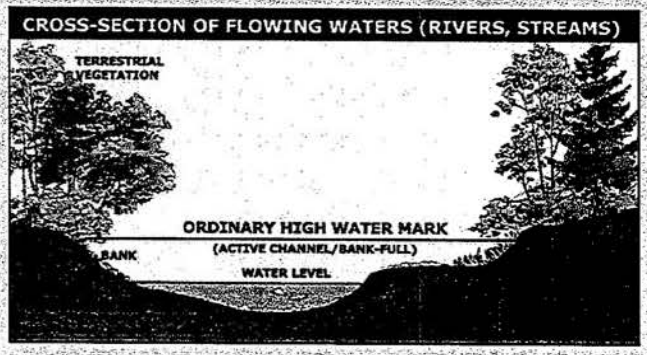
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Definition:

Ordinary high water mark (HWM) – The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In flowing waters (rivers, streams) this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In inland lakes, wetlands or marine environments it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For reservoirs this refers to normal high operating levels (Full Supply Level).

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This Operational Statement (Version 3.0) may be updated as required by Fisheries and Oceans Canada. It is your responsibility to use the most recent version. Please refer to the Operational Statements web site at **http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_e.asp** to ensure that a more recent version has not been released.

APPENDIX 'E'

TRANSPORT CANADA FORMS

- NAVIGABLE WATERS APPROVAL DOCUMENT (8200-09-6359) – AERIAL CROSSING OF THE NUNGESSER RIVER
- APPROVED AERONAUTICAL OBSTRUCTION CLEARANCE FORM
- NAVIGABLE WATERS PROTECTION ACT POLICY FOR SUBMARINE CABLES
- NAVIGABLE WATERS PROTECTION ACT POLICY FOR AERIAL CABLES

Transport Canada
Marine

Transports Canada
Maritime

Navigable Waters Protection Program
Programme de protection des eaux navigables
100 Front Street South
Sarnia, Ontario N7T 2M4

Your File Votre référence
07062
Our File Notre référence
8200-09-6359

REGISTERED MAIL

NOV 1 3 2009

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Pikangikum First Nations
C/o Keewatin-Aski Limited
PO Box 510
61 Queen Street
Sioux Lookout, ON P8T 1A8

Attention: Joe Cospito

Dear Sir:

Re.: Application under the *Navigable Waters Protection Act* by Pikangikum First Nations for Approval of the Aerial Cable located at Nungesser River in the Province of Ontario

Enclosed herewith is an Approval document signed on behalf of the Minister of Transport, Infrastructure and Communities pursuant to subsections 5(1) and (3) of the *Navigable Waters Protection Act* (R.S.C. 1985, c. N-22), as amended by Part 7 of the *Budget Implementation Act*, 2009, S.C. 2009, c. 2.

Please note Transport Canada has determined, that for purposes of the aforementioned approval document, the above-referenced project was not subject to an environmental assessment under the *Canadian Environmental Assessment Act* pursuant to the *Navigable Waters Protection Act*. However, any other forms of approval under any applicable laws may require an environmental assessment under the *Canadian Environmental Assessment Act*.

Sincerely,

Barry Putt
Manager
Navigable Waters Protection Program
Marine Safety
Transport Canada
Ontario

BP/jd

Enclosure

Canada

Transport Canada
Marine

Transports Canada
Maritime

NAVIGABLE WATERS PROTECTION ACT (R.S.C. 1985, c. N-22) as amended by Part 7 of the *Budget Implementation Act*, 2009, S.C. 2009, c. 2 (*Navigable Waters Protection Act*), PART I
Subsections 5(1) and (3) – Other than substantial interference

8200-09-6359

Approval

APPLICANT: Pikangikum First Nations
C/o Keewatin-Aski Limited
PO Box 510
61 Queen Street
Sioux Lookout, ON P8T 1A8

WORK: Aerial Cable

SITE LOCATION: Located at Approximately N 51° 25' 51.2" – W 093° 44' 03.7", Pikangikum First Nation, Nungesser River, Kenora District, in the Province of Ontario

IMPORTANT NOTICE: This document approves the work in terms of its effect on marine navigation under the *Navigable Waters Protection Act*. The work must be built, placed, maintained, operated, used and removed in accordance with the approved plan(s), the *Navigable Waters Protection Act*, its regulations and the terms and conditions in the Approval. It is the applicant's responsibility to obtain any other forms of approval, including building permits, under any applicable laws.

WHEREAS the above-named applicant has made application to the Minister of Transport, Infrastructure and Communities under the *Navigable Waters Protection Act* for approval of the above-described work at the above-referenced site in accordance with the attached plan(s);

WHEREAS it is considered advisable to approve the said work at the said site and plan(s) thereof for a period of 30 years pursuant to the Schedule referred to in subsection 3(1) of *the Navigable Waters Works Regulations*.

THEREFORE, the Minister of Transport, Infrastructure and Communities, pursuant to subsections 5(1) and (3) of the *Navigable Waters Protection Act*, hereby approves the said work at the said site and plan(s) thereof for the period of time aforesaid.

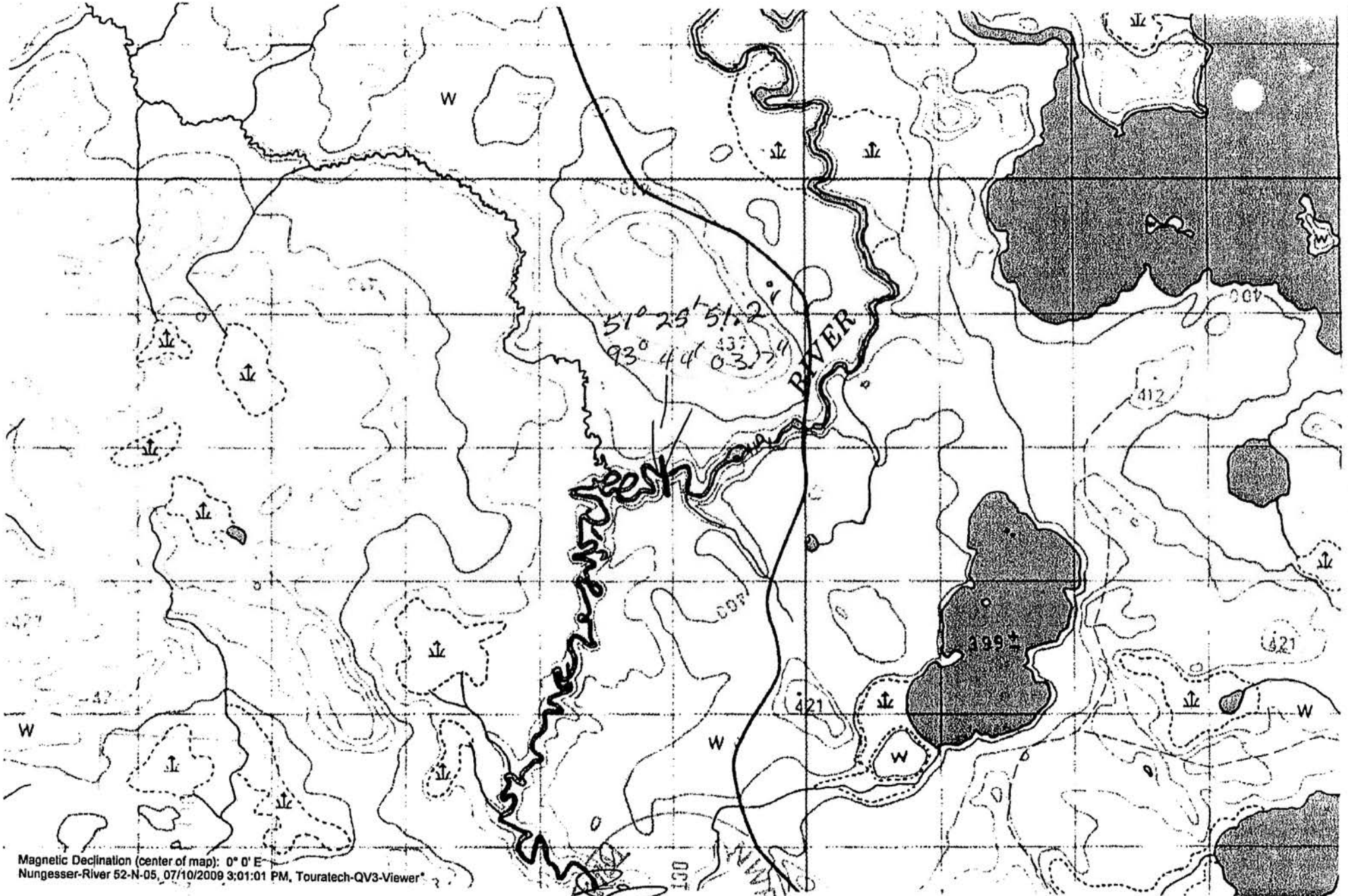
Sarnia, Ontario

Date: NOV 1 3 2009

Barry Putt
Manager
Navigable Waters Protection Program
Marine Safety
Transport Canada
Ontario

for the Minister of Transport, Infrastructure and Communities

Canada



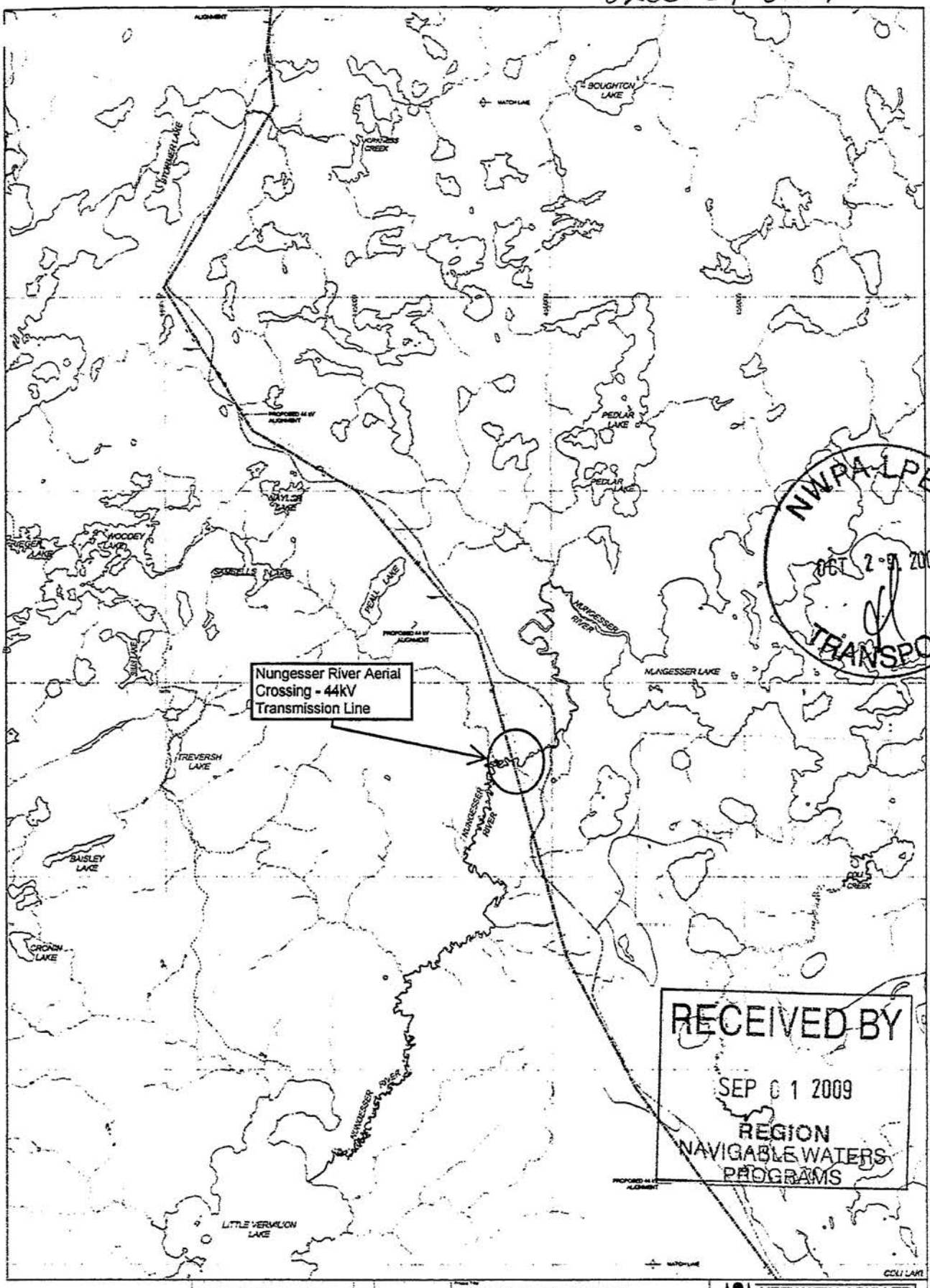
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TRANSPORTATION
OCT 20 2009
PAYMENT

8200-09-6359



NWPA-LPEN
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REGION
NAVIGABLE WATERS
PROGRAMS

PIKANGIKUM 44kV POWER LINE
PIKANGIKUM FIRST NATION
GENERAL ALIGNMENT PLAN - MIDDLE SECTION

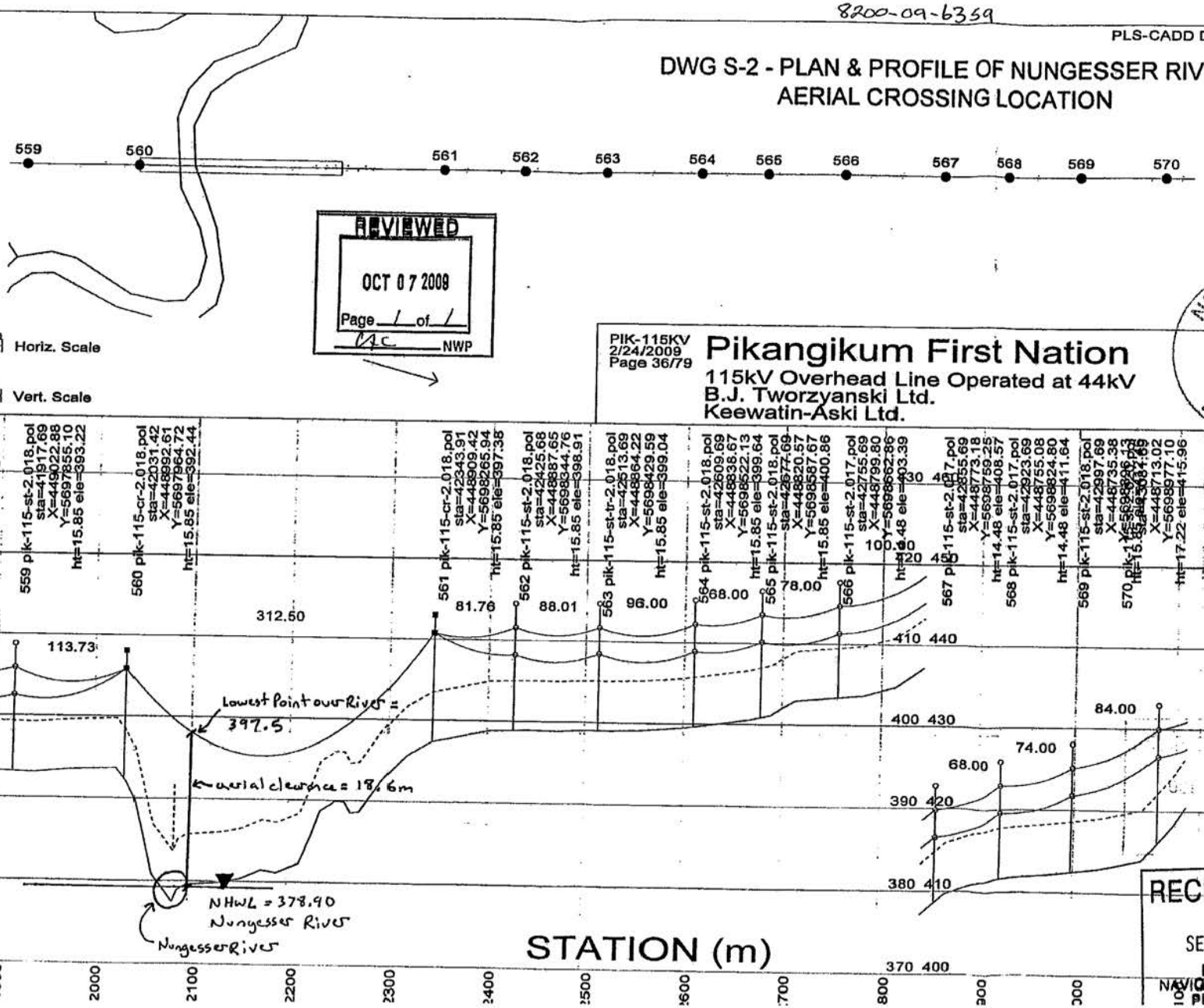
KEEWATIN-ASKI LTD
CONSULTING ENGINEERS & ARCHITECTS

07062-G2

8200-09-6359

PLS-CADD Drawing

DWG S-2 - PLAN & PROFILE OF NUNGESSER RIVER AERIAL CROSSING LOCATION



jcospito@keewatin-aski.on.ca

Transport Canada / Transports Canada

TC File No./Ref No. — TC n° du dossier/N° de réf.

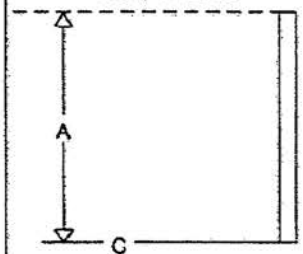
AERONAUTICAL OBSTRUCTION CLEARANCE FORM

FORMULAIRE D'AUTORISATION D'OBSTACLE AÉRIEN

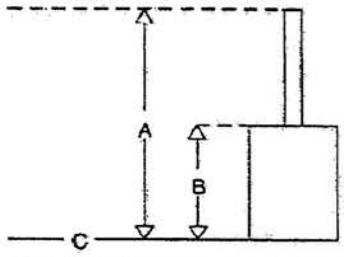
TO BE COMPLETED BY APPLICANT — À REMPLIR PAR LE REQUÉRANT

Operator's Name — Nom de l'opérateur	Thunder Bay Airport Service Inc.
Operator's Address — Adresse de l'operateur	350 Dougal Way, Thunder Bay, ON, CANADA, P7E 6M6
Operator's Contact — Agent de liaison de l'opérateur	Marianne Derouard
Contact's Telephone No. — N° de téléphone de liaison	(807) 662-2581
Applicant's Name — Nom du requérant	Keewatin-Aski Ltd.
Address — Adresse	61 Queen Street
City — Ville	Sioux Lookout
Province	Ontario
Postal — Code — postal	P 8 T 1 A 8
Telephone No. — N° de téléphone	(807) 737-3858
Contact — Personne ressource	Norm Lawrence, P.Eng.
Telephone No. — N° de téléphone	(807) 737-3858
Nearest city / town to proposed facility — Ville la plus proche de la structure proposée	Cochenour
Geographic coordinates of structure — Coordonnées géographiques de la structure	51 ° 4 ' 12.18 " N Latitude / Latitude N — 93 ° 46 ' 6.42 " W Longitude / Longitude O

TOWERS / ANTENNAS
TOURS / ANTENNES



BUILDING OR OTHER STRUCTURE
BÂTIMENT OU AUTRE STRUCTURE



		Feet — Pieds	Meters — Mètres
A	Height above ground / Hauteur au-dessus du sol	75	22.86
B	Building height / Hauteur du bâtiment	Not Applicable	Not Applicable
C	Ground elevation above sea level / Hauteur du sol au-dessus du niveau de la mer	apprx. 1255	apprx. 382.6

List any tall adjacent buildings and structures which may overshadow the proposed structure (Attach sketch)

Faire une liste indiquant les structures et bâtiments avoisinants plus haut que le bâtiment projeté (Inclure un diagramme)

New struc. — Nouv. struc.	Add. to exist. struc. incl. total hght — Ajout à un bâti. exis. incl. hauteur total	Proposed Construction — Date — de construction proposée
[X] Yes / Oui [ ] No / Non	Not Applicable - New Structure	November 2008

TYPE OF STRUCTURE (narrative description and function) — GENRE DE STRUCTURE (description narrative et fonction)

The proposed structure is a power line which will connect Pikangikum First Nation to the provincial grid. This powerline follows the Nungessor Road north for approximately 80 km before leaving the road and angling northwest towards Pikangikum. The proposed hydro poles will be closest to the Red Lake airport where the Nungessor Road intersects the Red Lake Airport Maintenance Road. The shortest distance from the end of the runway centre line to the nearest pole is 1.325 km (see attached drawings). The poles are a designed to carry a 44 kv line and have a maximum height of 75'.

Signature (of applicant) (du requérant)

Date (Y-A-M-D-J) 2008-07-11

TRANSPORT CANADA USE ONLY — À L'USAGE DE TRANSPORTS CANADA

REGIONAL MANAGER TECHNICAL SERVICES (as required) — GESTIONNAIRE RÉGIONAL — SERVICES TECHNIQUES (si nécessaire)
Comments — Commentaires

(Y-A-M-D-J)

Signature — Date

AERONAUTICAL ASSESSMENT — ÉVALUATION

Site acceptable — Emplacement acceptable
[ ] Yes / Oui [ ] No / Non (if no reason) (si non, pourquoi) N/A

This form does not constitute authority for construction.

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JUL 11 2008
AERODROMES AND AIR NAVIGATION

Lighting as per TP382 required — Balisage lumineux tel que demandé au TP382
[ ] Yes / Oui [✓] No / Non or / ou

Painting as per TP382 required — Balisage peint tel que demandé au TP382
[ ] Yes / Oui [✓] No / Non or / ou

Temporary lighting required — Nécessité d'un balisage lumineux temporaire
[ ] Yes / Oui [✓] No / Non (if yes type) (si oui, de quel genre)

Advise Transport Canada in writing 90 days before construction / Avertir Transports Canada par écrit 90 jours avant la construction ▶ [ ] when construction starts / au commencement de la construction [ ] and on completion / et à la fin des travaux [ ] Valid to: / Valide jusqu'au

Regional Supt. Standards and Procedures: / Surintendant régional — Normes et procédures : ▶ Signature

Date (Y-A-M-D-J) 2008.07.21

26-0427 (04-91)

Canada

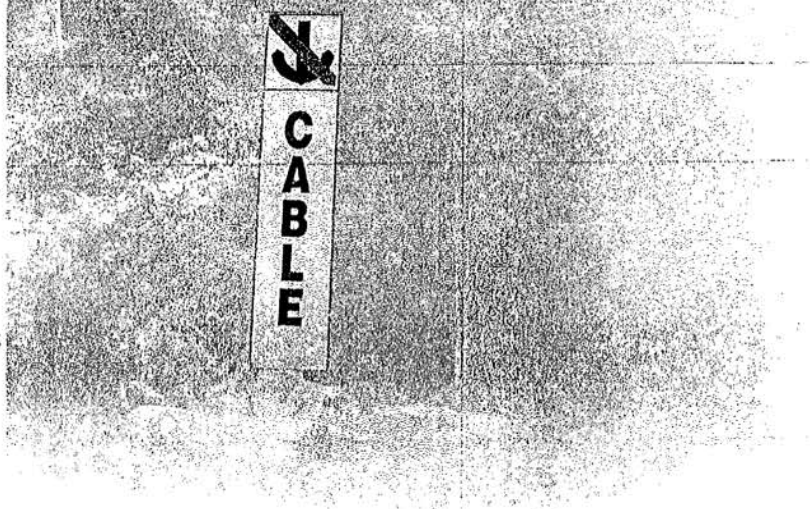
Transport Canada | Transports Canada

The Navigable Waters Protection Act

)UBMARINE CABLES

ıro and Communication)





This brochure outlines the specific standards and criteria under which Transport Canada considers submarine cables (hydro and communication) as a "minor work" and does not require an application under the *Navigable Waters Protection Act* (NWPA).

The NWPA is a federal law designed to protect the public right of navigation. It ensures that works constructed in navigable waterways are reviewed and regulated to minimize the overall impact on navigation.

The Act includes provisions for the removal of unauthorized works or obstructions that render navigation difficult enough to be considered dangerous.

A Minor Work

Historically, many projects pose no threat to the ongoing safety of navigation if positioned and constructed in accordance with specific known standards and criteria. Such projects are considered by Transport Canada as a minor work and, as such, no application under the NWPA is required.

Failure to construct the work in accordance with the standards and criteria identified in this document may result in enforcement action.

When is a submarine cable (hydro and communication) not considered a minor work?

A submarine cable project meeting any of the following criteria and standards **requires** the submission of an application for review and approval under the NWPA:

1. The submarine cable is located on a charted waterway;
2. The submarine cable is located within 10m of any existing dock or boat launch; or
3. The cable is located across the entrance to, including but not limited to, any marina, yacht club or harbour.

192E
5)

Canada

When is a submarine cable (hydro and communication) considered a minor work?

A submarine cable project meeting the following criteria is considered a minor work under this policy and **does not require** an application under the NWPA and the project may proceed:

1. The cable will be laid on the bed of the waterway, resting on the natural contours of the bed between points of entry and exit.

NOTE

Strict adherence to this policy is mandatory. In addition, other situations may arise that prevent the application of this policy to a specific submarine cable project.

You should note that other laws and regulations may be applicable to your submarine cable project.

If you require further information or clarification, please contact the Navigable Waters Protection Program Office in your area or consult Transport Canada's website at: **http://www.tc.gc.ca/marinesafety/oep/nwpp/menu.htm.**



if the works disturbed it.

AERIAL CABLES — POWER AND COMMUNICATION

Class established

5. (1) Aerial cables that consist only of power lines and communication cables, and the associated structures and equipment, are established as a class of works for the purposes of subsection 5.1 (1) of the Act if

(*a*) the width of the navigable waters that the cables are over or across is less than 15 m when measured from the high-water mark on one side to the high-water mark on the other side of the waters;

(*b*) the works meet the design and construction requirements of *Overhead Systems*, CAN/CSA-C22.3 No. 1-06, as amended from time to time;

(*c*) the works are more than 1 000 m from any lake or tidal waters;

(*d*) the works are not over or across charted navigable waters;

(*e*) the works are not over or across a canal that is accessible to the public; and

(*f*) the works do not include towers or poles within the navigable waters, including within the area from the waters' edge to the high-water mark.

Terms and conditions — during construction or placement

(2) The following terms and conditions are imposed during the construction or placement of the works:

(*a*) if the works are over or across a river, a stream, a creek or similar navigable waters, signs stating "Warning – Construction Ahead" and "Attention – Travaux de construction" that are legible from at least 50 m shall be in place 50 m upstream and downstream from the work site;

(*b*) vessels shall be allowed safe access through the work site at all times, and shall be assisted as necessary;

(*c*) any cables intended to be part of the works, and any temporary cables, that do not meet the design and construction requirements of the standard referred to in paragraph (1)(*b*) shall not be left unattended or unsupervised; and

(*d*) any temporarily submerged cables that are not lying on the bed of the navigable waters shall not be left unattended or unsupervised.

Term and condition — maintenance and operation

(3) A term and condition is that the works shall be maintained and operated in accordance with the requirements of the standard referred to in paragraph (1)(*b*).

SUBMARINE CABLES — POWER AND COMMUNICATION

Class established

6. Submarine cables that consist only of power lines and communication cables are established as a class of works for the purposes of subsection 5.1(1) of the Act if

APPENDIX B

Wildlife Species at Risk Assessment

August 2017

WILDLIFE SPECIES AT RISK ASSESSMENT

Pikangikum Distribution Line Project

Submitted to:
Wataynikaneyap Power L.P.

REPORT

Report Number: 1657738

Distribution:

1 e-copy - Wataynikaneyap L.P.
1 e-copy - Ministry of Natural Resources and Forestry
1 e-copy - Golder Associates Ltd.

Golder Associates

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ATTACHMENT A

Woodland Caribou Timing Restrictions Map

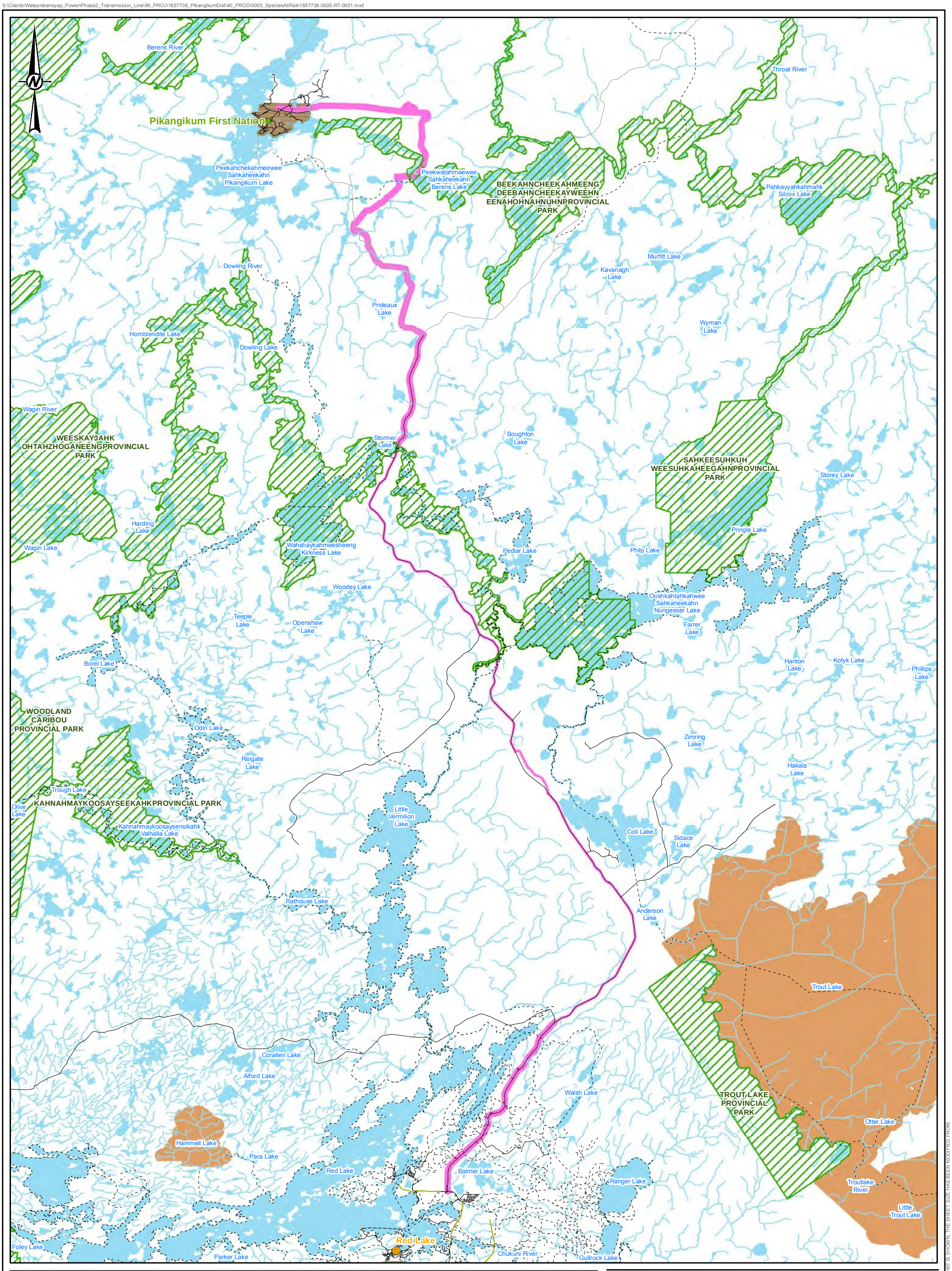
1.0 INTRODUCTION

Wataynikaneyap Power Limited Partnership (Wataynikaneyap) is proposing to construct, operate and maintain a 44 kV and 25 kV distribution line, the Pikangikum Distribution Project (the Project). The Project will provide a distribution connection between Pikangikum First Nation and an existing distribution line at Red Lake. The Project is located in northwestern Ontario (Figure 1). Connection to First Nation remote communities, including Pikangikum First Nation, is identified in Ontario's *Long Term Energy Plan* (LTEP) (Ministry of Energy 2013).

The Pikangikum First Nation successfully completed a federal environmental screening assessment under the previous *Canadian Environmental Assessment Act* (CEAA) (1992); and a screening under the Ministry of Natural Resources and Forestry Class Environmental Assessment Resource Stewardship and Facility Development (RSFD) screening under Category B in 2009. The 2009 federal screening environmental assessment (EA) concluded no significant impacts and received approval under Section 16 of CEAA. The Project has not yet commenced. Wataynikaneyap, as the new Project proponent, has developed a revised Project design, based on engagement results, First Nation community preference and design engineering.

More than five (5) years have elapsed since the Statement of Completion was issued by the Ministry of Natural Resources in August 20, 2009. Therefore, under the MNRF RSFD Class EA there is a requirement to provide an updated Project Description (PD). In addition, the Project crosses provincial parks and dedicated protected areas that were not identified or in force in the 2009 EA. Therefore, the MNRF Class EA Provincial Parks and Conservation Reserves (PPCR) applies and requirements of the PPCR Class EA have been included in this updated PD.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 5 10
1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
GENERAL PROJECT LOCATION

CONSULTANT

YYYY-MM-DD	2017-03-08
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
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As identified in the letters submitted by the MNRF on April 6, 2016 and October 16, 2016, there is a requirement to complete an assessment of effects to Species at Risk (SAR) as there have been several changes to the provincial *Endangered Species Act, 2007* (ESA) since the Statement of Completion was filed in 2009. The terrestrial species or SAR specifically identified by the MNRF to be addressed include:

- Woodland caribou;
- Eastern whip-poor-will;
- Wolverine;
- Bank swallow;
- Little brown myotis; and
- Northern myotis.

The following additional SAR were also assessed:

- Bald eagle;
- Horned grebe;
- Common nighthawk;
- Olive-sided flycatcher; and
- Canada warbler.

The rationale for selection of the criteria is provided in Section 3.2. This document represents a standalone SAR Report for the updated Project. The report includes baseline characterization and effects assessment and mitigation for the above identified SAR criteria.

2.0 PROJECT DETAILS

The Project includes the construction, operation and maintenance of a 44 kV and 25 kV power line that will connect Pikangikum to the provincial power grid. The line will originate from an existing 44kV feeder on the Nungesser Road, approximately 2 km from its intersection with Highway 125, and travel north to Pikangikum First Nation community. Construction is anticipated to begin in August 2017, after acquisition of required permits and approvals; and may take up to 14 months depending on environmental conditions and restrictions, and equipment procurement lead times.

The following main project components will be constructed, operated and maintained:

Power Line and Associated Structures

The power line includes approximately 96.3 km of 44 kV and 17.8 km of 25 kV of overhead single circuit line and associated components. The northern approximately 91 km of the 44 kV portion of the line will be designed and built to be able to operate at 115 kV in the future should separate approvals be obtained for such higher voltage operation. Line structures will be single-pole, double-pole (H-frame), triple-pole (possible at sharp corners, water crossings, or long spans) or a combination. Poles may be wood, metal, concrete, resin, or a concrete-steel hybrid.

Subject to surveying, geotechnical analysis, preliminary design, and a land rights assessment, approximately 32 km of the southern-most section of line is expected to be constructed on single poles in and/or adjacent to the existing Nungesser Road right-of-way (ROW). A significant portion of the power line structures and associated conductors and anchors will be installed within or adjacent to the road ROWs. The limits of work for the power line are identified in Figure 1. Any requirements for poles or anchors outside of the ROW will be appropriately dealt with as they occur in the field during detailed design.

The limits of work were identified taking into account environmental constraints (e.g., known woodland caribou habitat use areas), available traditional land and resource use information and engagement input.

Access Roads

Existing access options are relatively abundant and their utilization will be maximized in the project design as a means of minimizing Project impact. Primary access will be from Nungesser Road, the Pikangikum All Season Road, and any newly cleared portions of all-season roads that are planned to be constructed under the Whitefeather Forest Management Plan. Approved Whitefeather Forest Management Plan all-season roads or clearings will be utilized (if constructed) to access the existing utility clearing on the north side of the Berens River and the proposed substation area. An ice crossing across the Berens River may also be utilized should ice conditions permit. No new access apart from the Project ROW clearing are anticipated to be constructed for the Project.

Substation

A distribution station (substation) is proposed to be located south of the Berens River (Figure 1). The location is proposed to avoid having to transport materials and equipment across the Berens River and/or along the existing utility clearing running east out of Pikangikum First Nation; and therefore reduce environmental effects to the river, the challenge in responding to maintenance needs, and risks to the Project construction schedule. The substation will have an approximately 70 m x 80 m footprint.

Helicopter Landing Pad and Staging Area

A helicopter landing pad and a permanent equipment staging area may be required at the substation location. A helicopter landing pad would have a minimum area of approximately 30 m x 30 m, subject to terrain and vegetation conditions as well as aeronautical approval requirements. In total, the staging area and helicopter pad require approximately 100 m x 100 m of cleared area in addition to the substation fenced area above.

Additional Temporary Project Components

Additional temporary Project components will be required during construction, which will include the following:

- **Aggregate Sources** – subject to geotechnical and engineering analysis, substation foundations and pole foundation backfill may consist of either native soil (if deemed suitable), or contain concrete and/or aggregate. Aggregate will be sourced from either local existing facilities, or will be taken from a new hole dug near the pole foundation hole for the purposes of swapping subgrade with the pole foundation hole. Concrete will likely be sourced from supplier(s) in Red Lake, or will be brought to the site in dry format and mixed in small quantity near each foundation hole using water provided from off-site delivery trucks.

- **Construction Worker Housing** – Construction workers may be housed in existing private accommodations such as the Stormer Lake Camp owned by Pikangikum First Nation, and /or in the Municipality of Red Lake, and/or in Pikangikum First Nation.

  If necessary, temporary accommodations may be established and separately permitted by the selected constructor. Should this be the case, the following activities are assumed:

  - Power source is anticipated to be a portable diesel generating station;
  - Water will be sourced from either off-site delivery trucks or separately permitted local source
  - All liquid and solid waste will be appropriately stored onsite and transported to facilities licensed to dispose of the waste. There will be no discharge of liquid waste from the temporary accommodation unless separately permitted and approved.

  All applicable permits and approvals will be acquired for any temporary accommodation, should it be required.

- **Laydown Areas** – apart from the substation area, temporary laydown areas for the storage of materials and equipment will be located on existing cleared areas within the limits of work, or areas reachable by existing roads originating within the limits of work, with appropriate set back distances from sensitive environmental features.

- **Watercourse Crossing** – It is anticipated that there will not be a requirement for new watercourse crossings for power line construction as the ROW follows existing and planned roads or existing ROW area. If the planned Whitefeather Forest Management Plan roads are not constructed prior to construction timing of the Project, or the Whitefeather Forest Community Resource Management Authority is unable to construct the roads in accordance with their approvals; there may be a requirement for new watercourse crossings. If required, mitigation measures including minimizing removal of bank stabilizing vegetation where possible, will be employed during construction of the watercourse crossings considering MNRF's Environmental Guideline for Access Roads and Water Crossings (1990).

- **Refueling Areas** – refuelling areas will be located in the Municipality of Red Lake, the Pikangikum First Nation community, or other private facility unless separate permits are obtained for a temporary construction camp.

Additional information on project details is provided in Section 5.0 Project Details of the Project Description document.

3.0 EFFECTS ASSESSMENT METHOD

3.1 Overall Approach

The overall approach to the EA includes the following main steps:

- Describing the Project (Section 2.0 above and updated PD Section 5.0);
- Identifying components of the environment (including criteria, assessment endpoints and indicators) that may interact with the Project to focus the assessment, done in engagement with Aboriginal people, government agencies, and other interested parties;
- Defining the spatial and temporal boundaries for the assessment of criteria, and the assessment cases used to evaluate the effects of the Project;
- Describing existing conditions (Base Case);
- Identifying potential Project-environment interactions and screening effects pathways by completing an analysis of Project components and activities and the environment interactions, including consideration of mitigation, to focus those Project environment interactions that could create a net effect (referred to in this report as primary effect pathways);
- Predicting and characterizing net effects from the Project (Project Case);
- Predicting and characterizing cumulative effects from the Project Case in combination with past, present and reasonably foreseeable future activities (Reasonably Foreseeable Development Case [RFD Case]);
- Determining the significance of the net effects of the Project Case and the RFD Case;
- Identifying key factors influencing confidence in effects predictions and how uncertainty is managed so that effects are not underestimated; and
- Identifying monitoring and follow-up to test effects predictions and the effectiveness of mitigation, and address uncertainty.

3.2 Criteria, Assessment Endpoints, and Indicators

Criteria are components of the environment that are considered to have economic, social, biological, conservation, aesthetic and/or ethical value by participants in the public review process (Beanlands and Duinker 1983). The selection of appropriate criteria allows the assessment to be focused on those aspects of the natural and human environment that are of greatest importance to society and which will provide understanding of the significance of the effects of a project. SAR criteria species that were assessed in this report are listed in Table 1.

Table 1: Rationale for Selected SAR Criteria

Criteria	SARO[(a)] Status	COSEWIC[(b)] Status	SARA[(c)] Status	Rationale for Selection
Forest dwelling woodland caribou	Threatened	Threatened	Threatened	■ federally and provincially listed ■ regional connectivity is an issue of concern ■ social/cultural importance ■ relies on large areas of well-connected mature coniferous forest and bog-fen habitats ■ considered an umbrella species to support conservation of other wildlife and regional biodiversity
Wolverine	Threatened	Special Concern	No Status	■ provincially listed ■ social/cultural importance ■ requires large tracts of undisturbed habitat ■ considered an umbrella species to support conservation of other wildlife and regional biodiversity
Little brown myotis	Endangered	Endangered	Endangered	■ provincially and federally listed ■ dependent on standing dead and live trees for maternity roosts in mature deciduous and mixed stands ■ represents a species that requires open forest/edge habitat in wetter areas ■ surrogate for other provincially and federally listed bats (e.g., northern myotis)
Bald eagle	Special Concern	Not at Risk	No Status	■ provincially listed ■ important for continued ecological function of boreal ecosystems ■ social/cultural importance ■ breeding habitat is limited ■ sensitive to noise and human activity during nesting ■ considered a keystone species1

[1] A keystone species is a species that has a disproportionately large effect on its environment relative to its abundance (Paine 1995).

Table 1: Rationale for Selected SAR Criteria

Criteria	SARO[a] Status	COSEWIC[b] Status	SARA[c] Status	Rationale for Selection
Horned grebe	Special Concern	Special Concern	Special Concern	■ federally and provincially listed ■ important for continued ecological function of boreal ecosystems ■ represents a species that requires wetland and open water habitats
Eastern whip-poor-will	Threatened	Threatened	Threatened	■ federally and provincially listed ■ threatened by habitat loss and degradation ■ aerial insectivore that requires open forest/edge habitat in drier deciduous and coniferous habitats
Bank swallow	Threatened	Threatened	No Status	■ provincially listed ■ threatened by habitat loss and degradation and incidental take from aggregate extraction and erosion control projects
Common nighthawk	Special Concern	Threatened	Threatened	■ federally and provincially listed ■ important for continued ecological function of boreal ecosystems ■ aerial insectivore that forages and nests in open habitats
Olive-sided flycatcher	Special Concern	Threatened	Threatened	■ federally and provincially listed species ■ important for continued ecological function of boreal ecosystems ■ aerial insectivore indicator that requires coniferous forest, edges and openings near meadows and ponds
Canada warbler	Special Concern	Special Concern	Special Concern	■ federally and provincially listed ■ important for continued ecological function of boreal ecosystems ■ threatened by habitat loss ■ represents a species that requires coniferous, deciduous, moist mixed forest and regenerating habitats

a) Government of Ontario (2007),
b) COSEWIC (2016),
c) Government of Canada (2002),

Assessment endpoints represent the key properties of each criterion that should be protected. Maintenance of self-sustaining and ecologically effective populations represents the assessment endpoints for the SAR criteria species. Self-sustaining populations are healthy and viable populations, which are by definition robust and capable of withstanding environmental change and accommodating stochastic population processes (Reed et al. 2003). Maintaining viable populations is a conservation target frequently applied by conservation biologists and resource managers (Fahrig 2001; Nicholson et al. 2006; Ruggiero et al. 1994; With and Crist 1995). Achieving and maintaining self-sustaining woodland caribou populations are goals of the Recovery Strategy for Woodland Caribou in Canada (Environment Canada 2012) and Ontario's Woodland Caribou Conservation Plan (MNR 2009a). Similarly, the goal of Ontario's Cervid Ecological Framework is to ensure ecologically sustainable cervid (e.g., caribou and moose) populations and the ecosystems on which they rely, for the cultural and socio-economic benefits of people (MNR 2009b).

Achieving viable populations may not be sufficient to meet conservation objectives for other species or ecosystems that interact with the criteria being assessed (Soulé et al. 2005). For highly interactive SAR criteria that have strong effects on ecosystem structure and function, the concept of ecologically effective populations was applied as an assessment endpoint. An ecologically effective population differs from a self-sustaining population if the number of individuals needed to maintain ecological function is greater than the number required to maintain a viable population for the long term. Self-sustaining populations can also lose ecological function if animal behaviour changes. The application of the concept of self-sustaining and ecologically effective populations to significance determination for the SAR criteria assessment is described in Section 5.3.

Indicators represent attributes of the environment that can be used to characterize changes to criteria and the assessment endpoints in a meaningful way. The indicators for the SAR criteria are defined as follows:

- Habitat availability (i.e., quantity and quality): changes to the amount of different quality habitats (e.g., hectares), and animal use of available habitat.
- Habitat distribution (i.e., arrangement and connectivity): changes to spatial configuration and connectivity of habitats (e.g., linear feature density), and the spatial distribution and movement of animals.
- Survival and reproduction: changes to animal abundance from altering survival and/or recruitment.

Each indicator was assessed quantitatively where sufficient information existed to support a numerical assessment, and qualitatively, where necessary.

3.3 Assessment Cases

Assessment cases are used to analyze and characterize existing conditions, and predict the incremental net effects from the Project and the cumulative effects from past, present and reasonably foreseeable developments (including the Project).

- **Base Case** – This scenario represents existing conditions and characterizes cumulative changes associated with past and present developments. The Base Case includes information from the baseline field studies to better understand the existing physical, biological, and socio-economic conditions that may be influenced by the Project. The Base Case therefore reflects the effects of existing human disturbances, such as forestry, power, mining, transportation, municipal, residential and recreational development, and also natural factors (e.g., fire). The Base Case is used to provide ecological context for the assessment of the Project and

potential reasonably foreseeable developments on SAR criteria; there is no formal assessment of the Base Case.

- **Project Case** – This scenario represents predictions of the existing conditions in the Base Case combined with the effects that may result from the Project. This case is also used to identify incremental changes that are predicted to occur from the Project.
- **Reasonably Foreseeable Development Case (RFD Case)** – This scenario characterizes cumulative effects associated with past and present developments, the Project Case plus additional reasonably foreseeable developments in the region that have not yet been approved or are approved but not yet constructed. Developments and activities that are currently under application review or have officially entered a regulatory application process are considered reasonably foreseeable.

3.4 Assessment Boundaries

3.4.1 Temporal Boundaries

The Project is planned to occur during two phases:

- construction stage: the period from the start of construction to the start of operation (approximately 14 months); and,
- operation stage: encompasses operation and maintenance activities throughout the life of the Project, which is anticipated to be indefinite.

The assessment of the Project on wildlife considers effects that occur during the construction and operation phases. This timeframe is considered sufficient to capture the effects of the Project.

3.4.2 Spatial Boundaries

The wildlife assessment used the following spatial boundaries:

- a baseline study area (used in the description of Base Case only);
- the limits of work, which contains the Project footprint area; and
- a criterion-specific regional study area (RSA).

Baseline field surveys for the Wataynikaneyap Power Phase 2: Connecting 17 Remote First Nation Communities Project, which included the area of the Pikangikum Project, were completed in 2016. Surveys were completed within a 2 km corridor around the proposed corridor alignment (baseline study area).

The precise locations of some Project footprints were unknown at the time of this assessment, such as the power line ROW centreline and the laydown areas. Therefore, for the purposes of the assessment, the Project footprint is defined as the limits of work of a 200 to 500 m corridor, which includes the alignment ROW, distribution station [substation]) and the laydown areas. This limits of work provides flexibility in routing of the ROW and the location of other Project infrastructure during detailed design. Using the limits of work as the Project footprint provides a conservative estimate of Project effects as the limits of work is 4,355 ha and the actual up to 40 m alignment ROW will be approximately 478 ha and the distribution station is anticipated to be approximately 2 ha, which includes a helicopter landing pad and an equipment staging area. No additional clearing, outside of that required for the

alignment ROW are anticipated for the Project. No vegetation clearing is anticipated to be required for new access roads, laydown areas and construction camps (see Section 2 for details).

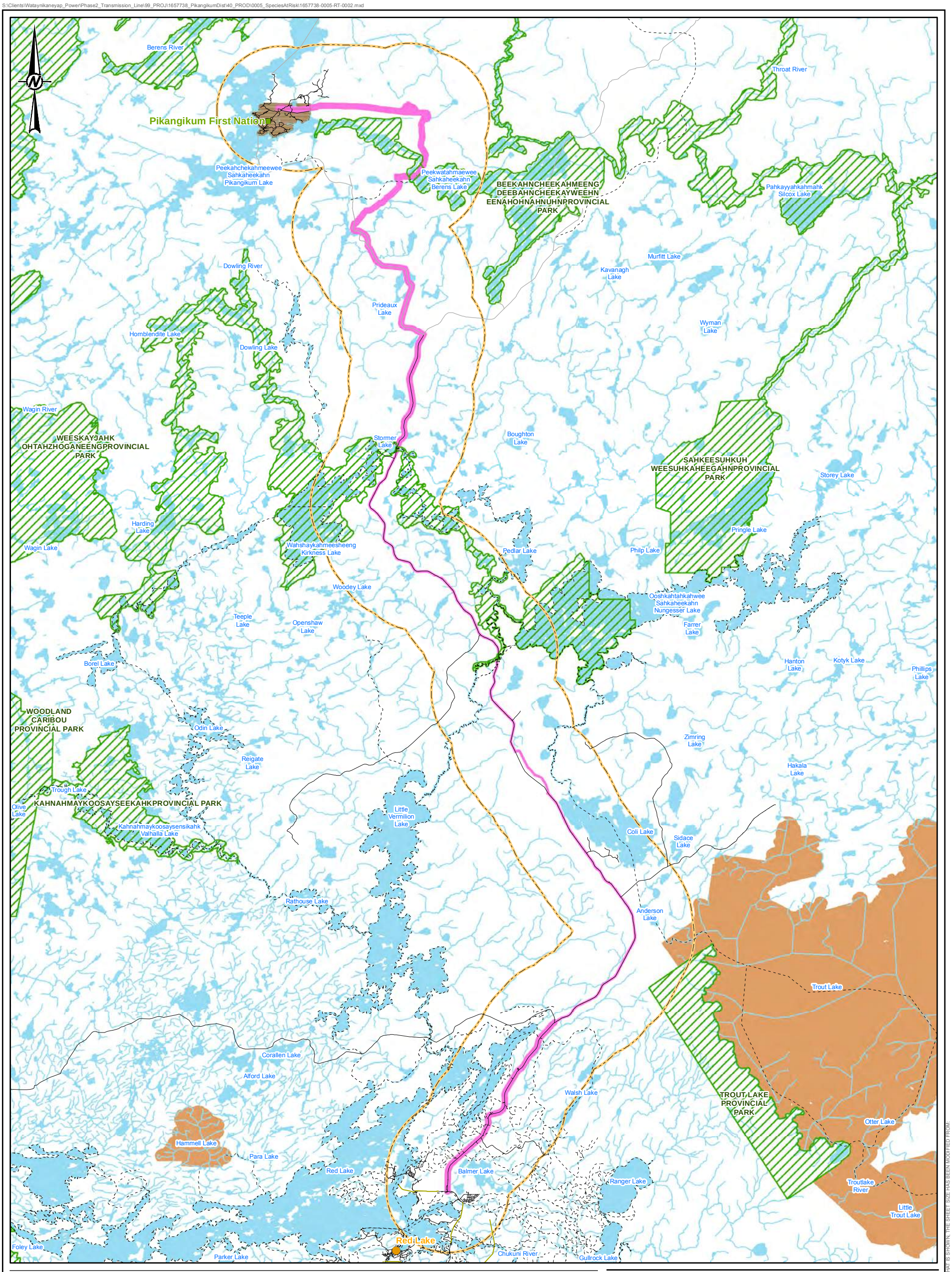
Specific RSAs for SAR criteria or groups of criteria were intended to capture and assess the significance of incremental and cumulative effects from the Project and other previous, existing and reasonably foreseeable developments (RFDs). The RSAs are the scale at which cumulative effects are most appropriately assessed. For caribou, the population can be reasonably defined based on existing data. However, no information is available to delineate the population boundaries for wolverine, little brown myotis, and bird criteria. Due to the length of the Project (approximately 128 km), a number of populations of each of these criteria could be potentially influenced by the Project along the route, and likely have patchy to continuous distributions. Populations intersected by the Project may be discrete or, more likely, exhibit variable connectivity through dispersal and movement.

Without estimates of population boundaries, the analysis of effects on assessment endpoints (self-sustaining and ecologically effective populations) necessarily involves uncertainty, but can still be ecologically appropriate. For SAR criteria with small to moderate breeding home ranges (i.e., all SAR criteria except caribou and wolverine), the RSA was defined by a 5.5 km buffer around the limits of work (Figure 2). The assessment area is anticipated to be large enough to contain important cumulative effects on populations of bat and bird criteria that are distributed inside the assessment area, but probably also extend beyond its boundaries. A recent meta-analysis showed that effects from infrastructure on bird and mammal populations typically extended over distances of up to approximately 1 and 5 km, respectively (Benítez-López et al. 2010).

The forest dwelling woodland caribou RSA, hereafter referred to as the caribou RSA, was defined by the Berens Range (Figure 3). The assessment area is based on provincial range management boundaries and population distribution data, which is ecologically appropriate for determining the significance of cumulative effects from the Project and other developments. A small portion of the Project (approximately 11 km from the Red Lake airport north to the Berens Range) intersects the Sydney Range. However, effects on the Sydney Range are not assessed because the portion of the Project in the Sydney Range is routed along the Nungesser Road. Additionally, there is low probability for caribou occurrence (0.1 to 0.2) in this area (MNRF 2014a). There is also a large amount of historical human disturbance in this area (MNRF 2014a).

Wolverine were assessed at the scale of the caribou RSA (Figure 3). This spatial scale was deemed appropriate because of this species' large home ranges and dispersal distances. Wolverine also depend on caribou carrion as a food source.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

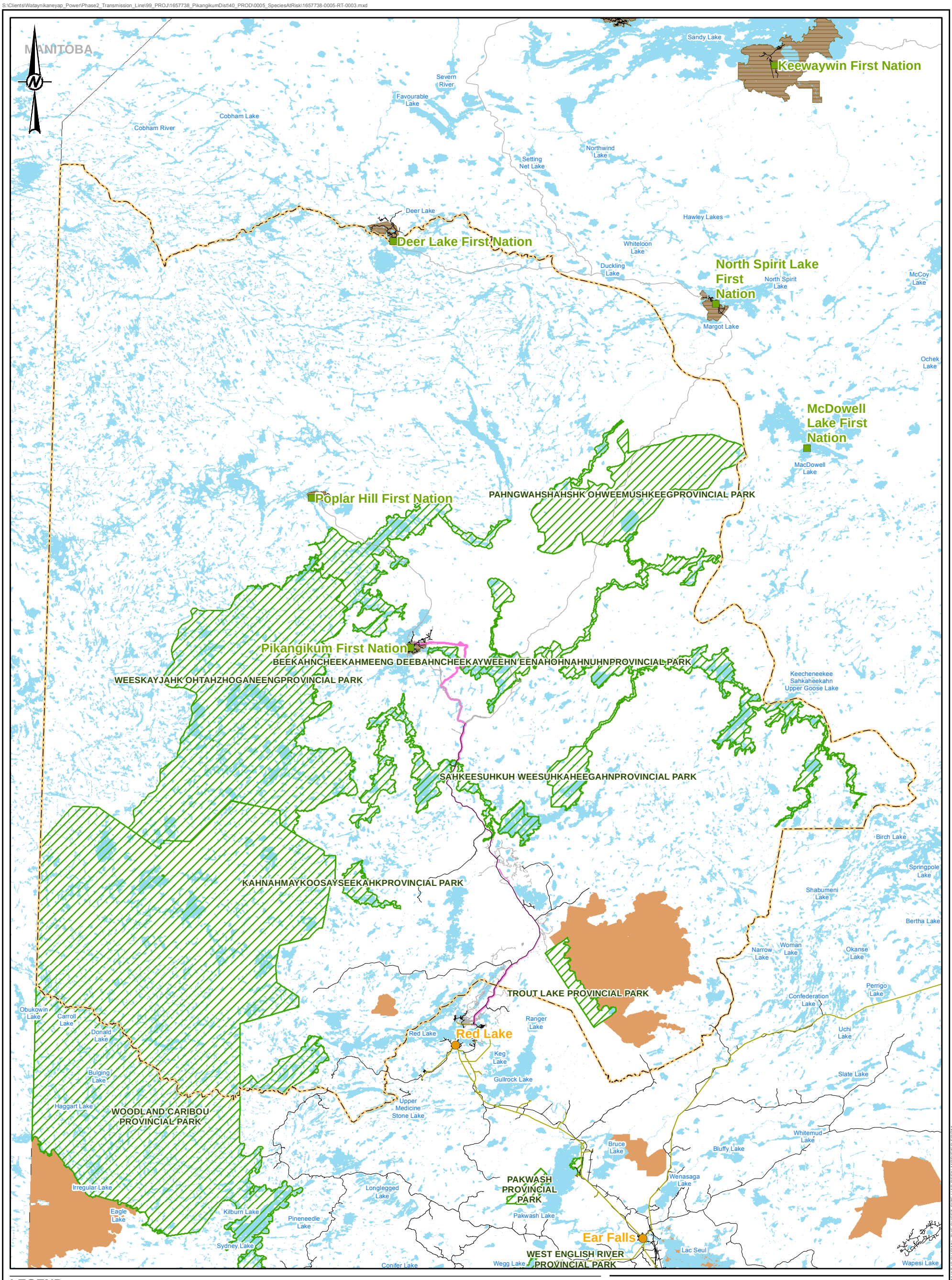
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REGIONAL STUDY AREA FOR BAT AND BIRD CRITERIA

CONSULTANT		
	YYYY-MM-DD	2017-03-08
	DESIGNED	JMC
	PREPARED	JMC/PR
	REVIEWED	LD
	APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Existing Electrical Transmission Line
- Railway
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area

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CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
REGIONAL STUDY AREA FOR WOODLAND CARIBOU AND WOLVERINE

CONSULTANT
Wataynikaneyap Power
Golder Associates

YYYY-MM-DD	2017-03-08
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
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4.0 DESCRIPTION OF THE EXISTING ENVIRONMENT (BASE CASE)

4.1 Methods

4.1.1 Existing Data and Information

Existing conditions were described to provide context for the wildlife assessment. Information used to characterize existing conditions was compiled from the following sources, as available and appropriate for each SAR criteria:

- historic scientific literature and information about SAR and their habitats in the criterion-specific RSAs;
- historic population inventory data to assess current abundance and recent population trends for SAR criteria;
- sensitive species data from the MNRF;
- Whitefeather, Red Lake, and Trout Lake Forest Management Plans (FMPs);
- findings of baseline field surveys for the Wataynikaneyap Phase 2: Connecting 17 Remote First Nation Communities Project;
- current (Base Case) land disturbance (e.g., settled areas, roads etc.); and
- Provincial Land Cover 2000 data.

4.1.2 Field Surveys

Baseline field surveys were completed in the baseline study area in 2016. Particular attention was given to searching for species of conservation concern. Species of conservation concern are defined as those that are either federally or provincially listed as “Special Concern,” “Threatened” or “Endangered”.

Five field surveys included an aerial reconnaissance survey, remote camera surveys, upland breeding bird surveys, waterbird aerial surveys, and nightjar (i.e., eastern whip-poor-will [*Antrostomus vociferus*] and common nighthawk [*Chordeiles minor*]) acoustic surveys. Targeted SAR criteria, number of sampling areas within the Pikangikum Distribution baseline study area and survey dates are provided in Table 2.

Table 2: Wildlife Field Surveys Completed in 2016

Survey Type	Targeted SAR	Number of Sampling Sites/Areas	Date of Completion
Remote camera deployment		9	May 16 to 21, 2016
Upland breeding birds		20	June 6 and 7, 2016
Nightjar surveys		42	June 22 to 24, 2016
Waterbird aerial surveys (raptor stick nests incidentally recorded; remote camera retrieval completed in conjunction)		4	September 13 to 23, 2016
Bat hibernacula survey		37	May 1 to 3, 2017

Remote camera surveys were completed to identify the presence and relative abundance of large mammals. They also provided information about trail use by large mammals. Nine Reconyx PC800 HyperFire Professional Semi-Covert IR cameras were deployed in a 2 km corridor around the centerline of the Project from May 17 to 22, 2016 and retrieved from September 13 to 23, 2016. Cameras were deployed on trails (e.g., wildlife trails, roads, and other linear features) near a pre-selected location. Cameras were placed in all habitat types, but were focused on habitats that are more likely to be used by woodland caribou (i.e., treed bogs and fens). Data were analyzed using the number of photographs of individuals of each species obtained by a camera at a particular location. When multiple photographs of the same individual were taken in succession, that individual was only counted once. Consecutive photographs of the same species were considered different individuals when the time lapse between the photographs exceeded one hour.

Upland breeding bird surveys were completed using point count methods described in the Forest Bird Monitoring Program Survey Instructions (Canadian Wildlife Service 2008). Survey locations consisted of a 50 m radius circular plot with an additional 50 m radius buffer (i.e., 100 m radius was surveyed). Plot centres were established with a minimum separation distance of 250 m in forested habitats and 400 m in open habitats. The surveys began approximately 30 minutes after sunrise (because of safety issues with flying a helicopter in low-light conditions) and ended no later than 10:00 a.m. (Ralph 1993). Two observers each surveyed two plots at each helicopter landing location. The first of the two plots to be surveyed were established a minimum of 300 m from helicopter landing locations. This distance took observers a minimum of ten minutes to walk and this time was considered adequate to allow birds to resume their normal activities after disturbance from the helicopter. At each point count station, the observer waited for two minutes to allow the birds to adjust to the observers' presence. A 10-minute survey period followed, and all species heard or observed within 100 m were recorded. Twenty point count survey plots were completed in 12 broad habitat types, but were focused on habitats that were more likely to support SAR. All breeding bird surveys in the baseline study area were completed on June 6 and 7, 2016.

Biologists completed surveys for listed nightjar species along the southern third of the baseline study area during the full moon period on June 22 and 23, 2016. The surveys followed the Bird Studies Canada (2014) survey guidelines and recommendations outlined in MNRF (2016a). Surveys were three minutes in duration. Survey locations were spaced 1 to 2 km apart from the south end of Nungesser Road at Red Lake north to where Nungesser Road became a winter road as suggested by MNRF (2016a). Approximately 83 km was surveyed along the Nungesser Road using 42 survey sites.

Waterbird surveys were completed to identify important fall migration staging areas and to obtain data on the species occurrence and community composition of waterbirds in the study area. Observers also recorded large concentrations of waterbirds that were incidentally observed in the study area during the surveys. During the surveys, observers recorded transect number, waypoints, waterbody type, waterbird species, and number of individuals. The waterbird fall staging aerial surveys in the 2 km corridor around the Project centerline were completed on September 15, 2016 and surveys were flown between dawn and 4:30 pm. Four wetlands in the baseline study area were surveyed. One preselected lake in the Beekahncheekahmeeng Deebahncheekyaweehn Eenahohnahnuhn Dedicated Protected Area was not surveyed in 2016 because a research permit to complete work in the park was not received at the time of the survey.

Suitable hibernacula habitat for little brown myotis were identified within the limits of work. A Light Detection and Ranging (LiDAR) survey was completed along the limits of work in November 2016. A helicopter equipped with a LiDAR camera collected topography and orthoimagery data within the limits of work. Using the high resolution

orthoimagery, potential suitable habitat for bat hibernacula was identified as rock outcrops that formed a rise or hill, and cliffs. In addition, the Abandoned Mines Information System (AMIS) database was searched for known abandoned mine features, and each record was evaluated to determine if it could be a hibernaculum (i.e., abandoned and underground). Thirty-seven potential hibernacula features were identified from aerial imagery and LiDAR data. A Golder biologist, accompanied for a period by an MNRF biologist, surveyed all 37 features from May 1 to 3, 2017 to determine if the features met the following criteria (from the U.S. Fish and Wildlife Service and Pennsylvania Game Commission's Protocol for Assessing Bat Use of Potential Hibernacula) for exclusion as a candidate hibernacula:

- There is only one horizontal opening, and it is less than 15 cm in diameter, and no or very little airflow is detected.
- The opening is a vertical shaft less than 0.3 m in diameter.
- The opening/passage shows evidence of frequent and/or complete flooding, collapses are completely sealed, for example with fine soil, or the opening/passage is completely sealed or otherwise inaccessible to bats; or
- It is a "new" opening, which has occurred recently (less than 1 year old) due to subsidence.

4.1.3 Habitat Suitability Modelling

4.1.3.1 Woodland Caribou

Habitat categorization for caribou followed that provided in the *General Habitat Description for the Forest-dwelling Woodland Caribou (Rangifer tarandus caribou)* (MNRF 2013b). The MNRF (2013b) classified habitat into three categories:

- **Category 1:** features or areas that have the lowest tolerance to alteration before their function or usefulness is compromised;
- **Category 2:** features or areas that have moderate tolerance to alteration before their function or usefulness is compromised; and,
- **Category 3:** features or areas with the highest tolerance to alteration before their function or usefulness is compromised.

Category 1

Nursery Areas

Nursery areas are defined as generalized features that an individual or a group of adult female caribou select to give birth and raise their calves during spring, summer, and early fall (MNRF 2013b). According to MNRF (2013b) nursery habitat features typically comprise "lakes and wetland complexes dominated by bog and fens, particularly those interspersed with upland islands and peninsulas (Carr et al. 2011)." Nursery areas delineated by the MNRF include female caribou observations between May 1 and September 15. This date range presumably excludes animal observations associated with large individual movements of adult females made prior to calving and those that occur in fall or early winter (MNRF 2013b). Nursery areas were identified using the following three information sources:

- Existing spatial delineations from LIO (LIO 2012).
- Female caribou collar location data (MNRF, unpublished data) from May 1 to September 15 (MNR 2013b). The Kernel Density tool in ArcGIS 10.4 was used to create a density surface of nursery points using pooled location data for all collared individuals. The density surface was created by applying ArcGIS' default search radius algorithm, which considers the mean centre of input points, the distance between mean centre and all points, the median of these distances, and the standard distance (i.e., dispersion of points around mean centre) (ESRI 2017). Nursery area polygons were then delineated using the isopleth representing the 95% utilization distribution as identified using the Geospatial Modelling Environment (GME) platform.
- Calving and nursery area descriptions from the Integrated Range Assessment (IRA) for the Berens Range (MNRF 2014b). Nursery areas identified through the IRA were a qualitative description of geographical areas and typically included whole lakes or wetland complexes. Lakes associated with calving and/or nursery function identified through this literature review were included on habitat maps but their areas were excluded from quantitative habitat metrics due to a high degree of uncertainty associated with the spatial extent that actually supports calving and/or nursery function.

Winter Use Areas

As described in MNRF (2013b), winter use areas typically provide an abundance of ground lichen for winter forage and have lower than average snow depth, which can facilitate easier movement than in surrounding areas. Lichen-rich habitats tend to contain lower amounts of deciduous browse and therefore tend to support lower densities of alternate prey species and predators (MNRF 2013b). Winter use areas may provide refuge from predators. Areas of lower snow depth (e.g., wind-swept areas or dense forest) may be selected more frequently in late winter, depending on the annual snow depth conditions. Individual fidelity to specific winter use areas is typically lower than for nursery areas (Cumming et al. 1996; Ferguson and Elkie 2004; Hazell and Taylor 2011). Winter use areas were identified using the following three information sources:

- Existing spatial delineations from LIO (LIO 2012).
- Caribou collar location data (MNRF, unpublished data) from December 1 to March 31 (MNR 2013b). Similar to nursery areas, the Kernel Density tool in ArcGIS 10.4 was used to create a density surface of winter use points using pooled location data for all collared individuals. The density surface was created by applying ArcGIS' default search radius algorithm (ESRI 2017). Nursery area polygons were then delineated using the isopleth representing the 95% utilization distribution as identified using the GME platform.

- Winter use area descriptions from the Integrated Range Assessment (IRA) for the Berens Range (MNRF 2014b). Winter use areas identified through the IRA were a qualitative description of geographical areas and typically included whole lakes or wetland complexes. As with nursery areas, lakes associated with winter use function identified through the literature review were included on habitat maps but were excluded from quantitative habitat metrics due to a high degree of uncertainty associated with the spatial extent that actually supports winter use function.

Travel Corridors

Travel corridors are the habitat features used by caribou to move between nursery areas and winter use areas in spring and fall (MNRF 2013b). The habitat features of travel corridors are variable and less distinct than other Category 1 habitats. They are typically delineated using telemetry data from collared individuals observed during long-distance movements in April and November.

Travel corridors were described using:

- Caribou collar location data (MNRF, unpublished data) from April and November (MNR 2013b). Locations of collared individuals were connected based on chronology to create movement paths for each individual. Due to the sensitivity of caribou location data (i.e., species at risk), movement paths were converted to a coarse-scale raster format by overlaying a 1 km by 1 km grid and assigning movement function to individual grid cells if a movement path was intersected.
- Existing spatial delineations for “caribou migration routes” from LIO (LIO 2012).
- Travel corridor descriptions from the IRA for the Berens Range (MNRF 2014b).
- Visual inspection of mapped nursery and winter use areas to identify potential movement paths between habitat types.

The spatial extent of known travel corridors were mapped to support a qualitative discussion of movement patterns.

Category 2

Seasonal Ranges

The MNRF (2013b) defines seasonal ranges as “large subrange habitat features that encompass the majority of current caribou distribution during all seasons within the range.” These areas tend to be large tracks of mature conifer dominated forests interspersed with lakes and wetlands. Seasonal ranges are relatively undisturbed and not fragmented, typically do not support high densities of moose, and therefore provide refuge from predators such as wolves and black bears (MNRF 2013b).

Seasonal ranges were mapped conservatively as all areas inside the Berens range, excluding areas of Category 1 habitat and all natural and anthropogenic disturbances.

In areas with no Forest Resource Inventory (FRI) coverage, Category 2 habitat also included Land Cover 2000 classes for “Other (Undefined)” and “Cloud and Shadow”. The spatial extent of the class “Other (Unknown)” covers 47,568 ha (2%) of the Berens Range, which was deemed a considerable amount of potential caribou habitat to exclude due to missing classification. The spatial extent of the “Cloud and Shadow” was limited, covering 8,954 ha (0.3%) of the Berens Range

Category 3

Remaining Areas in the Range

Areas in the Berens Range not identified as Category 1 or 2 habitat were considered Category 3 habitat. These areas generally have the biophysical features and forest composition consistent with seasonal ranges but are currently young or disturbed (MNRF 2013b). Disturbance types considered as Category 3 habitat included natural disturbances (i.e., fires) and temporary anthropogenic disturbances (e.g., cutblocks <36 years). All other disturbances were considered permanent disturbances and were not included as caribou habitat. The spatial extent of blowdown disturbances (i.e., natural disturbance) was not available at the time of report preparation. Consequently, blowdown areas were considered as Category 2 habitat unless GPS collar data indicated that the areas supported Category 1 habitat function.

Range-scale Disturbances

A Base Case disturbance inventory was compiled from available provincial databases, including LIO, Land Cover 2000, and FRI for the Trout River and Red Lake forests. The inventory incorporated anthropogenic disturbances from LIO, the “settlements/infrastructure” land cover class from Land Cover 2000, cut blocks 36 years and younger from FRI, and the “Cuts” land cover type from Land Cover 2000. The inventory also incorporated wildfire disturbances 36 years of age or younger. Fire disturbances were compiled from the provincial wildfire inventory (i.e., LIO) for disturbances since 2000 and from Land Cover 2000 for fires that occurred prior to 2000. Fire disturbances from the provincial inventory were intersected with water land cover classes from Land Cover 2000 to avoid overestimating the spatial extend of burned area.

Using the approach from Environment Canada (2011, 2012) and the MNRF (2014c), a 500 m buffer was applied to all anthropogenic disturbances and no buffer was applied to natural disturbances. The proportion of the Berens Range that is disturbed was then calculated by dividing the area of disturbance by the total area of the range.

Although the disturbance calculation approach applied is similar to that used by the MNRF, there will be small differences between disturbance metrics presented in this EA and those reported by the MNRF in the Integrated Range Assessment for the Berens Range (i.e., MNRF 2014b) due to the use of one different data source. In addition to FRI and Land Cover 2000, the MNRF used 2012 Provincial Satellite Derived Disturbance Mapping to quantify some burns and a relatively small area of cutblocks (MNRF 2014b). The satellite derived data were not available at the time of report preparation. Although the disturbance metrics are not identical, the data in the EA provide ecologically relevant and confident effects predictions across the assessment cases.

4.1.3.2 Wolverine

Wolverines use a wide range of habitat types within their large home ranges, but appear to show a preference for undisturbed areas of coniferous forest (Pasitschniak-Arts and Larivière 1995). Wright and Ernst (2004) reported wolverines in boreal forests in northwestern Alberta preferred mature stands of black spruce or diverse mixed-wood stands with conifers intermixed with dead aspen and poplar for food cache and resting sites. Boles (1977) suggested that wolverines use trees to escape from wolves and so availability of wooded areas may be important for avoiding predation. However, other studies indicate that wolverines do not avoid natural openings and their density may be more closely linked to food accessibility and proximity to humans than to specific habitat attributes (Petersen 1997; Krebs et al. 2007).

Wolverine are sensitive to human disturbance and generally avoid disturbed areas (Banci 1994; Magoun and Copeland 1998: May et al. 2006). Wolverines appear to be most sensitive to disturbance during denning, with reports of adult females moving kits within hours of detecting humans or human disturbance (Magoun and Copeland 1998). Radio-collared wolverines in British Columbia showed avoidance of disturbed areas in occupied habitats (May et al. 2006). Both May et al. (2006) and Krebs et al. (2007) showed that habitat selection by wolverines was negatively influenced by human activity including roads, winter recreation areas, and recently logged landscapes.

As wolverine habitat selection is more closely linked to food accessibility and proximity to humans than to specific habitat attributes, a full HSI model would not be an effective tool for assessing the effects of the Project on this species. Due to the apparent sensitivity of wolverines to human disturbance, a Core Security Model was developed to estimate the amount of habitat that may be affected by disturbance zones of influence (ZOIs), as well as the habitat far enough from development that it can be considered core security habitat. Core security habitat refers to areas where the probability of contact with humans, and the associated risk of mortality, is minimized. Areas outside of ZOIs are classified as moderate to high suitability, areas within ZOIs are classified as low suitability, and disturbed areas are assumed to have no value for wolverines (nil suitability).

There is a lack of literature regarding disturbance ZOIs for wolverine. However, for the prairie and northern region Environment Canada recommends minimum setback distances from various levels of disturbance during the winter denning season (Environment Canada 2009; Table 3). Existing features not associated with noise disturbance (e.g., inactive quarries) were not buffered, as doing so would underestimate the effects of the Project in the Project Case.

Table 3: Zone of Influence Buffers Applied for Various Levels of Disturbance for the Wolverine Core Security Model

Disturbance Type	Feature Type	Zone of Influence Buffer (m)[a]
Rural freeway, 4-lane divided highway	Linear	1000
Rural arterial undivided highway	Linear	1000
Rural collector undivided road, ramp	Linear	1000
Rural local undivided road, street	Linear	500
Rural resource road	Linear	500
Recreation road	Linear	500
Service road	Linear	500
Forestry road	Linear	500
Winter road	Linear	500
Railway	Linear	500
Aggregate site (active)	Polygon	500
Building, cottage, residential site, recreation camp, recreation point	Point[b]	500
Work camp	Point[c]	500
Airport	Polygon	500
Forest processing facility	Point[d]	500
Waste management site	Polygon	500
Dam and barrier	Point[e]	250
Communication/fire towers	Point[f]	250
Trapper cabin	Point[b]	250
Utility site	Point[g]	250
Utility line	Linear	250
Waterpower generation station	Point[h]	250
Tourism establishment area	Polygon	250

a) A buffer was applied to point and polygon features and a corridor was applied to linear features.
b) Point feature was buffered by 5 m, as per mean area of this feature inferred from imagery, to estimate a footprint.
c) Point feature was buffered by 100 m, as per mean area of this feature inferred from imagery, to estimate a footprint.
d) Point feature was buffered by 310 m, as per mean area of this feature inferred from imagery, to estimate a footprint.
e) Point feature was buffered by 50 m, as per mean area of this feature inferred from imagery, to estimate a footprint.
f) Point feature was buffered by 21 m, as per mean area of this feature inferred from imagery, to estimate a footprint.
g) Point feature was buffered by 77 m, as per mean area of this feature inferred from imagery, to estimate a footprint.
h) Point feature was buffered by 37 m, as per mean area of this feature inferred from imagery, to estimate a footprint.

4.1.3.3 Little Brown Myotis

4.1.3.3.1 General Habitat Model

The habitat requirements of the little brown myotis (*Myotis lucifugus*), also known as the little brown bat, vary by season (COSEWIC 2013a). In winter, little brown myotis hibernate in caves or abandoned mines where the open and accessible space extends below the frost line, and above zero temperatures and high humidity are relatively constant throughout the winter. In summer, maternity colonies are formed in trees, rock crevices, buildings, bat houses or under bridges. The trees that this species use are often large, sometimes partly dead (called snags or wildlife trees), features that are generally more abundant in late successional forest (i.e., old growth). Although there is considerable variation in the species of trees in which these bats roost, Lacki et al. (2007) identified little brown myotis most often in large trembling aspen (*Populus tremuloides*), but also in white spruce (*Picea glauca*) and red spruce (*Picea rubra*). Olson and Barclay (2013) found the majority of roosts in trembling aspen or balsam poplar (*Populus balsamifera*).

Myotis species are typically closed canopy specialists (Kalcounis and Brigham 1995; Jung et al. 1999; Morris et al. 2010); however, little brown myotis is more of a generalist than other *Myotis* species (e.g., northern myotis [*Myotis septentrionalis*]). It is tolerant of anthropogenic disturbance, often favouring man-made structures, and prefers to forage over open areas including ponds, rivers, forest gaps, forest edges or along trails and roads (Segers and Broders 2014).

Habitat mapping for this criterion considered both winter (hibernacula) and summer (maternity roosting) habitat. Habitat mapping does not fully capture foraging habitat. Foraging habitat is discussed qualitatively as appropriate. Potential hibernacula were identified as areas of bedrock habitat (due to the possibility that these could have spaces of unknown depth that may be suitable as caves). Critical habitat is the habitat that is necessary for the survival or recovery of the species. The SARA requires that recovery strategies for threatened and endangered species include an identification of the species' critical habitat, to the extent possible. Critical habitat was partially identified for hibernacula in the 2015 draft recovery strategy for little brown myotis (Environmental Canada 2015a). An approximate 50 km² grid was used to identify general geographic areas containing critical habitat. Critical habitat is discussed qualitatively as appropriate.

Potential maternity roosting and winter hibernacula habitat were identified using Land Cover 2000 data. Land cover types that were considered potential suitable (high or moderate quality) bat maternity habitat were dense deciduous forest and dense mixed forest. Exposed bedrock was considered potential suitable winter hibernacula habitat. All other land cover types were assigned nil to low quality habitat for potential maternity roost or winter hibernacula.

4.1.3.3.2 Desktop Characterization of Suitable Summer and Winter Habitat

Suitable summer (maternity roosting) and winter (hibernacula) habitat for little brown myotis was identified within the limits of work (250 to 500 m corridor). A Light Detection and Ranging (LiDAR) survey was completed along the limits of work in November 2016. A helicopter equipped with a LiDAR camera collected topography and aerial imagery within the limits of work. The potential maternity roost habitat was delineated in a GIS platform. Based on the surveyor's best approximation of snag density in mixed and deciduous habitats (maternal roost habitat quality) the following categories were developed:

- **None:** Open areas, clearings or treed habitat where no large deciduous snags were noticed, or these were very sparsely distributed.

- **Low:** Infrequent large deciduous snags present that could be suitable for bat maternity roosts.
- **Moderate:** Snags frequently observed.
- **High:** Extensive mature deciduous trees with visible dead trees and in high density above the forest canopy.

Potential suitable habitat for bat hibernacula was identified as rock outcrops that formed a rise or hill and cliffs using the aerial imagery captured during the aerial survey. In addition, the Abandoned Mines Information System (AMIS) database was searched for known abandoned mine features, and each record was evaluated to determine if it could be a hibernaculum (i.e., abandoned and underground). These potential hibernacula were field surveyed during May 1 to 3, 2017 (Section 4.1.2).

4.1.3.4 Bald Eagle

Bald eagles (*Haliaeetus leucocephalus*) in eastern Canada are short distance migrants that breed in eastern Canada in the summer, and may migrate farther south for the winter (Wright 2016). The Project is located in breeding habitat for the bald eagle, and this habitat is the focus of this assessment. Bald eagles are found near major lakes or rivers (Armstrong 2014), often using perches within approximately 500 m of open water when foraging at or near the surface of the water (Buehler 2000). Shallow water and nearshore emergent vegetation increase the likelihood that live fish prey will be available near the surface (Buehler 2000; Armstrong 2014). Foraging area quality may also be higher in areas without human development and disturbance (Buehler 2000). Bald eagle home range sizes vary from 7 km² in Saskatchewan to 21.6 km² in Oregon (Buehler 2000); assuming circular home ranges, this corresponds to home range radius of 1.5 to 2.6 km.

Bald eagle breeding territories tend to be within 2 km of water near lakes greater than 1,000 ha with more than 11 km of shoreline (Armstrong 2014). Bald eagles nest in mature or old growth forest with some edge, in the largest available trees, typically 20 to 60 m in height (Buehler 2000). In northwestern Ontario, 64% to 74% of nests are in white pine (*Pinus strobus*) and 19% to 24% of nests are in trembling aspen (Armstrong 2014). In Ontario between 1883 and 2013, 80% of bald eagle nests with recorded tree species or tree genera were in: white pine, *Populus* spp., trembling aspen, eastern cottonwood (*Populus deltoides*), *Pinus* spp., American elm (*Ulmus americana*), red oak (*Quercus rubra*), red pine (*Pinus resinosa*), or silver maple (*Acer saccharinum*) (Armstrong 2014). Conifers are preferentially used where they are dominant in the canopy; deciduous trees are used when large conifers are absent (Buehler 2000). While bald eagles have clear nest tree preferences, they are also flexible in nest site selection (Grier and Gunn 2003).

Suitable (high or moderate quality) bald eagle nesting habitat in the RSA was mapped with Land Cover 2000 classes of dense deciduous, dense coniferous, and dense mixed forest within 2.6 km of major waterbodies (i.e., greater than 1,000 ha), and stream order 7 or higher watercourses using the Strahler method in the MNRF waterbody dataset.

4.1.3.5 Eastern Whip-Poor-Will

Eastern whip-poor-wills (*Caprimulgus vociferus*) breed in semi-open or patchy forests; wide open spaces and dense forests are avoided (COSEWIC 2009). Forest structure seems to be more important than forest composition, but whip-poor-will are found in dry deciduous or mixed-wood forests throughout most of the species' range (Cink 2002). Whip-poor-wills are also commonly found in rock or sand barrens with scattered trees, old burns, other disturbed sites with early forest succession, and pine plantations (Cink 2002; COSEWIC 2009). This species prefers even-aged successional habitats and is uncommon in mature forests, although individuals may use openings in mature forest areas (Bushman and Therres 1988; Government of Ontario 2015a). Nests require tree cover, shade, and sparse ground cover, and need to be in close proximity to open areas used for foraging (MNR 2013a). Transmission line ROWs and road corridors may provide suitable foraging habitat for this species (COSEWIC 2009).

The following Land Cover 2000 habitats were determined to be suitable for whip-poor-will:

- bedrock;
- sparse forest;
- forest depletion – cuts;
- forest depletion – burns; and
- edge areas: 50 m into dense coniferous, dense deciduous, and dense mixed forest land cover classes that border one or more of the following:
  - water;
  - bedrock;
  - sparse forest;
  - forest depletion – cuts; and
  - forest depletion – burns.

4.1.3.6 Common Nighthawk

Common nighthawks (*Chordeiles minor*) breed in open habitats, such as recently logged and burned areas, open forests, open bogs and fens, and rock barrens (COSEWIC 2007a; Brigham et al. 2011). Nesting areas are chosen in association with large trees for roosting and vegetation for the production of flying insect prey (Brigham et al. 2011). This species avoids areas of dense, intact forest (Brigham et al. 2011).

The following Land Cover 2000 habitats were determined to be suitable (high or moderate quality) for common nighthawk:

- bedrock;
- sparse forest;
- forest depletion – cuts;
- forest depletion – burns;

- forest regenerating depletion; and
- edge areas: 50 m into dense coniferous, dense deciduous, and dense mixed forest land cover classes that border one or more of the following:
  - water;
  - bedrock;
  - sparse forest;
  - forest depletion – cuts;
  - forest depletion – burns; and
  - forest regenerating depletion.

4.1.3.7 Olive-sided Flycatcher

Olive-sided flycatchers (*Contopus cooperi*) breed in forested areas in Canada and parts of the United States and overwinter in central and south America. The Project is located in breeding habitat for this species, which is, therefore, the focus of this assessment. Olive-sided flycatchers prefer tall trees and snags adjacent to open areas, which provide individuals with perches from which to hunt flying insects. Olive-sided flycatchers nest in forested stands but, because of their foraging behaviour, are associated with high contrast habitats including burned forests, logged areas, and natural forest openings such as gaps within old growth forest stands, as well as meadows, rivers, and wetlands adjacent to forested habitat (COSEWIC 2007b; Altman and Sallabanks 2012). As a result, their abundance is correlated with landscapes containing fragmented late seral stage forest with high-contrast edges, mature trees and large numbers of dead trees (McGarigal and McComb 1995; Altman and Sallabanks 2012). In Ontario, olive-sided flycatchers commonly nest in conifers such as white and black spruce, jack pine and balsam fir (Government of Ontario 2015b).

The following Land Cover 2000 habitats were determined to be suitable for olive-sided flycatcher:

- dense coniferous forest;
- dense mixed forest;
- treed bog;
- treed fen; and
- edge areas: 50 m into coniferous or mixed forest that is adjacent to the following:
  - water;
  - treed fen;
  - open fen;
  - treed bog;
  - open bog;
  - forest depletion – cuts; and
  - forest depletion – burns.

4.1.3.8 Canada Warbler

Throughout their range, Canada warblers (*Cardellina canadensis*) nest in a range of usually wet, forest types, with a well-developed, dense shrub layer (COSEWIC 2008; Environment Canada 2016a). This species is commonly found in shrub marshes, swamps dominated by black spruce (*Picea mariana*) and tamarack (*Larix laricina*), and riparian woodlands (COSEWIC 2008). In the eastern portion of their range, which includes the RSA, Canada warblers are associated with wet mixedwood forests and early successional forests (6 to 30 years) created by forest harvesting or natural disturbance (Ball and Bayne 2014; Environment Canada 2016a).

The following Land Cover 2000 habitats were determined to be suitable (high or moderate quality) for Canada warbler:

- dense mixed forest;
- treed bog;
- treed fen;
- regenerating depletion forest;
- forest depletion – cuts;
- forest depletion – burns; and
- riparian areas: all land cover types (except mine tailings and bedrock) within 60 m from a watercourse edge for stream orders greater than 5 and all land cover types (except mine tailings and bedrock) within 30 m of the watercourse edge for stream orders less than 5.

4.2 Results

4.2.1 Woodland Caribou

4.2.1.1 Habitat Availability

As described in Section 2.4.2, the caribou RSA is the Berens Range. At large spatial scales such as the RSA, woodland caribou habitat typically includes large undisturbed areas of mature coniferous forest dominated by jack pine and/or black spruce (MNR 2013a). Caribou use habitat at multiple spatial and temporal scales and refuge from predation is considered to be a key driver of habitat selection across scales (Bergerud 1974; Rettie and Messier 2000; Racey and Arsenault 2007; Environment Canada 2012; MNRF 2013b).

The highest concentrations of year-round caribou activity occur in the southern portion of the range from Woodland Caribou Provincial Park to the eastern range boundary near Upper Goose Lake (MNRF 2014b). One woodland caribou was recorded on a remote camera in dense coniferous forest near Naylor Lake during baseline surveys in 2016.

Nursery Areas

In the RSA, calving and nursery functions are provided primarily by large lakes with islands and complex shorelines or by large peatland complexes (MNRF 2014b) (Figure 4). Potential and confirmed nursery areas (i.e., Category 1 habitat) are located on the Nungesser, Trout, Stout, Trough, Cherrington, Cairns, Roderick, Mamakwash, Goose, McInnes and Valhalla lakes (MNRF 2014b). In particular, Stout Lake and the islands of Trout Lake and Nungesser Lake are recognized as regionally significant nursery areas (MNRF 2014b). The peatland complexes around Sampson and Matchett lakes are also thought to be regionally significant because they support year-round use by caribou (MNRF 2014b).

Winter Use Areas

The Valhalla-Bigshell-Woody Lake areas represent the largest and most concentrated areas of caribou occurrence in winter (MNRF 2014b). As previously described, the regionally important Sampson and Matchett Lake peatland complexes support year-round caribou use. Other known winter use areas include the northern portion of Woodland Caribou Provincial Park and the area between Trout Lake and Mamakwash Lake (MNRF 2014b).

Seasonal Ranges

Seasonal ranges represent the most common habitat type in the Berens Range (Figure 4). Using habitat mapping methods described in Section 4.1.3.1, 318,007 ha of nursery areas, 289,206 ha of winter use areas, and 366,082 ha of overlapping nursery and winter use areas are available in the RSA at Base Case (Table 4; Figure 4). Nursery areas account for 24.4% of the Berens range while winter use areas cover 23.4% of the range (note: 13.1% of the RSA functions as both nursery and winter use areas; Table 4). Approximately 1,497,116 ha (53.4%) Category 2 habitat (seasonal ranges) and 328,716 ha (11.7%) of Category 3 habitat (remaining habitat areas in range) are available in the RSA at Base Case (Table 4; Figure 4).

Table 4: Woodland Caribou Habitat Availability in the Regional Study Area at Base Case

Habitat Category[a]	Regional Study Area	
	Area (ha)	Percent (%)
Category 1 (nursery areas)	318,007	11.3
Category 1 (winter use areas)	289,206	10.3
Category 1 (overlapping nursery areas and winter use areas	366,082	13.1
Category 2 (seasonal ranges)	1,497,116	53.4
Category 3 (remaining areas in the range)	328,716	11.7
Permanent disturbance [b]	2,787	0.1

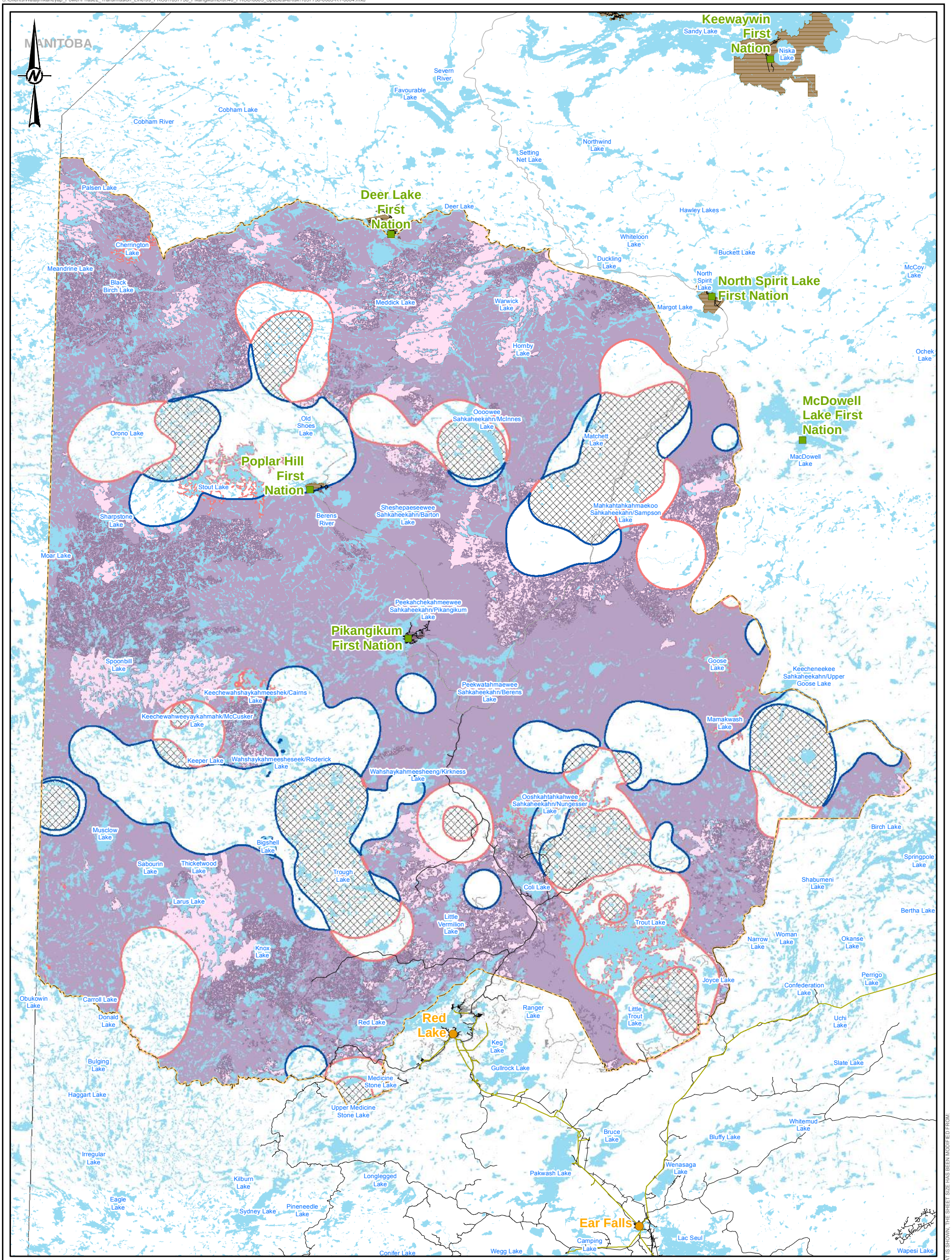
a) Habitat categories as described in MNRF (2013b).

b) As described in Section 4.1.3.1 mapping for Category 1 habitat was based on caribou location data and habitat polygons delineated by the MNRF, which did not exclude disturbances because of demonstrated use by caribou. The permanent disturbance category therefore does not represent a complete inventory of permanent anthropogenic disturbances in the Berens Range.

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values. Caribou habitat mapping was completed using raster file formats, which may introduce small differences in reported areas as compared to other SAR criteria that were completed using vector format files.

ha = hectare; = not applicable.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Existing Electrical Transmission Line
- Railway
- First Nation Reserve Land
- Waterbody
- Regional Study Area
- Category 1 - Nursery Areas
- Category 1 - Lakes Supporting Nursery Function (MNRF 2014b)
- Category 1 - Winter Use Area
- Category 1 - Lakes Supporting Winter Use Function (MNRF 2014b)
- Category 1 - Overlapping Nursery and Winter Use Areas
- Category 2 - Seasonal Ranges
- Category 3 - Remaining Areas in the Range
- Base Case Disturbance

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 20 40
1:800,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
WOODLAND CARIBOU HABITAT IN THE REGIONAL STUDY AREA AT BASE CASE

CONSULTANT
Wataynikaneyap Power
Golder Associates

YYYY-MM-DD	2017-03-22
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	4

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Disturbance Footprint

Prior to European settlement and development, the availability of habitat in the Berens range was affected primarily by an aggressive fire regime (MNRF 2014b). During this time period, the Nishnabe people created small-scale disturbances such as planting and tending medicinal plants and controlled some vegetation communities using fire. The current availability of habitat likely represents a decline in suitable habitat relative to what was historically available for this species, as large-scale development activities have influenced the amount and quality of habitat since the late 1890s when the community of Pikangikum was established (MNRF 2014b). Mining and mineral exploration have been ongoing around the Red Lake area since 1926, and horse logging began in 1930 (MNRF 2014b). Hunting and fishing lodges were established in the mid-1900s, and the expansion of logging operations was supported by the construction of new roads (MNRF 2014b).

Previously, small low intensity fires were likely common across the RSA; however, larger less frequent high intensity fires likely have had more of an influence to the structure of the landscape than small fires. Fire suppression over the last 60 years has prolonged the forest fire return cycle leading to changes in the average age of the forest. Before fire suppression, the boreal forest complex of northwestern Ontario was approximately 30 years younger than it was during the 1970s (based on comparisons from Pikangikum to Pickle Lake between 1915 and 1974) (Carleton 2001). Climate change may also exacerbate this scenario because longer summers favour the persistence of broad-leaved species and limits invasion by conifers (Carleton 2001).

At Base Case, existing disturbances in the RSA include forestry, fire, linear infrastructure (e.g., roads, transmission lines and rail lines), mining, and communities. The primary disturbance in the RSA is fire (MNRF 2014b). Linear features (roads and trails) and forestry are dominant anthropogenic disturbances, both of which are concentrated in the southern portion of the RSA (MNRF 2014b). In addition to direct loss of habitat over the past 130 years, caribou have been affected by indirect habitat loss. That is, caribou may respond negatively to anthropogenic disturbance by avoiding areas of otherwise suitable habitat because of its proximity to disturbance (Weclaw and Hudson 2004), which therefore reduces the amount of functional habitat available within the range. Avoidance may vary by type and intensity of disturbance (CPAWS Wildlands League 2013), season (Dyer et al. 2001, 2002; Eftestøl et al. 2016; Polfus et al. 2011), and can occur at multiple spatial scales (Apps et al. 2006; Leblond et al. 2011; Rettie and Messier 2001). In a literature review, Vistnes and Nellemann (2008) found that caribou and reindeer (*Rangifer tarandus*; a subspecies of caribou that occurs in Europe) reduced their use of areas within approximately 5 km of disturbances by 50% to 95%. Some studies suggest that caribou avoid areas of high disturbance density. In particular, caribou are thought to avoid areas of high road density (Apps et al. 2006; Faille et al. 2010; Nellemann and Cameron 1998; Pinard et al. 2012). Zones of influence identified around different disturbance types are summarized in Table 5.

Table 5: Reported Zones of Influence for Caribou

Location	Disturbance Type	Zone of Influence	Source
British Columbia	Urban development	3 to 9 km (magnitude of avoidance was season-specific)	Polfus et al. 2011
British Columbia	Mine	up to 2 km (2 km in summer; negligible in winter)	Polfus et al. 2011
British Columbia	Cabins and camps	up to 1.5 km (1.5 km in summer; negligible in winter)	Polfus et al. 2011
Norway	Ski resorts and cabins	15 km	Nellemann et al. 2010
British Columbia	Oil and gas	4.25 km	Johnson et al. 2015
British Columbia	Mines	3.0 km	Johnson et al. 2015
Alberta	Oil and gas wells	1.0 km	Dyer et al. 2001
Alberta	Cutblocks	1.2 km	Smith et al. 2000
Quebec	Cutblocks	0.7 to 3.4 km	Courtois et al. 2008
British Columbia	Cutblocks	5.5 km	Johnson et al. 2015
Quebec	Roads	1.25 km from active roads 0.75 km from derelict roads	Leblond et al. 2011
Alberta	Roads and seismic lines	250 m	Dyer et al. 2001
British Columbia	Various linear	1.75 km from roads 2.5 km from pipelines 2.5 km from seismic lines	Johnson et al. 2015
Northern Canada	Seismic lines	400 m	Nagy 2011
Quebec	Highway	5 km	Leblond et al. 2013
British Columbia	Roads	2 km from high use roads 1 km for low use roads	Polfus et al. 2011
Norway	Transmission line	6 km during calving 3.5 km during summer and fall negligible after construction	Eftestøl et al. 2016

km = kilometre.

At Base Case, the MNRF estimates that as of 2012, 28.7% of the RSA is disturbed, with natural and human disturbances accounting for 19.4% and 9.3%, respectively (MNRF 2014b). These estimates include the application of a 500 m buffer around all anthropogenic disturbances. The proportion of disturbance in the Berens Range calculated by Wataynikaneyap for this EA is 26.0%, which is similar to the value estimated by the MNRF. The area within the limits of work is currently 74.9% disturbed.

4.2.1.2 Habitat Distribution

As described in Section 4.2.1.1, calving and nursery areas in the Berens Range occur on Trout, Nungesser, Cairns, Roderick, Stout, Cherrington, Mamakwash, Goose, and McInnes lakes as well as the Sampson and Matchett lakes peatland complexes (MNRF 2014b). Additional nursery areas occur around Wavell Lake (i.e., the easternmost nursery polygon, Figure 4), the lake complexes south of Trout Lake, lake/wetland complexes in and around Woodland Caribou Provincial Park, around Gammon Lake, and around Medicine Stone Lake (Figure 4). The distribution of winter use areas is similar to that of nursery areas, with larger habitat patches occurring in Woodland Caribou Provincial Park and extending eastwards outside the park, around Stout Lake, and around Sampson Lake (Figure 4). Overall, nursery areas and winter use areas are relatively well distributed across the RSA, though there is a notable absence of these habitats across the central portion of the Berens Range. Category 2 habitat is well distributed across the Berens Range (Figure 4).

Travel corridors (i.e., Category 1 habitat) are used to travel between nursery areas and winter use areas in the spring and fall (MNR 2013b). Identified travel corridors (Figure 5) occur in the following areas:

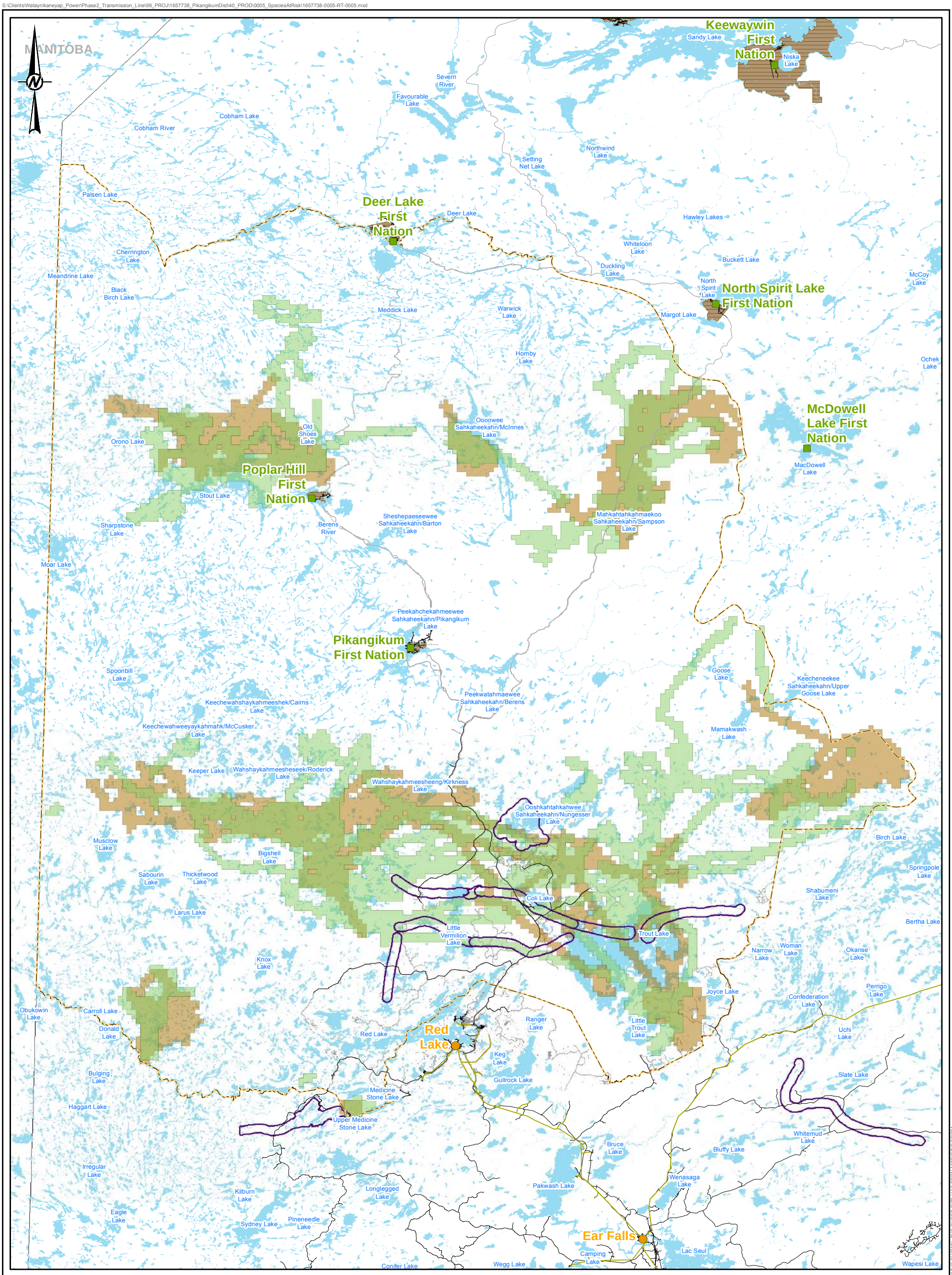
- around Stout Lake;
- around Sampson Lake;
- between the Sampson Lake area and McInnes Lake;
- between the Trout Lake area and the lake/wetland complexes of Woodland Caribou Provincial Park;
- around Nungesser Lake;
- between the Trout Lake area and Wavell Lake area;
- around Gammon Lake; and
- around Medicine Stone Lake.

The areas between key nursery and winter use areas (i.e., Trout Lake and Nungesser Lake, Sampson Lake and Matchett Lake, and the Valhalla-Bigshell-Woody Lake areas) are presumably of great importance for the maintenance of habitat connectivity in the Berens Range (MNRF 2014b) and likely function as travel corridors. There appears to be an important east-west movement corridor from wintering areas in the northeast corner of Woodland Caribou Provincial Park and around Valhalla Lake, across the Nungesser Road, to summering areas near Nungesser and Trout lakes (MNRF 2014b). High use areas (travel corridors, nursery and winter use areas) have not been identified in the central portion of the Berens Range (Figures 4 and 5), which suggests limited north-south movement across the RSA at Base Case.

The Berens Range is considered to function as one large range with the Atikaki-Berens Range in Manitoba (MNRF 2014b), highlighting the importance of regional connectivity. There is some level of connectivity between the Berens and Atikaki-Berens populations. Evidence from collared cows suggests that caribou from the Atikaki-Berens Range enter and stay in the Berens Range for more than a year before returning to Manitoba (MNRF 2014b). An important connectivity linkage between the Atikaki-Berens and Berens ranges appears to be present near Aikens Lake (MNRF 2014b). It is thought that movement between the Berens Range and Sydney Range is limited because of the large band of mixedwood forest that is present along the Gammon and Bloodvein rivers (MNRF 2014b). Data from collared caribou suggests some connectivity with the Sydney Range around Medicine Stone Lake (Figure 5).

The distribution of existing disturbances is believed to influence caribou movement at Base Case. The arrangement of winter and refuge habitat in the Berens Range is below the simulated range of natural variability (SRNV), suggesting that the landscape is fragmented relative to modeled estimates of the natural landscape (MNRF 2014b). The south-central portion of the range is considered to be highly disturbed by human infrastructure and development, such as industrial sites, mineral exploration, linear infrastructure and forest harvesting (MNRF 2014b). The remainder of the Berens Range is largely devoid of anthropogenic disturbance, with the exception of the First Nations communities of Pikangikum and Poplar Hill located in the north-central portion of the range. The southern portion of the Berens Range therefore has experienced the greatest impacts to habitat connectivity. Caribou movement patterns in the RSA are thought to be primarily east-west (MNRF 2014b). Existing linear infrastructure is predominantly oriented in a north-south orientation, presumably affecting some east-west movement.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Existing Electrical Transmission Line
- Railway
- First Nation Reserve Land
- Waterbody
- Regional Study Area
- Category 1 - Travel Corridor (MNRF)
- Category 1 - Spring Travel Corridor
- Category 1 - Fall Travel Corridor
- Base Case Disturbance

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 20 40
Kilometers
1:800,000

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
WOODLAND CARIBOU TRAVEL CORRIDORS IN THE REGIONAL STUDY AREA AT BASE CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
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4.2.1.3 Survival and Reproduction

The woodland caribou, boreal population, is listed as threatened on the provincial ESA, and as threatened and on Schedule 1 of the federal SARA due to interacting factors (primarily habitat loss and predation), which have resulted in population declines throughout their distribution.

Caribou survival and reproduction are related to the availability of suitable habitats that support life history processes. For example, the reproductive success of females and survival of calves are negatively affected if calving and post-calving habitats (i.e., Category 1 nursery areas) are unavailable, inadequate, or degraded (Thomas and Gray 2002; McCarthy et al. 2011; Environment Canada 2012; Pinard et al. 2012). Habitat suitability is strongly influenced by the habitat's capacity to provide refuge from predation (Bergerud 1974; Rettie and Messier 2000; Racey and Arsenault 2007; Environment Canada 2012; MNRF 2013b; Hornseth and Rempel 2015). Caribou spatially separate themselves from predators and alternate prey (e.g., moose [*Alces alces*] and white-tailed deer [*Odocoileus virginianus*]) as an anti-predator strategy, and maintain low population densities across their range (Bergerud, 1988, 1996; Johnson et al. 2001; Environment Canada 2008, 2012). Large continuous tracts of undisturbed habitat are therefore important to maintaining self-sustaining caribou populations. Nagy (2011) found a positive correlation between population growth rates and access to secure unburned habitat, particularly where most of the habitat was in patches greater than 500 km².

Predation, primarily by wolves, is considered to be the main factor limiting woodland caribou populations (Bergerud 1986; Seip 1992; Stuart Smith et al. 1997; James 1999; James and Stuart Smith 2000), and increased predation by wolves and possibly other predators is facilitated by underlying landscape changes through apparent competition (Holt 1977). In the case of caribou, apparent competition is manifested when a growing number of prey such as moose and white-tailed deer causes an increase in the number of predators, such as wolves, thereby increasing predation pressure. Although the proximate cause of caribou decline is predation, the ultimate cause of caribou decline is linked to a change in habitat (Boutin et al. 2012) because landscape alterations caused by natural and anthropogenic disturbances create early seral habitats suitable for moose and white-tailed deer (Latham 2009; Latham et al. 2011; Serrouya et al. 2011). Seral stage is the point along an ecological succession in an ecosystem advancing towards its climax community.

Caribou are sensitive to changes in predation rate because they have a low reproductive capacity relative to other ungulates (Environment Canada 2012). Females typically do not reproduce until three years of age and give birth to one calf per year (Bergerud 2000). Calf mortality due to predation can be especially high, particularly within the first 30 days after birth (Bergerud and Elliot 1986; Gustine et al. 2006). In many declining caribou populations, the proportion of calves that survive to one year of age is usually low and insufficient to compensate for annual adult mortality (Bergerud 1974; Stuart-Smith et al. 1997; DeMars et al. 2011). In 2013, the calf recruitment estimate for the Berens Range was 23.9 calves per 100 adult females; this is lower than the identified threshold of 28.9 calves per 100 adult females for maintaining a stable population (Environment Canada 2008, 2011; MNRF 2014b).

Bergerud and Elliot (1986) suggested that caribou populations cannot remain stable when moose densities are sufficient to support more than 6.5 wolves per 1,000 km². Moose densities of approximately 0.11 moose per km² are likely to support such wolf densities (Bergerud and Elliot 1986). The boundaries of WMUs 1C, 2, and 3 overlap the Berens Range. Moose density is 0.09 moose/km^2 in WMU 1C (MNRF 2014c). Moose density in WMUs 2 is 0.17 moose per km^2 and WMU 3 has a density of 0.22 moose per km^2 (MNRF 2014d,e).

Local and regional-scale disturbance patterns can influence caribou survival and reproductive success. Linear features (e.g., roads, pipelines, transmission lines, trails) may adversely affect caribou survival (DeCesare et al. 2012; James and Stuart-Smith 2000; Whittington et al. 2011). Linear features have been associated with increased predator mobility, leading to a greater risk of predation for caribou when on or near these features (James 1999; Whittington et al. 2011). Leclerc et al. (2014) found that the probability of calf loss was related to the avoidance of high density road areas; females whose calves survived demonstrated stronger avoidance of these areas.

Courtois et al. (2007) suggested that mortality increased with the extent of disturbed landscape within caribou home ranges because animals were vulnerable to predation. As the proportion of disturbance increases, it becomes more difficult for caribou to space out from predators and alternate prey. In Alberta and British Columbia, Peters et al. (2013) found a positive relationship between the amount of human-induced disturbance and the degree of spatial overlap of caribou and moose. Caribou mortalities were located in areas of high resource use by moose in summer (Peters et al. 2013). Using data from caribou populations across Canada, Environment Canada (2008, 2011) conducted a meta-analysis that quantified a negative relation between recruitment (i.e., calf to cow ratios) and total disturbance (including natural and anthropogenic) within a range. Furthermore, Environment Canada (2011) indicated that the probability of a population remaining stable or undergoing growth is directly influenced by the amount of disturbance within that range, meaning that the likelihood of population persistence decreases as the amount of disturbance increases.

Fragmentation effects that restrict caribou movement can also negatively influence the survival and reproduction. For wide-ranging species that need broad areas for their life history requirements, such as caribou, restricted movement and therefore restricted access to resources within a range can increase extinction probability and reduce lifetime reproductive success (McLoughlin et al. 2007; Revilla et al. 2008). Similarly, in many caribou subpopulations, reduced movements have been associated with fragmented populations and subsequent genetic drift (Serrouya et al. 2012).

Sensory disturbance may affect caribou through physiological stress; however, these effects are difficult to quantify (Dantzer et al. 2014). In general, sensory disturbance is most detrimental at key times of the year, such as late-winter periods, when animals tend to be in poor physical condition, and during the reproductive season (spring/early summer) when caribou are raising young (Kuck et al. 1985; Yarmoloy et al. 1988; Wolfe et al. 2000; Eftestøl et al. 2016). Using simulated seismic exploration noise in northeast Alberta (i.e., propane cannons fired every 1 to 2 minutes for one hour with a magnitude of 90 to 110 dB), Bradshaw et al. (1997) found that disturbed caribou moved notably faster and crossed habitat boundaries (i.e., habitat patches) substantially more often than undisturbed caribou. Similarly, Murphy and Curatolo (1986) determined that caribou near oilfield infrastructure (pipelines and roads) in Alaska spent less time lying down, more time running and had higher movement rates than caribou located away from these disturbances. Although these effects may seem minor, displacement and increased wariness may affect energetic expenditures and survival, particularly for young calves.

At Base Case, the Berens population has a minimum animal count of 237 and a corresponding population estimate that is likely above 500 individuals (MNRF 2014b). Adult female survival, measured between 2012 and 2013, was 0.87 (95% confidence interval = 0.75-1.0) (MNRF 2014b). Calf recruitment (4.8 and 23.9 calves per 100 adult females in 2012 and 2013, respectively) is below the 28.9 calves per 100 adult females threshold required to maintain a stable population, assuming a mean adult female survival rate of 0.85 (Environment Canada 2008, 2011). Recruitment estimates from 2011-2012 were also low in the neighbouring Sydney and Churchill Ranges,

suggesting that it was a poor recruitment year across ranges (MNRF 2014b). The estimated mean annual population growth rate (λ) is 0.93 (range = 0.89-0.98) (MNRF 2014b), which indicates a declining population trend (i.e., λ = 1.0 indicates a stable population, values below 1.0 indicate decline and values above 1.0 indicate increase). The proportion of the range that is disturbed is 28.7% (MNRF 2014b) (note: Wataynikaneyap calculated this proportion as 26.0% using data and methods described in Section 4.1.3.1). Based on the available evidence, the MNRF determined that it is uncertain if the current range condition is sufficient to sustain the Berens caribou (MNRF 2014b). The estimated population status and amount of habitat disturbance in the RSA may be approaching the limits of resilience and adaptive capacity of caribou at Base Case.

4.2.2 Wolverine

4.2.2.1 Habitat Availability

Wolverine is a generalist species that uses a wide variety of forested habitat types (COSEWIC 2014). The most important factor in habitat selection is likely prey abundance (COSEWIC 2014). Wolverines consume a wide variety of prey including rodents, snowshoe hares, and the carcasses of large ungulates such as moose and caribou. Females den under snow-covered rocks, logs, or in snow tunnels and are thoughts to require the snow cover to persist into April (COSEWIC 2014). However, a recent study in the boreal forest of Alberta suggests that wolverine are less reliant on snow cover than previously thought (Webb et al. 2016).

Home ranges for wolverines near Red Lake encompassed both logged and unlogged areas, but 95% of radio collar tracking observations were made in unlogged habitat types (Magoun et al. 2005). This result is supported by other studies that show wolverine may occasionally travel through harvested areas but generally avoid young clearcut areas (Hornocker and Hash 1981; Weir 2004). Although no investigations have studied wolverine response to fire, wolverine likely avoid recently burned areas.

Wolverines are found at low densities throughout their range (1 individual per 40 to 800 km^2) and have large home ranges (100 to 900 km^2), which varies in size based on food abundance (Banci 1994). Wolverines in the Red Lake area were found to have average home range sizes of 1,450 km^2 (males) and 525 km^2 (females) (Magoun et al. 2005).

Availability of wolverine habitat was estimated at Base Case using a Core Security Model, which estimated the amount of habitat that may be affected by disturbance ZOIs. Suitable habitat is estimated to compose approximately 2,706,379 ha (96.6%) of the RSA at Base Case (Table 6). This likely represents a decline in suitable habitat relative to what was historically available for this species because the amount of undisturbed forest has decreased during the 20th century. Overall, the changes in habitat availability at Base Case are predicted to be within the adaptive capacity and resilience limits of this criterion.

Table 6: Wolverine Habitat Availability in the Regional Study Area at Base Case

Habitat Suitability	Area (ha)	Proportion (%)
Moderate to High	2,706,379	96.6
Nil to Low	95,535	3.4
Total	**2,801,914**	**100.0**

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.
ha = hectare; % = percent.

4.2.2.2 Habitat Distribution

Genetic evidence suggests that wolverine populations are sensitive to habitat fragmentation from human disturbance. Cegelski et al. (2003) found that gene flow among wolverine populations in Montana is becoming increasingly fragmented due to human development and disturbance and that Montana wolverines are not part of a contiguous population. Instead at least three wolverine subpopulations occur in the state, even though subpopulations are separated by approximately 300 km, which is within annual movement ranges for individuals (Cegelski et al. 2003). This contrasts dramatically with wolverine populations in Canada and Alaska, which showed little genetic structure differences across distances of 1,000 to 2,000 km (Kyle and Strobeck 2001, 2002). Human disturbance of the landscape is thought to be the reason for the difference in genetic structure between wolverine populations in Montana and Canada/Alaska (Cegelski et al. 2003).

Natural barriers such as lakes and mountain ranges do not appear to limit wolverine movements (Kyle and Strobeck 2001, 2002). Wolverines generally do not tolerate human disturbances that permanently alter natural habitat, such as agriculture, human settlements, roads, and mining activities (Banci 1994; Carroll et al. 2001; Copeland et al. 2007; May et al. 2012). Wolverine behaviour was significantly different between study areas in the Rocky Mountains of Alberta with 0.0005% and 1.47% human disturbance footprint versus study areas with 8.09% human disturbance (Stewart et al. 2016). Differences in behaviour may be due to wolverine perception that human disturbance is a risk and changes to wolverine behaviour in highly disturbed landscapes may be influencing wolverine population declines (Stewart et al. 2016).

However, a recent study in the boreal forest of Alberta observed regular movements of wolverines throughout areas with dense industrial infrastructure, although roads were avoided by at least 300 m (Scrafford and Boyce 2014). Similarly, linear corridors that have a compacted snow layer (e.g., snowmobile trail) were used 100% of the time, when encountered, by wolverines accessing winter food caches in northwestern Alberta and northeastern British Columbia (Wright and Ernst 2004). Wolverines have also been observed to use transmission corridors as travel corridors in northern British Columbia (Harriman and Baker 2003).

Wolverine populations in Manitoba and Ontario currently show signs of genetic isolation from other populations in western Canada (MNR 2013c). Although the factors causing this genetic isolation are unknown, it is thought that habitat fragmentation from major highways and transmission corridors may impede wolverine movements, which would influence gene flow and population persistence (COSEWIC 2003). Landscape fragmentation from historical human developments may have contributed to the northward range contraction of wolverine in Ontario (COSEWIC 2014). Wolverine were historically distributed across all of northern Ontario but current range estimates show wolverine appear to be confined to the central and western portions of the far north (MNR 2013c; COSEWIC 2014).

There is little habitat fragmentation present in the RSA at Base Case. Linear disturbance features in the RSA includes the Nungesser Road and the Pikangikum All-Season Road. Linear feature density is 0.2 km/km^2 in the RSA at Base Case. Large, contiguous patches of habitat are still present throughout the RSA (Figure 6) and likely provide suitable habitat for wolverine. Habitat distribution in the RSA at Base Case is considered to be within the resilience and adaptability limits for wolverine.

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MANITOBA

Keewaywin First Nation
Deer Lake First Nation
North Spirit Lake First Nation
McDowell Lake First Nation
Poplar Hill First Nation
Pikangikum First Nation
Red Lake

PAHNGWAHSHAHSHK OHWEEMUSHKEEGPROVINCIAL PARK
BEEKAHNCHEEKAHMEENG DEEBAHNCHEEKAYWEEHN EENAHOHNAHNUHNPROVINCIAL PARK
WEESKAYJAHK OHTAHZHOGANEENGPROVINCIAL PARK
SAHKEESUHKUH WEESUHKAHEEGAHNPROVINCIAL PARK
KAHNAHMAYKOOSAYSEEKAHKPROVINCIAL PARK
TROUT LAKE PROVINCIAL PARK
WOODLAND CARIBOU PROVINCIAL PARK
PAKWASH PROVINCIAL PARK
WEST ENGLISH RIVER PROVINCIAL PARK

Sandy Lake
Severn River
Favourable Lake
Cobham Lake
Cobham River
Northwind Lake
Setting Net Lake
Deer Lake
Hawley Lakes
Whiteloon Lake
Duckling Lake
North Spirit Lake
McCoy Lake
Margot Lake
Ochek Lake
MacDowell Lake
Keecheneekee Sahkaheekahn Upper Goose Lake
Birch Lake
Springpole Lake
Shabumeni Lake
Bertha Lake
Narrow Lake
Woman Lake
Okanse Lake
Confederation Lake
Perrigo Lake
Uchi Lake
Slate Lake
Ranger Lake
Red Lake
Keg Lake
Gullrock Lake
Upper Medicine Stone Lake
Obukowin Lake
Carroll Lake
Donald Lake
Bulging Lake
Haggart Lake
Irregular Lake
Eagle Lake
Kilburn Lake
Sydney Lake
Pineneedle Lake
Longlegged Lake
Bruce Lake
Bluffy Lake
Whitemud Lake
Wenasaga Lake
Pakwash Lake
Ear Falls
Lac Seul
Wegg Lake
Conifer Lake
Wapesi Lake

LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Existing Electrical Transmission Line
- Railway
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Regional Study Area
- Base Case Disturbance
- Wolverine Habitat

REFERENCE(S)
1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 20 40
1:800,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
WOLVERINE HABITAT IN THE REGIONAL STUDY AREA AT BASE CASE

CONSULTANT
Wataynikaneyap Power
Golder Associates

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	6

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
25mm
0

4.2.2.3 Survival and Reproduction

Information on wolverine population trends and sizes is largely unknown because wolverines are sparsely distributed on the landscape and occupy large home ranges. Best estimates suggest that there are greater than 300 wolverines in Ontario (MNRF 2016c). The wolverine populations in northern Ontario may be increasing as aerial surveys have shown an eastward range reoccupation towards James Bay and Quebec (Magoun et al. 2005; COSEWIC 2014).

Wolverine are threatened by previous hunting and trapping, climate change, and habitat loss, degradation, and fragmentation (MNR 2013c). Adult wolverines in trapped populations have a much lower survival rate than adults in untrapped populations (less than 0.75 versus greater than 0.84, respectively; Krebs et al. 2004). Factors that limit wolverine populations include this species low population resiliency and specific habitat requirements during the denning season (MNR 2013c).

Wolverine have low reproductive potential and are relatively short lived with a life expectancy of eight to ten years in the wild (MNR 2013c). Wolverines reach sexual maturity at 12 to 15 months of age, although most females do not successfully give birth until they are an average 3.4 years old. Females breed once annually (from May to August) and give birth in early spring when there is greater ungulate carrion availability and snow cover (MNR 2013c). Not all females that breed will give birth in a given year (Magoun 1985). Female body condition is thought to be the most important factor influencing successful births (Banci 1994; Persson 2005).

Average litter size is two to three kits (MNR 2013c); studies in Sweden, Norway, Alaska, and Yukon report a range of one to six kits per litter (Pasitchinak-Arts and Larivière 1995). Young females have a higher likelihood of becoming pregnant and giving birth to larger litters than older females (MNR 2013c). Females older than six years of age have lower probability of breeding successfully than females two to three years of age and the probability of older females successfully breeding is correlated with summer primary production (MNR 2013c). Wolverines have low birth rates, with 0.6 to 0.7 young per female per year reported in Alaska (Magoun 1985) and 0.84 young per female per year reported in Sweden (MNR 2013c).

Spring snow cover is thought to be key for successful natal denning (Banci 1994; Magoun and Copeland 1998; Persson 2005; Aubry et al. 2007). Deep snow insulated females and kits from extreme weather and provides protection from predators. High snow accumulation may also result in more winter-killed ungulate carrion. Climate change is likely to negatively influence wolverine reproduction and survival by reducing spring snow cover. However, a recent study in the boreal forest of Alberta captured eight females, including five lactating individuals, at camera traps within townships that were predicted to have no spring snow cover (Webb et al. 2016). This suggests that wolverines may be more flexible in their spring snow requirements than previously thought (Webb et al. 2016).

Wolverine have low resilience to changes in survival and reproduction because of their low reproductive potential and their denning requirements for spring snow cover. However, this species may have more flexible natal denning requirements than previously thought (Webb et al. 2016), which would increase resilience to landscape change. The wolverine populations in northern Ontario may be increasing as aerial surveys have shown an eastward range reoccupation towards James Bay and Quebec (COSEWIC 2014). Based on this information, it is expected that historical changes in survival and reproduction present at Base Case are within the resilience and adaptability limits for this criterion.

No wolverines were recorded on remote cameras in the baseline study area in 2016. However, wolverines are known to occur and den in areas around Red Lake (Magoun et al. 2005). Sensitive species data received from the MNRF shows wolverine observations are distributed throughout the RSA.

4.2.3 Little Brown Myotis

4.2.3.1 Habitat Availability

Availability of summer maternity roosting habitat is not likely a limiting factor for little brown myotis in the Base Case. While loss of forests due to human developments has probably reduced maternity roosting habitat availability in the RSA relative to what may have been available historically, the majority of the RSA remains forested in the Base Case. Little brown myotis are not habitat specialists and have been documented in a wide variety of coniferous and deciduous forest types (COSEWIC 2013a). Moreover, little brown myotis are well adapted to human disturbance and will use buildings, bat houses, and bridges for maternity roosts indicating that they are resilient to changes in summer habitat. Bats that roost in tree cavities have less fidelity to roost sites, than species that roost in buildings or caves (Lewis 1995).

Fire suppression has generally resulted in older, broadleaved dominated forests replacing the conifer dominated forest (Carleton 2001). Fire suppression has likely had a positive effect on little brown myotis, as this species was found to be more abundant in old versus young forest types in Alberta and central Ontario (Jung et al. 1999; COSEWIC 2013a), and has demonstrated a preference for broadleaved forest (e.g., poplar [*Populus* spp.] and birch [*Betula* spp.] species). Full fire suppression around the community of Pikangikum has been practiced since 2012 to protect wood supply opportunities (MNR 2013d).

Effects from forest harvesting activities on little brown myotis are likely adverse (Patriquin and Barclay 2003; Taylor 2006). It is thought that even small-scale forestry activities can negatively affect bats by removing snags (roosting habitat) and decreasing canopy closure (Jung et al. 1999). In addition, forestry and other industrial activities in close proximity to hibernacula can degrade the habitat by altering its microclimatic characteristics (USFWS 2007). The effects of edges and corridors on little brown myotis are unclear but a number of studies suggest that forest fragmentation may be beneficial for little brown myotis (Broders and Forbes 2004; Broders et al. 2006; Ethier and Fahrig 2011; Jantzen and Fenton 2013; Segers and Broders 2014). Other studies have found that little brown myotis prefer closed and cluttered canopy areas and avoid edges (Kalcounis and Brigham 1995; Jung et al. 1999; Morris et al. 2010).

There is contradictory evidence regarding preferred foraging habitat for little brown myotis. Some studies suggest that this species uses edge habitat for foraging (COSEWIC 2013a), while other studies suggest that little brown myotis prefer to forage in areas with dense vegetation (i.e., cluttered canopies) (Kalcounis and Brigham 1995). The size of the clearing, as well the size of the bat, may influence the use of edge habitat for foraging. Large clearings have more wind and may inhibit efficient foraging by small bats. Large clearings also have different prey species and lower prey abundance than the forest interior (Kalcounis and Brigham 1995). Little brown myotis may prefer to forage in areas with cluttered canopies, but heavy individuals (i.e., with high wing loads) are less maneuverable than small individuals and so may be prevented from foraging in areas with dense vegetation (Kalcounis and Brigham 1995). Edges not be used as foraging habitat and instead may be used by little brown myotis as travel corridors between roosting sites and foraging areas (Kalcounis-Ruepell et al. 2013).

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. In Ontario, mines harbour the greatest concentrations of hibernating little brown myotis. The location of abandoned mines in the RSA is well understood but their occupancy by bats is not well understood. Those that have been identified as important hibernacula have occasionally been protected through gates and other means of restricting public access (e.g., signage). Minor hibernacula that harbour smaller concentrations of bats are poorly understood but have the potential to play a critical role in the recovery of the population from white nose syndrome (WNS), a deadly fungal disease that has wiped out most of the northeastern North American populations. In Canada, 192 hibernacula were identified as critical habitat required for the survival and recovery of the species, recognizing that this likely represents a small fraction of all occupied hibernacula (Environment Canada 2015a).

Sensory disturbance may temporarily result in avoidance of maternity roosting habitat by little brown myotis. Noise frequencies that overlap with the little brown myotis frequency range (i.e., approximately 40 to 70 kilohertz [kHz]) are expected to have the greatest effect on this species. Harrison (1965) found that little brown myotis did not respond to frequencies above 40 kHz when in torpor. A study by Luo et al. (2014) found that bats were more sensitive to noise when it occurred closer to sunset as opposed to earlier in the daily roosting period and responded least to traffic noise and most to vegetation noise (e.g., rustling of leaves), possibly because traffic noise was at a lower frequency than their hearing range. Bats may rapidly become habituated to repeated and prolonged noise exposure (e.g., bats roosting under bridges) (Luo et al. 2014).

Noise has been found to negatively impact foraging by passive-listening bat species, especially when noise frequencies occur at the same frequency as prey noises (Jones 2008; Schaub et al. 2008; Siemers and Schaub 2011). Consequently, passive-listening bats have been found to avoid areas with high noise levels (e.g., adjacent to highways) (Schaub et al. 2008). However, echo-locating species, such as little brown myotis, can adapt the amplitude and duration of their calls to the ambient noise level of an environment (Luo and Wiegrebe 2016).

One high potential and four moderate potential hibernacula features were identified during the field survey; the remaining 32 features identified from aerial imagery and LiDAR data were determined to have low to very low potential (Figure 7). The high potential site is a fractured granite cliff feature and is located on the east side of Nungesser Road, approximately 140 m from the road. Moderate potential features include a fractured granite feature in a road cut, natural fractured granite features, and rock cliff features. Cliff features that could not be clearly observed while completing the field visit were identified as moderate potential features. Three of the moderate potential features are also located along the east side of the Nungesser Road (Figure 7). The fourth moderate hibernacula potential feature is located at the alternate crossing of the Berens River.

Using the general habitat model, there are 19,414 ha (17.0%) of the potential moderate to high maternity roosting habitat available in the RSA, at Base Case (Table 7). In the RSA, 264 ha (0.2%) of habitat that could include suitable winter hibernacula is estimated to be present (Table 7).

Table 7: Little Brown Myotis Habitat Availability in the Regional Study Area at Base Case, Based on the General Habitat Model

Habitat Suitability	Area (ha)	Proportion (%)
Summer Habitat (Maternity Roost)		
Moderate to High	19,414	17.0
Nil to Low	94,806	83.0
Total	**114,220**	**100.0**
Winter Habitat (Hibernacula)		
Moderate to High	264	0.2
Nil to Low	113,956	99.8
Total	**114,220**	**100.0**

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.
% = percent; ha = hectare.

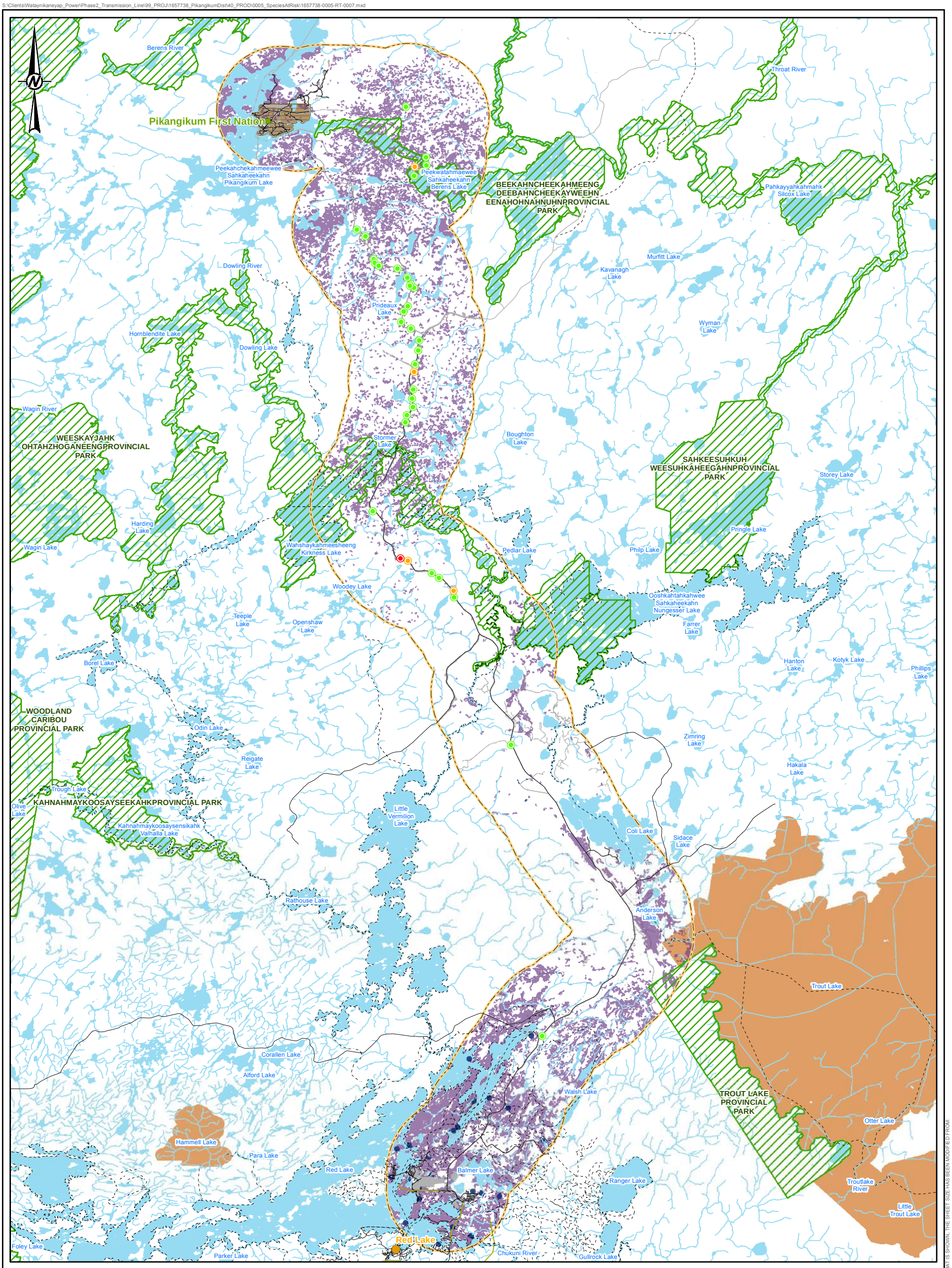
4.2.3.2 Habitat Distribution

The little brown myotis is widely distributed across Canada and in Ontario; its range extends across the province to just south of James Bay. Little brown myotis is a regional migrant and can move hundreds of kilometres between summer and winter areas (Fenton 1969; Kurta and Murray 2002; Norquay et al. 2013). Most of the known hibernating bats of a region are found in only a few hibernacula. In Ontario, many more little brown myotis hibernate in abandoned mines than caves (Fenton and Barclay 1980). Because of the congregatory (i.e., grouping) nature of this species, disturbance of hibernacula can have a disproportionate effect on local populations.

Results from the general habitat model using Land Cover 2000 data (Section 3.1.3.3.1) show that natural habitat features with potential to provide hibernacula for bats (i.e., exposed bedrock) are clustered in the extreme southern portion of the RSA in the vicinity of Red Lake (Figure 7). The AMIS database indicated that there are two abandoned mines with the potential to provide suitable hibernacula in the RSA; these mines are located approximately 15 and 20 km northeast of Red Lake and are approximately 300 and 700 m from the centerline of the Project. These two mines do not appear to have underground features and so are not likely to be suitable hibernacula habitat. If these abandoned mines are hibernacula, they may harbour smaller concentrations of bats and may have the potential to play a critical role in the recovery of the population from WNS. The 50 km² grid squares identified as critical habitat by Environment Canada (2015a) do not contain the abandoned mines in the RSA. All critical habitat 50 km² grid squares identified in Environment Canada (2015) are south of the RSA.

Based on the habitat modelling completed using Land Cover 2000 data (Section 3.1.3.3.1), suitable maternity roosting habitat is present in larger quantities in the southern and northern thirds of the RSA (Figure 7). The middle third of the RSA between Coli Lake and Kirkness Lake has little suitable maternity habitat (Figure 7).

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Regional Study Area
- Base Case Disturbance

Bat Hibernacula Field Survey

- High Potential
- Moderate Potential
- Low Potential

General Habitat Model Results

- Little Brown Myotis Summer Habitat
- Little Brown Myotis Winter Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 5 10
1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
LITTLE BROWN MYOTIS SUMMER AND WINTER HABITAT IN THE REGIONAL STUDY AREA AT BASE CASE, AS PREDICTED FROM THE GENERAL HABITAT MODEL AND HIBERNACULA FIELD SURVEY

CONSULTANT

YYYY-MM-DD	2017-06-01
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	7

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
0 25mm

Bats that roost in tree cavities have less fidelity to roost sites, than individuals and species that roost in buildings or caves (Lewis 1995). This may allow little brown myotis to be flexible when selecting roost sites in the RSA, especially in recently disturbed forested areas.

Bats will follow linear forest features for commuting and foraging, and little brown myotis are tolerant of linear disturbance, even when associated with noise (e.g., roads) (Abbott et al. 2012). The effects of edges and corridors on little brown myotis are unclear but a number of studies suggest that forest fragmentation may be beneficial for little brown myotis (Broders and Forbes 2004; Broders et al. 2006; Ethier and Fahrig 2011; Jantzen and Fenton 2013; Segers and Broders 2014). Other studies have found that little brown myotis prefer closed and cluttered canopy areas and avoid edges (Kalcounis and Brigham 1995; Jung et al. 1999; Morris et al. 2010).

Linear disturbance features may act as barriers to bats because some species are reluctant to cross open ground and some species avoid areas with lights (e.g., road and vehicle lights) (Altringham and Berthinussen n.d). Bats that forage in open space, such as little brown myotis, appear to be less sensitive to barrier effects from linear disturbances than species that glean prey from vegetation (Kerth and Melber 2009; Fensome and Mathews 2016). However, little brown myotis is a clutter-adapted, low-flying species that may experience higher barrier effects than faster, open-edge-adapted species (Fensome and Mathews 2016). Roads are thought to have greater barrier effects on bats than other linear disturbance such as rail lines and transmission lines because roads are usually wider than transmission lines and railways and there is more vehicle traffic (sensory disturbance) on roads (Altringham and Berthinussen no date). Barrier effects are higher in exposed areas than in areas with vegetation alongside the ROW (Fensome and Mathews 2016).

Overall, the habitat mapping and field survey results and an understanding of this species' biology indicate a clustered distribution of habitat in the RSA during the winter and a broader distribution in the RSA in the summer. The limited amount of existing disturbances in the RSA should prevent or restrict dispersal for this species in the Base Case because bats are highly mobile. Therefore, changes to habitat distribution in the Base Case have likely not exceeded the resilience or adaptability limits of the little brown myotis.

4.2.3.3 Survival and Reproduction

Little brown myotis is listed as endangered on the provincial ESA, and as endangered and on Schedule 1 of the federal SARA due to dramatic population declines resulting from a devastating fungal disease, WNS. Prior to the introduction of WNS, little brown myotis was probably the most common bat in Canada (Environment Canada 2015a). White nose syndrome has reduced populations by more than 75% in infected hibernacula (Frick et al. 2010). Mortality rates at infected sites in eastern Ontario were 92% after two years of exposure (COSEWIC 2012). White nose syndrome has been estimated to travel at an average rate of 200 to 400 km per year (COSEWIC 2012). It is anticipated that the entire Canadian population of little brown myotis will be impacted by WNS within 11 to 22 years, or possibly sooner based on the recent confirmation of WNS in Washington State (USGS 2016). The little brown myotis is predicted to be functionally extirpated (i.e., less than 1% of existing population remaining) in Canada and the United States within 16 years (COSEWIC 2012) due to WNS.

Although WNS has not yet been reported in the RSA, WNS was confirmed in Atikokan in 2015 (USFWS 2016). This is the furthest west confirmed site for WNS in Canada. Atikokan is approximately 300 km southeast of Red Lake. The presence of WNS in the RSA is uncertain because there is limited information related to the hibernacula in northern Ontario (Environment Canada 2015a). Regardless, there is an imminent threat to

little brown myotis populations that overlap the RSA from WNS. Therefore, changes to little brown myotis abundance in the Base Case may have exceeded the resilience and adaptability limits of this criterion due to the mortality associated with WNS. Other factors that may affect their recovery are discussed below.

Little brown myotis are long-lived but only give birth to one pup per year (Fenton and Barclay 1980; Kunz and Reichard 2010), making their populations sensitive to increases in adult mortality and slow to recover when the population size is small. Females may be reproductively active during their first year of life and have high fecundity rates (Kunz and Reichard 2010). Individuals of this species have been recorded to live to over 30 years of age (Fenton and Barclay 1980), although the average life span is thought to be shorter (COSEWIC 2013a). Reproductive rates seem to decline with increasing latitude; a reproductive rate of greater than 96% was recorded in the eastern United States, with lower rates of 42% to 57% in British Columbia (COSEWIC 2013a). Mean annual survival of little brown myotis in Ontario was 0.82 for males and 0.71 for females (COSEWIC 2013a). Survival rates are lowest in the first year of age because juveniles often lack sufficient fat reserves needed for hibernation (COSEWIC 2013a).

Mortality of little brown myotis may result from collision with or barotrauma from wind turbines, extermination, disturbance during hibernation, and declining insect populations. Little brown myotis are vulnerable to persecution because of their tendency to use anthropogenic structures (Environment Canada 2015a). Extermination of large colonies can affect local populations, particularly in areas that are already affected by WNS.

Disturbance during hibernation can result from recreational or industrial activities. Tourists, spelunkers, and researchers are the main visitors to hibernacula but their impact is likely minimal because these visits typically occur in the summer (Environment Canada 2015a). Noise and vibration from industrial activities has the potential to disturb hibernating bats, or to otherwise interfere with their behaviour by masking echolocation and hearing (Schaub et al. 2008; Siemers and Schaub 2011). Echolocating species may be less sensitive to sensory disturbance than passive-listening species, as they can adjust the amplitude and duration of their calls to the ambient noise level of an environment (Luo and Wiegrebe 2016).

4.2.4 Bald Eagle

4.2.4.1 Habitat Availability

Bald eagles are found in association with aquatic habitats (e.g., coastal areas, rivers, lakes and reservoirs) with forested shorelines or cliffs throughout North America (Buehler 2000; Armstrong 2014). Bald eagles often use perches within approximately 500 m of open water when foraging at or near the surface of the water (Buehler 2000). Shallow water and near shore emergent vegetation increase the likelihood that live fish prey will be available near the surface (Buehler 2000; Armstrong 2014).

The MNR (2000) Significant Wildlife Habitat Technical Guide identifies bald eagle winter habitat as "seasonal concentration areas" and bald eagle nesting, foraging and perching habitat as "rare or specialized habitats for wildlife." Areas identified as SWH receive an approximate 120 m buffer (MNR 2000) in addition to recommended activity setbacks (MNR 2010).

The main disturbances in the RSA at Base Case are forestry, fire and fire suppression activities, and linear development. Bald eagle typically nest in areas of low human disturbance. In northwestern Ontario, lakes with bald eagle nests were significantly farther from roads than lakes without nests (Jones 1995). However, more recent evidence indicates that some bald eagles are becoming tolerant of human modifications to the landscape and will nest closer to urban areas (Armstrong 2014).

Suitable bald eagle nesting habitat is estimated to compose 25.4% (28,968 ha) of the RSA at Base Case (Table 8).

Table 8: Bald Eagle Habitat Availability in the Regional Study Area at Base Case

Habitat Suitability	Area (ha)	Proportion (%)
Moderate to High	28,968	25.4
Nil to Low	85,252	74.6
Total	**114,220**	**100.0**

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.
ha = hectares; % = percent.

Shoreline urban and industrial development has the greatest potential to limit habitat availability because it overlaps with the highest quality habitat for bald eagles (Buehler 2000). Large scale harvest operations target fast-growing tree species and do not generally allow the forest to reach the old growth stage. In contrast, selective harvesting of high quality timber products (i.e., tall, straight trees) may have increased the proportion of trees on the landscape that provide high quality eagle nesting habitat, such as those with large tree forks (i.e., bifurcation in the trunk) that are considered low quality timber product (Packham 2005).

Overall, the changes from natural and anthropogenic disturbance and activities in the RSA at Base Case have likely resulted in less bald eagle habitat availability relative to historical conditions. However, most changes to habitat suitability have occurred in the southern third of the RSA with forest harvesting in the Red Lake and Trout Lake forests, and human development around Red Lake, including Nungesser Road.

There is little industrial and urban shoreline development in the central and northern portions of the RSA. Wildfires in areas defined as the Bak Lake sub-zone, which covers the north portion of the RSA, have been suppressed since 2004 to protect wood supply opportunities (WFMC 2012; MNR 2013d). Fire suppression has resulted in an increase in average forest age and possibly more suitable bald eagle habitat in the RSA. Additionally, commercial forest harvesting has not been undertaken in the Whitefeather Forest.

Bald eagles have some flexibility in their selection of breeding habitat (Grier and Gunn 2003) and there is increasing evidence of them becoming tolerant of habitat disturbed by humans (Armstrong 2014). Available evidence does not suggest that habitat availability is a limiting factor for this species in the RSA at Base Case. Therefore, changes to habitat availability in the Base Case appear to be within the adaptability and resilience limits of bald eagle populations that overlap with the RSA.

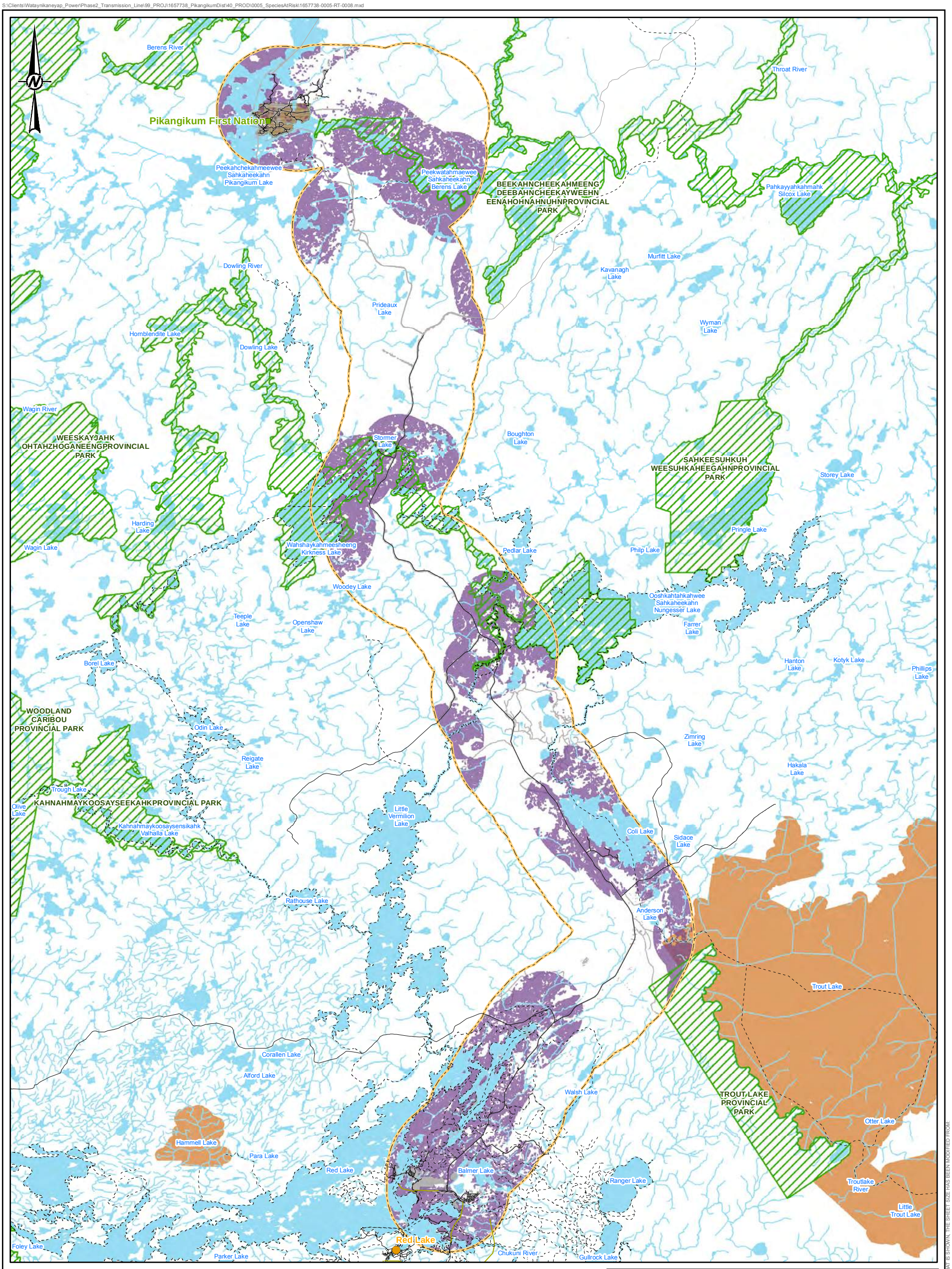
4.2.4.2 Habitat Distribution

In Ontario, the highest concentration of bald eagle nests is centered on Lake of the Woods in northwestern Ontario, which is outside the RSA (Armstrong 2014). Bald eagle habitat is patchily distributed in the RSA. Large patches of habitat are present around Red Lake, Trout Lake, Coli Lake, Pine Lake, Kirkness Lake, Berens Lake, and Pikangikum Lake at Base Case (Figure 8). The MNRF sensitive species data indicates that Trout Lake, Coli Lake, Little Vermillion Lake, and Berens Lake are important nesting areas for bald eagles in the Red Lake area.

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. Bald eagle are likely not negatively influenced by fragmentation as they are a highly mobile species and forest tract size may be unimportant if the tract is isolated from human development (Buehler 2000). Nest trees are more accessible in areas with habitat discontinuity, or edge, or relatively open canopies (McEwan and Hirth 1979; Anthony and Isaacs 1989; Livingston et al. 1990; Buehler 2000).

Existing disturbances in the RSA do not likely function as a dispersal barrier for this species in the Base Case as this species is highly mobile. Bald eagle populations that overlap with the RSA are considered to be within the resilience and adaptability limits of this criterion.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
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- Bald Eagle Habitat

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5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 5 10
1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
BALD EAGLE HABITAT IN THE REGIONAL STUDY AREA AT BASE CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	8

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B (279mm x 432mm)
25mm
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4.2.4.3 Survival and Reproduction

Bald eagle populations are estimated at 100,000 individuals in North America (Buehler 2000). Bald eagles declined drastically in the early 1900s because chemicals such as dichloro-diphenyl-trichloroethane (DDT) and polychlorinated biphenyls (PCBs) accumulated through the food chain and weakened egg shells leading to low reproductive success (Armstrong 2014). Bald eagles were also historically shot as pests or trophies (Armstrong 2014). Bald eagles are long-lived and slow to mature, capable of breeding at five years, but often not until they reach six or seven years of age (Armstrong 2014). Bald eagle clutch sizes are small (1 to 3 eggs) and their incubation time is long (34 to 46 days) such that if their nest tree is blown down, the affected pair may not breed for a year (Armstrong 2014). Slight shifts in adult bald eagle survival, for example from illegal shooting, accidental trapping, or collisions with wind turbines, can markedly affect population trends (Armstrong 2014).

Bald eagles in Ontario have shown a large recent increase after recovering from historical threats (Blancher et al. 2009; Wright 2016). However, bald eagles in Ontario still have vulnerabilities and face some threats, and are designated as a species of Special Concern in Ontario (MNRF 2015a). After DDT was banned in the 1970s, bald eagles in the Great Lakes region rebounded more slowly than more inland Ontario populations because of the more contaminated fish populations in that region (Armstrong 2014). Wright (2016) also found that numbers of bald eagles breeding in the north in summer (North Carolina to eastern Canada) increased more slowly than numbers of bald eagles breeding in the south in winter (Texas to North Carolina) based on migration counts from 1991 to 2015. As top predators that feed primarily on fish, bald eagles continue to face threats from pollution, residual chemical contamination, and heavy metal poisoning from lead and mercury (Armstrong 2014).

Collision with electrical lines is recognized as contributing to avian mortality, particularly for raptors that are known to have blind areas when in flight (Martin and Shaw 2010). Bald eagle collision risk with electrical lines is increased when lines are less than 1 km from shoreline and not surrounded by vegetation (Watts et al. 2009).

Forest harvesting can have adverse effects on bald eagle survival and reproduction. Isaacs et al. (2005) noted a negative correlation between the extent of forestry operations and bald eagle productivity. In general, clear cutting within approximately 400 m of an active nest may result in nest abandonment. However, timber harvest or road building within approximately 800 m of bald eagle nests did not result in nest abandonment or reduced productivity (Isaacs et al. 2005). Road density, proximity, and level of use does not appear to affect bald eagle productivity (MNR 2010).

Population data are not available for the RSA. Four bald eagles were incidentally observed along the Project corridor during wildlife field surveys in 2016; no bald eagle nests were observed. One raptor nest site was identified near the Project ROW in the Whitefeather FMP (WFMC 2012). The raptor nest site was on the east shore of Red Lake, near Nungesser Road. Sensitive species data from the MNRF shows bald eagles have been recorded at Kirkness Lake and Coli Lake in the RSA.

The RSA likely overlaps with several distinct but interbreeding bald eagle sub-populations. Based on the population status and trends for the Province, bald eagle populations that overlap with the RSA are likely smaller relative to those historically present, but Ontario populations are experiencing positive growth rates in the Base Case (MNR 2010). Therefore, changes to survival and reproduction are predicted to be within the resilience or adaptability limits of this criterion at Base Case.

4.2.5 Horned Grebe

4.2.5.1 Habitat Availability

For breeding habitat, horned grebes mainly select semi-permanent and permanent freshwater ponds and shallow bays or marshes containing open water and rich with emergent vegetation such as sedges, rushes and cattails (Stedman 2000). Nests are built within a few metres of open water and are generally floating in emergent vegetation (Stedman 2000). Horned grebes have also been shown to breed in constructed structures such as borrow pits in the boreal forest (Fournier and Hines 1999; Kuczynski 2009). Horned grebes have been reported using ponds up to about 18 ha in size for breeding, though most studies suggest smaller ponds up to about 2 ha in size are preferred (COSEWIC 2009).

The decline in the western population of the horned grebe has been largely attributed to the loss of wetland habitat in the prairies, most of which occurred before recent population declines; however, wetland conversion to agriculture and other development continues (COSEWIC 2009). Habitat loss is unlikely to be a major threat to northern populations, and changes to habitat availability in boreal regions that have occurred in the Base Case have not likely contributed measurably to broad population declines.

A habitat model was not developed for horned grebe because the Project is not anticipated to result in measurable effects on horned grebe populations that overlap the RSA (see Section 4.2.2).

4.2.5.2 Habitat Distribution

Although a habitat model was not developed for horned grebe, suitable habitat for this species (wetlands) is patchily distributed in the RSA. Existing disturbances in the RSA do not likely function as a dispersal barrier for this species in the Base Case as this species is highly mobile. Horned grebe populations that overlap with the RSA are considered to be within the resilience and adaptability limits of this criterion.

4.2.5.3 Survival and Reproduction

The horned grebe (western population) is estimated to total between 200,000 and 500,000 individuals (COSEWIC 2009). Horned grebes reach highest breeding abundance in prairie and parkland habitats, with smaller populations found in boreal and subarctic zones (COSEWIC 2009). Horned grebe is an irregular, rare breeder in Ontario (COSEWIC 2009). Population estimates in Ontario from the first OBBA were 10 pairs or less per year (COSEWIC 2009). However, most of this species' range is in remote areas in northwestern Ontario and so this species may be more common than is suggested by OBBA results (COSEWIC 2009).

A significant long-term (1968-2007) population decline of 2.7% per year at the national level has been identified from BBS data (COSEWIC 2009). Causes for the population decline are not known, though habitat loss and increased nest predation by species whose populations have increased in the prairies over the last century, including black-billed magpies (*Pica hudsonia*), ravens (*Corvus corax*) and raccoons (*Procyon lotor*), have been identified as possible causes (COSEWIC 2009). Threats identified in the federal status report apply primarily to populations in the southern portions of the breeding range (COSEWIC 2009).

Horned grebe was not recorded during field surveys in the baseline study area in 2016. Horned grebe was documented as a confirmed breeder in three squares within the OBBA Region 44 (Big Trout Lake) during the second OBBA (Cadman et al. 2007).

4.2.6 Eastern Whip-Poor-Will

4.2.6.1 Habitat Availability

Eastern whip-poor-will breed in forested landscapes in parts of central and eastern Canada and the eastern United States and overwinter in the southern United States and Central America. In Ontario, whip-poor-will are found from the Manitoba border, east to Kenora, with a northern limit roughly following the northern shore of Lake Superior, south to the United States border, and lower Great Lakes (COSEWIC 2009). Eastern whip-poor-will were found infrequently in several isolated locations near Red Lake and Lake Nipigon during the second Ontario Breeding Bird Atlas survey from 2001 to 2005 (COSEWIC 2009). Five whip-poor-will were recorded at two survey locations in the baseline study area during species-specific surveys in 2016. The two locations were approximately 12 m and 14 m from the proposed centerline of the limits of work.

The main disturbances in the RSA at Base Case include wildfire and wildfire suppression activities and linear developments. Disturbances have likely resulted in positive changes to whip-poor-will habitat as road ROWs and utility corridors can create habitat for this species (Cink 2002; COSEWIC 2009). Larger disturbance areas, such as laydown areas, may provide suitable foraging habitat, especially areas surrounded by suitable nesting habitat (e.g., semi-open mixed-wood forest) (MNR 2013b). Fire suppression can improve habitat for whip-poor-will by creating a juxtaposition of early and late seral forests (COSEWIC 2009).

Forestry activities are common throughout the southern third of the RSA, and have likely had positive and negative changes on habitat in the Base Case. Microclimate and vegetation features near the nest are important, and disturbance within 20 m of the nest may disrupt these parameters, making the area unsuitable for nesting (MNR 2013b). Timber harvesting practices that occur at a small scale and selectively remove individual trees likely increase whip-poor will-habitat (MNR 2013b). Developments that result in large scale alteration or clearing of vegetation are not compatible with whip-poor-will habitat requirements (MNR 2013b). Smaller clear cuts that are scattered throughout the forest have been favoured forest management policies in recent years (Domtar 2009) and have therefore likely increased suitable eastern whip-poor-will habitat relative to historical conditions. Post-harvest areas may be suitable for whip-poor will-within 0 to 15 years following disturbance (i.e., while the areas have sparse to moderate shrub and herbaceous vegetation cover) (Environment Canada 2015b). Suitable habitat is estimated to compose 43.2% (49,332 ha) of the RSA at Base Case (Table 9). This likely represents a decrease in suitable habitat relative to what was historically available for this species because fire suppression activities have increased the forest age in the RSA.

Table 9: Eastern Whip-Poor-Will Habitat Availability in the Regional Study Area at Base Case

Habitat Suitability	Area (ha)	Proportion (%)
Moderate to High	49,332	43.2
Nil to Low	64,887	56.8
Total	114,220	100.0

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.
ha = hectares; % = percent.

Overall, whip-poor-will habitat availability remains high in the RSA at Base Case and is not considered a limiting factor for this species. Therefore, the positive and negative changes to the amount of suitable habitat available in the Base Case are predicted to be within the adaptability and resilience limits of the whip-poor-will populations that may overlap with the RSA.

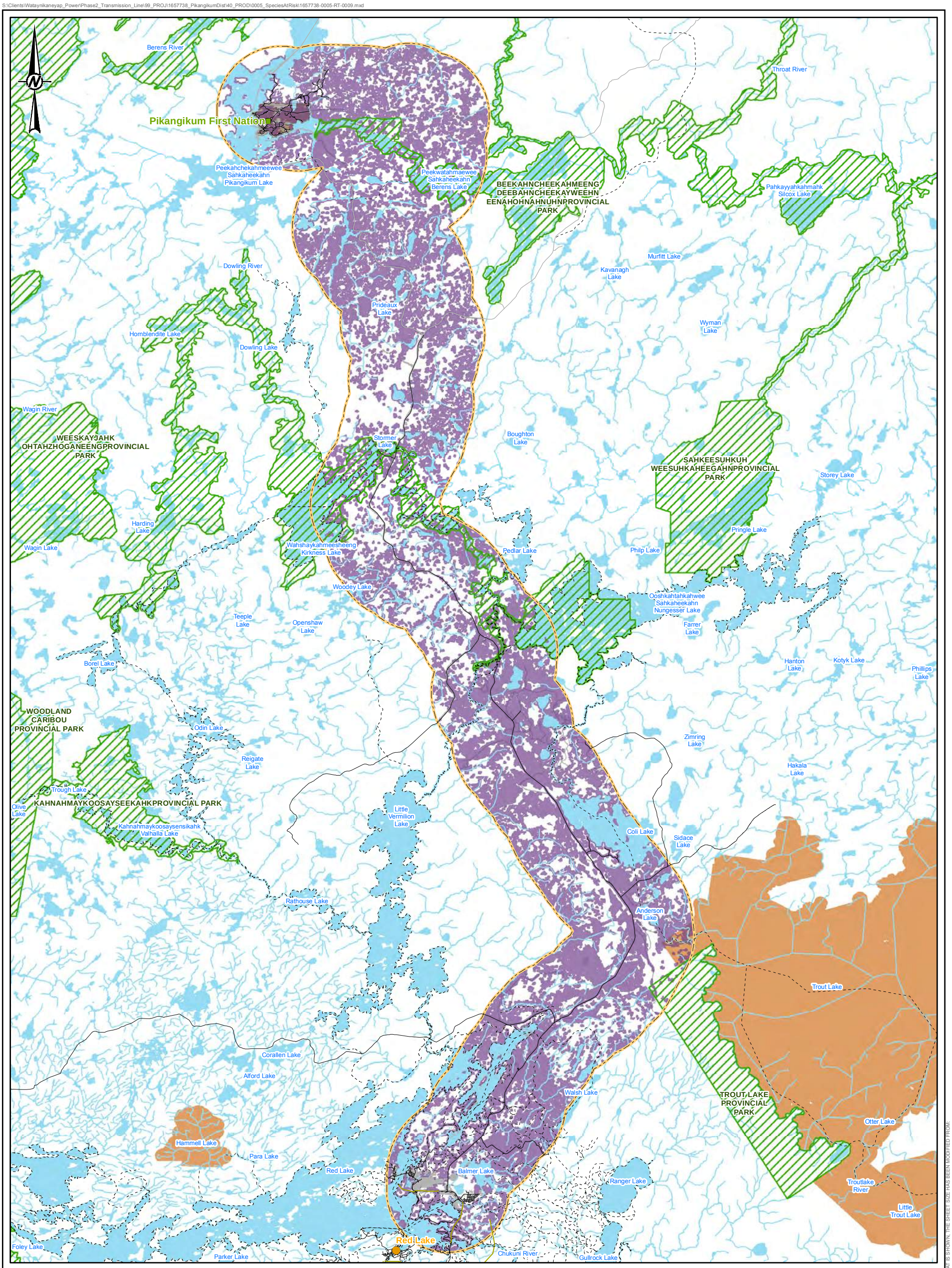
4.2.6.2 Habitat Distribution

Studies suggest whip-poor-will may avoid small, isolated woodlands and distance from forest tracts may be an important factor influencing the presence of whip-poor-will (Bushman and Therres 1988; COSEWIC 2009). Whip-poor-will abundance in southern Ontario was found to be positively correlated with anthropogenic linear disturbance density (English et al. 2016). Forest management policies that favour the development of smaller clear-cuts scattered throughout the forest have been implemented in recent years in the FMUs that intersect with the RSA. These practices may have increased whip-poor-will habitat availability and consequently habitat distribution relative to historical conditions (MNR 2013b).

Eastern whip-poor-will habitat distribution in the RSA at Base Case is shown in Figure 9. Based on habitat modelling, suitable habitat occurs in numerous discrete patches that are well distributed throughout the RSA. The occurrence map developed by the MNRF sensitive species data indicates eastern whip-poor-will is distributed sporadically in northern Ontario and has been observed in the RSA near Red Lake (Government of Ontario 2015a). This was confirmed by field studies in 2016.

Overall, habitat distribution is patchy and not well connected across the RSA, but the species has high mobility and existing disturbances in the RSA may have increased habitat distribution compared to Base Case conditions by creating open areas in the forested landscape.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Regional Study Area
- Base Case Disturbance
- Eastern Whip-poor-will Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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0 5 10

1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
EASTERN WHIP-POOR-WILL HABITAT IN THE REGIONAL STUDY AREA AT BASE CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	9

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4.2.6.3 Survival and Reproduction

Canada is estimated to contain 6% of the global eastern whip-poor-will population (120,000 individuals) (Environment Canada 2015b). Data from breeding bird surveys indicated a Canada-wide population decline of 3.19% per year from 2002 to 2012, or 75% loss of the population over this time period (Environment Canada 2015b). Between the first (1981 to 1985) and second (2001 to 2005) Ontario Breeding Bird Atlas periods, whip-poor-will declined by 37% (Cadman et al. 2007; Environment Canada 2015b).

Because the eastern whip-poor-will population in Canada has declined by 75% from 1968 to 2007, they are considered a priority species under the Bird Conservation Strategy with the objective of doubling current abundance (Environment Canada 2013). The eastern whip-poor-will was designated as threatened by COSEWIC in 2008 and was listed on Schedule 1 of SARA as a threatened species in 2011. It is also listed as threatened on the provincial ESA. Despite concerning population trend data, Environment Canada (2015b) states that individuals that are capable of reproduction are available to sustain the population and improve its abundance. The population objectives for Canada as identified in the final federal recovery strategy are to halt the national decline by 2025, with no more than a 10% population decline during this time, maintain an area of occupancy at 3,000 km² or more, and ensure a 10-year positive population trend thereafter, while gradually recolonizing areas in the southern portion of the breeding distribution (Environment Canada 2015b).

The primary threats to eastern whip-poor-will include reduced availability of insect prey, habitat conversion for agriculture on breeding and wintering ranges, and predation (Environment Canada 2015b). Eastern whip-poor-will feed on many types of flying insects (Cink 2002). Insect populations are declining worldwide and these declines may be contributing to whip-poor-will population decline (COSEWIC 2009; Environment Canada 2015b). Many aerial-foraging insectivorous birds, such as whip-poor-will, have experienced large declines since the 1980s (Blancher et al. 2009; NABCIC 2012). Forest and non-forest aerial-foraging birds have experienced drastic population declines, which suggests the major cause of the declines is decreased insect abundance (Blancher et al. 2009; Nebel et al. 2010; Nocera et al. 2012; Paquette et al. 2014). Wagner (2012) noted declines for many nocturnal moth species, which are the preferred prey for eastern whip-poor-will (Cink 2002). Potential causes of reduced availability of insects include habitat loss, climate change resulting in a temporal mismatch between reproduction and peak food abundance, and pesticide use, which can reduce the abundance and diversity of flying insects (Nebel et al. 2010; Nocera et al. 2012; Paquette et al. 2014). Insect and bird populations that are distributed within and likely extend outside the RSA have likely been affected by all of these factors at Base Case. Eastern whip-poor-will may be susceptible to these factors because they are primarily aerial insectivores and they have low annual productivity (average of two eggs per brood, with up to two broods per year reported; Cink 2002).

Forest harvesting can result in positive and negative changes to whip-poor-will habitat, and ultimately survival and reproduction in the Base Case (Bushman and Therres 1988; Wilson and Watts 2008; Environment Canada 2015b). Forest harvesting is not likely the leading cause of whip-poor-will declines (Environment Canada 2015b). Early successional habitats are preferred by this species, but high shrub density at 10- to 15-year post-harvest reduces habitat suitability (Environment Canada 2015b). Regenerating areas were found to have high densities of foraging individuals (Wilson and Watts 2008). Clear-cuts may increase the occupancy and abundance of breeding whip-poor-wills (Tozer et al. 2014).

Fire suppression has likely had negative effects on whip-poor-will in the Base Case. Fire suppression may keep forest stands at a more mature stage, which is less suitable for whip-poor-will. In Ontario, fire suppression has been identified as a cause of whip-poor-will population decline, especially in northern Ontario (Cadman et al. 2007; Tozer et al. 2014).

Nest parasitism by brown-headed cowbirds has not been reported for eastern whip-poor-will; an increase in edge density is not likely to decrease whip-poor-will survival and reproduction.

Eastern whip-poor-will were likely never abundant in the RSA due to a historical limited amount of naturally available suitable habitat. Despite declining population trends, Environment Canada (2015b) states that individuals that are capable of reproduction are available to sustain the population and increase abundance. Therefore, changes to whip-poor-will survival and reproduction in the Base Case are expected to be within the resilience and adaptability limits of this criterion that has populations overlapping the RSA.

4.2.7 Common Nighthawk

4.2.7.1 Habitat Availability

Common nighthawks are associated with a variety of open or semi-open habitats, including forest clearings, burned areas, grassy meadows, rocky outcrops, sandy areas, grasslands, pastures, peat bogs, marshes, lake shores, quarries, mines, and urban areas (Peck and James 1983; COSEWIC 2007a; Brigham et al. 2011). Wetlands and open water are often used as foraging locations (Brigham et al. 2011). Forested areas with low canopy closure may also provide habitat for the common nighthawk (COSEWIC 2007a). Critical habitat has not yet been identified for common nighthawk due to the diversity of nesting, roosting and foraging habitats that have been reported (Environment Canada 2016c). Nighthawks eat a wide variety of insects but most commonly consume queen ants, beetles, caddisflies, moths, and true bugs (Brigham et al. 2011). Common nighthawks are generally crepuscular, foraging under low light conditions at dusk and dawn, and often forage in large groups at particular times of the year (Brigham et al. 2011).

Suitable habitat covers 50,910 ha (44.6%) of the RSA, at Base Case (Table 10). This likely represents a decrease in suitable habitat relative to what was historically available for this species because fire suppression activities limit the number of open habitats (COSEWIC 2007a).

Table 10: Common Nighthawk Habitat Availability in the Regional Study Area at Base Case.

Habitat Suitability	Area (ha)	Proportion (%)
Moderate to High	50,910	44.6
Nil to Low	63,309	55.4
Total	**114,220**	**100.0**

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.
ha = hectares; % = percent.

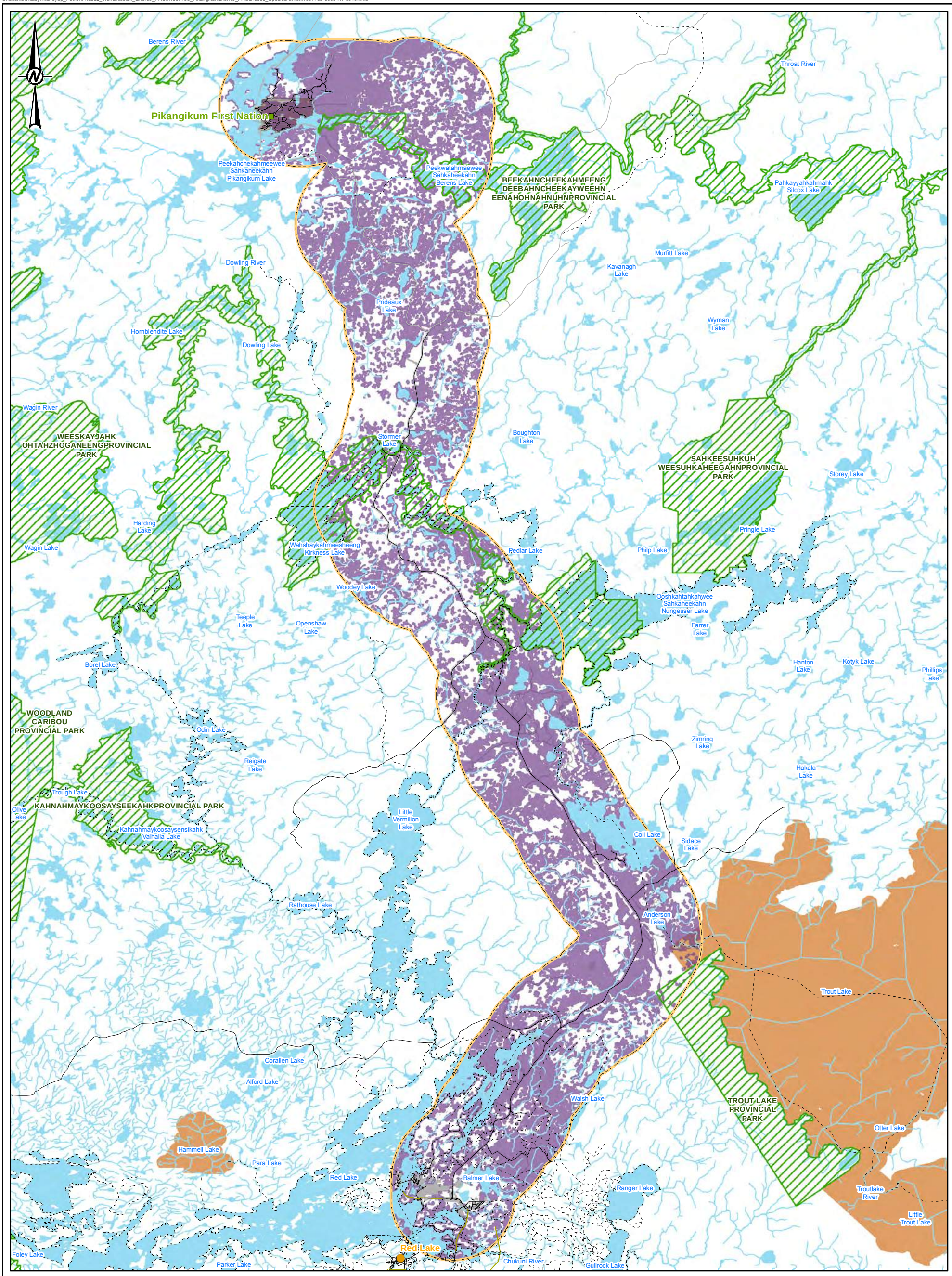
Although little is known about habitat trends for the common nighthawk in Canada, it is thought that the extensive deforestation that followed European settlement increased suitable habitat for this species (COSEWIC 2007a). Recent changes to forestry practices that favour limiting the size of clear-cuts and scattering cuts throughout the forest, along with extensive reforestation, have contributed to the decline in the quantity and quality of common nighthawk habitat (COSEWIC 2007a). Fire suppression activities are also thought to have contributed to the decline in suitable habitat for nighthawk by limiting the number of open habitats (COSEWIC 2007a).

It is currently unknown whether breeding habitat is limiting Canadian populations of common nighthawk (Environment Canada 2016c). Results of the habitat mapping in the RSA indicate that approximately 45% of the RSA is suitable breeding habitat for nighthawk, which does not consider existing disturbances (i.e., roads) that may provide additional suitable breeding habitat. As such, the predicted amount of suitable breeding habitat is likely an underestimate. The results suggest that breeding habitat is not a limiting factor for common nighthawk populations that overlap with the RSA at Base Case and that changes in habitat availability have not exceeded the adaptability or resilience limits of this criterion. Disturbances can have both positive and negative effects on common nighthawk habitat availability. Forest harvesting, for example, creates openings that may actually benefit common nighthawk through increased habitat available for nesting (Environment Canada 2016c).

4.2.7.2 Habitat Distribution

Based on habitat modelling, suitable habitat occurs in numerous discrete patches that are well distributed throughout RSA (Figure 10). Habitat fragmentation from mineral exploration and linear disturbances present at Base Case is not likely to have negatively affected common nighthawk habitat distribution because this species uses recently disturbed, open areas for nesting. Nest fidelity of common nighthawk has been documented in urban habitats (Dexter 1961). However, this species is highly mobile and can nest in a variety of different types of habitats; therefore, it is expected that breeding habitat is not limiting.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
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- Conservation Reserve
- Provincial Parks
- Regional Study Area
- Base Case Disturbance
- Common Nighthawk Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
COMMON NIGHTHAWK HABITAT IN THE REGIONAL STUDY AREA AT BASE CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	10

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4.2.7.3 Survival and Reproduction

The common nighthawk is federally listed as threatened by COSEWIC (2007a) and "Schedule 1: Threatened" by SARA due to both short- and long-term population declines (COSEWIC 2007a). The population status of the common nighthawk is relatively unknown due to strong variations in local abundance (FAN 2007) and the difficulty of observing the species. However, long-term data collected in Canada from 1968 to 2005 suggests a population decline (COSEWIC 2007a). Breeding Bird Survey data from Environment Canada (2014) does not cover the RSA. Sauer et al. (2014) analyzed BBS data and estimated that common nighthawk populations in Ontario have declined by 0.7% per year from 1966 to 2013. However, breeding bird survey data are not designed for detecting common nighthawks, and the accuracy of trends estimated from those data are therefore unknown. Seventeen common nighthawks were recorded at eight locations in the baseline study area during species-specific surveys in 2016. There are no common nighthawk observations in the RSA according to MNRF sensitive species data.

Population data are not available in the RSA. The RSA likely overlaps with several distinct but interbreeding common nighthawk populations. The number of individuals in the RSA was roughly estimated based on data from the Ontario Breeding Bird Atlas (Region 39: English River and Region 44: Big Trout Lake). Estimates were averaged across the two survey regions and assumed a 100 m radius (0.0314 km^2) was sampled at each point count station. Point counts for the Breeding Bird Atlas are unlimited distance (Cadman et al. 2007) but assuming an approximately 100 m sampling radius provides a conservative estimate of bird abundance. The abundance estimate for Region 39 is 0.07 individuals/km^2. Abundance estimates for common nighthawk were not available for Region 44. Applying an abundance estimate of 0.07 individuals/km^2 to the amount of suitable habitat present at Base Case (Table 10) corresponds to an abundance estimate of approximately 36 individuals in the RSA.

Reasons for the apparent decline of common nighthawk populations are not well understood, but may be due in part to diminishing populations of insect prey due to habitat loss, changes to timing of peak food abundance from climate change, and pesticide use (COSEWIC 2007a; Brigham et al. 2011). Insect and bird populations in the wintering range and breeding range (e.g., RSA) have likely been affected by these factors at Base Case. Nighthawks may be susceptible to these factors because their residency on breeding grounds is brief compared to other landbirds. Common nighthawk is one of the last species to arrive on breeding grounds and one of the first species to leave in the fall (COSEWIC 2007a). This behaviour reduces the possibility for raising more than one clutch per year, as well as limits adaptive capability in regards to climate change (Environment Canada 2016a).

The main threat to common nighthawk populations in North America is suggested to be the loss and alteration of suitable breeding habitat (COSEWIC 2007a). For example, fire suppression and changes in harvesting practices have reduced the number of open areas in forested regions (COSEWIC 2007a).

Common nighthawk primarily feed on queen ants, beetles, caddisflies, moths, and true bugs. Insect populations are declining worldwide and may be contributing to the decline of common nighthawk populations (Environment Canada 2016a). Many aerial-foraging insectivorous birds have experienced large declines since the 1980s (Blancher et al. 2009; NABCIC 2012). The declines suggest a single cause related to insect abundance as both forest and non-forest aerial-foraging birds are declining (Blancher et al. 2009; Nebel et al. 2010; Nocera et al. 2012; Paquette et al. 2014). Potential causes of reduced availability of insects include habitat loss, changes to timing of peak food abundance from climate change, and pesticide use (Nebel et al. 2010; Nocera et al. 2012; Paquette et al. 2014).

Although information on the age of first breeding is unknown, it is assumed that nighthawks breed at one year of age and every year thereafter (Brigham et al. 2011). Common nighthawks typically lay two eggs and have one clutch per year (Brigham et al. 2011).

4.2.8 Olive-sided Flycatcher

4.2.8.1 Habitat Availability

Anthropogenic disturbances can result in positive and negative changes to olive-sided flycatcher habitat. Vegetation clearing can improve habitat around the disturbance perimeter by creating edge habitats that are positively associated with this species' abundance (McGarigal and McComb 1995). However, vegetation clearing can also result in a net loss of habitat when the edge to open area ratio is small. Overall, disturbances tend to have positive effects when they result in small forest openings and tend to have negative effects when the disturbance is large. In general, human developments have likely had a net negative change to olive-sided flycatcher habitat availability in the RSA, relative to historical conditions. Olive-sided flycatchers are more abundant in landscapes with a large amount of fragmentation (i.e., patchily distributed habitat) (McGarigal and McComb 1995).

Fire suppression has likely resulted in opposing changes to habitat in the RSA. Several studies report higher densities of olive-sided flycatchers in early post-burn communities (Lowe et al. 1978; Hutto and Young 1999). Fire suppression in the RSA has probably resulted in less high-quality burned habitat, relative to historical conditions. However, increased amount and age of forests can create habitat conditions suitable for this species, especially where variable canopy height is created. In areas with no young post-fire habitat, olive-sided flycatchers are primarily found in late-successional forests with low canopy cover (Verner 1980; Scott and Crouch 1988). Overall, fire suppression has likely reduced the amount of suitable olive-sided flycatcher habitat in the RSA, relative to what was historically present for this species.

Olive-sided flycatcher was recorded at two breeding bird survey plots during baseline surveys in 2016. One individual was detected in sparse forest and one individual was detected in dense coniferous forest habitat.

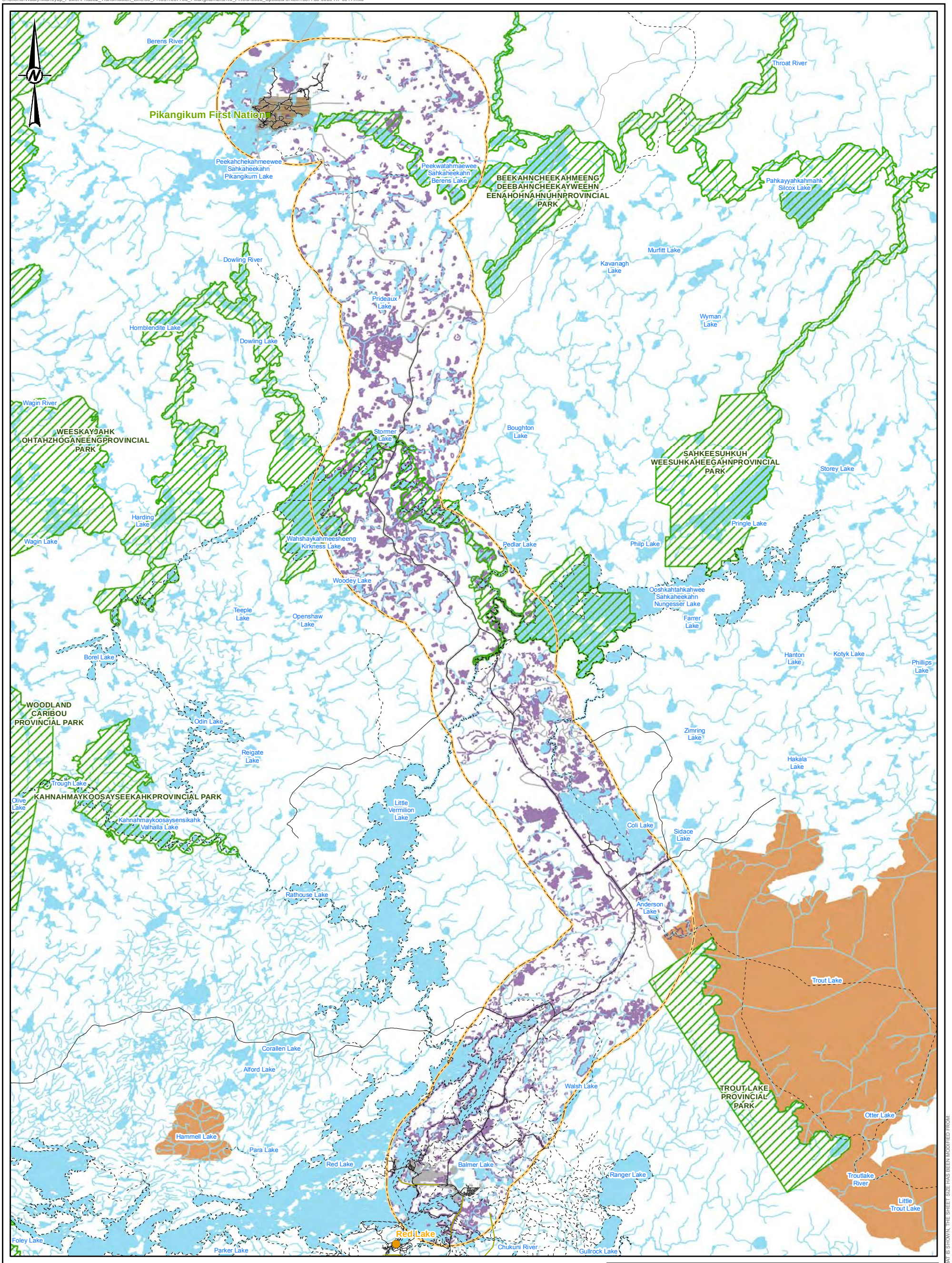
The RSA contains 13,068 ha (11.4%) of suitable olive-sided flycatcher habitat at Base Case (Table 11). Overall, the changes in habitat availability at Base Case are predicted to be within the adaptive capacity and resilience limits of this criterion. Habitat is naturally patchy and sparsely distributed in the RSA (Figure 11); olive-sided flycatchers are well adapted to patchily distributed habitat as this species is more abundant in highly fragmented landscapes than undisturbed landscapes (McGarigal and McComb 1995). Additionally this species is not a mature or old growth forest obligate and edge habitat can increase habitat suitability.

Table 11: Olive-sided Flycatcher Habitat Availability in the Regional Study Area at Base Case

Habitat Suitability	Area (ha)	Proportion (%)
Moderate to High	13,068	11.4
Nil to Low	101,152	88.6
Total	**114,220**	**100.0**

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.
ha = hectares; % = percent.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Regional Study Area
- Base Case Disturbance
- Olive-sided Flycatcher Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
OLIVE-SIDED FLYCATCHER HABITAT IN THE REGIONAL STUDY AREA AT BASE CASE

CONSULTANT

YYYY-MM-DD	2017-03-22
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
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4.2.8.2 Habitat Distribution

Habitat fragmentation is thought to improve olive-sided flycatcher habitat by providing edge habitat; however, Haché et al. (2014) found that the density of olive-sided flycatchers was negatively affected by linear disturbances on the landscape. Suitable breeding habitat for olive-sided flycatcher is patchily distributed throughout the RSA, with larger patches of contiguous habitat located in the vicinity of Kirkness Lake and Coli Lake (Figure 11). The small amount of existing disturbances in the RSA do not likely function as movement or dispersal barriers for this species in the Base Case.

4.2.8.3 Survival and Reproduction

Olive-sided flycatchers are found throughout most of Canada, with the latest population estimate indicating there are approximately 900,000 individuals in Canada (Environment Canada 2016b). Olive-sided flycatcher are found in lower abundance in northwestern Ontario compared to other parts of their range (Environment Canada 2016b). This is corroborated by the low detection rate of this species during baseline surveys (i.e., detected at 2 of 20 plots in the baseline study area in 2016). One olive-sided flycatcher was also incidentally observed during nightjar surveys in the baseline study area in 2016.

Data from the Ontario Breeding Bird Atlas (Cadman et al. 2007) (Region 39: English River and Region 44: Big Trout Lake) were used to estimate the number of individuals in the RSA. Using the same methods applied to estimate the number of common nighthawk in the regions (Section 3.2.7.3), abundance estimates for Region 39 and 44 are 1.02 and 1.36 individuals/km², respectively, which averages to 1.19 individuals/km² over the two regions. Applying this abundance estimate to the amount of suitable habitat present at Base Case (Table 11) corresponds to a rough abundance estimate of 156 individuals in the RSA.

An analysis of Breeding Bird Survey data by Environment Canada (2014) indicates an average annual population decline of 2.1% in Ontario from 1970 to 2012, suggesting an overall 88% decline during that time period. Because the olive-sided flycatcher population may have declined by more than 50%, they are considered a priority species under the Bird Conservation Strategy with the objective of doubling current abundance (Environment Canada 2013b). More recent analyses completed by the Boreal Avian Monitoring Project found no evidence for a decline in olive-sided flycatcher density across Canada between 1997 and 2013 (Haché et al. 2014).

Nevertheless, olive-sided flycatcher is designated as threatened by COSEWIC (2007) and has the same status under Schedule 1 of SARA. In Ontario it is designated as Special Concern under the ESA. Environment Canada (2016b) states that “there are currently adequate numbers of individuals to sustain the species in Canada or increase its abundance with the implementation of proper conservation actions.” The population objective for olive-sided flycatcher identified in the federal recovery strategy is to halt the national decline by 2025, with no more than a 10% decline during this time, and ensure a 10-year positive population trend thereafter (Environment Canada 2016b).

The abundance of olive-sided flycatcher appear to be positively related with the amount of old-growth, forest edge, and fragmentation (McGarigal and McCombs 1995). The main threats to olive-sided-flycatcher populations include habitat loss or degradation, fire suppression, and reduced availability of insect prey (Environment Canada 2016b). Several studies have suggested that deforestation on the wintering grounds in South and Central America may also be a primary factor in the decline of this species (Altman and Sallabanks 2000; Petit et al. 1993).

Olive-sided flycatcher abundance is often higher in early post-fire communities than in other habitat types (Lowe et al. 1978; Hutto and Young 1999). Altman and Sallabanks (2012) report that nest success for olive-sided flycatcher was highest in early post-fire habitat. Robertson and Hutto (2007) found nest success to be twice as high in a burned plot compared to a selectively forested one and suggest that nests in logged areas are subject to higher rates of predation. In contrast Meehan et al. (2003) reported higher reproductive success in logged habitat.

Similar to the common nighthawk, the olive-sided flycatcher is limited by insect populations which may be influenced by a number factors such habitat loss, pesticide use, and climate change (Both et al. 2006; Environment Canada 2016b). Changes in prey availability may also related to a temporal mismatch between reproduction and peak food availability. The RSA has likely been affected by these factors at Base Case. Olive-sided flycatcher may be particularly susceptible to these factors because they have low reproductive potential and the longest migration distance of all flycatchers (Environment Canada 2016b). Even though habitat is patchily distributed in the RSA at Base Case, olive-sided flycatchers are well-adapted to this naturally patchily distribution of habitat; olive-sided flycatchers are more abundant in highly fragmented landscapes than undisturbed landscapes (McGarigal and McComb 1995), As such, changes in survival and reproduction at Base Case are expected to be within the resilience and adaptive capacity limits for this species.

4.2.9 Bank Swallow

4.2.9.1 Habitat Availability

Bank swallows primarily breed in friable soils in vertical banks, cliffs, and bluffs along ocean coasts, rivers, streams, lakes, reservoirs, and wetlands (Garrison 1999). Most nesting colonies in natural habitats are found along low-gradient, meandering waterways with eroding streamside banks (Garrison 1999). Nesting colonies are also commonly found in artificial habitats such as sand and gravel quarries and road cuts (Garrison 1999). Bank swallows avoid dense forests because of the lack of suitable nesting sites (Garrison 1999). Foraging habitats primarily include wetlands, open water, grasslands, riparian woodlands, agricultural areas, and shrublands (Garrison 1999).

The increase in erosion control measures in riverine, lacustrine, and ocean coast environments have decreased habitat availability for bank swallow (COSEWIC 2013). Other human interventions such as control of water level fluctuations and peak discharge rates via dams have also drastically reduced bank erosion and therefore suitable bank swallow habitat (COSEWIC 2013). However, sand and gravel excavation and road cuts have likely increased nesting habitat suitability for bank swallow (COSEWIC 2013). The availability of artificial habitats in gravel and sand pits and quarries increased at the same time that dams and flood control measures decreased natural habitat availability (COSEWIC 2013).

A habitat model was not developed for bank swallow because the Project is not anticipated to result in measurable effects on bank swallow populations that overlap the RSA (see Section 4.2.2).

4.2.9.2 Habitat Distribution

In Ontario the bank swallow occurs most commonly in the lower Great Lakes, St. Lawrence Valley and the Abitibi-Témiscamingue and Lac-Saint-Jean regions. This species is sparsely distributed throughout the Canadian Shield and most commonly occur in aggregate pits and large river corridors (COSEWIC 2013). Suitable habitat for bank swallow is likely patchily distributed in the RSA due to the reliance of this species on particular soil types and vertical banks near water sources.

4.2.9.3 Survival and Reproduction

Canada was thought to support approximately 1.4 million bank swallows in 2007; the current population estimate is likely lower because of the population declines since 2007 (COSEWIC 2013). The population estimate of barn swallows in Ontario was approximately 200,000 individuals in 2007 (COSEWIC 2013).

The long-term breeding bird survey (BBS) data show that bank swallow populations in Canada have decreased by 8.84% per year from 1970 to 2011; this in an overall decline of 98% (COSEWIC 2013). In Ontario, bank swallow populations decreased by 4.99% per year from 2001 to 2011 (COSEWIC 2013). This species it is considered a priority species under the Bird Conservation Strategy for the region, which has the objective of assessing and maintaining the population (Environment Canada 2013). The barn swallow was designated as threatened by COSEWIC in 2013 but has yet to be listed under SARA.

Bank swallow was recorded in five squares in OBBA Region 44 during the second OBBA and is noted as a confirmed breeder in the region (Cadman et al. 2007). Bank swallow was not observed in the baseline study area during field surveys in 2016.

The bank swallow primarily feeds on jumping and flying insects (Garrison 1999). Insect populations are declining worldwide and this may be contributing to bank swallow decline (COSEWIC 2011). Many aerial-foraging insectivorous birds, such as band swallow, have experienced large declines since the 1980s (Blancher et al. 2009; NABCIC 2012). The declines suggest a single cause related to insect abundance as both forest and non-forest aerial-foraging birds are declining (Blancher et al. 2009; Nebel et al. 2010; Nocera et al. 2012; Paquette et al. 2014). Potential causes of reduced availability of insects include habitat loss, changes to timing of peak food abundance from climate change, and pesticide use (Nebel et al. 2010; Nocera et al. 2012; Paquette et al. 2014).

4.2.10 Canada Warbler

4.2.10.1 Habitat Availability

Throughout their range, Canada warblers (*Cardellina canadensis*) nest in a variety of usually wet, forest types, with a well-developed, dense shrub layer (COSEWIC 2008; Environment Canada 2016c). This species is commonly found in shrub marshes, swamps dominated by black spruce (*Picea mariana*) and tamarack (*Larix laricina*), and riparian woodlands (COSEWIC 2008). In the eastern portion of their range, which includes the RSA, Canada warblers are associated with wet mixedwood forests and early successional forests (6 to 30 years) created by forest harvesting or natural disturbance (Ball and Bayne 2014; Environment Canada 2016c).

The RSA contains 29,642 ha (26.0%) of suitable Canada warbler habitat at Base Case (Table 12).

Table 12: Canada Warbler Habitat Availability in the Regional Study Area at Base Case.

Habitat Suitability	Area (ha)	Proportion (%)
Moderate to High	29,642	26.0
Nil to Low	84,577	74.1
Total	**114,220**	**100.0**

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.
ha = hectares; % = percent.

Forestry can have both positive and negative effects on Canada warbler habitat. Initially forestry activities remove suitable habitat; Canada warbler are generally absent from recently disturbed areas (0 to 5 years post-disturbance) (Norton et al. 2000; Schieck and Song 2006). In the eastern part of their range, Canada warbler are most abundant in areas 6 to 30 years post-harvest that contained residual live trees (Hagan et al. 1997; Hobson and Schieck 1999; Schieck and Hobson 2000; Lambert and Faccio 2005; Hallworth et al. 2008; Environment Canada 2016c). Canada warbler do not use harvested areas where residual mature tree retention is low. Canada warbler were absent in harvested stands when retention was 6% but were present when mature tree retention was 30% to 40% and retention was aggregated into larger patches (Norton and Hannon 1997; Schieck and Hobson 2000).

Fire suppression activities have increased the average forest age in northern Ontario by approximately 30 years, compared to 1915. Shrub density is highest in young regenerating (0 to 24 years) and mature forests (>100 years) because light levels are limited in closed-canopy stands of 25 to 100 years (Alaback 1982; McKenzie et al. 2000). The direction of the effect on Canada warbler habitat from fire suppression activities (i.e., positive or negative) is likely related to the density of the shrub layer in old forests. If old forests have a dense shrub layer, fire suppression activities have likely increased Canada warbler habitat from what was historically available for this species. Conversely, if the shrub layer in old forests is sparse, fire suppression activities have likely decreased the amount of habitat that is available in the RSA, from historical conditions, by decreasing the amount early regenerating habitat.

It is currently unknown whether breeding habitat is limiting Canadian populations of Canada warbler (Environment Canada 2016c). Approximately 50% of the Canadian population may reside in Ontario and results of the habitat mapping in the RSA indicate that 26% of the RSA is suitable breeding habitat for Canada warbler. This suggests that breeding habitat is not a limiting factor for Canada warbler populations that overlap with the RSA at Base Case and that changes in habitat availability have not exceeded the adaptability or resilience limits of this criterion.

4.2.10.2 Habitat Distribution

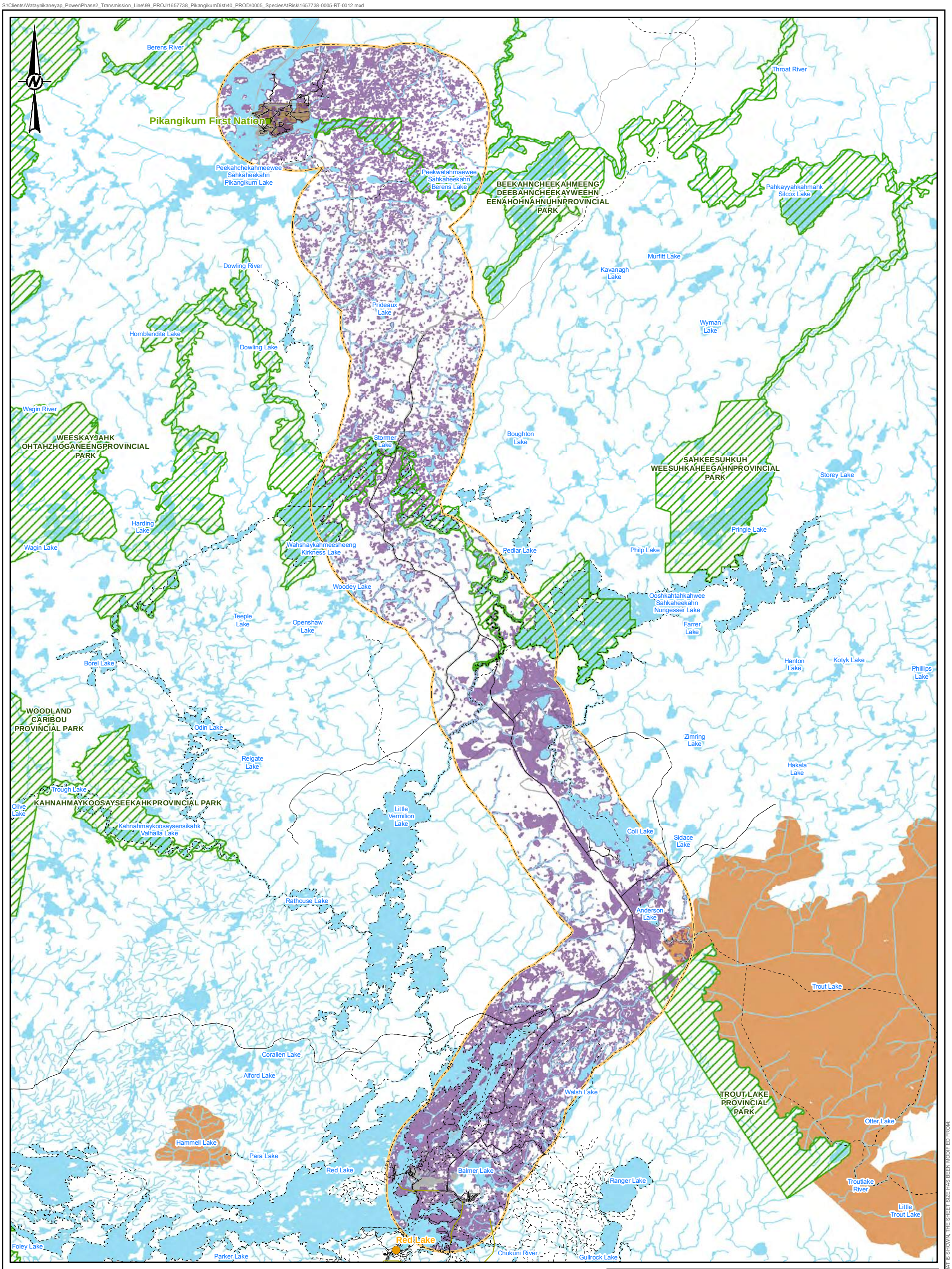
Changes to forest composition have been greatly influenced by forest harvesting operations. Overall, forests have become more fragmented over the past 60 years, with policies providing direction to limit the size of clearcuts and scatter cuts throughout the forest. Effects from habitat fragmentation on Canada warbler are unclear. Some studies suggest that fragmentation has negative effects on Canada warbler because they are an interior-forest nesting bird that avoids edge habitat (Askins and Philbrick 1987; Hobson and Bayne 2000). Other studies suggest that Canada warbler are resilient to habitat fragmentation from logging activities as the species uses early successional habitat (Schmiegelow et al. 1997; Schmiegelow and Monkkonen 2002).

Habitat fragmentation from linear disturbances present in the RSA at Base Case may have negatively affected Canada warbler habitat distribution. However, habitat does not appear to be a limiting factor for Canada warbler at Base Case, and this species is highly mobile and can establish territories in areas below carrying capacity. St. Clair et al. (1998) found that some forest birds were reluctant to cross gaps greater than 50 m but would cross gaps of 200 m when no other choice existed.

At Base Case, suitable Canada warbler habitat is distributed throughout the RSA, with relatively less habitat being present between Coli Lake and Kirkness Lake (Figure 12). Baseline surveys for the Project did not recorded Canada warbler in the baseline study area in 2016. Information from the MNRF (2015b) indicates that Canada warbler breed from the Mixedwood Plains north to the Hudson Plains, with the highest densities of this species occurring in the Southern Shield.

Overall, habitat is well distributed and connected across the RSA. Existing disturbance in the RSA do not likely function as dispersal barriers for this species in the Base Case and habitat conditions at Base Case are predicted to be well within the resilience and adaptive capacity limits for this criterion.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Regional Study Area
- Base Case Disturbance
- Canada Warbler Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
4. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

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1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
CANADA WARBLER HABITAT IN THE REGIONAL STUDY AREA AT BASE CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
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4.2.10.3 Survival and Reproduction

Approximately 82% of the Canada warbler breeding range occurs in Canada (Environment Canada 2016a). The Canadian population of this species is estimated to be three million individuals (Environment Canada 2016a). Abundance estimates of Canada warbler in Ontario suggest a population of 900,000 individuals or approximately 33% of the Canadian population (COSEWIC 2008). In Ontario, the Ontario Breeding Bird Atlas showed an annual population trend of -0.8% between the first (1981 to 1985) and second (2001 to 2005) atlas periods. Long-term breeding bird survey data show a decline of Canada warbler abundance of 4.5% per year from 1968 to 2007 (overall 83% decline) (Environment Canada 2016a). Population trends for eastern Canada (Ontario, Quebec, and the Maritimes) show long- (1968 to 2007) and short- (1997 to 2007) term declines (COSEWIC 2008).

Because the Canada warbler population in Canada has declined by 83% from 1968 to 2007, they are considered a priority species under the Bird Conservation Strategy with the objective of doubling current abundance (Environment Canada 2013b). The Canada warbler was designated as threatened by COSEWIC in 2008 and was given the same status under Schedule 1 of SARA in 2010. Despite concerning population trend data, Environment Canada (2016a) states that “there are currently adequate numbers of individuals to sustain the species in Canada or increase its abundance with the implementation of proper conservation actions.” The population objective for Canada as identified in the final federal recovery strategy is to halt the national decline by 2025, with no more than a 10% decline during this time, and ensure a 10-year positive population trend thereafter (Environment Canada 2016a).

Data from the Ontario Breeding Bird Atlas (Cadman et al. 2007) (Region 39: English River and Region 44: Big Trout Lake) were used to estimate the number of individuals in the RSA. Using the same methods applied to estimate the number of common nighthawk in the regions (Section 3.2.7.3), abundance estimates for Region 39 and 44 are 0.79 and 0.21 individuals/km², respectively, which averages to 0.50 individuals/km² over the two regions. Applying this abundance estimate to the amount of suitable habitat (Table 12) corresponds to a rough abundance estimate of 148 individuals in the RSA.

The abundance of Canada warbler is positively related to shrub density (Norton and Hannon 1997; Hallworth et al. 2008). The primary threats to Canada warbler habitat include conversion of land for agriculture, removal of the shrub layer (e.g., from forest harvesting or silviculture), forest harvesting, and accidental mortality from collisions with infrastructure (Environment Canada 2016a). Several theories have been suggested as the cause of Canada warbler population decline, including habitat loss and degradation (Ball and Bayne 2014), predation on breeding grounds (Bohning-Gaese et al. 1993), and spruce budworm declines (Sleep et al. 2009). A cause-effect relationship has not been established between loss and degradation of wintering habitat and Canada warbler population decline but loss of primary forest on the wintering grounds is still considered to be a key potential cause of this species decline (Environment Canada 2016a). It is currently unknown whether breeding habitat is limiting in Canada (Environment Canada 2016a).

Canada warbler primarily feeds on flying insects and spiders. Although Canada warbler is not considered a spruce budworm specialist, it has been found to feed heavily on spruce budworms during outbreaks. Insect populations are declining worldwide and spruce budworm outbreaks in eastern forests have decreased since 1970; both factors may be contributing to Canada warbler decline (Environment Canada 2016a). Many aerial-foraging insectivorous birds, such as Canada warbler, have experienced large declines since the 1980s (Blancher et al. 2009; NABCIC 2012). The declines suggest a single cause related to insect abundance as both forest and non-forest aerial-foraging birds are declining (Blancher et al. 2009; Nebel et al. 2010; Nocera et al. 2012;

Paquette et al. 2014). Potential causes of reduced availability of insects include habitat loss, changes to timing of peak food abundance from climate change, and pesticide use (Nebel et al. 2010; Nocera et al. 2012; Paquette et al. 2014). Insect and bird populations in the wintering range and breeding range (e.g., RSA) have likely been affected by these factors at Base Case. Canada warblers may be susceptible to these factors because their residency on breeding grounds is brief compared to other warblers. Canada warblers are one of the last species to arrive on breeding grounds and one of the first species to leave in the fall (COSEWIC 2008). This behaviour reduces the possibility for raising more than one clutch per year, as well as limits adaptive capability in regards to climate change (Environment Canada 2016a).

Changes to Canada warbler habitat from forest harvesting may have positive and negative effects on this species' survival and reproduction. Canada warbler have been found to tolerate a degree of forest harvesting, especially in the eastern portion of its range (Hagan et al. 1997; Environment Canada 2016a). Canada warbler habitat in eastern Canada could potentially be maintained by rotating harvests that leave residual trees and create dense shrub understories (Hallworth et al. 2008).

Canada warbler nests typically contain four or five eggs, though as few as two and as many as six eggs have been observed (Reitsma et al. 2009). Brown-headed cowbirds have been reported to parasitize Canada warbler nests although the degree that nest parasitism contributes to Canada warbler survival and reproduction is not known (Reitsma et al. 2009). Brown-headed cowbirds prefer edge habitat (Lowther 1993) and the density of brown-headed cowbirds may increase with an increase in edge habitat. Canada warbler is an interior-forest nesting species. Therefore, although habitat availability may decrease within increasing edge, the risk of nest parasitism is not expected to increase as Canada warbler avoid edge habitats (Lambert and Faccio 2005).

Despite declining population trends, Environment Canada (2016a) states that "there are currently adequate numbers of individuals to sustain the species in Canada or increase its abundance with the implementation of proper conservation actions." Therefore, changes to Canada warbler survival and reproduction in the Base Case are expected to be within the resilience and adaptability limits of this criterion that has populations overlapping the RSA.

5.0 EFFECTS ASSESSMENT AND MITIGATION

5.1 Project-Environment Interactions and Pathway Analysis

The linkages between Project components and activities and potential effects to SAR criteria are identified and assessed through a pathway analysis. Potential effect pathways were identified by reviewing the Project Description, existing environmental conditions and knowledge from similar projects and activities. Effect pathways after the implementation of mitigation (or net effects) are screened to determine if net effects are likely. The screening process classifies potential effect pathways into the following categories:

- **No pathway:** the pathway is removed (i.e., effect is avoided) by implementation of mitigation practices and policies or actions. The pathway is not expected to result in a measurable change relative to the Base Case and, therefore, would not have a net effect on a criterion's assessment endpoint.
- **Secondary:** the pathway could result in a measurable environmental change relative to the Base Case but would have a negligible net effect on a criterion's assessment endpoint. The pathway is, therefore, not expected to additively or synergistically contribute to effects of other past, previous or reasonably foreseeable projects.
- **Primary:** the pathway is likely to result in an environmental change relative to the Base Case that could contribute to net effects on a criterion's assessment endpoint.

Potential pathways for effects to SAR criteria species and mitigation are presented in Table 13. Classification of effects pathways to SAR species criteria are also presented in Table 13, and detailed descriptions are provided in the following sections. It should be noted that much of the mitigation to address potential indirect effects (e.g., surface water) are provided in the INAC 2009 Screening Report; and therefore not completely repeated in the table below.

Table 13: Potential Effect Pathway for Effects for SAR Criteria

Project Component or Activity	Effect Pathway	Mitigation	Pathway Type
Project activities that generate air emissions and fugitive dust. During the construction stage: ■ clearing, grading earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction infrastructure (e.g., laydown areas); operation of vehicles and construction equipment; and ■ transportation of personnel, materials and equipment. During the operations and maintenance stage: ■ operation and maintenance of the new ROW, fencing, power line, conductors, tower foundations and permanent access roads.	Dust and air emissions, and subsequent deposition can change soil quality and vegetation, which can affect wildlife habitat availability and distribution	■ Watering of access roads and use of dust suppressants. ■ Regular maintenance of vehicles and equipment. ■ Speed limits will be defined and enforced to limit fugitive dust. ■ Salvaged soil stockpiles will be seeded, where necessary, to reduce wind erosion.	Secondary
Project activities that result in the loss or alteration of vegetation and topography. During the construction stage: ■ clearing, grading earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction infrastructure (e.g., laydown areas); and ■ surface water management and erosion control. During the operation and maintenance stage: ■ vegetation maintenance along ROW at an appropriate height to protect the facility and improve public and worker safety.	Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution	■ Limit the Project footprint. ■ Use of existing access roads. ■ Selective clearing and retention of shrub vegetation, trees, wildlife trees, and coarse woody debris as much as practical. ■ Known sensitive ecological features would be clearly marked (e.g., wetlands and significant wildlife habitat) with associated setbacks, as feasible. ■ Engage with applicable government agency (Ministry of Natural Resources and Forestry and Environment and Climate Change Canada) if sensitive ecological features are encountered or cannot be avoided. ■ Salvage/rescue cut timber; limit disturbance to other areas; employ tree protection measures (INAC 2009). ■ Disturbance to the LFH soil layer will be limited to the extent possible to facilitate natural regeneration in cleared areas.	■ Primary (woodland caribou, wolverine, little brown myotis, bald eagle, Canada warbler, eastern whip-poor-will, common nighthawk, and olive-sided flycatcher) ■ Secondary (bank swallow and horned grebe)
	Vegetation clearing will result in an increase in edge habitat, which could increase nest parasitism risk for forest breeding birds.	■ Selective clearing and retention of shrub vegetation, trees, wildlife trees, and coarse woody debris in areas where safe operation practices can still be achieved.	■ Primary (Canada warbler) ■ Secondary (eastern whip-poor-will, common nighthawk, and olive-sided flycatcher)

Table 13: Potential Effect Pathway for Effects for SAR Criteria

Project Component or Activity	Effect Pathway	Mitigation	Pathway Type
Project activities that result in the loss or alteration of vegetation and topography. During the construction stage: ■ clearing, grading earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction infrastructure (e.g., laydown areas); and ■ surface water management and erosion control. During the operation and maintenance stage: ■ vegetation maintenance along ROW at an appropriate height to protect the facility and improve public and worker safety.	Site preparation, construction and maintenance of the power line ROW may result in the destruction of nests, eggs, and individuals of migratory birds (incidental take)	■ Manage, to the extent possible, the incremental removal of vegetation so that removal occurs outside of the migratory bird nesting period of April 15 to August 31 of each year to avoid disturbing active migratory bird nests (Environment Canada 2014). ■ If vegetation clearing or other construction activities that may result in the incidental take of non-SAR birds is required during the nesting season, activities will be managed to comply with the SARA (Government of Canada 2002) and the MBCA (Government of Canada 1994). Pre-construction nest surveys will be completed and in the event that a nest is found, the MNRF and ECCC will be contacted to determine appropriate impact management measures. ■ No clearing within 100 m of an identified bald eagle nest.	Secondary
	Site preparation, construction and maintenance of the power line ROW may result in the destruction of wolverine dens (incidental take)	■ Manage, to the extent possible, the incremental removal of vegetation so that removal occurs outside of the wolverine denning period of January 1 to March 30 of each year to avoid disturbing denning wolverine. ■ If vegetation removal cannot be avoided during the wolverine denning period, then engage with MNRF and First Nation communities for knowledge of active denning sites that have not been identified in the SAR Report. If active dens sites observed during this period at or near the Project construction area, work will stop and the MNRF will be notified. If work is to continue during this period, Project activities will need to be 500 m from the identified den.	Secondary
	Site preparation, construction and maintenance of the power line ROW may result in the destruction of roosting and hibernating bats (incidental take)	■ Clearing activities during construction for the Project will be managed so that vegetation removal will occur outside of the maternal roosting period (June 1 to July 31). ■ Hibernation period: Avoid construction between potential hibernacula and a boundary being the lesser of: ▪ a 200 m radius of contiguously-treed area, or ▪ the distance to the nearest existing road right of way (ROW); ■ Implement a restricted timing window (October 1 to April 30) for any construction within 200 m of potential hibernacula.	Secondary
Project activities that result in changes to surface water flow. During the construction stage: ■ clearing, grading earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction infrastructure (e.g., laydown areas); operation of vehicles and construction equipment; and ■ surface water management and erosion control	Changes to hydrology may alter drainage patterns and increase/decrease drainage flows and surface water levels that can cause changes to soils and vegetation, which can affect wildlife habitat availability and distribution	■ Fording of watercourses is not permitted outside the winter period freeze-up. ■ Follow best management practices for the installation, maintenance, removal and reclamation of ice crossings if needed.	No Pathway

Table 13: Potential Effect Pathway for Effects for SAR Criteria

Project Component or Activity	Effect Pathway	Mitigation	Pathway Type
Project activities that could result in invasive species introduction. During the construction stage: ■ surveying and flagging; ■ clearing, grading earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction infrastructure (e.g., laydown areas); operation of vehicles and construction equipment; and ■ transportation of personnel, materials and equipment During the operation and maintenance stage: ■ operation and maintenance of new ROW, fencing, power line, conductors, tower foundations, and permanent access roads; and ■ transportation of personnel, materials and equipment	Introduction and spread of noxious and invasive plant species can affect plant community composition, which can affect wildlife habitat availability and distribution	■ Implement the mitigation to limit effects of noxious and invasive plants on natural vegetation, which would include: ▪ cleaning and inspection of vehicles and equipment at dedicated cleaning area prior to Project site entry; ▪ re-cleaning vehicles and equipment if an area of weed infestation is encountered, prior to advancing to a weed-free area; ▪ locating and managing cleaning locations on the Project site; and core areas requiring re-vegetation following the completion of the Project, use seed mixes and/or tree saplings of native species of plants which are adapted to the local climate and conditions that will further enhance the plant community (INAC 2009).	No pathway
Project activities that could result in sensory disturbance. During the construction stage: ■ clearing, grading earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction infrastructure (e.g., laydown areas);surface water management and erosion control ■ transportation of personnel, materials and equipment During the operation and maintenance stage: ■ operation and maintenance of new ROW, fencing, power line, conductors, tower foundations ■ transportation of personnel, materials and equipment	Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution	■ Use of existing access roads will limit the area disturbed and minimize the quantity of new sensory disturbances. ■ Selective clearing and retention of shrub vegetation, trees, wildlife trees, and coarse woody debris in areas where safe operation practices can still be achieved. ■ Within a caribou range, avoid all activities in high use areas as identified by the MNRF (Attachment A) during the following periods: ▪ Nursery areas: May 1 to July 14; and ▪ Travel Corridors: April and November. ■ Within a caribou range, minimize sensory disturbance within 10 km of known high use areas during sensitive periods (Attachment A): ▪ Nursery areas: July 15 to September 15 ■ Wildlife always have the right-of-way. ■ Speed limits will be defined and enforced on access roads. ■ Environmental awareness and sensitivity training will be provided to Project field employees and key contractor staff. ■ Recreational use of off-road vehicles by employees and contractors is prohibited.	■ Primary (woodland caribou, wolverine, little brown myotis, bald eagle, Canada warbler, eastern whip-poor-will, common nighthawk, and olive-sided flycatcher) ■ Secondary (bank swallow and horned grebe)
	Use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of caribou	Use existing access roads to avoid and minimize additional linear development and habitat conversion.	Primary

Table 13: Potential Effect Pathway for Effects for SAR Criteria

Project Component or Activity	Effect Pathway	Mitigation	Pathway Type
Project activities that could result in sensory disturbance. During the construction stage: ■ clearing, grading earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction infrastructure (e.g., laydown areas);surface water management and erosion control ■ transportation of personnel, materials and equipment During the operation and maintenance stage: ■ operation and maintenance of new ROW, fencing, power line, conductors, tower foundations ■ transportation of personnel, materials and equipment	Collisions with Project vehicles during construction and operation may cause injury or mortality to individual animals	■ Speed limits will be defined and enforced on access roads. ■ Wildlife always have the right-of-way. ■ Drivers have standard safety training and are provided with environmental awareness training. ■ Post signs warning drivers of high use wildlife areas. ■ Employees in vehicles encountering large mammals (e.g., caribou, moose, black bear, and wolf) on roads are required to communicate the presence of wildlife on the roads to other employees working in the area. ■ Recreational use of off-road vehicles by employees and contractors is prohibited. ■ Wildlife-vehicle collisions would be monitored and reported, which provides feedback for adaptive management.	Secondary
	Collisions with the power line causing injury or mortality to bat and birds criteria	■ Bird deterrents or visibility enhancements (e.g., spinning reflectors) will be installed on the power line in areas of concern (e.g., near waterbodies known to represent staging areas). ■ Installation of reflectors where the line is in areas with no vegetation cover and within 1 km of large waterbodies.	■ Primary (bald eagle) ■ Secondary (little brown myotis, horned grebe, bank swallow, common nighthawk, eastern whip-poor-will, Canada warbler, olive-sided flycatcher)
	Increase in public access could affect wildlife survival and reproduction through vehicle strikes, and/or legal and illegal hunting	■ Use of existing roads. ■ Selective clearing and retention of shrub vegetation, trees, wildlife trees, and coarse woody debris in areas where safe operation practices can still be achieved to limit access for hunting. ■ Hunting by Project employees and contractors will be prohibited	No Pathway
Project activities that could require waste management. During the construction stage: ■ hazardous materials, solid and liquid waste handling; ■ re-fuelling, service and maintenance of vehicles and construction equipment; and ■ discharges of wastewater from construction, vehicle and equipment wash, and domestic activities.	Attraction of wildlife to the Project (e.g., food waste, petroleum-based products, salt) during construction may increase human-wildlife interactions and change predator-prey relationships, which can affect wildlife survival and reproduction	■ Manage attractants (e.g., bear-proof containers, garbage removed frequently) to limit interactions between people and wildlife. ■ Implement a policy that prohibits feeding wildlife to minimize habituation. ■ Provide training to staff and contractors to reinforce the importance of not feeding wildlife and carrying out proper waste management practices. ■ Monitor waste management practices for improvement through adaptive management, when necessary.	Secondary
	Chemical or hazardous material stored on the Project site, or spills (e.g., petroleum products, ammonium nitrate) on site or along access roads can affect wildlife survival and reproduction	■ Spills will be contained locally and disposed of at an approved industrial waste disposal facility in accordance with all Provincial regulations. ■ Storage facilities for hazardous materials and waste will meet regulatory requirements and would be designed to protect the environment and workers from exposure ■ Equipment for containing spills would be maintained on-site. Emergency spill kits would be available near fuel and hazardous materials handling locations (e.g., spill kits at the main service areas) and in vehicles. ■ Refueling and lube stations are not to occur within 100 m of waterbody, watercourse or wetland, and include secondary containment structures. ■ Construction equipment, machinery, and vehicles would be regularly maintained to limit mitigate risk of leaks. ■ Train individuals working on-site and handling hazardous materials about best practices for the transportation of dangerous goods to minimize adverse effects on plants and wildlife through introduction of hazardous materials into the environment.	No Pathway

Table 13: Potential Effect Pathway for Effects for SAR Criteria

Project Component or Activity	Effect Pathway	Mitigation	Pathway Type
Project activities that require blasting: During the construction stage: ■ use of explosives and blasting to create level areas of transmission structures and for foundation excavations	Fly rock from blasting may result in injury or mortality to wildlife	■ Wataynikaneyap will use explosives if excavation to remove materials for foundation systems is not feasible. ■ Check the blast zone for wildlife before a blast.	No pathway
Project activities related to electricity transmission During the operation and maintenance stage: ■ electricity transmission	Electrocution causing injury or mortality to birds	■ Industry standards to avoid minimize risk of electrocutions would be incorporated in tower design. ■ Maintain minimum clearance of 2.3 m between the lines to reduce the risk of electrocutions.	Secondary
	Electromagnetic fields from the power line may cause changes to wildlife survival and reproduction.	None	No Pathway

5.2 Pathway Screening

5.2.1 No Pathway

- **Introduction and spread of noxious and invasive plant species can affect plant community composition, which can affect wildlife habitat availability and distribution**

The ground disturbance associated with construction and operation of the power line can create the type of habitat favoured by invasive plant species. Newly cleared areas provide dispersal avenues for non-native and invasive species, and invasions may be more likely to succeed as a result of stress placed on native species from habitat alteration (Trombulak and Frissell 2000). Vehicles and machinery can serve as dispersal mechanisms for plant seeds and vegetative parts that can get lodged in tires, the undercarriage, or mud on the surface of the vehicle.

The introduction of non-native and invasive plant species can upset the natural balance of established ecosystems (Forman 1995). When non-native or invasive plant species (e.g., Canada thistle [*Cirsium arvense*]) are introduced or invade from an adjacent area, they may compete with native species for resources, degrade habitats, or modify genetic diversity resulting in population declines of native species (Pimentel et al. 2007). Once invasive species are introduced into an area and become established, they are difficult to eradicate (Simberloff 1997). Non-native plant species can negatively affect wildlife habitat quality if non-native species come to dominate native vegetation in certain areas, thereby reducing habitat niches for some wildlife.

Preventing noxious and invasive species from entering an area is often more efficient and cost effective than dealing with their removal once established (Clark 2003; Polster 2005; Carlson and Shepard 2007). Wataynikaneyap will implement a mitigations to avoid and minimize the introduction and spread of noxious and invasive plants during construction and operations. Additional mitigation would include cleaning and inspection of vehicles and equipment prior to Project site entry, re-cleaning vehicles and equipment if an area of weed infestation is encountered, prior to advancing to a weed-free area.

The implementation of mitigation is anticipated to minimize the introduction and spread of noxious and invasive species so that any effect to native vegetation would be localized and minor, and is predicted to result in no to negligible ecological changes to wildlife habitat availability and distribution relative to Base Case conditions.

- **Fly rock from blasting may result in injury or mortality to wildlife**

Explosives may be used to remove bedrock for the placement of towers. Use of explosives produces fly rock, which has potential to cause wildlife injury and mortality. However, the use of explosives will be limited to Project construction and to specific geological conditions that do not allow for an alternative method of removing material for the anchoring of towers. The blast zone will be checked for wildlife prior to the blast.

Blasting would occur infrequently and over a short duration in small, localized areas, and considering the high level of activity that would be occurring in the area prior to the blast, animals are expected to avoid the immediate area, which should result in no to negligible changes to wildlife abundance due to mortality from fly rock.

- **Increase in public access could affect wildlife survival and reproduction through vehicle strikes, and/or legal and illegal hunting**

Primary access for construction of the Project will be from Nungesser Road, the Pikangikum All-Season Road, and any newly cleared portions of all-season roads that are planned to be constructed under the Whitefeather Forest Management Plan. Approved Whitefeather Forest Management Plan all-season roads or clearings will be used (if constructed) to access the existing utility clearing on the north side of the Berens River and the proposed substation area. No new access roads are anticipated to be constructed for the Project. As such, this pathway is expected to result in no net effect on wildlife abundance.

- **Chemical or hazardous material stored on the Project site, or spills (e.g., petroleum products) on-site or along access roads may affect wildlife survival and reproduction**

Spills have the potential to change soil quality. Spills that occur in high enough concentrations could contaminate soils and cause effects on aquatic organisms, soil organisms, vegetation and wildlife habitat. Chemical spills can also affect wildlife survival and reproduction if animals are directly exposed to the chemical (e.g., ingestion).

Transport and handling of hazardous materials will be carefully managed by Wataynikaneyap. Storage facilities for hazardous materials and waste will meet regulatory requirements and will be designed to protect the environment and workers from exposure. Emergency spill kits will be available at transfer locations for toxic materials and fuel. Construction equipment, machinery, and vehicles would be regularly maintained to mitigate risk of leaks. Employees will respond to, report, and monitors spills involving hazardous materials. Spills will be contained locally and disposed of at an approved industrial waste disposal facility in accordance with all Provincial regulations. Individuals working on-site and handling hazardous materials will be trained in best practices related to the transportation and handling of dangerous goods.

Training of personnel in safe handling of chemicals and hazardous materials are anticipated to avoid and minimize the frequency, spatial extent, and severity of spills. Therefore, spills on the Project site or along access roads are expected to result in no measurable changes to wildlife habitat, survival and reproduction.

5.2.2 Secondary Pathway

- **Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution (horned grebe and bank swallow only).**

- **Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution (horned grebe and bank swallow only)**

The availability and distribution of habitat for horned grebe is predicted to not change as the Project will avoid wetlands or waterbodies. The power line will span large waterbodies and a riparian buffer (30 m) regrowth will be left around large waterbodies. Support tower structures are anticipated to be set back from wetlands, as much as practical. Additionally, baseline surveys in 2016 recorded low abundance of waterbirds in the baseline study area. Two individuals from 2 waterbird species (pied-billed grebe [*Podilymbus podiceps*] and green-winged teal [*Anas crecca*]) were observed on the five lakes that were surveyed in the baseline study area. Three of the five lakes had no waterfowl present during the survey. Large concentrations of waterbirds were not observed at other

waterbodies while completing the waterbird aerial survey. No horned grebe or other listed waterbird species were observed during baseline surveys in 2016. No waterbodies were identified as being important duck hunting areas during engagement sessions and no waterfowl staging areas are identified in the RSA (MNRF 2017).

Bank swallows require vertical or near-vertical banks composed of unconsolidated substrates (e.g., silty fine sands) for constructing nesting colonies (COSEWIC 2013b). Bank swallows nest in a wide variety of habitat that contain suitable banks including river banks, sand and gravel pits, roadcuts, and piles of sand (COSEWIC 2013b). Construction of the Project is not anticipated to disturb bank swallow nesting colonies. Aggregate that is required for construction of the Project will be sourced from active, permitted aggregate pits that are in close proximity to the Project. Aggregate is anticipated to be extracted only outside of the bank swallow nesting period (April 15 to August 31).

Wetlands in the baseline study area appear to support low densities of waterbirds and the Project will avoid wetlands or waterbodies. Additionally suitable habitat for bank swallow in the baseline study area will be avoided to the extent possible; aggregate required for the Project will be sourced from active, permitted aggregate pits outside of the bank swallow nesting season. As such, this pathway is determined to result in localized and small changes to habitat availability and distribution, and a negligible net effect on horned grebe and bank swallow.

- **Changes in hydrology may alter drainage patterns and increase/decrease drainage flows and surface water levels that can cause changes to soils and vegetation, which can affect wildlife habitat availability and distribution**

Changes in drainage patterns and increases/decreases in drainage flows and surface water levels beyond the natural range of variation could lead to a loss of soils through increased erosion, affect vegetation, and alter wildlife habitat availability and distribution. A change in local water flows could alter the distribution of wetlands, riparian, and upland areas in relation to the changes in soil moisture (Nilsson and Svedmark 2002; Odland and del Moral 2002; Shafroth et al. 2002; Leyer 2005). As soil moisture levels change because of alterations in surface flows and water levels, plant species that thrive in drier soil moisture regimes can out compete riparian species that rely on fluctuations in soil moisture (Shafroth et al. 2002; Leyer 2005).

Mitigations have been included in the Project design to limit loss of soils, and include not permitting the fording of watercourses outside the winter period freeze-up., and installing culverts or temporary bridges using best management practices and following environmental approval conditions. Project activities are expected to not influence broad scale drainage patterns. Some measurable changes to localized soil moisture regimes (and erosion) adjacent to smaller drainages are predicted during construction and into operations until vegetation cover is restored in the surrounding area.

The effects predicted in the 2009 federal screening report and the MNRF screening table are not predicted to change with the implementation of mitigation measures identified in the 2009 federal screening report and in this section. Overall, small and local changes in the abundance and distribution of soils and plant communities are predicted to result in minor changes in the availability and distribution of wildlife habitat relative to Base Case conditions. Therefore, this pathway was determined to have a negligible net effect on SAR criteria.

- **Vegetation clearing will result in an increase in edge habitat, which could increase nest parasitism risk for forest breeding birds (eastern whip-poor-will, common nighthawk, and olive-sided flycatcher).**

The Project may increase predation risk by increasing the amount of edge habitat in the RSA. Ground-nesting species (e.g., eastern whip-poor-will and common nighthawk) are particularly vulnerable to nest predation (Cink 2002; Brigham et al. 2011) and many predators will use habitat edges as movement corridors (Chalfoun et al. 2002). The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density from Base Case to Project Case. The linear disturbance density in the RSA at Base Case is 0.2 km/km^2 and is predicted to remain the same at Project Case. As such, there is not anticipated to be a measurable change to predation risk on little brown myotis, bald eagle, eastern whip-poor-will, common nighthawk, olive-sided flycatcher, bank swallow, and horned grebe.

An increase in edge habitat may also increase the risk of nest parasitism to songbirds. Fragmentation of forests has increased accessibility for brown-headed cowbirds (*Molothrus ater*), which prefer more open habitats (Lowther 1993). However, cowbirds are generally more dispersed and have lower densities in forested areas in the Canadian Shield than south of the Canadian Shield where agricultural land is more common (Lowther 1993). Cowbird densities in southern Ontario are around 10 cowbirds per km^2; brown-headed cowbird density in OBBA Region 39 (English River) is 0.14 individuals/km^2. One cowbird was recorded in OBBA Region 44 (Trout Lake) during the first OBBA Atlas (1981-1985) and no cowbirds were recorded in OBBA Region 44 during the second OBBA Atlas (2001-2005) (Cadman et al. 2007). Additionally, eastern whip-poor-will, common nighthawk, and olive-sided flycatcher are not particularly vulnerable to brood parasitism (Cink 2002; Brigham et al. 2011; Altman and Sallabanks 2012). Therefore, nest parasitism risk to these species is not anticipated to increase with construction of the Project.

Increases in edge habitat are not predicted to affect the maintenance of self-sustaining and ecologically effective eastern whip-poor-will, common nighthawk, olive-sided flycatcher, and bank swallow populations that overlap the RSA.

- **Collisions with Project vehicles during construction and operation may cause injury or mortality to individual animals**

There is potential for an increase in the risk of injury or death to wildlife through collisions with Project vehicles and equipment. The predominant factors that contribute to road-related wildlife deaths are traffic volume, vehicle speed, and animal crossing speed (EBA 2001; Jaarsma et al. 2006; Litvaitis and Tash 2008). These factors directly affect the success of an animal reaching the opposite side of the road. An increase in either factor reduces the probability of an animal crossing safely (Underhill and Angold 2000).

The following mitigations are expected to limit the risk from vehicle and equipment collisions with wildlife:

- wildlife always have the right-of-way;
- speed limits will be defined and enforced on access roads;
- drivers will have standard safety training and will be provided with environmental awareness training;
- post signs warning drivers of high use wildlife areas;

- employees in vehicles encountering large mammals (e.g., caribou, moose, and black bear) will be required to communicate the presence of wildlife on the roads to others working in the area;
- recreational use of off-road vehicles by employees and contractors will be prohibited; and
- wildlife-vehicle collisions would be monitored and reported, and used to provide feedback for adaptive management.

Mitigation implemented for the Project is anticipated to limit wildlife mortality from vehicle collisions relative to Base Case conditions. The largest risk to wildlife from collisions with vehicles would occur when traffic volumes are highest during construction, and predicted to decrease during operations. Subsequently, mortality from vehicle collisions is expected to have a negligible net effect on wildlife abundance.

- **Collisions with the power line causing injury or mortality (little brown myotis, horned grebe, bank swallow, common nighthawk, eastern whip-poor-will, and olive-sided flycatcher and Canada warbler)**

The Project would cause injury or mortality to horned grebe, and nightjar (i.e., common nighthawk and eastern whip-poor-will), and songbird criteria, and possibly bats, through collisions with conductors and shield wires. Shield wires, which protect the power line from lightning strikes, are suspected to be the cause of most bird collisions because shield wires are thinner and less visible than the conductor lines (Bevanger and Brøseth 2001; APLIC 2012). Higher power lines may increase bird collision rates, especially during bird migrations. To date, no research has been completed on the potential for bat collisions with transmission lines but it is thought that echolocating species have a low potential for collisions with wires. For example, big brown bats (*Eptesicus fuscus*) were found to be able to avoid colliding with wires that were spaced 20 to 30 cm apart (Sändig et al. 2014).

Transmission lines carry 50 kilovolts (kV) or higher to load centres, while distribution lines carry lower loads of electricity (1 to 50 kV) from the centre to peripheral users (APLIC 2012). Birds are generally more vulnerable to collisions with transmission lines than distribution lines (Rioux et al. 2013). It has been estimated that 2.5 million to 25.6 million birds may be killed by transmission lines in Canada each year (Rioux et al. 2013). Distribution lines are conservatively estimated to kill 377,764 to 3.9 million birds per year (Rioux et al. 2013). The poor manoeuverability of waterfowl and other waterbirds (e.g., grebes, cranes) appears to increase these species vulnerability to collisions with power lines, especially when power lines are located near wetlands (Erickson et al. 2005; Calvert et al. 2013; Rioux et al. 2013). Songbirds seem to be the most vulnerable to collisions with power lines in upland areas (Erickson et al. 2005). All bird groups are more vulnerable to collisions with power lines during migration periods (Rioux et al. 2013). This may be due to flocking behaviour or inexperience of young birds (during fall migration).

The differences in the documented results of collision rates may vary among studies because power line collisions are a function of the following factors (Avery 1979; Bevanger 1995; Bevanger and Brøseth 2004; APLIC 2012):

- awareness of the presence of power lines;
- wind and weather (especially fog);
- time of day (collisions are more frequent at dawn and dusk);
- disturbance or distractions (e.g., mating);

- cable size (smaller gauge wires have higher collision rates);
- use of a shield wire to protect against lightning strikes (the shield wire is smaller in diameter and so increases collision rates);
- age of birds (increased collision frequency among juvenile birds); and,
- line location (lines near wetlands or above tree tops are more hazardous to birds).

Wataynikaneyap will install bird deterrent or visibility increasing devices on wires (e.g., spinning reflectors or wire collars) where it is routed near known flight corridors and waterbird staging areas. The distance between conductors (i.e., 6 m) may also reduce the collision rate of bat, nightjar, and songbird criteria with the power lines, and result in a negligible net effect to the abundance of bat and bird populations.

- **Site preparation, construction and maintenance of the power line ROW may result in the destruction of nests, eggs, and individuals of migratory birds (incidental take)**

The *Migratory Birds Convention Act, 1994* (Government of Canada 1994) prohibits the destruction of migratory bird nests (e.g., passerines and waterfowl) during the breeding season. Some bird species (e.g., eastern whip-poor-will) and their nests are protected under the SARA (Government of Canada 2002), which prohibits the damage or destruction of the residence (e.g., nest) of individuals of a species listed in Schedule 1 as endangered, threatened, or extirpated on Federal lands. The Ontario ESA (Government of Ontario 2007) prohibits the harming of a species that is listed as extirpated, endangered, or threatened.

Bird nests, eggs, and/or birds could be destroyed during construction of the power line ROW and maintenance of the power line ROW during operations. To limit incidental take of bird species that nest in vegetated habitat, clearing activities during construction and operation for the Project will be managed so that vegetation removal will occur outside of the migratory bird nesting period (April 15 to August 31) for SAR bird species. Some species, such as common nighthawk and eastern whip-poor-will, nest in recently disturbed or cleared areas. As such, construction activities, such as driving on existing access roads, may result in the incidental take of these species and their nests. If vegetation clearing or other construction activities that may result in the incidental take of non-SAR birds is required during the nesting season, activities will be managed to comply with the SARA (Government of Canada 2002) and the MBCA (Government of Canada 1994). Pre-construction nest surveys will be completed and in the event that a nest is found, the MNRF and ECCC will be contacted to determine appropriate impact management measures.

Mitigation policies and practices for construction activities are expected to limit incidental take of migratory birds and nests. As such, this pathway is predicted to have localized and negligible net effects on migratory birds.

- **Site preparation, construction and maintenance of the power line ROW may result in the destruction of wolverine dens (incidental take)**

Section 8(2) of the Ontario *Fish and Wildlife Conservation Act, 1997* (Government of Ontario 1997) prohibits the intentional damage or destruction of a den or habitual dwelling of a furbearing mammal other than a fox or skunk, unless the person holds a licence to trap furbearing mammals. The wolverine is listed in Schedule 1 of the Ontario FWCA (Government of Ontario 1997) as a furbearing mammal. Wolverine habitat is also protected under the *Endangered Species Act*.

Wolverine dens could be destroyed during construction of the power line ROW and maintenance of the power line ROW during operations. Wolverines typically use dens from mid-February to the end of April (MNR 2013c). Clearing activities during construction will be primarily completed during the winter (i.e., wolverine denning period). Pre-clearing discussion with local First Nations and MNRF will be completed to identify any known active wolverine dens not available to date that may be affected by Project activities. Should denning sites be identified during construction activities, work would cease and MNRF would be notified. Mitigation policies and practices for construction activities are expected to limit incidental take of wolverine dens. As such, this pathway is predicted to have negligible net effects on denning wolverine.

- **Site preparation, construction and maintenance of the power line ROW may result in the destruction of roosting or hibernating bats (incidental take)**

Little brown myotis is listed as endangered on the provincial ESA, and as endangered and on Schedule 1 of the federal SARA due to dramatic population declines resulting from a fungal disease called white-nose syndrome (WNS).

A potential effect of the Project during construction is the removal or alteration of maternity roosts or hibernacula that are occupied. Because little brown myotis is a congregatory species loss of these habitat features has the potential to result in the mortality of many individuals. Clearing activities during construction for the Project to avoid incidental take of roosting bats will be managed so that vegetation removal will occur outside of the maternal roosting period (generally June 1 to July 31).

Wataynikaneyap will avoid construction between potential hibernacula and a boundary being the lesser of (a) a 200 m radius of contiguously-treed area, or (b) the distance to the nearest existing road ROW. Wataynikaneyap will also implement a restricted timing window (October 1 to April 30) for any construction within 200 m of potential hibernacula. As such, this pathway is predicted to have a negligible net effect on bat populations that overlap the RSA.

- **Attraction of wildlife to the Project (e.g., food waste, petroleum-based products, salt) during construction may increase human-wildlife interactions and change predator-prey relationships, which can affect wildlife survival and reproduction**

Food smells and other aromatic compounds such as petroleum-based chemicals can attract carnivores to human developments (Benn and Herrero 2002; Peirce and Van Daele 2006; Canadian Wildlife Service 2007; Beckmann and Lackey 2008). The attraction of wildlife to the Project also has the potential to increase human-wildlife interactions, which may result in the removal of individuals by mortality or relocation. However, attraction of wildlife to the Project is anticipated to be restricted to the construction phase as no to little food garbage and other attractants should be present during operations. To reduce the number of carnivores and predatory birds that are attracted to the Project during construction, the following management practices and policies will be implemented:

- manage attractants (e.g., bear-proof containers, garbage removed regularly) to limit interactions between people and wildlife;
- prohibit feeding of wildlife;
- training will be provided to staff and contractors to reinforce the importance of not feeding wildlife and carrying out proper waste management practices; and
- monitoring waste management practices for improvement through adaptive management, when necessary.

Mitigations implemented for the Project are anticipated to limit the attraction of wildlife to the site and result in minor changes in survival and reproduction from problem wildlife and altered predator-prey relationships relative to Base Case conditions. Subsequently, this pathway is expected to have a negligible net effect on wildlife abundance.

- **Electrocution causing injury or mortality to birds**

Raptors are vulnerable to electrocution from power lines because of their large wingspan and perching behaviour (Bevanger 1998; Manville 2005; Dwyer and Mannon 2007; Lehman et al. 2010). Birds are most commonly electrocuted when they come in contact with two adjacent conductors (i.e., phase-to-phase electrocution). The Avian Powerline Interaction Committee (APLIC 2006) provides a summary of issues and solutions to avoid electrocutions. In general, electrocutions can occur on structures with the following (APLIC 2006):

- phase conductors separated by less than the wrist-to-wrist, head-to-foot, or flesh-to-flesh distance of a bird; or
- distance between grounded hardware (e.g., grounded wires and metal towers) and any energized phase conductor that is less than the flesh-to-flesh distance of a bird.

Electrocutions are usually associated with municipal distribution lines, which have complicated wiring and shorter distances between phases, rather than transmission lines (Harron 2003). Industry standards for transmission line construction have been developed (APLIC 2006), and will be considered in the tower design. Although avian-safe construction reduces electrocution risk, electrocutions can never be completely eliminated. Bird feathers do not conduct electricity well and so contact must usually be made with fleshy parts, such as the skin, feet, or bill

(APLIC 2006). However, wet feathers may conduct electricity and larger birds may be electrocuted when their wings span conductors or grounded hardware.

The tower structures proposed for the Project are single-pole, double-pole (H-frame), triple-pole (possible at sharp corners, water crossings, or long spans). A 1.5 m spacing between transmission lines is sufficient to accommodate a bald eagle (APLIC 2006). Based on the smallest structure for the towers, conductors for the Project would be a minimum of 2.3 m apart (Section 1.3.2.1; Figure 1.3-3). None of the bird species likely to encounter the line are large enough to span two conductors. Phase-to-ground distances for the proposed transmission towers would be small enough that larger birds may span the distance between the conductor and the tower, but the orientation of the lines (either hanging below or suspended on an insulator) reduces the likelihood of phase-to-ground contact. Tower design will adhere to the Standards for Overhead Systems (CSA-C22.3, CSA 2010a).

Studies in the NWT have indicated that nests in contact with or near insulators may cause phase-to-phase flashover (Poole 1985). Birds that build nests on H-frame structures are more susceptible to electrocution if nests are built above the center energized wire (center phase) (Dwyer and Leiker 2012). Management of nests during the non-breeding season, such as trimming nest materials, insulating conductors, moving nests to alternate structures, and removing unoccupied nests can minimize the risk of avian mortality from electrocution (APLIC 2006). Wataynikaneyap will consider implementing these management practices, or placing nest diverters on the poles, to limit risk of electrocution to nesting birds (Dwyer and Leiker 2012). Subsequently, the Project design is expected to result in minor changes to the abundance of birds (particularly raptors) from mortality due to electrocution.

- **Electromagnetic fields from the power line may cause changes to wildlife survival and reproduction.**

Electric and magnetic fields (EMFs) surround electrical equipment that carry electricity, such as power lines and power cords. Electric and magnetic fields are strongest when close to their source and is expected that wildlife would have highest exposure to EMFs when right beside the transmission line (e.g., perched on transmission lines and poles or standing under the transmission line) (Government of Canada 2016b). The strength of EMFs fades rapidly and objects such as trees and buildings can block EMFs (Government of Canada 2016b).

A review of peer-reviewed studies that looked at the effects of EMFs on wildlife found that there was no clear dose-effect relationship (Cucurachi et al. 2013). Doherty and Grubb (1998) found that tree swallows (*Tachycineta bicolor*) had significantly lower reproductive success under powerlines than at reference areas but this effect was not noted for house wrens (*Troglodytes aedon*). A study completed on cows suggests that some individuals are radiation-sensitive, while other are not sensitive to EMF radiation (Hässig et al. 2014). Rats that were exposed to EMFs were found to have equal litter sizes to rats that were not exposed to EMFs (Rommereim et al. 1989). Similarly, rats and chicken embryos exposed to EMFs did not have greater malformation rates than non-exposed rates (Rommereim et al. 1990; Koch and Koch 1991).

Based on the above information, it is expected that wildlife exposure to EMFs would be low and would occur sporadically when animals are standing directly underneath the transmission line or perched on transmission lines or poles as the strength of EMFs decreases rapidly with distance from the line. Exposure to EMFs may result in minor changes to the survival and reproduction of some wildlife species.

- **Dust and air emissions, and subsequent deposition can change soil quality and vegetation, which can affect wildlife habitat availability and distribution**

Construction and operation of the Project will generate air and dust emissions such as carbon monoxide (CO), oxides of sulphur (SO_x includes sulphur dioxide [SO_2]), oxides of nitrogen (NO_x), particulate matter ($PM_{2.5}$), and total suspended particulates (TSP). Air emissions such as SO_x and NO_x can result from the use of fossil fuels in generators, vehicles, machinery, and the use of explosives used during the Project. Wataynikaneyap will use explosives if excavation to removee material for tower foundationsis not feasible. The dominant contributor to dust emissions (TSP) is from vehicles travelling on roads (Farmer 1993; Harrison et al. 2003; Peachey et al. 2009; Liu et al. 2011).

Air and dust emissions, and subsequent deposition can change soil quality and alter vegetation and wetlands, which can adversely influence wildlife habitat availability and distribution. Sulphur dioxide and NO_x from combustion of fossil fuels and dust deposition can affect soil pH and nutrient content, and soil fauna composition. Changes in soil quality (physical, chemical and biological properties) can affect plant community composition, structure and diversity. Dust that falls directly on plants also can have a physical effect by smothering plant leaves or blocking stomata openings. Plant species have different levels of tolerance to dust deposition, which can result in changes to above ground biomass and species composition. For example, bryophyte and lichens can be sensitive to the chemical effects of dust because they obtain moisture and nutrients from the atmosphere and immediate surroundings, including substances that are trapped or deposited directly on the surface of the bryophyte leaf or lichen thalli. Bryophytes and lichens may experience the largest effects close to roads where the greatest amount of deposition frequently occurs. Rates of dust deposition and accumulation are dependent on the rate of supply from the source, wind speed, precipitation events, topography, and vegetation cover.

Mitigation planned for the Project to further reduce the effects of air emissions includes practices to control dust and other air emissions (maintenance of vehicles and equipment, use of water and/or dust suppressants on roads, vegetating soil stockpiles) (Table 13). Overall, air and dust emissions and subsequent deposition are expected to result in minor and local alterations to soil quality and vegetation communities relative to Base Case conditions. Therefore, this pathway was determined to result in minor changes to wildlife habitat availability and distribution, and negligible net effects on SAR criteria.

5.2.3 Primary Pathways

The following primary pathways were assessed in detail, and net and cumulative effects were characterized and significance determined for woodland caribou, wolverine, little brown myotis, bald eagle, eastern whip-poor-will, common nighthawk, olive-sided flycatcher, and Canada warbler in the subsequent sections.

- **Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution**
- **Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution**

The following primary pathway was also assessed for caribou.

- **Use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of caribou**

The following primary pathway was also assessed for bald eagle.

- **Collisions with the transmission line causing injury or mortality to bald eagle**

The following primary pathway was also assessed for Canada warbler.

- **Vegetation clearing will result in an increase in edge habitat, which could increase nest parasitism risk for Canada warbler.**

6.0 EFFECTS ASSESSMENT METHODS

This section outlines the methods used to predict and characterize net effects to SAR criteria from primary pathways (i.e., those pathways predicted to result in net effects after incorporation of mitigation).

6.1 Project Case Net Effects Classification

This section outlines the methods used to predict and describe net effects of the Project on each wildlife criterion, and to put these effects in the context of interacting cumulative effects from previous, existing, and reasonably foreseeable developments. Net effects were measured for the Project ROW and contextualized using three assessment cases, Base Case, Project Case, and RFD Case. The specific application of the assessment cases to wildlife is described in the following sections. Wildlife specific methods for describing net effects using the effects characteristics (Table 14) and methods for determining significance for SAR criteria are also presented below.

Table 14: Definitions of Effects Characteristics Used to Describe Predicted Net Effects on Criteria

Effects Characteristic	Definition	Description
Direction	The direction of change in the effect relative to the current value or state	■ Positive – net gain or positive effect ■ Neutral – no change ■ Negative – net loss or adverse effect
Magnitude	Magnitude is the intensity of the effect or a measure of the degree of change from existing (baseline) conditions expected to occur in the criterion.	■ Narrative or numeric quantification of effects
Geographic extent	Geographic extent refers to the spatial area over which an effect will occur/can be detected (distance covered or range).	■ Project footprint – effect is limited to the direct physical disturbance from the Project ■ Local – the effect includes the Project footprint and immediate indirect effects from sensory disturbance ■ Regional – the effect extends beyond the local scale, but is confined to the RSA ■ Beyond regional – the effect extends beyond the RSA boundary

Table 14: Definitions of Effects Characteristics Used to Describe Predicted Net Effects on Criteria

Effects Characteristic	Definition	Description
Duration/reversibility	■ Duration is the period of time over which the environmental effect will be present. The amount of time between the start and end of an activity or stressor (which relates to Project development phases), plus the time required for the effect to be reversed. Duration and reversibility are functions of the length of time a criterion is exposed to activities. ■ Reversibility characterizes the potential for recovery of the criterion from an effect. Reversible implies that the effect will not influence the criterion at a future predicted period in time. For effects that are permanent, the effect is determined to be irreversible.	■ Short-term – the effect is reversible before the end of construction ■ Medium-term – the effect occurs during construction and/or operation and is reversible soon after operation begins ■ Long-term – the effect occurs during construction and/or operation and persists into operations, but is reversible ■ Permanent – the effect occurs during construction and/or operation and is irreversible
Frequency/timing	■ Frequency refers to the occurrence of the environmental effect over the duration of the assessment. ■ Discussions on seasonal considerations are made when they are important in the evaluation of the effect.	■ Infrequent – the effect is expected to occur rarely ■ Frequent – the effect is expected to occur intermittently ■ Continuous – the effect is expected to occur continually
Probability of occurrence	Probability of occurrence is a measure of the likelihood that an activity will result in an environmental effect.	■ Unlikely – the effect is not likely to occur ■ Possible – the effect may occur, but is not likely ■ Probable – the effect is likely to occur ■ Certain – the effect will occur

Net effects of the Project are measured and described in the Project Case. Net effects are the Project-specific residual effects measured as the incremental change from existing conditions (i.e., Base Case). The description of net effects focuses on primary pathways, which are those pathways predicted to result in effects that remain after mitigation (Section 4.2.3).

Changes in indicators for each criterion were estimated relative to the Base Case to describe net effects, as follows:

- Changes in habitat availability and animal use were estimated quantitatively by calculating differences in the amount of different types of suitable habitat for each criterion, and qualitatively considering potential changes in habitat use (e.g., avoidance due to sensory disturbance).
- Changes in habitat distribution, including the effects on wildlife movement and habitat connectivity, were estimated by qualitatively examining changes to the size and distribution of habitat patches within the relevant criterion-specific RSAs, and considering potential barriers to movement.
- Changes in survival and reproduction (abundance) were identified qualitatively and quantitatively using the results from changes in habitat, and knowledge of potential changes in abundance from other Project components and activities (e.g., changes to carrying capacity). Predictions of change were made using data collected in the relevant criterion-specific RSAs, where possible, and supported by scientific literature.

Net effects on SAR criteria considered expected magnitude (e.g., number of hectares lost or gained, change in abundance), geographic extent (i.e., spatial extent of the effect), duration and reversibility (e.g., years, decades, permanent/irreversible), frequency (i.e., number of times the effect happens per unit time), and probability of occurrence (e.g., how likely is the effect). Direction of effects described herein are conservatively assumed to be negative, although edge habitat may provide suitable habitat for some species at risk (e.g., olive-sided flycatcher, eastern whip-poor-will).

Duration and frequency were described categorically but were also described more precisely using months or years. The more precise definition was applied to avoid confusion or misinterpretation of the effects assessment that sometimes accompanies broad categories. Effects from forest harvesting are considered reversible in the long-term because harvested areas are allowed to regenerate, which reverses effects on SAR criteria from habitat loss. In contrast, effects created by habitat loss due to infrastructure that will operate indefinitely (e.g., transmission lines and permanent roads) are considered permanent (i.e., irreversible) because vegetation within the disturbance footprints for these developments will be permanently removed for use by some wildlife species. For example, the vegetation within a power line ROW must be maintained below a certain height (e.g., 2 to 3 m) so to not interfere with the safe operation of the power line. Reclamation of this habitat will not occur as the power line will exist in perpetuity so habitat within the ROW is permanently removed for use by some wildlife species.

Magnitude was not described categorically. Characterizing magnitude using an ordinal scale (i.e., low, moderate, or high) in a manner meaningful for SAR criteria requires that the effect size be placed in the ecological context of the criterion, incorporating resilience, adaptability, and amount of historic disturbance. Universal effect size boundaries, such as a 20% change at the criterion-specific RSA scale used to define a high magnitude effect, work poorly because they fail to consider ecological context. A 20% additional habitat loss from existing conditions in the criterion-specific RSAs may be required to cause a high magnitude effect on some criteria, whereas a 2% habitat loss may be sufficient for others, depending on ecological context (BC EAO 2013). Integrating ecological

context to understand the point at which an effect size is large enough to be important for a criterion is directly linked to the self-sustaining and ecologically effective status of the population, and therefore directly linked to significance. To avoid providing a definition of magnitude synonymous with the determination of significance, predicted effect sizes were provided in specific terms (i.e., a narrative or numeric quantification). The ecological context of the predicted effect size is discussed in a reasoned narrative for the determination of significance.

The precise locations of some Project footprints were unknown at the time of this assessment, such as the power line ROW and the laydown areas. Therefore, to be conservative, the Project footprint is defined as the limits of work of a 200 to 500 m corridor, which includes the alignment ROW, distribution station [substation]) and the laydown areas. Using the limits of work as the Project footprint provides a conservative overestimate of Project effects as the limits of work is 4,355 ha and the actual up to 40 m alignment ROW will be approximately 478 ha and the distribution station is anticipated to be approximately 2 ha, which includes a helicopter landing pad and an equipment staging area. The limits of work is approximately nine times larger than the anticipated Project ROW.

6.2 Reasonably Foreseeable Development Case Effects Classification

The RFD Case measures and describes cumulative effects of adding the incremental changes from the Project Case, and certain/planned and reasonably foreseeable developments (RFDs) to the Base Case. The RFD Case also determines the significance of cumulative effects from the Project and past, present and RFDs. Subsequently, the cumulative effects assessment is completed at the regional scale (i.e., criterion-specific RSA or beyond RSA). The RFD Case effects assessment for each wildlife criterion is primarily qualitative and describes how the interacting effects of developments and natural factors are predicted to affect indicators for each criterion. The assessment is presented as a reasoned narrative describing the outcomes of cumulative effects for each wildlife criterion. The relative contribution of the Project to the total cumulative effect is clearly described in the RFD Case effects assessment section for each wildlife criterion.

All certain/planned and RFD projects are described in detail in Table 15. Reasonably foreseeable developments were categorized into Tier 1 and Tier 2 based on the level of project information available, their status within the regulatory process, and their anticipated development schedule. Tier 1 Developments include reasonably foreseeable developments that have been formally proposed and for which details on the location and physical footprint are available. Tier 2 Developments are reasonably foreseeable developments have not yet been formally proposed and/or do not have detailed information that is publicly available.

Table 15: Summary of RFD Case Interactions for Wildlife

Project/Activity	Description	Potential Cumulative Effect	Quantified in the RFD Case
Certain/Planned Projects and Activities			
Wataynikaneyap Power Phase 2: Connecting 17 Remote First Nation Communities Project	The Project is the construction, operation, maintenance and retirement of a 115 kV, 44 kV, and 25 kV alternating current transmission system, located north of Red Lake and Pickle Lake, to connect to 17 remote First Nation communities.	■ Loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and contribute to cumulative effects on wildlife abundance and distribution. ■ Sensory disturbance may contribute to cumulative changes in wildlife habitat availability, use and connectivity, which can lead to changes in wildlife abundance and distribution. ■ Use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of prey	Yes
Reasonably Foreseeable Projects and Activities			
Tier 2 Developments			
Commercial Forestry	Forest harvesting and forestry road developments in the Whitefeather, Red Lake, and Trout Lake forests	■ Loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and contribute to cumulative effects on wildlife abundance and distribution. ■ Sensory disturbance may contribute to cumulative changes in wildlife habitat availability, use and connectivity, which can lead to changes in wildlife abundance and distribution. ■ Use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of prey	No

6.3 Determination of Significance

For each wildlife criterion, a determination of significance was made based on an assessment of combined effects of previous and existing developments described in the Base Case and the addition of the Project (i.e., for the Project Case), as well as the addition of RFDs (i.e., for the RFD Case).

Significance was determined based on combined effects because the effects of a single project infrequently cause an ecologically significant effect on their own (McCold and Saulsbury 1996), and many environmental effects of primary concern are cumulative (Canter and Ross 2010). Therefore, whether populations of wildlife criterion would remain self-sustaining and ecologically effective was assessed by combining the effects identified in the Base Case with the net effects identified for the Project Case and the RFD Case to assess the total predicted combined effect. If a significant effect was identified, the contribution of the Project to the combined effect was described.

Significance was predicted as a binary response, with effects classified as significant or not significant. Net (Project Case) and cumulative (RFD Case) effects were determined to be significant if a criterion population is expected to no longer be: (1) self-sustaining, or (2) ecologically effective. Specifically:

- A criterion population was considered to be no longer self-sustaining where cumulative net effects were expected to place the abundance of a criterion, whether an open or closed population, on a declining trajectory that is not predicted to recover or stabilize. Part of being self-sustaining, in this context, was that a criterion population that stabilizes at a lower abundance is not expected to be extirpated because of unrelated stochastic events. Another part of being self-sustaining was the assumption that no additional mitigation or management actions beyond the proposed Project mitigation strategies and existing management strategies in the region would be required. Effects that are not significant could result in no change, stabilization at lower abundance, stabilization at higher abundance, or a temporary decline followed by recovery. Even where populations remain stable, fragmentation effects that cause populations to become isolated or substantially disconnected (e.g., severely reducing or eliminating gene flow and/or demographic rescue within one regional or meta-population or between two or more local populations) may also be considered significant.
- A criterion population that has lost important ecological function would also result in determination of a significant adverse effect, regardless of its self-sustaining status. Loss of ecological function occurs when a population can no longer perform its ecological role, such that it might trigger ecological changes that result in degraded or simplified ecosystems (Soulé et al. 2003). The potential to lose ecological function is more common for highly interactive SAR criteria that have important ecological effects on other species, such as predators or species described as ecosystem engineers (e.g., beavers, earthworms) (Soulé et al. 2003).

7.0 NET EFFECTS ASSESSMENT RESULTS

7.1 Forest-Dwelling Woodland Caribou

7.1.1 Assessment of Project Effects (Project Case)

7.1.1.1 Habitat Availability

The Project is expected to affect caribou habitat availability in the Berens Range by causing an incremental increase in the amount of disturbance. The proportion of disturbance in the Berens Range, measured by applying a 500 m buffer around human disturbances and no buffer around burns, is expected to increase from 26.0% to 26.2%, with the application of the limits of work, which is conservatively estimated as nine times larger than the anticipated Project ROW. There are approximately 366 ha of nursery areas in the limits of work, representing less than 0.1% of available nursery area habitat in the RSA at Base Case (Table 16; Figure 13). No winter use areas occur inside the limits of work. Category 2 habitat (seasonal ranges) and Category 3 habitat (remaining habitat areas) in the limits of work cover 2,518 ha and 518 ha, respectively (Table 16). These amounts of Category 2 and 3 habitats represent both represent 0.2% of the availability of each habitat in the RSA at Base Case. Habitat changes summarized in Table 16 result from a conversion of higher value caribou habitats (i.e., Category 1 and 2) and moderate value habitat (i.e., Category 3) to permanent disturbances.

The limits of work will directly impact one known nursery area (i.e., Category 1 habitat). One additional nursery area and five winter use areas are also located within 10 km of the Project footprint (Figure 13).

In addition to direct habitat loss, caribou habitat suitability around the Project may be reduced if animals avoid areas near the Project footprint. As described in Section 4.2.1.1 (Table 5), zones of influence around development (i.e., where caribou exhibit avoidance behaviour) vary considerably; however, the majority of reported values are typically within 5 km of development (Courtois et al. 2008; CPAWS Wildlands League 2013; Dyer et al. 2001; Eftestøl et al. 2016; Johnson et al. 2015; Leblond et al. 2011, 2013; Nagy 2011; Polfus er al. 2011; Smith et al. 2000; Vistes and Nellman 2008). Indirect habitat loss may therefore extend to areas up to 5 km from the development footprint. This estimate is considered conservative because the effects of power lines on caribou habitat use are not well understood and the studies that have been completed often reach different conclusions. Disparity in the results among studies may be due to different survey methods, survey duration, inclusion of different environmental variables, and the interaction of effects from power lines with other human disturbances (e.g., roads) (Reimers and Colman 2003; Vistnes and Nellemann 2008). Resource selection functions for reindeer in Norway showed notable effects related to construction work, habitat quality, elevation and aspect on the area used by reindeer; however, there was no evidence from the study to support the hypothesis that power lines have negative effects on reindeer habitat use, independent of associated human activity during construction (Eftestøl et al. 2016).

Sensory disturbances will be avoided in high use areas, as identified by the MNRF in Attachment A, during sensitive periods (i.e., May 1 to July 14 (nursery areas) and April and November (travel corridors)). In addition, sensory disturbances will be minimized within 10 km of high use areas identified by the MNRF in Attachment A during sensitive periods (i.e., July 15 to September 15 (nursery areas)).

Construction activities are likely to alter caribou movement and behaviour around the Project footprint resulting in a temporary, indirect loss of habitat. Indirect habitat loss, measured by applying a 500 m buffer around the limits of work (Environmental Canada 2012), could remove 1,854 ha of nursery areas, 6,817 ha of Category 2 habitat, and 2,149 ha of Category 3 habitat in the RSA, if these areas are avoided by caribou. This likely represents a

considerable overestimate given that the limits of work is nine times larger than the anticipated Project ROW, the Project will largely parallel existing linear developments (i.e., the Nungesser Road and Pikangikum All-Season Road) and the limits of work is 75% disturbed at Base Case. These existing developments are associated with vehicular activity, noise and other sensory disturbances, and therefore, it is unlikely that there will be measurable losses in local habitat from indirect effects where the power line ROW parallel existing disturbances. Indirect habitat loss is more likely to occur in areas where the Project is not adjacent to existing disturbances (i.e., does not occur within approximately 500 m of existing disturbances).

Table 16: Changes to Woodland Caribou Habitat Availability in the Regional Study Area at Project Case

Habitat Category[a]	Base Case [ha]	Project Case (Limits of Work) [ha]	Change in Area Using the Limits of Work Footprint[b][c] [ha]	Percent Change Using the Limits of Work Footprint[c] [%]
Category 1 (nursery areas)	318,007	317,641	-366	-0.1
Category 1 (winter use areas)	289,206	289,206	0	0
Category 1 (overlapping nursery areas and winter use areas)	366,082	366,082	0	0
Category 2 (seasonal ranges)	1,497,116	1,494,598	-2,518	-0.2
Category 3	328,716	328,197	-518	-0.2
Permanent disturbance [d]	2,787	6,189	3,402	122.1

a) Habitat categories as described in MNRF (2013).

b) Changes in habitat area result from a conversion of suitable habitat to lower suitability habitats (i.e., other).

c) The limits of work is approximately nine times larger than the anticipated Project ROW (4,355 ha for the limits of work versus 478 ha for the maximum anticipated Project ROW), but specific areas of disturbance had not been identified at the time of writing.

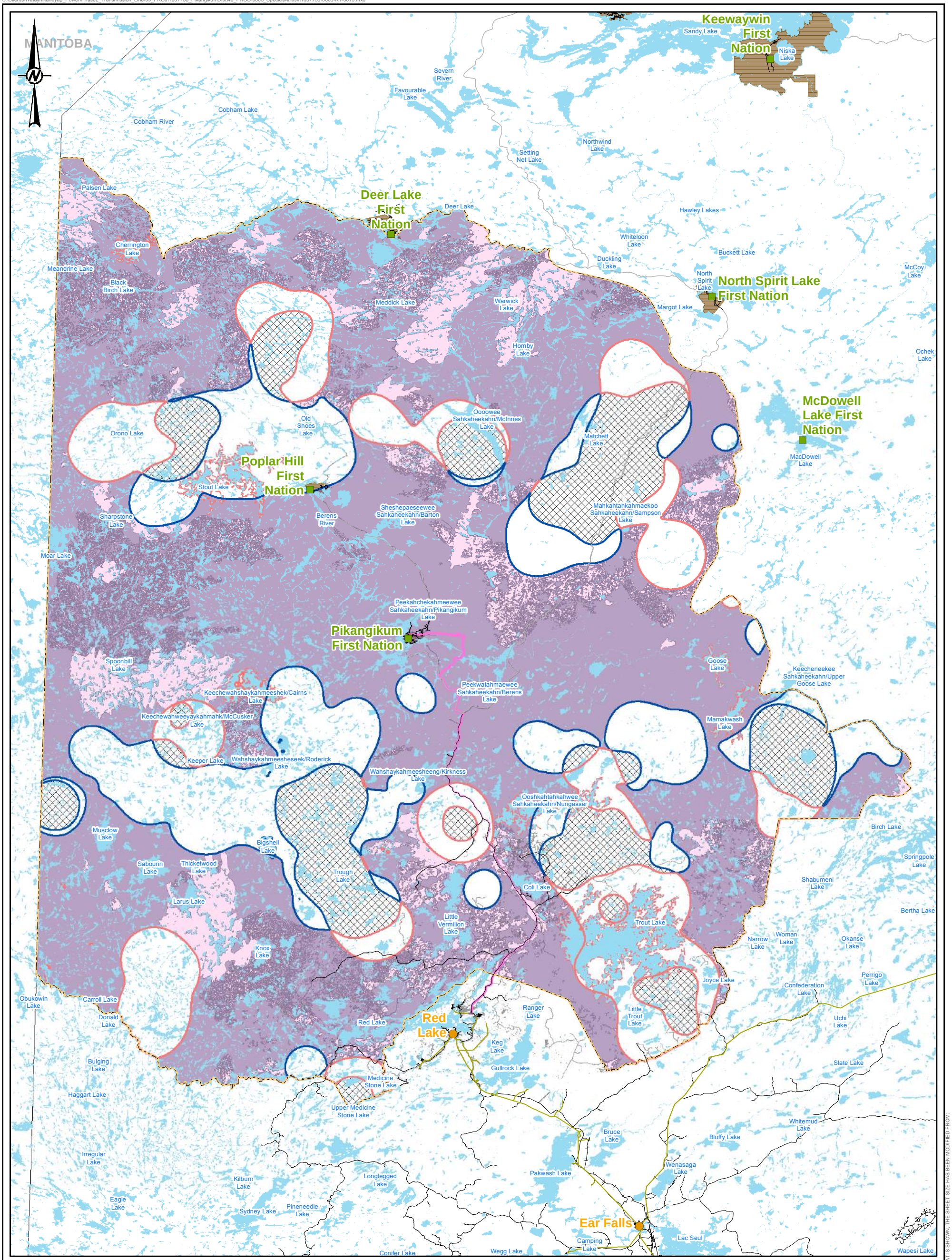
d) As described in Section 4.1.3.1 mapping for Category 1 habitat was based on caribou location data and habitat polygons delineated by the MNRF, which did not exclude disturbances because of demonstrated use by caribou. The permanent disturbance category therefore does not represent a complete inventory of permanent anthropogenic disturbances in the Berens Range.

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

Note: The percent change is calculated relative to the amount of each habitat category available at Base Case; percent change is not relative to the size of the study area.

ha = hectare; % = percent.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Existing Electrical Transmission Line
- Railway
- First Nation Reserve Land
- Waterbody
- Project Limits of Work
- Regional Study Area
- Category 1 - Nursery Areas
- Category 1 - Lakes Supporting Nursery Function (MNRF 2014b)
- Category 1 - Winter Use Area
- Category 1 - Lakes Supporting Winter Use Function (MNRF 2014b)
- Category 1 - Overlapping Nursery and Winter Use Areas
- Category 2 - Seasonal Ranges
- Category 3 - Remaining areas in the Range
- Base Case Disturbance

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
4. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 20 40
1:800,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
WOODLAND CARIBOU HABITAT IN THE REGIONAL STUDY AREA AT PROJECT CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	13

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7.1.1.2 Habitat Distribution

Habitat losses either through direct or indirect effects can result in changes to the distribution of available habitat (and ultimately caribou within the range) through avoidance of affected areas and localized changes in the distribution of animals. Consistent with the above interpretation of Project-related habitat losses, changes to local distributions of caribou are expected to be small, particularly where the ROW is parallel to the Nungesser Road and Pikangikum All-Season Road. A contraction in the Berens Range is not expected from localized changes in habitat suitability, although some displacement of animals may result from the Project.

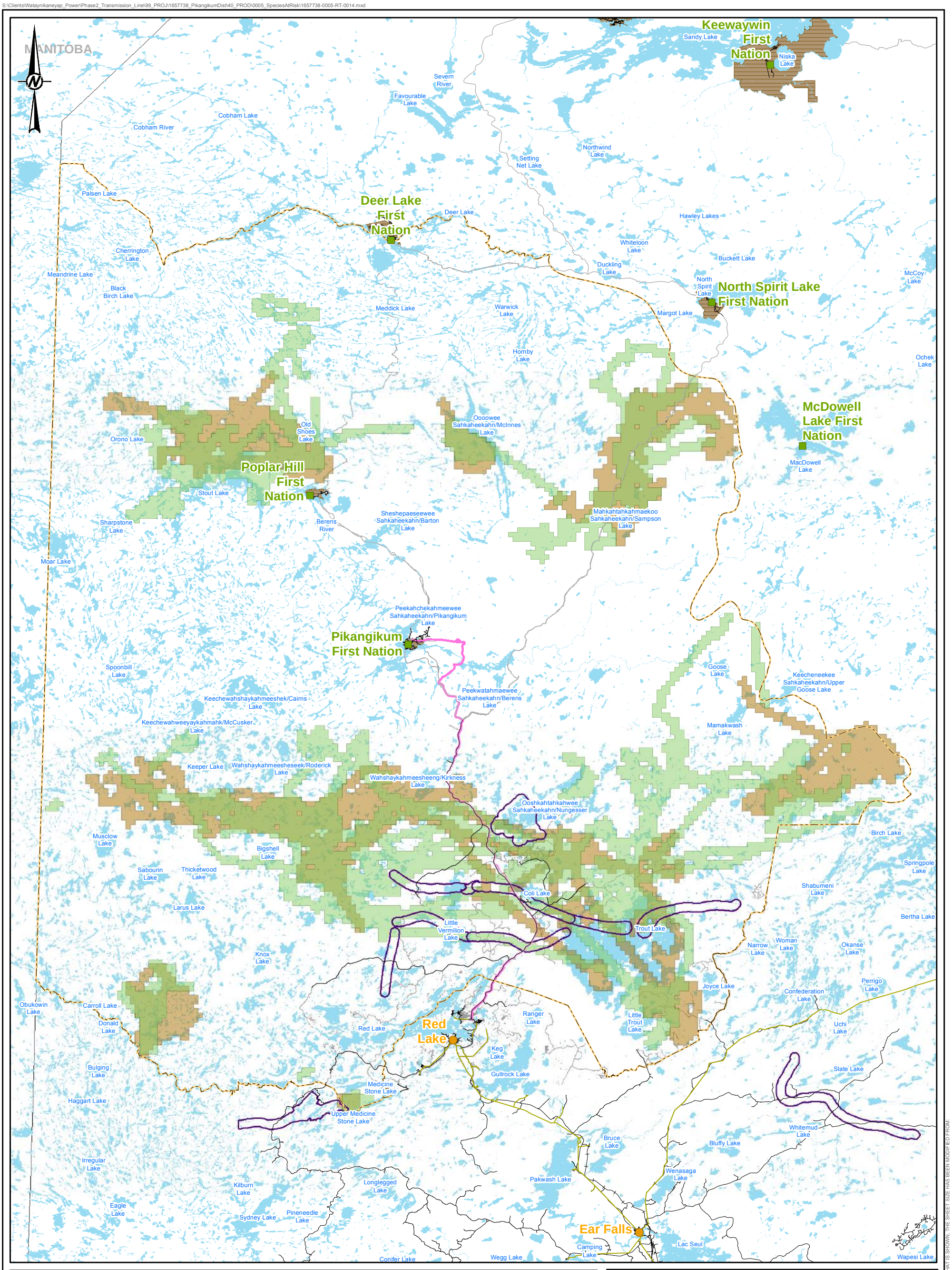
The distribution of available habitat can also change where there are effects to travel corridors (i.e., Category 1 habitat) because these features function as migration corridors that enable access to other Category 1 habitats, such as nursery or winter use areas. The Project will cross one large travel corridor that connects the Trout Lake area to the lake/wetland complexes of Woodland Caribou Provincial Park (Figure 14). This travel corridor is intersected by existing disturbances (Figure 14), namely the Nungesser Road and Pikangikum All-Season Road, which are associated with vehicle traffic at Base Case. The limits of work are also in proximity to an area of caribou movement concentrated around Nungesser Lake (Figure 14).

Power lines are thought to have measurable but minimal and temporary effects on caribou movements and distributions compared to effects from human disturbances that have higher levels of activities (e.g., resorts, roads) (Berger et al. 2000; Vistnes and Nellemann 2008). Some data indicate that reindeer exhibited no observed response to power lines shortly after their construction (i.e., became habituated), when power lines are not accompanied by other human activity (such as roads) (Reimers et al. 2000, 2007). For example, Eftestøl et al. (2016) found no evidence that reindeer habitat use was affected by power lines, independent of associated human activity that occurred during construction. The re-establishment of migration behaviour by woodland caribou in west-central Newfoundland after construction (Mahoney and Schafer 2002) is consistent with previous studies; caribou appear to be more sensitive to the human activities associated with construction, traffic, and noise, than to the infrastructure per se (Curatolo and Murphy 1986; Murphy and Curatolo 1987; Nellemann and Cameron 1998; Smith et al. 2000; Dyer et al. 2001).

Caribou movement may be constrained during the construction period but these effects are expected to be temporary. The ROW largely parallels the Nungesser Road and Pikangikum All-Season Road and is not expected to affect traffic levels beyond the construction period. It is therefore unlikely that the Project will sever travel corridors because caribou cross the Nungesser Road to move between winter and summer habitats at Base Case (MNRF 2014b).The ROW is expected to cause an incremental increase in fragmentation of the RSA by adding another linear disturbance oriented in a generally north-south direction.

The MNRF's assessment of winter and refuge habitat arrangement at Base Case indicates that the Berens Range is fragmented relative to an estimated natural landscape (i.e., SRNV) (MNRF 2014b). The Project will likely cause an incremental change in the arrangement of winter and refuge habitats, which means that the landscape pattern would be further below the SRNV.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Existing Electrical Transmission Line
- Railway
- First Nation Reserve Land
- Waterbody
- Project Limits of Work
- Regional Study Area
- Category 1 - Travel Corridor (MNRF)
- Category 1 - Spring Travel Corridor
- Category 1 - Fall Travel Corridor
- Base Case Disturbance

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 20 40
Kilometers
1:800,000

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
WOODLAND CARIBOU TRAVEL CORRIDORS IN THE REGIONAL STUDY AREA AT PROJECT CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	14

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7.1.1.3 Survival and Reproduction

The Project is predicted to affect caribou survival and reproduction through habitat loss (vegetation clearing), sensory disturbance, and increased predation pressure. Habitat loss may reduce local abundance of caribou particularly within the small nursery area west of Nungesser Lake (Figure 13) where impacts could affect calf survival and recruitment. Where the development footprint does not follow existing access roads, clearing will occur outside the sensitive period for nursery areas (i.e., between May 1 and September 15) and effective implementation of mitigation such as selective clearing and retention of shrubs and wildlife trees will minimize these impacts. After implementing mitigation and considering that habitat loss is expected to occur along previously disturbed areas ((i.e., 75% of the limits of works are considered disturbed), the change in abundance as a result of direct habitat loss is predicted to be have little influence on the resilience and adaptive capacity of caribou.

Potential effects from sensory disturbance (noise, lights, and vibrations) may affect caribou survival, particularly in the six high use areas (one nursery areas and five winter use areas; Figure 13) in proximity to the limits of work. These changes would affect caribou occurrence during construction, but are predicted to be reversible shortly after construction (Eftestøl et al. 2016). Similar to effects from habitat loss, sensory disturbances are unlikely to result in a measurable change in caribou survival and reproduction because construction activities are planned to adhere to timing restrictions recommended by the MNRF (Attachment A). During operations, caribou could be affected by corona-related noise and light emissions. Corona is the result of electrical energy in the conductor interacting with surrounding air temperature, humidity, and wind speed and direction. Corona may increase caribou wariness, in particular if corona emissions elicit a predator evasion response (Tyler et al. 2016).

Vegetation clearing along the ROW and for ancillary facilities (i.e., the substation) is expected to create early seral habitat, which is more favourable for moose. Increased moose density can cause an associated increase in wolf abundance, which can increase predation risk for caribou. Once the vegetation grows back along the ROW moose may be attracted to the power line ROW for feeding. It is difficult to quantify by how much this magnitude of habitat alteration will change the density of moose, the density of wolves, and ultimately the predation rate on caribou. Given that the majority of the limits of work (i.e., 75%) is considered disturbed at Base Case, the change in predation risk as a result of the Project is likely to be small. Nevertheless, an incremental increase in predator density could occur as a result of the Project, which would result in an incremental increase in predation risk for caribou. Any increase in predation risk is more likely to affect the portion of the Berens Range caribou population that uses the small nursery area west of Nungesser Lake (Figure 13). In particular, calf survival and recruitment for these individuals could be negatively affected. Effects from an incremental increase in predation risk to caribou making seasonal movements across the RSA are expected to be comparatively lower. Although caribou cross the Nungesser Road to access summer and winter areas, they distance themselves from the road when not travelling (MNRF 2014b). These observations suggest that interactions with the Project will be infrequent and occur over a short duration for individuals making seasonal movements across the power line. Overall, the resulting change in caribou survival may not be measurable given the spatial arrangement of the limits of work along existing disturbances.

7.1.1.4 Characterization of Net Effects

Effects from direct loss of caribou habitat are certain to occur at the Project scale (Table 17). The limits of works overlaps with 366 ha of nursery areas (Category 1 habitat), 2,518 ha of Category 2 habitat and 518 ha of Category 3 habitat. The quantification of habitat loss represents a conservative estimate of magnitude. These effects are assumed to be continuous and permanent given that the Project's operation phase is considered to be indefinite.

Indirect effects to caribou habitat located in proximity to the Project footprint are likely to reduce habitat quality at the local scale due to sensory disturbances and/or perceived predation risk. Indirect effects are assumed to occur continuously over the medium-term because construction-related sensory disturbances will end once operation begins. Habitat loss from avoidance due to sensory disturbance is expected to be reversible within a few months of completion of construction (Eftestøl et al. 2016; Reimers et al. 2000, 2007). Indirect effects to habitat are considered probable (not certain) because the limits of work includes considerable overlap (i.e., 75%) with existing disturbances or within a zone of influence (i.e., 500 m buffer) around existing disturbances, resulting in a small amount of habitat degradation. Caribou may also adapt to sensory disturbance. Sensory disturbance from maintenance activities during operation is expected to be isolated, infrequent, and temporary.

Effects to caribou habitat distribution are expected to occur as a result of an incremental increase in movement constraints, in particular east-west movement between wintering and summering areas. These effects are predicted to be regional and permanent (Table 17). Effects to caribou movement were conservatively predicted as continuous; however, these effects are most likely to be experienced during seasonal movement periods in the spring and fall (i.e., April and November), and will be more important during construction. The magnitude of effects caused by an incremental increase in linear feature density and removal of habitat within potential travel corridors is uncertain due to knowledge gaps regarding caribou movement patterns in the RSA. At a minimum, the limits of work is predicted to directly affect one large travel corridor between the Trout Lake area and the lake/wetland complexes of Woodland Caribou Provincial Park. The Project footprint follows existing roads and available evidence indicates that caribou currently cross the Nungesser Road (MNRF 2014b). Most caribou are likely to continue using established travel corridors; therefore, effects were considered possible to occur.

Changes to survival and reproduction of caribou from the Project may occur as a result of increased predation risk and/or displacement of individuals. Effects to survival and reproduction are predicted to occur at the local scale (i.e., in proximity of areas affected by habitat change). The magnitude of effects is difficult to quantify because the change in predation rate on caribou is difficult to estimate. Increased predation risk would affect a small proportion of the Berens Range caribou population, notably individuals that use habitat west of Nungesser Lake where the limits of work overlap with one known nursery area and are in close proximity to a small winter use area. The magnitude of effects to caribou making seasonal movements across the power line would be comparatively lower because these individuals would presumably interact with the Project infrequently and over a short duration. The resulting change in caribou survival may not be measurable given the spatial arrangement of the limits of work along existing disturbances (i.e., 75% of the limits of works are considered disturbed). Effects to survival and reproduction are predicted to be permanent and probable given the low likelihood of sustained caribou occurrence inside the majority of limits of work, with the exception of the small nursery area west of Nungesser Lake.

Table 17: Description of Effects and Significance in the Project Case for Woodland Caribou

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona related noise and light emissions, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution	Direction	Negative	Not Significant
		Magnitude	■ Category 1 (nursery habitat): 266 ha (0.1% of available in the Berns Range); one additional nursery area within 10 km of the limits of work. ■ Category 1 (winter use areas): 0 ha; five winter use areas within 10 km of the limits of work. ■ Category 2 (seasonal ranges): 2,518 ha (0.2% of available in Berens Range). ■ Category 3 (remaining areas in the range): 518 ha (0.2% of available in Berens Range). ■ Possible avoidance of Category 1, 2, and 3 habitats (indirect habitat loss) associated with sensory disturbances in proximity to the limits of work.	
		Geographic Extent	■ Project footprint (direct habitat loss) ■ Local (indirect habitat loss)	
		Duration/Reversibility	■ Permanent (direct habitat loss) ■ Medium-term (sensory disturbance)	
		Frequency	■ Continuous	
		Probability of Occurrence	■ Category 1 - nursery areas: certain ■ Category 1 - winter use areas: unlikely ■ Category 2 - seasonal ranges: certain ■ Category 3 - remaining areas in the range: certain ■ Indirect habitat loss: probable	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona related noise and light emissions, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution	Direction	Negative	Not Significant
		Magnitude	■ One large travel corridor (Category 1 habitat) connecting the Trout Lake Area and lake/wetland complexes of Woodland Caribou Provincial Park directly affected. ■ Caribou habitat remains well connected in identified high-use areas	
		Geographic Extent	■ Regional	
		Duration/Reversibility	■ Permanent	
		Frequency	■ Continuous	
		Probability of Occurrence	■ Probable	

Table 17: Description of Effects and Significance in the Project Case for Woodland Caribou

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona related noise and light emissions, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution Use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of caribou	Direction	■ Negative	Not Significant
		Magnitude	■ Incremental increase in predation risk. Effect most important for individuals using small nursery area west of Nungesser Lake. ■ Displacement of a few individuals with home ranges that overlap the limits of work. ■ Resulting change in caribou survival unlikely to be measurable	
		Geographic Extent	■ Local	
		Duration/Reversibility	■ Permanent	
		Frequency	■ Continuous	
		Probability of Occurrence	■ Probable	

a) Value calculated by Wataynikaneyap. There are small differences between disturbance metrics presented in this EA and those reported by the MNRF (MNRF 2014b) due to the use of one different data source (see Section 4.1.3.1). Although the disturbance metrics are not identical, those calculated in this EA provide ecologically relevant and confident predictions across assessment cases.

ha = hectares; RSA = regional study area.

7.1.2 Determination of Significance

The Berens Range caribou population is considered healthy, with a population that is likely more than 500 individuals at Base Case (MNRF 2014b). Adult female survival was recently estimated at 0.87 (95% confidence interval = 0.75-1.0) (MNRF 2014b). Category 1 habitats, which are key components required for caribou survival and reproduction, represent 34.7% (973,294 ha) of the landscape and are well distributed across the Berens Range. Similarly, seasonal ranges (Category 2 habitat) are well distributed across the RSA. However, calf recruitment (23.9 calves per 100 adult females in 2013) is below the 28.9 calves per 100 adult females threshold required to maintain a stable population, assuming a mean adult female survival rate of 0.85 (Environment Canada 2008, 2011). The estimated mean annual population growth rate (λ) is 0.93 (range = 0.89-0.98) (MNRF 2014b), which indicates a declining population trend. The proportion of the range that is disturbed is 28.7% and consists primarily of natural disturbances (i.e., 19.4% of the Berens Range) (MNRF 2014b). The proportion of disturbance in the Berens Range calculated by Wataynikaneyap (26.0%) was similar to the MNRF estimate. Although the cumulative disturbance footprint is below the 35.0% threshold proposed by Environment Canada (2012), the MNRF (2014b) found that the arrangement of habitat was fragmented relative to an estimated natural landscape. Based on the available evidence, the MNRF determined that it is uncertain if the current range condition is sufficient to sustain the Berens caribou (MNRF 2014b). This information suggests that caribou in the RSA are approaching their limits of resilience and adaptability at Base Case, and provides context from the Base Case to which incremental changes in the Project Case are added.

The amount of suitable caribou habitat in the limits of work is 3,402 ha (0.1% of suitable habitat in the RSA, relative to the Base Case), including 366 ha of nursery areas (Category 1 habitat), 2,518 ha of seasonal ranges (Category 2 habitat), and 518 ha Category 3 habitat. These habitat loss estimates are conservative because the limits of work is approximately nine times larger than the anticipated Project ROW and the mapping approach for Category 2 habitat (i.e., all areas of the range not assigned as Category 1 or disturbance) likely overestimated the spatial extent of this habitat. Nevertheless, changes to high use areas, such as nursery areas and winter use areas, can have disproportionally large effects to caribou because these habitats support key functions linked to survival and reproduction. High use areas were avoided to the extent possible by delineating a limits of work that follows existing disturbances. Adhering to timing restrictions recommended by the MNRF around identified high use areas (Attachment A), and selective clearing and retention of shrubs and wildlife trees will help minimize effects from habitat loss. After implementing mitigation and considering that habitat loss is expected to occur along previously disturbed areas (i.e., 75% of the limits of works are considered disturbed at Base Case), the change in caribou abundance as a result of direct habitat loss is predicted to be small. The limits of work will increase the proportion of the Berens Range that is considered disturbed by 0.2% (26% to 26.2%), indicating that the total disturbance in the range will remain below the 35.0% threshold proposed by Environment Canada (2012). These changes are predicted to be within the resilience and adaptive capacity limits of caribou in the RSA because caribou are highly mobile and extensive areas of suitable habitat will remain in the RSA. Habitat loss is not predicted to affect the population's ecological effectiveness and self-sustainability.

The Project is expected to contribute to reduced habitat quality and functional habitat loss due to sensory disturbance or perceived predation risk from the Project. Project activities will change the availability of Category 1, 2, and 3 habitats in proximity to the limits of work, with the majority of potential indirect habitat loss expected to occur in Category 2 habitat. Sensory disturbance could also affect caribou survival and reproduction, particularly in the six high use areas (one nursery area and five winter use areas; Figure 15) in proximity to the limits of work. Effects of indirect habitat loss are predicted to be negligible because the Project will largely parallel

existing linear developments (i.e., the Nungesser Road and Pikangikum All-Season Road) and the limits of work is 75% disturbed at Base Case. These existing developments are associated with vehicular activity, noise and other sensory disturbances, which suggests that caribou using habitats in and around the limits the works have adapted to the current level of disturbance. Avoidance may occur during construction (i.e., during 14 months) when sensory disturbances are higher but negative effects will be minimized adhering to timing restrictions around high use areas, as recommednded by the MNRF (Attachment A). Available information on local caribou occurrence in and around the limits of work suggests that caribou will continue using the area once construction activities have ceased, a prediction supported by Eftestøl et al. (2016) who found no evidence that power lines have negative effects on reindeer habitat use, independent of associated human activity during construction. Some disruptions to caribou may occur during maintenance activities during the Project's operation phase; however, these are expected to be isolated, infrequent, and temporary. It is therefore unlikely that indirect habitat loss/degradation associated with the Project will result in measurable long-term change to caribou abundance and distribution.

The Project is predicted to create small changes in caribou habitat distribution, which are expected to result in an incremental increase in movement constraints across the power line. In particular, the east-west linkage between the Trout Lake area (east of the Project) and the lake/wetland complexes of Woodland Caribou Provincial Park (west of the Project) could be affected. Effects are most likely to be experienced during seasonal movement periods in the spring and fall (i.e., April and November) and will be more important during construction when sensory disturbances associated with the Project are higher. Projects impacts will be minimized by paralleling existing roads (i.e., Nungesser Road and Pikangikum All-Season Road). Most caribou are expected to continue using established travel corridors to cross the power line. No measurable change to habitat connectivity is predicted because caribou cross the Nungesser Road at Base Case (MNRF 2014b) and the Project will not alter long-term traffic levels or sensory disturbances (i.e., beyond the construction phase).

Use of linear corridors and converted habitat (i.e., younger, more productive forest) by moose and wolves could lead to a reduction in caribou survival and reproduction through increased predation pressure. The magnitude of this effect is difficult to quantify. Given the extent of disturbances in the limits of work (i.e., 75%) at Base Case, the change in predation risk to caribou as a result of the Project is likely to be small. Any increase in predation risk is more likely to affect the portion of the Berens Range caribou population that uses the small nursery area west of Nungesser Lake (Figure 15). In particular, calf survival and recruitment for these individuals could be negatively affected. Effects from an incremental increase in predation risk to caribou making seasonal movements across the RSA are expected to be comparatively lower because individuals distance themselves from the road when not travelling (MNRF 2014b). The extent of disturbances within the limits of work suggests that changes to predator-prey dynamics have largely occurred at Base Case. The Project's contribution to alterations in the predator-prey system is likely to have no to little influence on the population survival rate. Changes in predation pressure as a result of the Project are not predicted to alter caribou abundance and distribution.

The small incremental changes in caribou habitat availability, habitat distribution, and survival and reproduction from the Project are not predicted to change the abundance and distribution of caribou in the RSA, relative to the Base Case. The changes are all predicted to be within the resilience and adaptability limits of the population. Consequently, the Project is not anticipated to adversely affect the self-sustainability and ecological effectiveness of the Berens caribou population. Although the self-sustaining status of the population will remain "uncertain" at the Project Case (i.e., it is uncertain if the current range condition is sufficient to sustain the Berens caribou [MNRF 2014b]), the incremental and cumulative effects from the Project and previous and existing developments are predicted to be not significant (Table 17).

7.1.3 Reasonably Foreseeable Development Case (RFD Case)

7.1.3.1 Habitat Availability

Reasonably foreseeable developments including the Project are predicted to reduce habitat for woodland caribou in the RSA relative to the Base Case (Table 15). Cumulative changes associated with the Project (limits of work) and the Wataynikaneyap Phase 2 Project were quantified and are conservatively predicted to result in the loss of approximately 400 ha (0.1%) of nursery areas and 75 ha (less than 0.1%) of winter use areas in the RSA, including 13 ha that support both nursery and winter use function (Table 18). Changes will also remove 2,884 ha (0.2%) of Category 2 habitat (seasonal ranges) and 614 ha (0.2%) of Category 3 habitat (Table 18). The proportion of disturbance in the Berens Range (as calculated by Wataynikaneyap) is expected to increase from 26.0% at Base Case to 26.6% in the RFD Case. The RFDs that did not have footprints available at the time of analysis and reporting (i.e., forest harvesting and forestry road developments) are described in Table 11, and are expected to contribute to additional loss of caribou habitat.

Indirect habitat loss caused by avoidance due to sensory disturbance or perceived predation risk could affect another 2,389 ha (0.8%) of Category 1 habitat (nursery areas), 1,541 ha (0.5%) of Category 1 habitat (winter use areas), 371 ha (0.1%) of overlapping nursery and winter use areas, 16,577 ha (1.1%) of Category 2 habitat, and 4,546 ha (1.4%) of Category 3 habitat in the RSA based on a 500 m zone of influence.

Table 18: Changes to Woodland Caribou Habitat Availability in the Regional Study Area at RFD Case

Habitat Category[a]	Base Case [ha]	RFD Case [ha]	Change in Area[b] [ha]	Percent Change[c] [%]
Category 1 (nursery areas)	318,007	317,620	-387	-0.1
Category 1 (winter use areas)	289,206	289,143	-62	<-0.1
Category 1 (overlapping nursery areas and winter use areas)	366,082	366,069	-13	<-0.1
Category 2 (seasonal ranges)	1,497,116	1,494,232	-2,884	-0.2
Category 3	328,716	328,102	-614	-0.2
Permanent disturbance [d]	2,787	6,747	3,960	142

a) Habitat categories as described in MNRF (2013b).

b) Changes in habitat area result from a conversion of suitable habitat to lower suitability habitats (i.e., other).

c) The percent change is calculated relative to the amount of each habitat category available at Base Case; percent change is not relative to the size of the study area.

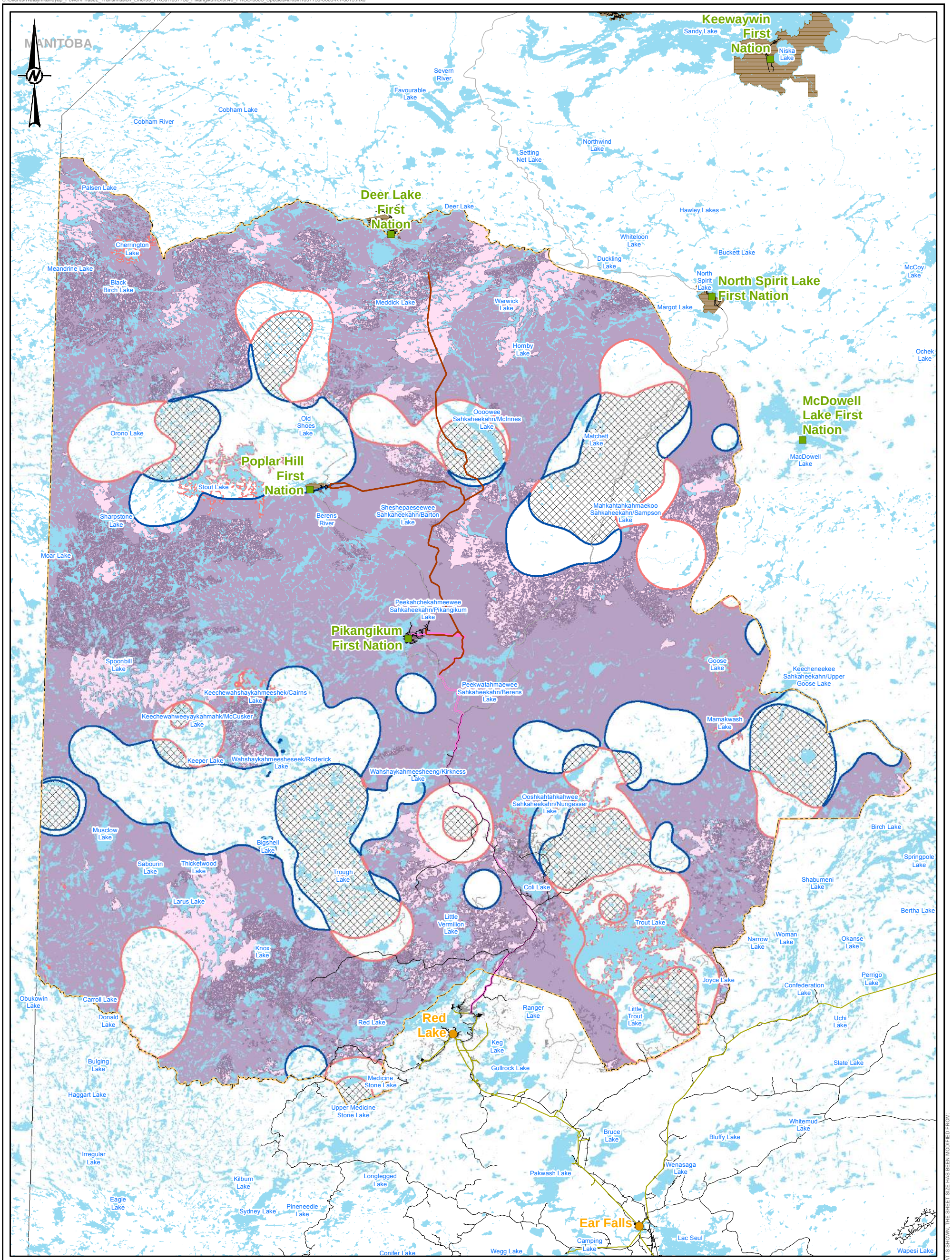
d) As described in Section 4.1.3.1 mapping for Category 1 habitat was based on caribou location data and habitat polygons delineated by the MNRF, which did not exclude disturbances because of demonstrated use by caribou. The permanent disturbance category therefore does not represent a complete inventory of permanent anthropogenic disturbances in the Berens Range.

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

<-0.1% = approaches zero.

ha = hectare; % = percent; <= less than.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Existing Electrical Transmission Line
- Railway
- First Nation Reserve Land
- Waterbody
- Project Limits of Work
- Regional Study Area
- Category 1 - Nursery Areas
- Category 1 - Lakes Supporting Nursery Function (MNRF 2014b)
- Category 1 - Winter Use Area
- Category 1 - Lakes Supporting Winter Use Function (MNRF 2014b)
- Category 1 - Overlapping Nursery and Winter Use Areas
- Category 2 - Seasonal Ranges
- Category 3 - Remaining areas in the Range
- Base Case Disturbance
- RFD Case Disturbance

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
4. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 20 40
1:800,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
WOODLAND CARIBOU HABITAT IN THE REGIONAL STUDY AREA AT REASONABLY FORESEABLE DEVELOPMENT CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	15

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
25mm
0

The Project limits of work overlaps with the Trout Lake, Red Lake, and Whitefeather forests. Of these three forest tenures, the Whitefeather Forest covers the largest spatial extent in the Berens Range. The Whitefeather FMP indicates that harvest is planned using Dynamic Caribou Habitat Schedules (DCHS) to maximize the proportion of productive area with conifer dominated forest cover, that is at least 60 years old (WFMC 2012). The short-term target is to maintain more than 40% of the forest in suitable habitat condition within habitat tracts over 20-year planning intervals. As such, large areas of even-aged mature, conifer forest were deferred from harvest until another planning period.

Cutblocks located in high-use areas would have disproportionately larger effects to caribou. In particular, large-scale disturbances around the southern extent of the Whitefeather Forest (near the boundary with Woodland Caribou Provincial Park) or in the northeastern section of the Berens Range (around Sampson Lake), could reduce the availability of nursery areas and winter use areas. On the other hand, Woodland Caribou Provincial Park will provide long-term protection of some high use areas (Figure 15). Using forest harvest blocks from the DCHS, potential RFD impacts to caribou habitat are predicted from:

- Sixteen (16) “A” blocks (i.e., where harvest is scheduled to occur within the next 0-20 years) overlap with the Berens caribou range, including three in the Red Lake Forest, seven in the Trout Lake Forest, and six in the Whitefeather Forest. Six of these blocks will directly remove winter and/or nursery area habitat over the next 20 years, including:
  - Most of the nursery/winter use area polygon that overlaps with the Project limits of works (i.e., north of Little Vermillion Lake; Figure 15);
  - Various portions of nursery/winter use area polygons around Trout Lake. This includes (i) the overlapping area of winter and nursery area south of Trout Lake, (ii) areas along the north shore of Trout Lake (including overlapping nursery and winter use areas), and (iii) areas north of Nungesser Lake (including overlapping nursery and winter use areas) (Figure 15); and
  - Most of the polygon of overlapping nursery and winter use area that overlaps with McInnes Lake (Figure 15).
- Twenty-one (21) “B” blocks (i.e., where harvest is scheduled to occur within the next 20-40 years) overlap with the Berens range, the majority of which are located in the Whitefeather Forest (17). At least fourteen of these blocks will directly remove winter and/or nursery area habitat over the next 40 years, including:
  - Overlapping nursery/winter use areas between Little Trout Lake and Joyce Lake, and nursery areas north of Joyce Lake (Figure 15);
  - Overlapping nursery/winter use areas south of Nungesser Lake and nursery and winter use areas northeast of Nungesser Lake;
  - A considerable portion of the nursery/winter use polygons at the easternmost extent of the range (i.e., southeast of Mamakwash Lake; Figure 15);
  - Part of the nursery area that overlaps with the Project limits of work (i.e., north of Little Vermillion Lake; Figure 15);
  - Portions of overlapping nursery and winter use areas, and winter use area near Trough Lake (Figure 15);

- Some winter use areas between Poplar Hill First Nation and Stout Lake (Figure 15);
- Some nursery areas west of McInnes Lake (Figure 15).

- Eight (8) "Z" blocks, which have open timing with no restrictions, overlap with the Berens Range including four in the Red Lake Forest, four in the Trout Lake Forest, and two small blocks in the Whitefeather Forest. Although Z blocks are typically considered unsuitable caribou habitat (due to productive forest cover [mixedwood or hardwood dominant], high fragmentation, or permanent disturbances), cuts in these areas could affect:
  - The small winter use area east of Little Vermillion Lake (Figure 15);
  - Nursery areas south of Little Trout Lake (Figure 15);
  - Small extents of nursery area at the southernmost extent of the range (i.e., near Medicine Stone Lake; Figure 15); and
  - Small extents of nursery area west of Little Vermillion Lake (Figure 15).

If these areas are harvested over the next 40 years, there could be a considerable increase in caribou habitat loss over the next 40 years in the Berens Range. Over the long-term, harvested areas should return to functional caribou habitat.

Within the Berens Range, the Project contributes approximately 3,402 ha (13%) to the quantified loss of caribou habitat in the RFD Case (with the conservative assumption of nine times larger than the anticipated Project ROW), excluding potential losses from forest harvesting. It is assumed that other RFDs will be required to implement caribou mitigation to limit cumulative adverse changes in habitat availability for this species; however, it is unclear if this assumption will apply to future cutblocks in the Berens Range.

Changes in forest composition associated with climate change can also adversely affect caribou habitat availability. For example, a change in forest species composition could decrease habitat suitability if coniferous cover is replaced by mixedwood or deciduous forest cover. Similarly, increased frequency of wildfires could also have an adverse effect on caribou habitat availability.

7.1.3.2 Habitat Distribution

Consistent with the above interpretation of habitat loss, changes to local distributions of caribou are expected to be minor, particularly where the Project and Wataynikaneyap Phase 2 Project overlap with existing disturbances. The density of linear features in the Berens Range is predicted to increase incrementally in the RFD Case. The increase in fragmentation is unlikely to result in a measurable change in caribou movement beyond the construction period because the Project and Wataynikaneyap Phase 2 Project are both transmission lines, they use the same ROW, and neither project is expected to affect long-term traffic levels (locally, and at the RSA scale).

The Project and Wataynikaneyap Phase 2 Project cross two potential east-west travel corridors in the Berens Range. The first is a large connectivity area between the Trout Lake area and lake/wetland complexes of Woodland Caribou Provincial Park (Figure 16). Further north, the projects cross a potential movement area between the McInnes Lake-Matchett Lake area (east) and the Stout Lake area (west (Figure 16). Following construction, there are limited sensory disturbances associated with transmission lines (see Sections 4.2.1.1, 4.2.1.2, and 7.1.1.2). The projects have the potential to affect these travel corridors in the

RFD Case; however, these are currently bisected by disturbances at Base Case and continue to be used by caribou (MNRF 2014b) (Figure 16). Although some displacement of animals may result, the magnitude of this change is expected to be small because at Base Case, caribou distance themselves from the Nungesser road when not travelling (MNRF 2014b). A contraction in the range is not expected from localized changes in habitat suitability.

There is a large amount of uncertainty around potential fragmentation effects that could result from future forestry operations. The magnitude of impacts to caribou from changes in habitat connectivity will ultimately depend on the spatial configuration of these disturbances. If the pattern of forest harvesting over the next 40 years is as described in Section 7.1.3.1, reduced connectivity is expected along the southern boundary of the Berens range, in the south-central portion of the range (i.e., between Little Vermillion Lake and McInnes Lake), between Trout Lake and Nungesser Lake, and southeast of Mamakwash Lake (Figure 16). In particular, cutblocks between regionally important winter use and nursery areas could have important effects at the range scale. Such effects could materialize if forest harvesting occurs between Trout Lake and Nungesser Lake (MNRF 2014b) or between Nungesser Lake/Trout Lake and Woodland Caribou Provincial Park (Figure 16).

Possible effects to regional caribou movement could occur, particularly if forestry-related habitat loss occurs in and around the boundary with Woodland Caribou Provincial Park, in the northeastern section of the Berens Range (around Sampson Lake), or around Stout Lake (Figure 15 and 16). Such landscape changes could constrain connectivity between the Berens Range and other neighbouring caribou ranges, including the Atikaki-Berens Caribou Range in Manitoba (to the west), the Kinloch Range (to the east) and the Spirit Range (to the north). Although the Berens Range is considered fragmented at Base Case (MNRF 2014b) with anthropogenic disturbances concentrated in the southern extent of the RSA, the Berens Range remains well connected with the Atikaki-Berens Range at Base Case. Habitat protection afforded inside Woodland Caribou Provincial Park will maintain some ongoing connectivity across the provincial border in the RFD Case.

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MANITOBA

Keewaywin First Nation
Sandy Lake
Niska Lake
Severn River
Favourable Lake
Cobham Lake
Cobham River
Northwind Lake
Setting Net Lake
Palsen Lake
Deer Lake First Nation
Deer Lake
Hawley Lakes
Whiteloon Lake
Buckett Lake
Cherrington Lake
Meandrine Lake
Black Birch Lake
Duckling Lake
North Spirit Lake
North Spirit Lake First Nation
McCoy Lake
Meddick Lake
Warwick Lake
Margot Lake
Hornby Lake
Ochek Lake
McDowell Lake First Nation
MacDowell Lake
Old Shoes Lake
Orono Lake
Poplar Hill First Nation
Ooooowee Sahkaheekahn/McInnes Lake
Stout Lake
Sharpstone Lake
Berens River
Sheshepaeseewee Sahkaheekahn/Barton Lake
Mahkahtahkahmaekoo Sahkaheekahn/Sampson Lake
Moar Lake
Peekahchekahmeewee Sahkaheekahn/Pikangikum Lake
Pikangikum First Nation
Spoonbill Lake
Goose Lake
Keecheneekee Sahkaheekahn/Upper Goose Lake
Peekwatahmaewee Sahkaheekahn/Berens Lake
Keechewahshaykahmeeshek/Cairns Lake
Keechewahweeyaykahmahk/McCusker Lake
Mamakwash Lake
Keeper Lake
Wahshaykahmeesheseek/Roderick Lake
Wahshaykahmeesheeng/Kirkness Lake
Ooshkahtahkahwee Sahkaheekahn/Nungesser Lake
Musclow Lake
Bigshell Lake
Birch Lake
Springpole Lake
Sabourin Lake
Thicketwood Lake
Shabumeni Lake
Coli Lake
Larus Lake
Bertha Lake
Little Vermilion Lake
Trout Lake
Knox Lake
Narrow Lake
Woman Lake
Okanse Lake
Joyce Lake
Perrigo Lake
Confederation Lake
Obukowin Lake
Carroll Lake
Donald Lake
Red Lake
Red Lake
Ranger Lake
Little Trout Lake
Uchi Lake
Keg Lake
Gullrock Lake
Bulging Lake
Slate Lake
Haggart Lake
Medicine Stone Lake
Upper Medicine Stone Lake
Whitemud Lake
Bruce Lake
Bluffy Lake
Irregular Lake
Wenasaga Lake
Kilburn Lake
Pakwash Lake
Longlegged Lake
Eagle Lake
Sydney Lake
Pineneedle Lake
Ear Falls
Camping Lake
Lac Seul
Conifer Lake
Wegg Lake
Wapesi Lake

LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Existing Electrical Transmission Line
- Railway
- First Nation Reserve Land
- Waterbody
- Project Limits of Work
- Regional Study Area
- Category 1 - Travel Corridor (MNRF)
- Category 1 - Spring Travel Corridor
- Category 1 - Fall Travel Corridor
- Base Case Disturbance
- RFD Case Disturbance

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
4. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 20 40
1:800,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
WOODLAND CARIBOU TRAVEL CORRIDORS IN THE REGIONAL STUDY AREA AT RESONABLY FORESEEABLE DEVELOPMENT CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	16

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7.1.3.3 Survival and Reproduction

The Project and RFDs could affect caribou survival and reproduction through habitat loss (vegetation clearing), increased predation risk, and sensory disturbances.

Habitat loss may displace individuals and reduce the local abundance of caribou. Loss of high use areas, particularly nursery areas, could have negative consequences to caribou survival and reproduction if displaced females are forced to rear calves in less suitable habitats (e.g., where predation risk is higher) where calf survival declines. Forest harvesting would account for the majority of these predicted effects.

Vegetation clearing will create early seral habitat, which is more favourable for moose. Increased moose density can cause associated increases in wolf abundance, which can increase predation risk for caribou. Forestry activities are predicted to be the main driver of this disturbance by creating large tracts of early seral habitat. The geographic location of these disturbances will determine the magnitude of impacts because increased predation risk in and around key calving and nursery areas can have disproportionate large effects on calf recruitment (see Sections 7.1.3.1 and 7.1.3.2). These effects could be exacerbated if habitat conversion and changing climatic conditions allow for white-tailed deer range expansion into the Berens Range (Dawe and Boutin 2016). The magnitude of change in predation rate attributable to a combination of forest harvesting and climate change could be considerable. Population monitoring conducted by the MNRF suggests that the Berens Range caribou may be limited by calf survival and recruitment. Although adult survival was above the estimated national average (0.87 versus 0.85 [MNRF 2013b]), recent calf recruitment rates were estimated at 4.8 calves per 100 females in 2012 and at 23.9 calves per 100 females in 2013 (MNRF 2014b). Recruitment estimates from 2011-2012 were also low in the neighbouring Sydney and Churchill Ranges, suggesting that it was a poor recruitment year across ranges (MNRF 2014b). The Berens Range caribou population may therefore be particularly sensitive to changes in calf survival. Young calves are particularly vulnerable to predation (Adams et al. 1995; Rayl et al. 2014; Seip 1992; Whitten et al. 1992). Altered predator-prey dynamics could decrease calf survival, causing a further reduction in calf recruitment that would negatively affect the population growth rate (λ), which is already indicating a population decline at Base Case.

Increased sensory disturbance (noise, light, vibrations) associated with RFDs in the RSA are unlikely to result in a measurable change in caribou survival or reproduction. Sensory disturbance and perceived predation risk effects from the Project and similar types of developments are expected to be reversible following construction activities, while longer term effects are predicted for forestry operations.

Possible effects to regional caribou movement are expected, particularly if forestry-related habitat loss occurs high use areas or along key travel corridors, as discussed above in Sections 7.1.3.1 and 7.1.3.2. Survival and reproduction would be negatively affected if connectivity is constrained (or disrupted/severed) between the Berens Range and other neighbouring caribou ranges (i.e., Spirit Range, Kinloch Range or Atikaki-Berens Caribou Range in Manitoba).

7.1.3.4 Characterization of RFD Case Effects

The loss of caribou habitat in the RSA due to cumulative changes is certain and is predicted to be permanent and continuous because the Project and some other RFDs will operate indefinitely (Table 19). The magnitude of effects will depend on how climate and wildfire change the amount of habitat available in the caribou RSA, as well as on the timing and location of RFDs, particularly forest cutblocks and associated roads. Quantified habitat loss in the RSA includes 400 ha (0.1%) of nursery areas, 75 ha (<0.1%) of winter use areas, 2,884 ha (0.2%) of Category 2

habitat (seasonal ranges) and 614 ha (0.2%) of Category 3 habitat. Loss of Category 1 habitat under the full limits of work analysis includes 13 ha of overlapping area that supports both nursery and winter use function. Forest harvesting could contribute considerably more habitat loss over the next 40 years but these effects were not quantified. Indirect changes to habitat located in proximity to RFDs is likely to reduce habitat quality at the regional scale due to sensory disturbances and/or perceived predation risk. Indirect effects are assumed to occur continuously over the long-term because of anticipated forest harvesting activities. Effects from changes in habitat availability are expected to occur at the beyond regional scale because of potential influences from climate change.

Changes to caribou habitat distribution in the RSA are predicted to be permanent because the Project and some other RFDs will operate indefinitely (Table 19). Consistent with the above interpretation of habitat loss, the magnitude of change to habitat distribution will depend on how climate and wildfire change the amount of habitat available in the caribou RSA, as well as on the timing and location of RFDs, particularly forest cutblocks and associated roads. The density of linear features in the Berens Range is predicted to increase incrementally in the RFD Case. Effects from changes in habitat connectivity are expected to occur as a result of an incremental increase in movement constraints, in particular east-west movement along two identified travel corridors: the linkage between the Trout Lake Area and the lake/wetland complexes of Woodland Caribou Provincial Park and the linkage between the McInnes Lake-Sampson Lake area and the Stout Lake area. Effects to caribou movement are conservatively predicted as continuous; however, effects are most likely to be experienced during seasonal movement periods in the spring and fall (i.e., April and November). Most caribou are expected to continue using established travel corridors across transmission lines but large cutblocks are more likely to cause a disruption. It is therefore possible that disturbances could disrupt regional east-west movement routes through the Berens Range and may even reduce connectivity with neighbouring caribou ranges (i.e., Kinloch, Spirit and Atikaki-Berens Range in Manitoba). Effects are considered probable to occur at the beyond regional scale due to climate change and the potential to affect connectivity with other caribou ranges.

Cumulative changes to caribou survival and reproduction from RFDs may occur as a result of habitat loss, displacement of individuals, altered connectivity and/or increased predation risk. Effects are predicted to be permanent and continuous because the Project and some other RFDs will operate indefinitely. The magnitude of effects on survival and reproduction due to changes in habitat availability and habitat distribution will largely depend on the geographic location of disturbances and climate change. These changes will in turn influence the magnitude of effects expected from increased predation pressure. Transmission line projects are expected to contribute to a small amount change in predation pressure, particularly if RFDs largely align with existing disturbances. The magnitude of change in predation rate attributable to forest harvesting could be considerable. Disruption to regional and beyond regional connectivity (i.e., neighbouring caribou ranges), as described above, would also adversely affect caribou abundance and distribution. Overall, effects are considered probable (not certain) based on uncertainties associated with forest harvesting. Effects are predicted to occur at the beyond regional scale due to climate change and the potential to impact connectivity with other caribou ranges.

Table 19: Description of Effects and Significance in the RFD Case for Woodland Caribou

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona related noise and light emissions, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution	Direction	Negative	Significant
		Magnitude	■ Category 1 (nursery habitat): 400 ha (0.1% of available in Berens Range); possible avoidance in proximity to RDFs. ■ Category 1 (winter use areas): 75 ha (<0.1% of available in Berens Range); possible avoidance in proximity to RDFs. ■ Category 2 (seasonal ranges): 2,884 ha (0.2% of available in Berens Range); possible avoidance in proximity to RDFs. ■ Category 3 (remaining areas in the range): 614 ha (0.2% of available in Berens Range); possible avoidance in proximity to RDFs. ■ Potential for considerably more forestry-related habitat loss over the next 40 years based on DCHS. ■ Disturbance: proportion of Berens Range disturbed changes from 26.0% to 26.6%[(a)]	
		Geographic Extent	Beyond regional[(b)]	
		Duration/Reversibility	■ Permanent (direct habitat loss) ■ Long-term (sensory disturbance)	
		Frequency	Continuous	
		Probability of Occurrence	■ Category 1 – nursery areas: certain ■ Category 1 – winter use areas: certain ■ Category 2 – seasonal ranges: certain ■ Category 3 – remaining areas in the range: certain ■ Indirect habitat loss: probable	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona related noise and light emissions, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution	Direction	Negative	Significant
		Magnitude	■ Two travel corridors (Category 1 habitat), including a large travel corridor connecting the Trout Lake Area and lake/wetland complexes of Woodland Caribou Provincial Park and a linkage between McInnes Lake-Sampson Lake area and Stout Lake area. ■ Caribou habitat remains well connected in identified high-use areas; however, future forestry impacts in Whitefeather Forest are largely unknown, and may influence movement within the Berens Range and among neighbouring ranges.	
		Geographic Extent	Beyond Regional	
		Duration/Reversibility	Permanent	
		Frequency	Continuous	
		Probability of Occurrence	Probable	

Table 19: Description of Effects and Significance in the RFD Case for Woodland Caribou

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona related noise and light emissions, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution ■ Use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of caribou	Direction	Negative	Significant
		Magnitude	■ Displacement of individuals with home ranges that overlap RFDs. Important effects if forestry cutblocks overlap with high use areas as predicted by DCHS. ■ Small incremental increase in predation risk associated with transmission line projects. ■ Potential for considerable increase in predation pressure associated with forestry given the absence of cutblocks in Whitefeather Forest at Base Case. Highly uncertain. ■ Small incremental increase in movement constraints associated with transmission projects. ■ Potential for reduced/severed connectivity within the Berens Range and with neighbouring ranges as a result of forestry cutblocks. Highly uncertain	
		Geographic Extent	Beyond regional	
		Duration/Reversibility	Permanent	
		Frequency	Continuous	
		Probability of Occurrence	Probable	

a) Value calculated by Wataynikaneyap. There are small differences between disturbance metrics presented in this EA and those reported by the MNRF (MNRF 2014b) due to the use of one different data source (see Section 4.1.3.1). Although the disturbance metrics are not identical, those calculated in this EA provide useful insight on relative change across assessment cases.

b) Changes may be beyond regional due to climate change and other natural disturbance factors

ha = hectares; DCHS = dynamic caribou habitat schedules; RSA = regional study area; RFD = reasonably foreseeable development.

7.1.3.5 Determination of Significance

The Berens Range caribou population is considered healthy, with a population that is likely more than 500 individuals at Base Case (MNRF 2014b). Adult female survival was recently estimated at 0.87 (95% confidence interval = 0.75-1.0) (MNRF 2014b). Category 1 habitats, which are key components required for caribou survival and reproduction, represent 34.7% (973,294 ha) of the landscape and are well distributed across the Berens Range. Similarly, seasonal ranges (Category 2 habitat) are well distributed across the RSA. However, calf recruitment (23.9 calves per 100 adult females in 2013) is below the 28.9 calves per 100 adult females threshold required to maintain a stable population, assuming a mean adult female survival rate of 0.85 (Environment Canada 2008, 2011). The estimated mean annual population growth rate (λ) is 0.93 (range = 0.89-0.98) (MNRF 2014b), which indicates a declining population trend. The proportion of the range that is disturbed is 28.7% and consists primarily of natural disturbances (i.e., 19.4% of the Berens Range) (MNRF 2014b). The proportion of disturbance in the Berens Range calculated by Wataynikaneyap (26.0%) was similar to the MNRF estimate. Although the cumulative disturbance footprint is below the 35.0% threshold proposed by Environment Canada (2012), the MNRF (2014b) found that the arrangement of habitat was fragmented relative to an estimated natural landscape. Based on the available evidence, the MNRF determined that it is uncertain if the current range condition is sufficient to sustain the Berens caribou (MNRF 2014b). This information suggests that caribou in the RSA are approaching the limits of resilience and adaptability at Base Case.

Reasonably foreseeable developments including the Project limits of work (conservatively assumed to be approximately nine times larger than the anticipated Project ROW) are predicted to remove approximately 400 ha (0.1%) of nursery areas and 75 ha (less than 0.1%) of winter use areas in the RSA, including 13 ha that support both nursery and winter use function (Table 19). Cumulative changes will also remove 2,884 ha (0.2%) of Category 2 habitat (seasonal ranges) and 614 ha (0.2%) of Category 3 habitat (remaining areas in the range) in the RSA (Table 19). The Project will contribute 3,402 ha (13%) to the quantified loss of caribou habitat in the RFD Case, excluding forest harvest. These estimates likely underestimate the amount of long-term habitat loss at the RFD Case because footprints for forestry related activities were highly uncertain (i.e., no harvest has occurred to date in the Whitefeather Forest at Base Case). Adverse changes to high use areas such as nursery areas and winter use areas as predicted from DCHS “A”, “B” and “Z” blocks (Section 7.1.3.1) could have disproportionally large effects on caribou. The timing, spatial extent and geographic location of future cutblocks will therefore be critical in determining the magnitude of impacts to the Berens Range caribou. If all areas of DCHS “A”, “B” and “Z” blocks are harvested as planned over the next 40 years (Section 7.1.3.1), these large-scale disturbances near Woodland Caribou Provincial Park (i.e., around Trough Lake), Trout Lake, Nungesser Lake, McInnes Lake, and Mamakwash Lake could have considerable effects on the distribution and abundance of caribou due to the loss of nursery and winter use areas, which support key functions linked to survival and reproduction. On the other hand, Woodland Caribou Provincial Park will provide long-term protection of some high use areas in the RFD Case.

The Project and RFD developments are also expected to contribute to reduced habitat quality and functional habitat loss due to sensory disturbance or perceived predation risk, and would adversely influence approximately 25,424 ha of Category 1, 2, and 3 habitats in proximity to RFDs (i.e., within a 500 m zone of influence), with the majority of potential indirect habitat loss expected to occur in Category 2 habitat. Potential effects from sensory disturbance could also influence caribou survival and reproduction, particularly where high use areas are in proximity to the RFDs (Figure 15). Indirect habitat loss effects from transmission line RFDs are predicted to be negligible because these projects are largely expected to parallel existing disturbances. Avoidance may occur

during construction when sensory disturbances are higher but negative impacts should be minimized if proponents adhere to the *Best Management Practices for Renewable Energy, Energy Infrastructure and Energy Transmission Activities and Woodland Caribou in Ontario* (MNR no date). Forestry-related activities will contribute to additional indirect habitat loss through avoidance but the magnitude of impacts is difficult to predict given uncertainty around the timing, spatial extent and geographic location of future cutblocks.

Based on the quantified RFD footprints, the proportion of disturbance in the Berens Range is expected to increase from 26.0% at Base Case to 26.6% in the RFD Case, indicating that the total disturbance in the range will remain below the 35.0% threshold proposed by Environment Canada (2012). Although forestry footprints are not included in this estimate, current land use policy (e.g., *Range Management Policy in Support of Woodland Caribou Conservation and Recovery* [MNRF 2014d]) suggests a prudent approach to resource management, such that future activities, including forestry, will need to be balanced and planned in such a way to maintain the Berens Range under the 35% disturbance threshold. The quantified changes in habitat availability at the RFD Case are predicted to be within the resilience and adaptive capacity limits of caribou in the RSA because caribou are highly mobile and extensive areas of suitable habitat would remain in the RSA. This prediction is associated with a high degree of uncertainty owing to information gaps related to forestry activities in the Whitefeather Forest. Habitat alterations from climate change (e.g., conversion to more deciduous forest cover and altered fire regime) could exacerbate these effects and also introduce a moderate amount of uncertainty.

The Project and other RFDs are predicted to alter the distribution of caribou habitat. Consistent with the above interpretation of direct and indirect habitat loss, the magnitude of change to habitat distribution will depend on how climate and wildfire change the amount of habitat available in the RSA, as well as on the timing, extent and location of forest cutblocks and associated roads. The density of linear features in the Berens Range is predicted to increase incrementally from Base Case to RFD Case. An incremental reduction in east-west habitat connectivity is expected as a result of the transmission line RFDs that bisect two identified travel corridors: the linkage between the Trout Lake Area and the lake/wetland complexes of Woodland Caribou Provincial Park and the linkage between the McInnes Lake-Sampson Lake area and the Stout Lake area. Caribou with home ranges in and around these RFDs will be affected year-round; however, the majority of animals will be affected only during seasonal movement periods (i.e., April and November). Most caribou are expected to continue using established travel corridors across transmission lines following the construction phases of the Project and Wataynikaneyap Phase 2 Project. In contrast, large cutblocks are more likely to cause a long-term disruptions, despite their temporary nature, because it can take decades for the functionality of these areas to return (MNRF 2014b; Environment Canada 2012). The most important potential fragmentation effects associated with forestry would be those occurring between Trout Lake/Nungesser Lake and Woodland caribou Provincial Park, and between Trout Lake and Nungesssor Lake.

Depending on the spatial configuration of cutblocks, it is possible that disturbances could disrupt regional east-west movement routes through the Berens Range. Further, disturbances could reduce or disrupt connectivity with neighbouring caribou ranges (i.e., Kinloch, Spirit and Atikaki-Berens Range in Manitoba), which would reduce the population's ecological effectiveness and self-sustainability. Habitat protection afforded inside Woodland Caribou Provincial Park will provide some ongoing connectivity across the provincial border at RFD Case. Changes to habitat distribution are predicted to remain within the resilience and adaptive capacity limits of caribou in the RSA and are not expected to affect the population's ecological effectiveness and self-sustainability. These predictions are based on the quantified RFD changes and an assumption of prudent management of the land base.

The predictions are associated with a high degree of uncertainty owing to information gaps around forestry activities and climate change.

Altered predator-prey dynamics associated with the creation of early seral habitat are expected to cause an increase in predation pressure at the RFD Case. Forestry activities are predicted to be the main driver of this change by creating large tracts of early seral habitat whereas the contribution of transmission line projects is likely to be minimal for reasons previously discussed (Sections 4.2.1.1, 7.1.1.1 and 7.1.1.3). Impacts from forestry could be considerable, especially considering the absence of cutblocks in the Whitefeather Forest at Base Case. These effects could be exacerbated if habitat conversion and changing climatic conditions allow for white-tailed deer range expansion into the Berens Range (Dawe and Boutin 2016). The magnitude of impacts to caribou survival and reproduction will largely depend on the spatial extent and location of cutblocks. Increased predation risk in and around key calving and nursery areas could have disproportionately large effects on calf survival and recruitment (see Sections 7.1.3.1 and 7.1.3.2). As previously described, the Berens Range caribou may be particularly sensitive to changes in calf recruitment as it appears to be a limiting factor for this population (MNRF 2014b). A further reduction in calf recruitment would negatively affect the Berens population growth rate, which is already indicating a population decline at Base Case. Such changes would likely exceed the limits of adaptability and resilience for this criterion.

Changes in caribou habitat availability (i.e., quantity and quality) and habitat distribution (i.e., arrangement and connectivity) are predicted to be within caribou's resilience and adaptability limits, although there is a high degree of uncertainty associated with these predictions. Changes to caribou survival and reproduction are likely to occur as a result of increased predation (i.e., associated with the conversion of habitat to earlier seral stages) which would cause a change to the abundance and distribution of caribou in the RSA. These changes are expected to be driven by a combination of forestry activities and climate change. Given that the Berens caribou are approaching their limits of resilience and adaptability at Base Case (i.e., it is uncertain if the current range condition is sufficient to sustain the Berens caribou), the population may be not likely to be self-sustaining at the RFD Case, but should remain ecologically effective. However, there is a low amount of confidence associated with this prediction given the uncertainty associated with future forestry activities, climate change and population demographic rates. Using a precautionary approach, the cumulative effects from previous, existing and reasonably foreseeable developments are predicted to be significant (Table 19). However, the Project is expected to contribute little to the significance of cumulative effects after mitigation.

7.2 Wolverine

7.2.1 Assessment of Project Effects (Project Case)

7.2.1.1 Habitat Availability

There are 2,468 ha of moderate to high suitability wolverine habitat in the in the limits of work, which is 0.1% of suitable habitat that is present in the RSA at Base Case (Table 20). The limits of work (4,355 ha) is approximately nine times larger than the anticipated Project footprint (478 ha with an additional disturbance area [approximately 2 ha] required for the substation). Sensory disturbance from the Project may reduce habitat quality and cause some individuals to avoid potential suitable habitat at the local scale.

Table 20: Changes to Wolverine Habitat Availability in the Regional Study Area, at Project Case

Habitat Suitability[(a)]	Base Case [ha]	Project Case [ha]	Change in Area Using the Limits of Work Footprint[(a)(b)] [ha]	Percent Change using the Limits of Work Footprint[(b)] [%]
Moderate to High	2,706,379	2,703,910	-2,468	-0.1
Nil to Low	95,535	98,004	2,468	2.6

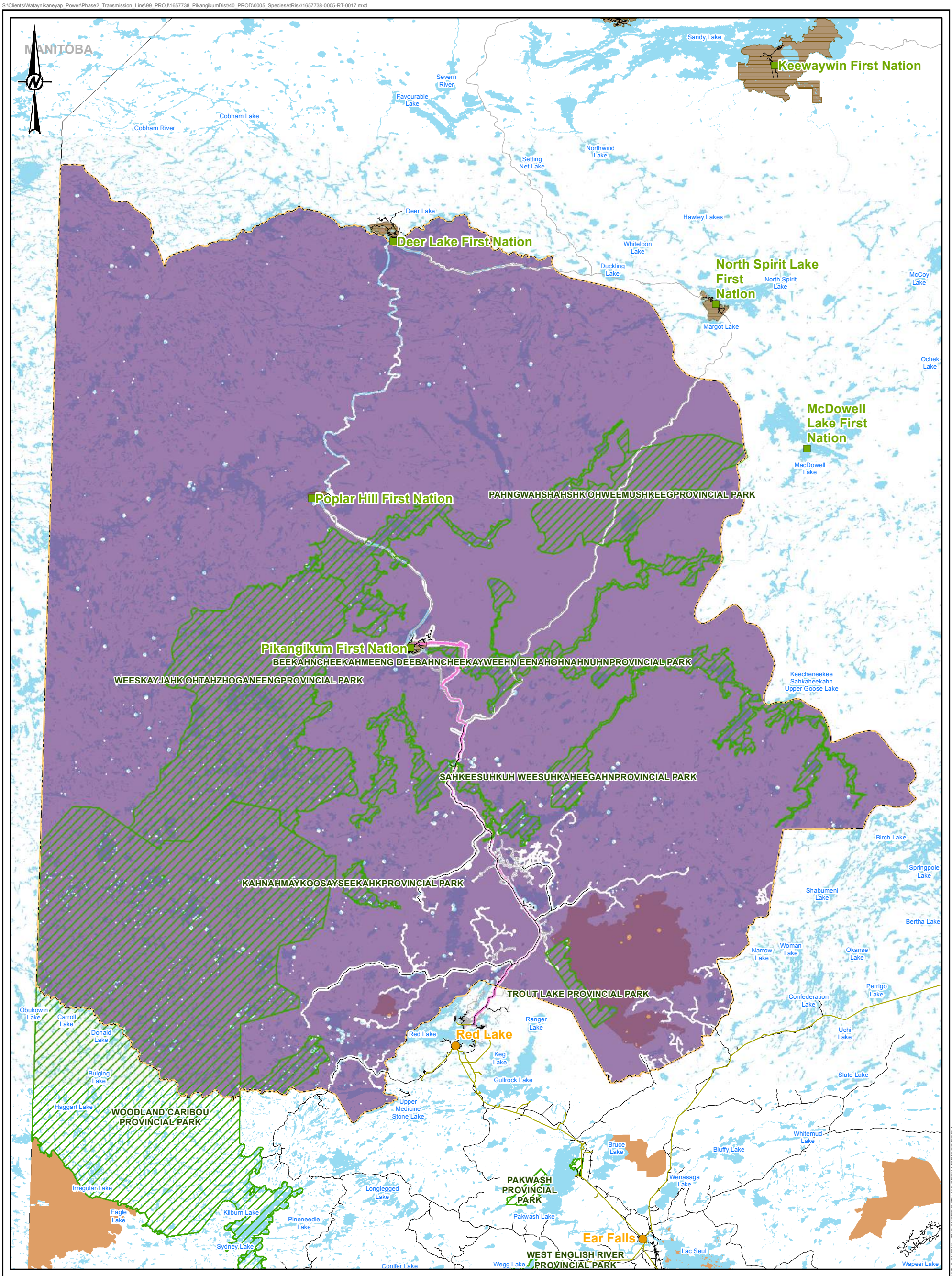
a) Changes in habitat area result from a conversion of moderate to high suitability habitat to lower suitability habitats (i.e., nil to low).
b) The limits of work is approximately nine times larger than the anticipated Project ROW (4,355 ha for the limits of work versus 478 ha for the maximum anticipated Project ROW), but specific areas of disturbance had not been identified at the time of writing.
Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.
Note: The percent change is calculated using the total amount of moderate to high or nil to low habitat available at Base Case; percent change is not relative to the size of the study area.
ha = hectare; % = percent.

7.2.1.2 Habitat Distribution

Linear features such as roads and transmission lines may alter wolverine movements due to habitat fragmentation effects. The genetic isolation of the Manitoba and Ontario wolverine populations from populations in other provinces is thought to be due to habitat fragmentation from major highways and transmission lines (COSEWIC 2003; MNR 2013c). Wolverines appear to generally avoid areas of dense human disturbance and roads (Banci 1994; Carroll et al. 2001; Copeland et al. 2007). However, avoidance of human disturbance features with low sensory disturbance (e.g., transmission lines) by wolverines is less well understood. Wolverines in northern Alberta and British Columbia were found to use linear corridors with a compacted snow layer (e.g., snowmobile trail) 100% of the time, when individuals encountered these features (Wright and Ernst 2004). Wolverines have also been observed to use transmission corridors as travel corridors in northern British Columbia (Harriman and Baker 2003).

The Project contributes to a negligible increase in linear feature density, when compared to the Base Case as the Project will be routed along existing disturbances (e.g., Nungesser Road and the Pikangikum All-Season Road) as much as possible. Linear feature density in the RSA at Base Case and Project Case is 0.2 km/km^2. Similarly, moderate to high suitability wolverine habitat at Project Case will remain similarly distributed to Base Case conditions (Figure17). As such, wolverine connectivity in the RSA is not predicted to be measurably reduced when the Project Case is compared to Base Case conditions.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Existing Electrical Transmission Line
- Railway
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area
- Base Case Disturbance
- Wolverine Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
4. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

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1:800,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
WOLVERINE HABITAT IN THE REGIONAL STUDY AREA AT PROJECT CASE

CONSULTANT

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7.2.1.3 Survival and Reproduction

The Project is not expected to influence the survival and reproduction of wolverine from increased access as no new access roads will be constructed and so hunter and trapper access will not be improved in the RSA. Wolverine prey abundance is not expected to change as a result of the Project, in particular, no changes to woodland caribou abundance and distribution are predicted (Section 7.1.2). Changes to habitat availability and distribution are not anticipated to affect wolverine survival and reproduction because the Project is predicted to intersect three to five wolverine home ranges (based on home range diameters of 26 to 43 km; Magoun et al 2005). The Project will be routed along existing linear disturbance as much as possible and transmission lines may not remove habitat from use by wolverine (Harriman and Baker 2003; Wright and Ernst 2004). As such, the carrying capacity of the RSA for wolverine is not predicted to be reduced, compared to Base Case.

7.2.1.4 Characterization of Net Effects

Effects from direct habitat loss of moderate to high suitability wolverine habitat in the Project Case are conservatively assumed to be certain to occur at the local scale (Table 21). The operation phase of the Project is considered to be indefinite and thus, for the purposes of this analysis, the direct loss of wolverine habitat availability is conservatively assumed to be continuous and permanent.

Effects from sensory disturbance (avoidance or reduction in habitat quality) are probable because some individuals may adapt to sensory disturbance. Effects from changes to habitat availability from sensory disturbance are expected to occur at the local scale and to be reversible at the end of construction (medium-term) (Table 21). Sensory disturbance effects during construction are conservatively assumed to be continuous because, although construction activities will typically occur during one 10 hour shift per day (from 07:00 to 18:00), night time work may be required in some instances. Sensory disturbance from maintenance activities during operation is expected to be isolated, infrequent, and temporary.

Effects to wolverine from changes to habitat distribution are possible. The connectivity of wolverine populations in the RSA is not likely restricted at Base Case because there are few linear disturbance in the RSA. Effects from changes in habitat distribution will occur continuously at the local scale and are conservatively assumed to be permanent as Project operation is indefinite. Project-related changes in habitat availability and distribution are predicted to not influence survival and reproduction (Table 21). The likelihood of a neutral effect is probable as habitat does not appear limiting, few wolverine home ranges will be disturbed, and the Project will implement mitigation to avoid and limit direct mortality of wolverines during construction activities.

Table 21: Description of Effects and Significance in the Project Case for Wolverine.

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	Not Significant
		Magnitude	■ Direct loss of 2,468 ha of suitable habitat (4.4% of the RSA Base Case) ■ Reduced quality of habitat and possible avoidance in close proximity to construction activities from sensory disturbance	
		Geographic Extent	Local	
		Duration/Reversibility	■ Permanent (direct loss) ■ Medium-term (sensory disturbance)	
		Frequency	Continuous	
		Probability of Occurrence	■ Certain (direct loss) ■ Probable (sensory disturbance)	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	
		Magnitude	Small reduction in movements among habitat patches	
		Geographic Extent	Local	
		Duration/Reversibility	Permanent	
		Frequency	Continuous	
		Probability of Occurrence	Possible	
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Neutral	
		Magnitude	n/a	
		Geographic Extent	n/a	
		Duration/Reversibility	n/a	
		Frequency	n/a	
		Probability of Occurrence	Probable	

Note: If a net effect was identified as positive or neutral, no additional effects characteristics, other than probability of occurrence, were summarized.
n/a = not applicable. Project effect pathways are predicted to result in no measurable changes to wolverine survival and reproduction rates.
ha = hectares; RSA = regional study area

7.2.1.5 Determination of Significance

Past and existing developments in the Base Case may have adversely affected habitat availability, habitat distribution, and survival and reproduction of wolverine populations that overlap the RSA. Wolverine in Ontario are currently threatened by hunting and trapping and habitat loss, degradation, and fragmentation (MNR 2013c). Habitat is not limiting in the RSA for wolverine at Base Case; high suitability wolverine habitat covers 96.6% of the RSA at Base Case. Although wolverine populations have intrinsically low resilience, because of their low densities, large home range sizes, and relatively low reproductive rates, the wolverine population in northern Ontario appears to be increasing (Magoun et al. 2005; COSEWIC 2014). Additionally, boreal wolverine populations may have more flexible denning habitat requirements than previously thought (Webb et al. 2016). Based on the above information, wolverine populations that overlap the RSA are considered to be self-sustaining and ecologically effective at Base Case.

The amount of suitable wolverine habitat in the limits of work is 2,469 ha (0.1% in the RSA, relative to the Base Case). The limits of work (4,355 ha) is approximately nine times larger than the maximum anticipated Project ROW (478 ha, with an additional disturbance area required for the substation [approximately 2 ha]). Effective implementation of mitigation such as selective clearing and retention of shrubs and wildlife trees along the Project ROW will reduce the magnitude of habitat loss from the Project.

Habitat degradation from noise, dust and other sensory disturbances will be reduced in the operation phase because maintenance activities will be infrequent and of short duration. The Project may restrict wolverine movements and population connectivity however, transmission lines are likely less inhibiting to wolverine movements than roads. Effects from changes due to direct habitat loss and sensory disturbance are unlikely to influence population survival and reproduction rates because wolverines have large home ranges and habitat in the RSA is likely not at carrying capacity for this species. The Project will also implement mitigation to avoid and limit direct mortality to wolverines during construction activities. Changes to wolverine survival and reproduction are not expected as a result of altered prey abundance. For example, the Project is not expected to reduce woodland caribou abundance in the RSA (Section 7.1.2).

The small incremental changes in wolverine habitat availability and distribution from the Project, relative to the Base Case, is predicted to remain within the resilience and adaptability limits of this species. Consequently, wolverine populations that are within or overlap the RSA are anticipated to remain self-sustaining and ecologically effective in the Project Case. Incremental and cumulative effects from the Project and previous and existing developments are predicted to be not significant (Table 21).

7.2.2 Reasonably Foreseeable Development Case (RFD Case)

7.2.2.1 Habitat Availability

The Wataynikaneyap Phase 2 Project, forestry road developments, and forest harvesting in the Trout Lake, Red Lake, and Whitefeather Forests are reasonably foreseeable developments that overlap with the limits of work and the RSA (Figures 17 and 18. The Project and Wataynikaneyap Phase 2 Project are RFDs that were quantified in the habitat modelling for wolverine in the RFD Case. These projects will contribute to a loss of approximately 9,633 ha (0.4%) of moderate to high suitability wolverine habitat in the RSA, relative to Base Case (Table 22). Forestry harvesting and forestry road construction in the Red Lake, Trout Lake, and Whitefeather forests were not quantified but will also remove wolverine habitat in the RFD Case, and create sensory disturbance that would result in avoidance of wolverine near these activities.

In addition to development, natural factors such as climate change may contribute cumulatively to influence habitat availability for wolverine. Climate warming is expected to result in less snow accumulation in Ontario (Thompson et al. 1998), which may result in changes to denning habitat availability (Banci 1994; Magoun and Copeland 1998; Persson 2005; Aubry et al. 2007). However a recent study from the boreal forest of Alberta suggests that wolverines in boreal environments may not be as reliant on spring snow cover as previously thought (Webb et al. 2016).

Table 22: Changes to Wolverine Habitat Availability in the Regional Study Area at Reasonably Foreseeable Development Case

Habitat Suitability[(a)]	Base Case [ha]	RFD Case [ha]	Change in Area[(a)] [ha]	Percent Change [%]
Moderate to High	2,706,379	2,696,745	-9,633	-0.4
Nil to Low	95,535	105,168	9,633	10.1

a) Changes in habitat area result from a conversion of moderate to high suitability habitat to lower suitability habitats (i.e., nil to low).

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

Note: The percent change is calculated using the total amount of moderate to high or nil to low habitat available at Base Case; percent change is not relative to the size of the study area.

ha = hectare; % = percent; RFD = reasonably foreseeable development.

7.2.2.2 Habitat Distribution

Reasonably foreseeable developments occurring in the RSA will remove wolverine habitat and result in additional fragmentation. The effects that the transmission lines will have on wolverine population connectivity is unclear. Wolverine may use (Harriman and Baker 2003; Wright and Ernst 2004) or avoid (COSEWIC 2003; MNR 2013c) transmission line corridors. Other RFDs that are located in the RSA and may alter wolverine habitat distribution and population connectivity are the forestry road construction and forest harvesting in the Red Lake, Trout Lake, and Whitefeather forests. It is assumed the RFDs will use mitigation that avoids and minimizes effects to wolverine habitat and population connectivity.

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MANITOBA

Keewaywin First Nation
Deer Lake First Nation
North Spirit Lake First Nation
McDowell Lake First Nation
Poplar Hill First Nation
Pikangikum First Nation
Red Lake

PAHNGWAHSHAHSHK OHWEEMUSHKEEGPROVINCIAL PARK
BEEKAHNCHEEKAHMEENG DEEBAHNCHEEKAYWEEHN EENAHOHNAHNUHNPROVINCIAL PARK
WEESKAYJAHK OHTAHZHOGANEENGPROVINCIAL PARK
SAHKEESUHKUH WEESUHKAHEEGAHNPROVINCIAL PARK
KAHNAHMAYKOOSAYSEEKAHKPROVINCIAL PARK
TROUT LAKE PROVINCIAL PARK
WOODLAND CARIBOU PROVINCIAL PARK
PAKWASH PROVINCIAL PARK
WEST ENGLISH RIVER PROVINCIAL PARK

Sandy Lake
Severn River
Favourable Lake
Cobham Lake
Cobham River
Northwind Lake
Setting Net Lake
Deer Lake
Hawley Lakes
Whiteloon Lake
Duckling Lake
North Spirit Lake
Margot Lake
McCoy Lake
Ochek Lake
MacDowell Lake
Keecheneekee Sahkaheekahn Upper Goose Lake
Birch Lake
Springpole Lake
Shabumeni Lake
Bertha Lake
Narrow Lake
Woman Lake
Okanse Lake
Confederation Lake
Perrigo Lake
Uchi Lake
Slate Lake
Ranger Lake
Red Lake
Keg Lake
Gullrock Lake
Upper Medicine Stone Lake
Obukowin Lake
Carroll Lake
Donald Lake
Bulging Lake
Haggart Lake
Irregular Lake
Eagle Lake
Kilburn Lake
Sydney Lake
Pineneedle Lake
Longlegged Lake
Bruce Lake
Bluffy Lake
Whitemud Lake
Wenasaga Lake
Pakwash Lake
Ear Falls
Lac Seul
Wegg Lake
Conifer Lake
Wapesi Lake

LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Existing Electrical Transmission Line
- Railway
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area
- Base Case Disturbance
- RFD Case Disturbance
- Wolverine Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
4. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 20 40
1:800,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
WOLVERINE HABITAT IN THE REGIONAL STUDY AREA AT RESONABLY FORESEEABLE DEVELOPMENT CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	18

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
0 25mm

As with habitat availability, climate change may contribute cumulatively to changes in the distribution of wolverine habitat. The effects of climate change on wolverines is uncertain. Climate change may result in a loss of conifer cover and reduced snow accumulation, which may alter habitat distribution. Overall, connectivity among wolverine habitat patches is expected to be maintained at the RFD Case despite potential increased fragmentation from natural factors and RFDs.

7.2.2.3 Survival and Reproduction

Mortality from improved hunter and trapper access by development of new roads and trails can affect the survival and reproduction of wolverine. Development of permanent and temporary access roads needed for forest harvesting in the Red Lake, Trout Lake, and Whitefeather forests is likely to increase hunter and trapper access in the RSA. Mitigation that will be implemented to discourage use of permanent forestry roads includes posting signs, avoiding culturally significant areas, gating major river crossings, and using winter roads instead of all-season roads (WFMC 2012). Mitigation implemented for the RFDs is expected to limit cumulative effects to harvest rates of wolverine.

The small cumulative changes in habitat availability and distribution are predicted to have no measurable influence on the abundance (survival and reproduction) of wolverine in the RSA. Habitat is common and well distributed in the RFD Case relative to the Base Case, and it is expected that future developments will implement mitigation to avoid and limit direct mortality to wolverine during vegetation clearing activities.

A change in prey availability could affect wolverine survival and reproduction at the RFD Case. The abundance of woodland caribou is predicted to decrease as a result cumulative effects, primarily as a result of increased predation driven by forestry and climate change (Section 7.1.3.5). The wolverine's diet is however varied so a reduction in caribou prey availability is not predicted to affect its survival and reproduction because other prey items such as rodents, snowshoe hares and moose carrion are expected to remain widely available at the RFD Case.

Climate change is predicted to contribute to cumulative changes in the survival and reproduction of wolverine. Although climate modelling has not been focussed on wolverine, reduction in spring snow cover may reduce kit survival (Banci 1994; Magoun and Copeland 1998; Persson 2005; Aubry et al. 2007). Wolverines may also be restricted by an upper thermal limit and high summer temperatures may limit the geographic distribution of wolverines (Copeland et al. 2010). Climate change may also result in a loss of conifer cover and reduced snow accumulation, which may alter prey distribution and influence wolverine survival and reproduction (MNR 2013c). However, the magnitude of changes in the RFD Case is uncertain because climate change predictions are based on simulations that can be highly variable.

7.2.2.4 Characterization of RFD Case Effects

Effects from direct habitat loss of suitable wolverine habitat from human developments in the RFD Case are conservatively assumed to be certain to occur at the regional scale (Table 23). Effects from direct loss of habitat in the RFD Case are expected to be continuous and permanent for RFDs such as transmission lines. Effects from forest harvesting are expected to be frequent and reversible over the long-term as harvested areas are allowed to regenerate.

Effects from sensory disturbance (avoidance or reduction in habitat quality) are probable, rather than certain, because some individuals may adapt to sensory disturbance. Effects from habitat loss associated with avoidance is expected to be reversible at the end of construction activities (medium-term) for projects where most sensory disturbance occurs during construction (e.g., transmission lines) or over short periods (e.g., forest harvesting) (Table 23). The spatial extent of effects from sensory disturbance during the RFD Case depends on the temporal overlap of RFDs. Currently, it is anticipated that there will be no temporal overlap between the Project and the Wataynikaneyap Phase 2 Project. The Project is anticipated to be completed construction by the end of October 2018, while the Wataynikaneyap Phase 2 Project is not anticipated to begin construction until the winter of 2018/2019. If there are delays in the construction of the Project, there may be temporal overlap of construction activities between the two transmission line projects. There is also uncertainty about the timing and location of forestry road construction and harvest schedules in the Red Lake, Trout Lake, and Whitefeather forests. With no temporal overlap in activities that result in sensory disturbance (e.g., construction and harvesting), effects from sensory disturbance will likely occur at the local scale. If there is temporal overlap in activities that result in sensory disturbance, effects will occur at the regional scale.

Effects from changes to habitat distribution are conservatively considered probable to occur continuously at the regional scale as there is uncertainty around how transmission line corridors alter wolverine movements and population connectivity. Effects from changes to wolverine population connectivity and habitat distribution from direct habitat loss are expected to be permanent for most the Project and the Wataynikaneyap Phase 2 Project; effects from changes to habitat distribution from forest harvesting are expected to be reversible in the long term (Table 23).

Cumulative effects from changes due to direct habitat loss and sensory disturbance are unlikely to influence population survival and reproduction rates because habitat in the RSA is likely not at carrying capacity for this species, and the Project and RFDs should implement mitigation to avoid and limit direct mortality to wolverine during development activities (i.e., neutral effect). Cumulative effects from changes to wolverine survival and reproduction are considered possible to occur and may occur continuously and indefinitely at the regional scale (Table 23).

Effects to wolverine populations that overlap the RSA from changes to habitat availability, habitat distribution, population connectivity, and survival and reproduction associated with climate change are expected to possibly or probably occur continuously and indefinitely. Effects from other natural factors (e.g., wildfire) would be frequent and reversible in the long-term. Effects from changes to habitat availability and distribution due to wildfire are probable, not certain, because fire suppression is actively carried out throughout most of the RSA. Effects from climate change may occur at the beyond regional scale; effects from other natural factors will likely occur at the regional to beyond-regional scale (Table 23).

Table 23: Description of Effects and Significance in the RFD Case for Wolverine

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	Not Significant
		Magnitude	■ Direct loss of 9,633 ha (0.4%) of suitable habitat in the RSA, from Base Case ■ Reduced quality of habitat and possible avoidance in the RSA from sensory disturbance during construction and reclamation activities at RFDs ■ Magnitude will depend on the influences from climate change	
		Geographic Extent	■ Regional (direct loss)[a] ■ Local to Regional (sensory disturbance)[b]	
		Duration/Reversibility	■ Long-term to Permanent (direct loss and natural factors) ■ Medium-term (sensory disturbance)	
		Frequency	■ Continuous (sensory disturbance) ■ Frequent to Continuous (direct loss and natural factors)	
		Probability of Occurrence	■ Certain (direct loss) ■ Probable (sensory disturbance and natural factors)	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	
		Magnitude	■ Small reduction in movements among habitat patches from RFDs ■ Contracted distribution due to climate change	
		Geographic Extent	Regional[a]	
		Duration/Reversibility	Long-term to Permanent	
		Frequency	Frequent to Continuous	
		Probability of Occurrence	Probable	
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	
		Magnitude	■ No measurable influence on survival and reproduction from direct habitat loss and sensory disturbance from RFDs ■ Small increase in mortality from increased road development from RFDs ■ Reduced spring snow cover and higher summer temperatures from climate change	
		Geographic Extent	Regional[a]	
		Duration/Reversibility	Permanent	
		Frequency	Continuous	
		Probability of Occurrence	Possible	

Note: Natural factors include climate change and associated changes, inclement weather (e.g., storms), and wildfire.
a) Some effects may be beyond regional due to climate change and RFDs that occur within and beyond the RSA (i.e., the Wataynikaneyap Power Phase 2: Connecting 17 Remote First Nation Communities Project)
b) Local if no temporal overlap among activities associated with sensory disturbance; regional if temporal overlap among activities associated with sensory disturbance
ha = hectares; RSA = regional study area; RFD = reasonably foreseeable development.

7.2.2.5 Determination of Significance

Suitable habitat for wolverine is wide-spread and abundant in the RSA at Base Case (96.6%) and RFD Case (96.2%). The cumulative direct disturbance to moderate to high suitability wolverine habitat from previous and existing disturbance, the Project, and other RFDs is predicted to be 0.4% (9,633 ha) in the RSA, relative to the amount present at Base Case. Forestry is predicted to further reduce habitat availability; however, fire suppression may partially compensate for this loss.

Wolverines are likely to avoid access roads and areas of forest harvesting in the Red Lake, Whitefeather, and Trout Lake forests (Magoun 2005). However, effects from changes to habitat availability from linear disturbance features with low sensory disturbance (such as transmission lines) are unclear; these features may be used (Harriman and Baker 2003; Wright and Ernst 2004) or avoided (COSEWIC 2003; MNR 2013c). These small changes in habitat availability and distribution are predicted to have no measurable influence on population survival and reproduction rates. It is assumed the RFDs will use mitigation that avoids and reduces effects to wolverine population connectivity and abundance.

Climate change is also predicted to reduce habitat availability, habitat distribution, and survival and reproduction of wolverine in the RFD Case; however, the effects were not quantified in this assessment. In general, the wolverine RSA may be subjected to warmer temperatures, changes in snow cover, and shifts in vegetation communities, all of which may be a disadvantage to wolverine. There is a large amount of uncertainty regarding the potential effects of climate change on wolverine because predictions are based on simulations that can be highly variable and many scenarios are possible. Additionally, wolverines in boreal landscapes may not be as reliant on spring snow cover as previously thought (Webb et al. 2016). Although the abundance of woodland caribou is predicted to decrease as a result cumulative effects (Section 7.1.3.5) this change is not predicted to affect wolverine survival and reproduction because other prey items such as rodents, snowshoe hares and moose carrion are expected to remain widely available at RFD Case.

Overall, the cumulative changes in habitat availability and distribution, and survival and reproduction (i.e., abundance) are expected to be within the resilience and adaptability limits of wolverine populations that are within and overlap the RSA. Wolverine are predicted to remain self-sustaining and ecologically effective in the RFD Case relative to the Base Case, although possibly at a lower abundance. Consequently, cumulative effects on wolverine in the RFD Case are predicted to be not significant (Table 23).

7.3 Little Brown Myotis

7.3.1 Assessment of Project Effects (Project Case)

7.3.1.1 Habitat Availability

Site clearing will result in a loss of winter hibernacula and summer maternity roosting habitat for little brown myotis in the Project footprint. Based on the general habitat model, there are 848 ha (4.4% of the RSA) of potentially suitable maternity roosting habitat in the limits of work (Table 24). The limits of work is approximately nine times larger than the anticipated Project ROW (4,355 ha for the limits of work versus 478 ha for the maximum anticipated Project ROW). For clarity, if it is assumed that the actual Project footprint is constructed through only moderate to high quality (suitable) maternity habitat, the amount of habitat lost would be approximately half as what was predicted in the general habitat model (478 ha for the actual Project ROW compared to 848 ha for the general model results). The predicted loss of 478 ha from the actual Project ROW is also an overestimate as habitat that contains moderate to high snag density is not continuously distributed within the limits of work.

The desktop assessment of bat maternity habitat was similar to results from the general habitat model. Moderate to high snag density (suitable maternity habitat) comprises 1,211 ha (30.2%) of the mapped limits of work as determined from the desktop assessment of suitable bat maternity habitat (Table 25). Approximately 44.8 km (35.1%) of the total length of the centerline of the corridor is comprised of moderate to high snag density (suitable habitat).

Based on the general habitat model, the limits of work contains approximately 4 ha (1.4%) of potentially suitable winter habitat (i.e., bedrock habitat) in the RSA (Table 24). This is a conservative estimate of habitat loss as the entire limits of work will not be disturbed at Project Case and the actual Project footprint will be routed around areas of potential hibernacula. The desktop habitat assessment identified 37 potential hibernacula features (i.e., bedrock that forms a rise or hill and cliffs) within the entire length of the limits of work (Figure 19). One high potential and four moderate potential hibernacula features were identified during the field survey in May 2017; the remaining 32 features were identified as low to very low potential features (Table 25; Figure 19).

Little is known about preferred foraging habitat for little brown myotis. This species may use edge habitat for foraging (COSEWIC 2013a) or may prefer to forage in areas with dense vegetation (i.e., cluttered canopies) (Kalcounis and Brigham 1995). The size of the clearing, as well the size of the bat, may influence the use of edge habitat for foraging. Edges may not be used as foraging habitat, but instead may be used by little brown myotis as travel corridors between roosting sites and foraging areas (Kalcounis-Ruepell et al. 2013). Effects from forest clearing for the Project may have positive or negative effects on little brown myotis.

Sensory disturbance may temporarily result in avoidance of maternity roosting habitat by little brown myotis during construction. The effects of noise on little brown myotis will likely depend on the frequencies generated by the Project. Noise frequencies from the Project that overlap with the little brown myotis frequency range (i.e., approximately 40 to 70 kHz) are expected to have the greatest effect on this species. Noise effects are more likely to interfere with roosting habitat than foraging habitat because bats forage at night and construction activities will typically take place during the day (i.e., one 10-hour shift per day, with normal working hours of 07:00 to 18:00), when bats are roosting. Night time work, which may interfere with bat foraging, may be required to make up for schedule delays caused by weather or other unexpected conditions.

Harrison (1965) found that little brown myotis did not respond to frequencies above 40 kHz when in torpor. A study by Luo et al. (2014) found that bats were more sensitive to noise when it occurred closer to sunset as opposed to earlier in the daily roosting period and responded least to traffic noise and most to vegetation noise (e.g., rustling of leaves), possibly because traffic noise was at a lower frequency than their hearing range. Passive-listening bats have been found to avoid areas with loud noise (e.g., highways) (Schaub et al. 2008; Siemer and Schaub 2011); however, echolocating bats may not be as sensitive to noise because they can adjust the amplitude and duration of their calls to the ambient noise level of an environment (Luo and Wiegrebe 2016). Bats may rapidly become habituated to repeated and prolonged noise exposure (e.g., bats roosting under bridges) (Luo et al. 2014). At present, little is known about the specific effects of noise on habitat avoidance by the little brown myotis.

There are no 50 km^2 grid locations identified as containing critical habitat by Environment Canada (2015a) near the Project limits of work area, and no SWH for little brown myotis has been identified in the RSA by the MNRF. Industrial activities in close proximity to hibernacula can degrade the habitat by altering its microclimatic characteristics (USFWS 2007) and this could hinder the recovery of little brown myotis populations from WNS.

Table 24: Changes to Little Brown Myotis Winter and Summer Maternity Roosting Habitat Availability in the Regional Study Area at Project Case, Based on the General Habitat Model

Habitat Suitability[a]	Base Case [ha]	Project Case [ha]	Change in Area Using the Limits of Work Footprint[a][b] [ha]	Percent Change Using the Limits of Work Footprint[b] [%]
Summer Maternity Roosting Habitat				
Moderate to High	19,414	18,566	-848	-4.4
Nil to Low	94,806	95,654	848	0.9
Winter Habitat				
Moderate to High	264	260	-4	-1.4
Nil to Low	113,956	113,960	4	<0.1

a) Changes in habitat area result from a conversion of moderate to high suitability habitat to lower suitability habitats (i.e., nil to low).

b) The limits of work is approximately nine times larger than the anticipated Project ROW (4,355 ha for the limits of work versus 478 ha for the maximum anticipated Project ROW), but specific areas of disturbance had not been identified at the time of writing.

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

Note: The percent change is calculated using the total amount of moderate to high or nil to low habitat available at Base Case; percent change is not relative to the size of the study area.

ha = hectare; % = percent; <= less than.

Table 25: Desktop Assessment of Potential Suitable Maternity and Wintering Habitat in the Project Limits of Work

Habitat Category/Type	Limits of Work
Maternity Roosting Habitat	
Moderate to High Snag Density (ha and% of total mapped area)	1,211 (30.2%)
Nil to Low Snag Density (ha and% of total mapped area)	2,798 (69.8%)
Total Area Mapped (ha)	4,008 [(a)]
Length of Centerline that has Moderate to High Snag Density (km and% of total mapped length)	44.8 (35.1%)
Length of Centerline that has Nil to Low Snag Density (km and% of total mapped length)	82.7 (64.9%)
Total Length of Centerline (km)	127.5
Winter Habitat	
Number of Moderate and High Potential Hibernacula	■ 1 (high potential) ■ 4 (moderate potential)

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.
a) Area mapped does not equal area of limits of work as some of the limits of work was not surveyed during the LiDAR survey.
ha =hectares; km = kilometres; % = percent.

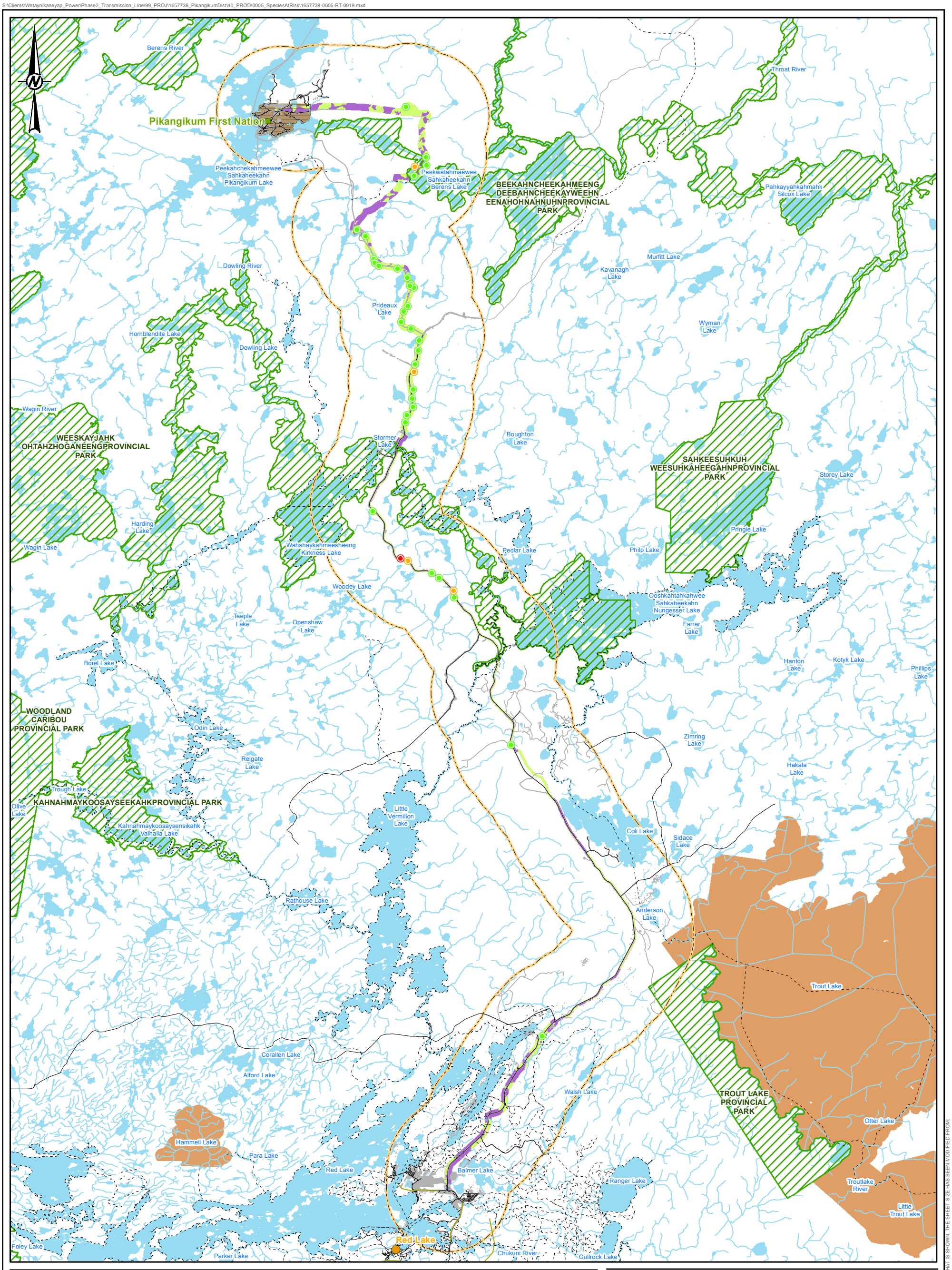
7.3.1.2 Habitat Distribution

Site clearing and sensory disturbance during construction of the Project could result in adverse changes to the distribution of potential little brown myotis winter hibernating and summer maternity roosting habitat in the RSA. General habitat model results show the direct loss of potential winter habitat due to the Project footprint is primarily associated with the presumed removal of exposed bedrock in the southern portion of the limits of work (Figure 20). Results of the field program identified one high potential and four moderate potential hibernacula features within the limits of work. The one high potential hibernacula feature is on the east side of Nungesser Road, approximately 140 m from the road. Three of the moderate potential features are also located along the east side of the Nungesser Road. The fourth moderate hibernacula potential feature is located at the alternate crossing of the Berens River (Figure 19). The Project is not anticipated to result in a change in the distribution of potential hibernacula habitat after implementation of mitigation. Completing construction outside of the hibernation period (October 1 to April 30) and not completing construction in contiguous treed habitat within 200 m of potential hibernacula is predicted to avoid effects on hibernating bats.

General habitat model results show potential maternity roosting habitat will be more evenly lost throughout the limits of work (Figure 20). The general habitat model and the desktop assessment of potential maternity habitat noted that the southern and northern thirds of the limits of work contain more potential suitable maternity habitat than the central third of the limits of work (Figure 19 and Figure 20). As such, the actual Project ROW will intersect areas of nil to low snag density as well as areas of moderate to high snag density. There is a relatively large patch of moderate to high snag density near Coli Lake (Figure 19).

Occupied habitat is not predicted to be lost after mitigation and the loss of unoccupied habitat is predicted to not have any effect on connectivity among populations that overlap with the RSA because bats are highly mobile and little brown myotis may be flexible in their maternity roost locations (Lewis 1995). Displaced individuals are expected to find alternative suitable roosting habitat nearby because habitat availability is not a limiting factor for this species in the RSA. Changes to the distribution of hibernacula is not anticipated as the Project is will limit the removal of potential hibernacula features to the extent possible and construction in areas containing potential hibernacula habitat will be completed outside of the hibernation period to limit disturbance to hibernating bats.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area
- Base Case Disturbance

Bat Hibernacula Potential

- High Potential
- Moderate Potential
- Low Potential

Desktop Assessment Results

- Suitable Maternity Habitat
- Unsuitable Maternity Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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0 5 10

1:280,000 Kilometers

CLIENT
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PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
LITTLE BROWN MYOTIS SUMMER AND WINTER HABITAT IN THE LIMITS OF WORK AT BASE CASE AS DETERMINED FROM THE DESKTOP ASSESSMENT AND HIBERNACULA FIELD SURVEY

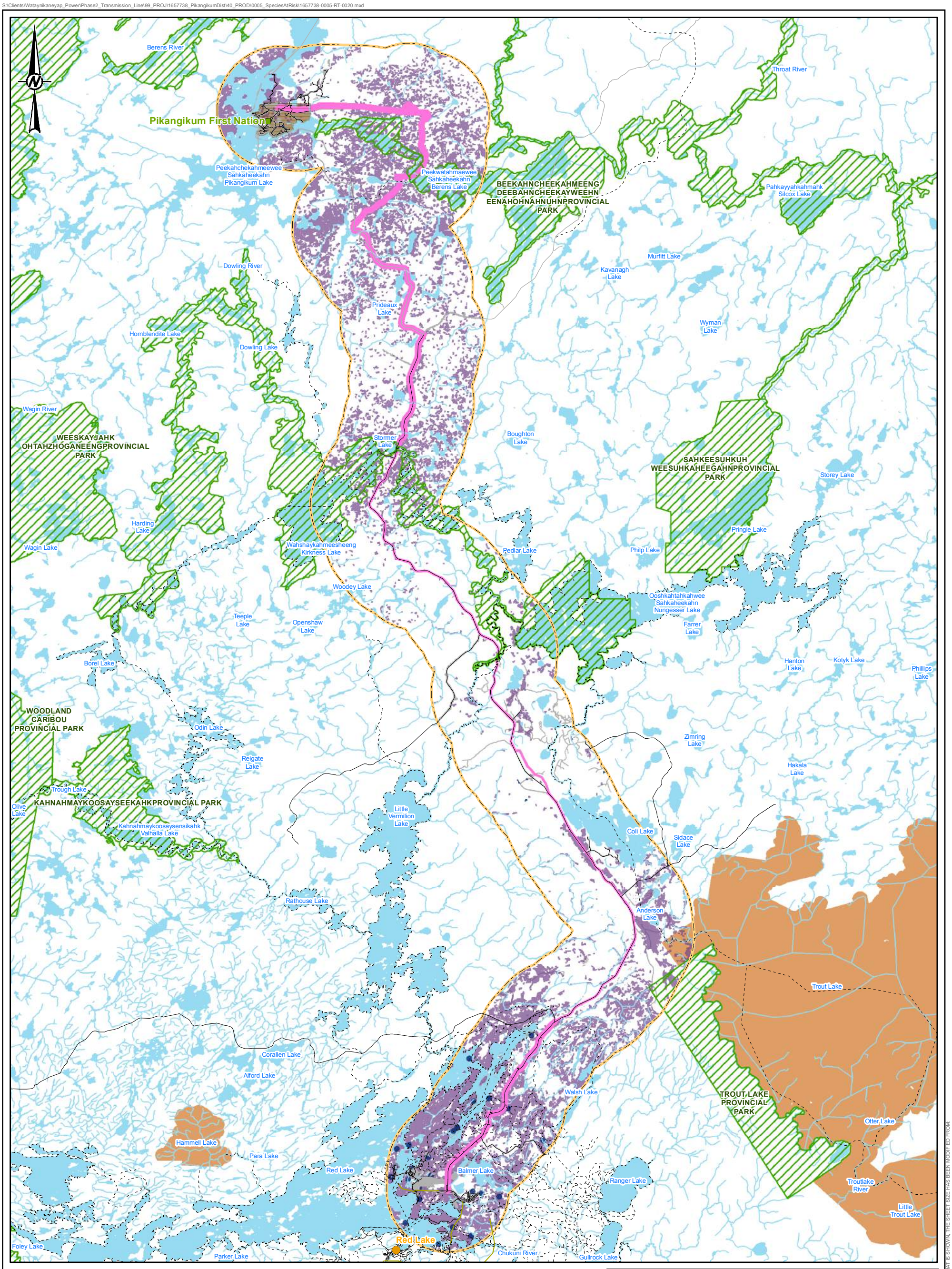
CONSULTANT

YYYY-MM-DD	2017-05-30
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	19

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area
- Base Case Disturbance
- Little Brown Myotis Summer Habitat
- Little Brown Myotis Winter Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
4. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 5 10
1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
LITTLE BROWN MYOTIS SUMMER AND WINTER HABITAT IN THE REGIONAL STUDY AREA AT PROJECT CASE, AS PREDICTED FROM THE GENERAL HABITAT MODEL

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	20

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Little brown myotis are predicted to fly directly over or along the Project ROW when dispersing or searching for food and water in the Project Case (Kalcounis-Ruepell et al. 2013). Edge habitat created by the Project may facilitate movement and foraging behaviour but there is some uncertainty with this prediction because some studies suggest that this species prefers closed canopy habitat for foraging (Kalcounis and Brigham 1995; Jung et al. 1999; Morris et al. 2010).

Although positive changes in movement patterns at local scales are possible during operation, the overall net effect of the Project on habitat distribution is considered negative because of uncertainty in how little brown myotis responds to habitat fragmentation. The Project is not expected to reduce the extent of occurrence of little brown myotis, and is therefore compliant with the objectives outlined in the federal recovery strategy (Environment Canada 2015a).

7.3.1.3 Survival and Reproduction

Little brown bat populations in the RSA may be currently affected by WNS and as such are particularly susceptible to other threats because the resilience and adaptability limits of populations that overlap with the RSA may have been exceeded at Base Case. Because little brown myotis congregate during both the summer and winter, avoidance is a key mitigation for this species. In particular, clearing of potential bat maternity roost habitat will be completed outside of the maternity roosting season (June 1 to July 31) and work in contiguous forest habitat within 200 m of potential hibernacula will be avoided during the hibernation season (October 1 to April 30).

Little brown bats that roost in trees may have lower fidelity to their maternity roosting sites than individuals that roost in buildings or caves (Lewis 1995). However, loss of maternal roosting habitat has the potential to displace some breeding individuals at a local scale. Displaced individuals are expected to find alternative suitable roosting habitat nearby because habitat availability is not a limiting factor for this species.

Bats at the northern edge of their range in Canada spend longer periods of time in hibernation and are, therefore, more vulnerable to sensory disturbance because each disturbance event consumes valuable energy reserves required for survival (Fenton and Barclay 1980). A few studies have looked at the effects of blasting on hibernating bats. Some studies found no evidence of bat population declines after exposure to vibration levels ranging from 1.52 to 5.08 millimetres per second (mm/sec) and 6.35 mm/sec during hibernation (West Virginia Department of Environmental Protection 2006). Other studies found that that seismic vibration of 2.54 mm/sec (Besha 1984) and 0.5 mm/sec (Myers 1975) did not disturb hibernating bats. Construction of the Project is not anticipated to alter the survival of hibernating bats as construction will be avoided between potential hibernacula and a boundary being the lesser of (a) a 200 m radius of contiguously-treed area, or (b) the distance to the nearest existing road ROW; and construction within 200 m of potential hibernacula features will not be completed during the hibernation period (October 1 to April 30).

7.3.1.4 Characterization of Net Effects

If occupied habitat is removed, the effect of this loss would be permanent and experienced continuously by little brown myotis because the life of the Project is indefinite. Sensory disturbance during construction is assumed to degrade the quality of roosting habitat for bats in close proximity to the Project; however, the degree to which habitat would be avoided by bats is unknown and the effect is considered to be probable to occur. The effect would be continuous over the medium-term, and is anticipated to be reversible within a few months after the end of construction (Table 26).

The Project could possible influence winter habitat but there is a moderate level of uncertainty associated with the magnitude of the effect because all habitat in the Project footprint is assumed to be lost, whereas in reality this will only occur in areas where incompatible vegetation is removed during construction. Non-vegetated features such as bedrock outcrops, cliffs, and talus slopes (i.e., potential suitable winter habitat for bats) located between transmission-line-structure foundations will not likely be disturbed. Therefore, the loss of winter habitat is likely overestimated.

The predicted net effects of the Project on potential maternity roosting habitat are probable to occur because forested habitat will be cleared along the ROW (Table 26). Compensation for habitat loss has the potential to reverse the effects of habitat loss over the long-term, but is not factored into the characterization of net effects because of uncertainty in the timing and success of these actions.

The Project is expected to result in a small but negative change to bat maternity roosting habitat distribution. Although little brown myotis may alter the location of their maternity roosts, movements of little brown myotis are expected to be similar to Base Case as this species is highly mobile, can occupy fragmented landscapes, and may be flexible in the selection of their roost sites. Effects from changes to habitat distribution will occur continuously and permanently at the local scale (Table 26).

After mitigation, the Project is expected to have a neutral effect on little brown myotis survival and reproduction rates from alterations in habitat availability and distribution. The likelihood of this effect is possible because there is some uncertainty in the effectiveness of mitigation, particularly with respect to avoiding hibernacula potentially associated with small geologic features due to the difficulty associated with locating them on the landscape. There is also uncertainty associated with locating maternity roosts if clearing activities cannot avoid the maternity roosting period of June 1 to July 31.

Table 26: Description of Effects and Significance in the Project Case for Little Brown Myotis.

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona-related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	Significant[(a)]
		Magnitude	■ Direct loss of approximately 4 ha (17.7%) of potential winter habitat in the RSA Base Case ■ No avoidance of wintering habitat due to sensory disturbance by adhering to setbacks ■ Direct loss of 848 ha of potential maternity roosting habitat (4.4%) of little brown myotis RSA Base Case ■ Potential avoidance of maternity roosting habitat in close proximity to construction activities due to sensory disturbance ■ Potential loss to maternity roost habitat where the Project intersects Federal Crown Land but no loss of hibernacula habitat on these lands.	
		Geographic Extent	Local	
		Duration/Reversibility	■ Permanent (direct loss) ■ Medium-term (sensory disturbance)	
		Frequency	Continuous	
		Probability of Occurrence	■ Unlikely (direct loss of winter habitat) ■ Probable (direct loss of maternity roosting habitat and sensory disturbance)	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	
		Magnitude	Slight shifts in maternity roost locations due to increased human disturbance	
		Geographic Extent	Local	
		Duration/Reversibility	Permanent	
		Frequency	Continuous	
		Probability of Occurrence	Possible	
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona-related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Neutral	
		Magnitude	n/a	
		Geographic Extent	n/a	
		Duration/Reversibility	n/a	
		Frequency	n/a	
		Probability of Occurrence	Possible	

Note: If a net effect was identified as positive or neutral, no additional effects characteristics, other than probability of occurrence, were summarized.
n/a = not applicable. Project effect pathways are expected to result in no measurable changes to little brown myotis survival and reproduction.
a) Little brown myotis in the RSA are considered as not likely to be self-sustaining in the Base Case; therefore, combined effects from the Project and existing developments are predicted to remain significant in the Project Case.
ha = hectares; RSA = regional study area.

7.3.1.5 Determination of Significance

Populations of little brown myotis that overlap with the RSA are highly sensitive to changes in survival and reproduction because WNS has resulted in dramatic declines of this species across the eastern portions of its range. Although WNS has not yet been reported in the RSA, the disease was confirmed in Atikokan in 2015 (USFWS 2016). Atikokan is approximately 300 km southwest of Red Lake and WNS has been observed to spread by 200 to 400 km per year (USFWS 2016). The presence of the disease in the RSA is uncertain because there is limited information related to the hibernacula in northern Ontario (Environment Canada 2015a). Nevertheless, there is an imminent threat to little brown myotis populations that overlap the RSA from WNS. As such, this species is highly vulnerable to additional threats in the future including changes in habitat availability, distribution or other factors affecting population survival and reproduction rates.

Although not confirmed, WNS was conservatively assumed to be present in the RSA at Base Case. As such, rapid declines in abundance may have exceeded the resilience and adaptability limits of this criterion. Therefore, at Base Case, little brown myotis populations that overlap with the RSA are considered as not likely self-sustaining and not ecologically effective (i.e., small populations are likely ineffective at limiting the abundance of insects; therefore changes due to WNS are considered significant at Base Case). Declining populations are largely due to mortality associated with the disease but other sources of mortality (e.g., extermination on private lands, reduced insect populations) and changes to habitat availability and distribution have the potential to accelerate their decline, hinder their recovery, or even limit the ability of populations to develop resistance to the fungus that causes WNS (Environment Canada 2015a).

Habitat is not a limiting factor in the Base Case and 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 maternity roosting. The species tends to be tolerant of fragmented forested habitat and uses linear features for movement and foraging. The species' congregatory behaviour does make little brown myotis sensitive to the loss of key habitat features because the removal of such a feature can have a disproportionate effect on local populations.

In the Project Case, the general habitat model predicted that the limits of work would remove 4 ha (1.4%) of potential winter habitat and 848 ha (4.4%) of potential maternity roosting habitat in the RSA. The desktop assessment noted approximately 1,211 ha (30.2%) of potential suitable maternity habitat and five locations of moderate to high potential hibernacula in the limits of work. This is a highly conservative estimate as the limits of work (4,355 ha) was used as the Project footprint. The actual Project footprint will be much smaller; the Project ROW will be 40 m wide (478 ha) with additional disturbance areas for the substation (approximately 2 ha).

Additional roosting habitat in close proximity to construction activities may be temporarily avoided due to sensory disturbance, and bat distributions; this effect is expected to be reversible after construction is completed (medium-term). The Project may result in changes in habitat distribution at a local scale but these changes are not expected to alter the broader spatial extent of occurrence of populations in the RSA because bats are highly mobile and capable of long commute distances.

Habitat is not a limiting factor in the RSA and the Project will likely avoid direct mortality of individuals through the implementation of mitigation measures. Mitigation, such as spanning or avoiding disturbing habitats with compatible vegetation (e.g., bedrock habitat), retaining wildlife trees (snags) were possible, and avoiding construction between potential hibernacula and a boundary being the lesser of: (a) 200 m radius of contiguously-

treed area, or (b) the distance to the nearest existing road ROW will limit effects from changes to habitat availability and distribution. There is high confidence that the effects to habitat availability and distribution will not be greater than predicted because conservatism was built into the assessment (e.g., assumed removal of all habitat within the limits of work). There is a moderate level of confidence that the Project will have a neutral effect on bat survival and reproduction because occupancy surveys will be challenging due to the length of the Project and the difficulty of locating natural roosts and hibernacula.

With effective implementation of mitigation, the Project is predicted to have a small but negative effect on habitat availability and distribution for little brown myotis and a neutral effect on their survival and reproduction. Incremental changes due to the Project are predicted to not adversely affect little brown myotis populations that overlap the RSA; however, these populations are expected to continue to decline in the Project Case due to WNS. Subsequently, little brown myotis populations that overlap the RSA continue to be considered as not likely self-sustaining and not ecologically effective in the Project Case (i.e., cumulative effects in the Project Case are predicted to be significant) (Table 26). However, the Project, after mitigation, would have no to little contribution to the combined effects from the Base Case on little brown myotis.

7.3.2 Reasonably Foreseeable Development Case (RFD Case)

7.3.2.1 Habitat Availability

The Wataynikaneyap Phase 2 Project, road developments, and forest harvesting in the Red Lake, Trout Lake, and Whitefeather Forest are RFDs that overlap with the RSA. The Wataynikaneyap Phase 2 Project and the Project were quantified in the RFD Case and will contribute to a loss of approximately 4 ha of potential suitable winter habitat, which is 1.4% in the RSA, relative to the Base Case. However, the potentially affected habitat was derived from the Land Cover 2000 data and suitability of this habitat for hibernating bats has not been confirmed. Wataynikaneyap will conduct pre-construction surveys in suitable habitat affected by the Project and the Wataynikaneyap Phase 2 Project to determine occupancy and will avoid known hibernacula through siting, timing restrictions and activity setbacks. It is assumed that other RFDs will be required to implement similar mitigation to limit the incremental contributions to cumulative effects on habitat availability for this species.

The Project and the Wataynikaneyap Phase 2 Project will contribute to a loss of approximately 855 ha (4.4%) of potential suitable summer maternity habitat in the RSA, relative to Base Case conditions. This is a conservative estimate as the limits of work (4,355 ha) was used as the Project footprint; anticipated Project ROW is anticipated to be 478 ha with an additional area required for the substation. Wataynikaneyap is committed to working with the MNRF to mitigate the incremental contribution from the Project and the Wataynikaneyap Phase 2 Project to the loss of maternity roosting habitat, thereby avoiding direct loss of occupied habitat and minimizing avoidance due to sensory disturbance. Field surveys will be completed in spring/summer 2017 to determine the suitability of potential hibernacula features and wildlife trees (i.e., snags) will be retained in the ROW where possible.

Forestry may further reduce the availability of winter and summer maternity roosting habitat for little brown myotis where clearcut harvesting is practiced. The retention of tree snags and riparian buffers may mitigate the effects of forest harvest to some degree. Further, there has been a recent downturn in the forest sector, which has resulted in reduced harvesting and renewal levels (MNR 2012). Fire suppression and climate change may further mitigate the effects of forestry on habitat availability for the little brown myotis because Ontario's forests are shifting towards mature, broad-leaved forest stands (Carleton 2001), which may favour bats.

Table 27: Changes to Little Brown Myotis Winter and Summer Maternity Roosting Habitat Availability in the Regional Study Area at RFD Case

Habitat Suitability[a]	Base Case [ha]	RFD Case [ha] [a]	Change in Area [ha]	Percent Change [%]
Winter Habitat				
Moderate to High	264	260	-4	-1.4
Nil to Low	113,956	113,960	4	<0.1
Summer Maternity Roosting Habitat				
Moderate to High	19,414	18,560	-855	-4.4
Nil to Low	94,806	95,660	855	0.9

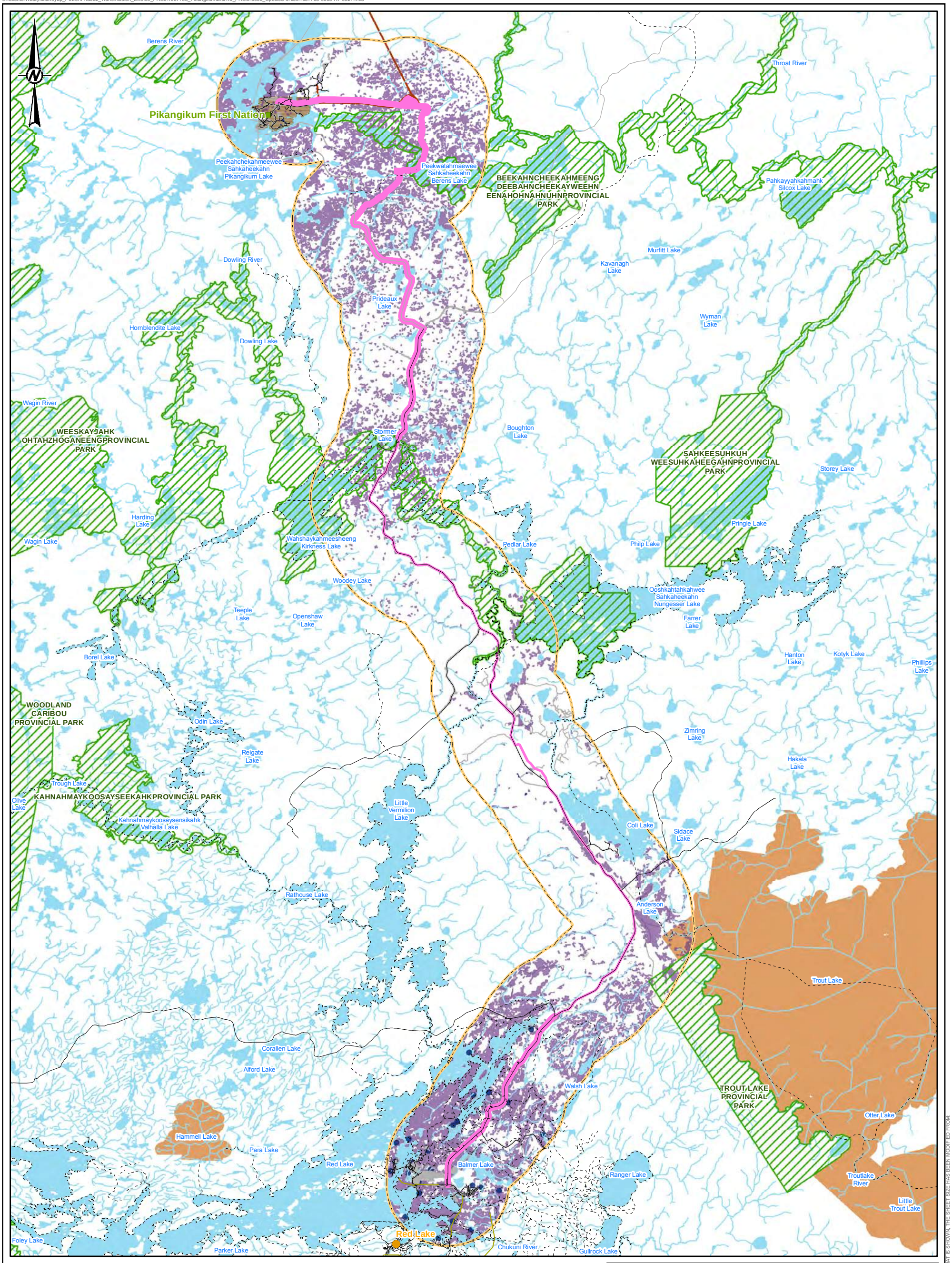
a) Changes in habitat area result from a conversion of moderate to high suitability habitat to lower suitability habitats (i.e., nil to low).

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

Note: The percent change is calculated using the total amount of moderate to high or nil to low habitat available at Base Case; percent change is not relative to the size of the study area.

ha = hectare; % = percent; RFD = reasonably foreseeable development.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area
- Base Case Disturbance
- RFD Case Disturbance
- Little Brown Myotis Summer Habitat
- Little Brown Myotis Winter Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

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1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
LITTLE BROWN MYOTIS SUMMER AND WINTER HABITAT IN THE REGIONAL STUDY AREA AT RESONABLY FORESEEABLE DEVELOPMENT CASE, AS PREDICTED FROM THE GENERAL HABITAT MODEL

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	21

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7.3.2.2 Habitat Distribution

Changes in habitat distribution due to the Project and RFDs are not likely to result in local changes in the distribution of little brown myotis populations that overlap with the RSA (Figures 20 and 21). It is assumed that regulatory approval of RFDs will require proponents to demonstrate that they are meeting the distribution objectives for little brown myotis as outlined in the recovery strategy (Environment Canada 2015a). Based on this assumption, changes in the distribution of occupied habitat are unlikely due to the protection this species and its habitat receives under the provincial ESA and the federal SARA. Climate change also has the potential to expand the distribution of little brown myotis due to the energetic limit for hibernation shifting north (Humphries et al. 2002).

7.3.2.3 Survival and Reproduction

Little brown myotis populations that overlap with the RSA are considered to be particularly sensitive to factors affecting survival and reproduction because populations in Ontario have declined by over 75% in recent years due to the deadly fungal disease, WNS. The little brown myotis is predicted to be functionally extirpated (i.e., less than 1% of existing population) in Canada and the United States within 16 years (COSEWIC 2012), or possibly sooner based on the recent confirmation of the disease in Washington (USGS 2016).

The short term (12 to 18 years) population objective for little brown myotis in areas affected by WNS is to maintain (and increase where feasible) the population compared to the 2015 level. Reasonably foreseeable developments and other factors (e.g., extermination on private lands, climate change) may interfere with this objective if they increase mortality risk or reduce reproductive potential. Reasonably foreseeable developments must be carefully planned to avoid population level effects that would further threaten little brown myotis populations that overlap with the RSA.

Extermination of roosting and hibernating little brown myotis on private lands will likely continue to take place and climate change adds a high level of uncertainty to the recovery of populations because the timing and effects of climate change are largely unknown. Reduced insect abundance is one possible outcome of climate change and this has the potential to limit survival of reproductive females if they are unable to accumulate sufficient winter fat stores following summer reproduction (Frick et al. 2010). Little brown myotis are highly sensitive to changes in adult mortality, and particularly that of adult females because they have low reproductive rates. However, because this species is long-lived, populations of little brown myotis do have the capacity to recover, if released from WNS.

7.3.2.4 Characterization of RFD Case Effects

Effects from direct habitat loss of moderate to high suitability little brown myotis winter habitat are unlikely as the Project and other RFDs will be required to implement mitigation to avoid direct loss of winter habitat. Effects from direct habitat loss of moderate to high suitability little brown myotis habitat summer maternity are possible (Table 28). Little brown myotis that roost in trees may have lower site fidelity than individuals that roost in buildings or caves (Lewis 1995). Effects from changes to habitat availability from direct habitat loss are expected to occur at the regional scale. The direct loss of little brown myotis summer and winter habitat availability is conservatively assumed to be continuous and permanent for RFDs that will operate indefinitely (e.g., transmission lines) and reversible in the long-term for forest harvesting activities.

Effects from sensory disturbance (avoidance or reduction in habitat quality) are conservatively considered probable to occur (Table 28). There is little information on how little brown myotis respond to sensory disturbance but traffic noise may be lower than bat hearing ranges (Luo et al. 2014) and little brown myotis can adjust the amplitude and duration of their calls to the ambient noise level of an environment (Luo and Wiegrebe 2016).

As such, little brown myotis may not be sensitive to sensory disturbance and may not avoid areas with loud noise. Effects due to habitat loss from avoidance are expected to be reversible at the end of construction activities (medium-term) for projects where most sensory disturbance occurs during construction (e.g., pipelines and transmission lines) or are of short duration (e.g., forest harvesting). Habitat avoidance due to sensory disturbance is expected to occur at the local scale if there is not temporal overlap between the construction of the Project and similar activities at other RFDs. However, overlap in the construction of the Project and the Wataynikaneyap Phase 2 Project or road construction and forest harvesting in the Red Lake, Trout Lake, and Whitefeather forests may have regional effects on little brown myotis.

Cumulative effects from changes to little brown myotis habitat distribution from the Project and other RFDs are probable, not certain, as potential roosting habitat may be removed during Project construction but little brown myotis may be flexible in their roost site selection (Lewis 1995). Effects from changes in habitat distribution in the RFD Case will occur continuously at the regional scale (Table 28), will be permanent for projects such as transmission lines, and reversible in the long-term for forest harvesting activities.

Cumulative changes in habitat availability and distribution from the Project and RFDs are anticipated to have no to little influence on survival and reproduction rates in little brown myotis (neutral effect; Table 28). Habitat is not limiting in the RSA and developments are assumed to implement mitigation to avoid and limit direct mortality of little brown myotis during development activities. Alternately, effects from the intentional extermination of individuals on private lands are probable to occur and may occur continuously at the regional scale.

Cumulative effects to little brown myotis from changes in habitat availability, habitat distribution, and survival and reproduction associated with natural factors such as climate change and wildfire are probable to possible to occur (Table 28). Effects from climate change would occur continuously and permanently at the ‘beyond regional’ scale. Effects from changes to habitat availability and distribution due to wildfire and other natural factors (e.g., severe wind storms) would be frequent, possible to occur at the regional to beyond regional scale, and reversible in the long-term. Effects from WNS are considered certain to occur continuously for the indefinite future at the beyond regional scale.

Table 28: Description of Effects and Significance in the RFD Case for Little Brown Myotis.

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	Significant[c]
		Magnitude	■ Direct loss of approximately 4 ha (1.4%) of potential winter habitat in the RSA Base Case ■ No avoidance of wintering habitat due to sensory disturbance by adhering to setbacks ■ Direct loss of 855 ha of potential maternity roosting habitat (4.4%) of little brown myotis RSA Base Case ■ Potential avoidance of maternity roosting habitat in close proximity to construction activities due to sensory disturbance ■ Magnitude depends on the influences from climate change	
		Geographic Extent	■ Regional (direct loss)[a] ■ Local to Regional (sensory disturbance)[b]	
		Duration/Reversibility	■ Long-term to Permanent (direct loss and natural factors) ■ Medium-term (sensory disturbance)	
		Frequency	■ Continuous (sensory disturbance) ■ Frequent to Continuous (direct loss and natural factors)	
		Probability of Occurrence	■ Unlikely (direct loss of winter habitat) ■ Probable (direct loss of maternity roosting habitat, sensory disturbance, and natural factors)	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	
		Magnitude	■ Slight shifts in maternity roost locations due to increased human disturbance ■ No change to wintering habitat distribution after mitigation ■ Possible range expansion due to climate change	
		Geographic Extent	Regional	
		Duration/Reversibility	Long-term to Permanent	
		Frequency	Frequent to Continuous	
		Probability of Occurrence	Possible	
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Neutral	
		Magnitude	n/a	
		Geographic Extent	n/a	
		Duration/Reversibility	n/a	
		Frequency	n/a	
		Probability of Occurrence	Possible	

Note: Natural factors include climate change and associated changes, inclement weather (e.g., storms), and wildfire.
n/a = not applicable. Effect pathways from the Project and RFDs are expected to result in no measurable changes to little brown myotis survival and reproduction.
a) Effects may be beyond regional due to climate change, white-nose syndrome, other natural factors, forestry, and RFDs that occur within and beyond the RSA (i.e., the Wataynikaneyap Power Phase 2: Connecting 17 Remote First Nation Communities Project)
b) Local if no temporal overlap among activities associated with sensory disturbance; regional if temporal overlap among activities associated with sensory disturbance
c) Little brown myotis in the RSA are considered as not likely to be self-sustaining in the Base Case; therefore, combined effects from the Project, previous and existing developments, and confirmed/approved and reasonably foreseeable developments are predicted to remain significant in the RFD Case.
ha = hectares; RSA = regional study area; RFD = reasonably foreseeable development

7.3.2.5 Determination of Significance

In the RFD Case, approximately 4 ha (1.4% of the RSA) of winter habitat and approximately 852 ha (4.4% of the RSA) of summer maternity roosting habitat would be removed, respectively. Forestry is predicted to further reduce habitat availability for little brown myotis; however, ongoing fire suppression may continue to increase the age of forest stands in the RSA, which may increase habitat quality for little brown myotis. It is assumed that regulatory approval of RFDs will require proponents to demonstrate that they are meeting the distribution objectives for little brown myotis as outlined in the recovery strategy (Environment Canada 2015a). Also, that RFDs will be required to implement mitigation that will limit cumulative effects on this species. These small changes in habitat availability and distribution are predicted to have no measurable influence on population survival and reproduction rates.

Incremental changes due to the Project are predicted to not adversely affect the resilience and adaptive capacity of little brown myotis populations that overlap with the RSA. However, these populations are expected to continue to decline in the RFD Case due to WNS, which has likely exceeded the resilience limits of this species. Subsequently, little brown myotis populations that overlap the RSA continue to be considered as not likely self-sustaining and not ecologically effective in the RFD Case, relative to the Base Case (i.e., effects are significant at Base Case due to disease). Therefore, the total combined effects in the RFD Case are predicted to be significant, even though the Project and RFDs would contribute no to little cumulative effects on little brown myotis, after mitigation (Table 28).

7.4 Bald Eagle

7.4.1 Assessment of Project Effects (Project Case)

7.4.1.1 Habitat Availability

Site clearing is predicted to contribute to a measurable loss of nesting habitat for bald eagle in the Project footprint. No loss of bald eagle foraging habitat is predicted because the Project will avoid large lakes and rivers. The limits of work contain approximately 1,091 ha of moderate to high suitability bald eagle nesting habitat (Table 29). This decrease represents 3.8% of suitable habitat in the RSA in the Project Case relative to the Base Case. This is a conservative estimate as the limits of work that was used in the habitat suitability model is much larger than the anticipated Project footprint (4,355 ha for the limits of work versus 478 ha for the Project ROW).

Table 29: Changes to Bald Eagle Habitat Availability in the Regional Study Area at Project Case

Habitat Suitability[(a)]	Base Case [ha]	Project Case [ha]	Change in Area using the Limits of Work footprint [ha] [(a) (b)]	Percent Change using the Limits of Work footprint [%] [(b)]
Moderate to High	28,968	27,877	-1,091	-3.8
Nil to Low	85,252	86,343	1,091	1.3

a) Changes in habitat area result from a conversion of moderate to high suitability habitat to lower suitability habitats (i.e., nil to low).

b) The limits of work is approximately nine times larger than the anticipated Project ROW (4,355 ha for the limits of work versus 478 ha for the maximum anticipated Project ROW), but specific areas of disturbance had not been identified at the time of writing.

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

Note: The percent change is calculated using the total amount of moderate to high or nil to low habitat available at Base Case; percent change is not relative to the size of the study area.

ha = hectare; % = percent.

7.4.1.2 Habitat Distribution

The distribution of bald eagle habitat in the Project Case is similar to Base Case conditions (Figure 22). Habitat fragmentation due to clearing and construction activities associated with the Project ROW would result in minimal changes to the existing distribution of bald eagle habitat in the RSA. Human disturbance may cause this species to increase their territory size or shift their territory or home range away from areas of human disturbance (Fraser et al. 1985; Anthony and Isaacs 1989). However, this species is highly mobile and the corridor alignment is not expected to function as a movement barrier for bald eagle. Therefore, although there may be slight shifts in territory sizes or locations, fragmentation due to the Project is not expected to affect the connectivity of bald eagle populations that overlap the RSA.

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Berens River
Pikangikum First Nation
Peekahchekahmeewee Sahkaheekahn Pikangikum Lake
Peekwatahmaewee Sahkaheekahn Berens Lake
BEEKAHNCHEEKAHMEENG DEEBAHNCHEEKAYWEEHN EENAHOHNAHNUHNPROVINCIAL PARK
Throat River
Pahkayyahkahmahk Silcox Lake
Dowling River
Murfitt Lake
Kavanagh Lake
Prideaux Lake
Wyman Lake
Hornblendite Lake
Dowling Lake
Wagin River
WEESKAYJAHK OHTAHZHOGANEENGPROVINCIAL PARK
Stormer Lake
Boughton Lake
SAHKEESUHKUH WEESUHKAHEEGAHNPROVINCIAL PARK
Storey Lake
Harding Lake
Pringle Lake
Wagin Lake
Wahshaykahmeesheeng Kirkness Lake
Pedlar Lake
Philp Lake
Woodey Lake
Ooshkahtahkahwee Sahkaheekahn Nungesser Lake
Teeple Lake
Openshaw Lake
Farrer Lake
Borel Lake
Hanton Lake
Kotyk Lake
Phillips Lake
WOODLAND CARIBOU PROVINCIAL PARK
Odin Lake
Zimring Lake
Reigate Lake
Hakala Lake
Trough Lake
KAHNAHMAYKOOSAYSEEKAHKPROVINCIAL PARK
Olive Lake
Kahnahmaykoosaysensikahk Valhalla Lake
Little Vermilion Lake
Coli Lake
Sidace Lake
Rathouse Lake
Anderson Lake
Trout Lake
Corallen Lake
Alford Lake
Walsh Lake
TROUT LAKE PROVINCIAL PARK
Otter Lake
Hammell Lake
Para Lake
Red Lake
Balmer Lake
Ranger Lake
Troutlake River
Little Trout Lake
Foley Lake
Red Lake
Parker Lake
Chukuni River
Gullrock Lake

LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area
- Base Case Disturbance
- Bald Eagle Habitat

REFERENCE(S)
1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 5 10
1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
BALD EAGLE HABITAT IN THE REGIONAL STUDY AREA AT PROJECT CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	22

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25mm
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7.4.1.3 Survival and Reproduction

Habitat loss due to the Project footprint is predicted to result in a small reduction in carrying capacity in the RSA. Bald eagle collisions with electrical lines can be expected to increase due to the Project, particularly along areas of the line that span open habitat and are within 1 km of the waterbody shorelines (Watts et al. 2009). Eagle collisions with the conductors will be minimized to the extent possible after implementation of mitigation (e.g., reflectors on conductors or collars on wires near large lakes and open areas), but it is unlikely to be avoided all together. Reduced carrying capacity due to habitat loss, and reduced survival due to collisions are likely to have a small, but measurable adverse effect on bald eagle populations that overlap with the RSA.

7.4.1.4 Characterization of Net Effects

Once suitable habitat for bald eagle is removed, the effect of this loss would be certain to occur, permanent, and continuous at the local scale because the Project will operate indefinitely (Table 30). To reduce effects on bald eagles, there wil be no vegetation clearing within 100 m of a bald eagle nest.

To be conservative, sensory disturbance during construction of the Project is considered to be probable to occur continuously during the construction period (Table 30). Sensory disturbance will be limited in extent to areas of specific construction activities in the Project footprint due to construction being planned to be completed concurrently in multiple segments sequentially along the line (local scale). Effects are anticipated to be reversible a few months after construction is completed (medium-term duration).

Effects from changes to habitat distribution would be probable to occur at the local scale as bald eagles have been observed to shift their nesting territories away from areas of human disturbance (Fraser et al. 1985; Anthony and Isaacs 1989), although there is evidence that some individuals are becoming tolerant of habitat disturbed by humans (Armstrong 2014). These effects will be continuous and permanent because the Project will operate indefinitely (Table 30).

Reduced survival due to collisions with conductors is probable, even after mitigation such as the installation of reflectors on the transmission line in areas within 1 km of large waterbodies that are not surrounded by vegetation cover, and effects will occur continuously and indefinitely at the local scale (Table 30). Potential reductions in survival and reproduction may result from site clearing and sensory disturbance, especially if activities are undertaken during the breeding season. Effects are possible because of the uncertainty associated with forest clearing and productivity of bald eagles with home ranges that are in close proximity to construction activities. Possible mortality or productivity effects from direct habitat loss would be continuous and permanent because the Project will operate indefinitely. Possible changes in productivity from sensory disturbance are anticipated to occur continuously and will be reversible in the medium-term, following cessation of construction activities. Inspection and maintenance of the preferred route ROW during the operation phase may also result in sensory disturbance, but such events will be infrequent, and temporary.

Table 30: Description of Effects and Significance in the Project Case for Bald Eagle.

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	Not Significant
		Magnitude	■ Direct loss of approximately 1,091 ha (3.8%) of suitable nesting habitat in the RSA Base Case ■ Potential avoidance of nesting habitat in close proximity to construction activities due to sensory disturbance	
		Geographic Extent	Local	
		Duration/Reversibility	■ Permanent (direct loss) ■ Medium-term (sensory disturbance)	
		Frequency	Continuous	
		Probability of Occurrence	■ Certain (direct loss) ■ Probable (sensory disturbance)	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	
		Magnitude	Slight shifts in territory sizes or locations due to increased human disturbance	
		Geographic Extent	Local	
		Duration/Reversibility	Permanent	
		Frequency	Continuous	
		Probability of Occurrence	Probable	
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability ■ Collisions with the transmission line causing injury or mortality to bald eagle	Direction	Negative	
		Magnitude	■ Small reduction in carrying capacity of the RSA compared to Base Case; ■ Possible reduction in productivity of home ranges overlapping areas in close proximity to construction activities ■ Reduced survival due to collisions with electrical lines	
		Geographic Extent	Local	
		Duration/Reversibility	■ Permanent (direct loss and collisions with electrical lines) ■ Medium-term (sensory disturbance)	
		Frequency	Continuous	
		Probability of Occurrence	■ Probable (collisions with electrical lines) ■ Possible (direct loss and sensory disturbance)	

ha = hectares; RSA = regional study area

7.4.1.5 Determination of Significance

Populations of bald eagles that overlap with the RSA are not considered sensitive to changes in habitat availability or distribution because habitat is not considered a limiting factor in the RSA. Bald eagles are highly mobile, and demonstrate flexibility in habitat selection including some tolerance of human disturbance (Armstrong 2014). As long-lived, top predators with low reproductive rates, bald eagles are most sensitive to changes in survival and reproduction. Bald eagle populations that overlap with the RSA have recovered from historical threats (e.g., chemical and heavy metal contamination of their food supply) and are increasing in the Base Case (Blancher et al. 2009; Wright 2016). Populations are currently estimated at 100,000 individuals in North America (Buehler 2000). The combined evidence indicates that bald eagle populations that overlap with the RSA are self-sustaining and ecologically effective in the Base Case.

In the Project Case, the limits of work contains 1,091 ha (3.8%) of suitable bald eagle habitat in the RSA. The limits of work used in the habitat model is much larger than the anticipated Project footprint. Additional habitat may be temporarily avoided by individuals due to sensory disturbance during construction. The Project would likely result in slight shifts of territory sizes or locations at local scales but these changes are not expected to alter the connectivity of this criterion in the RSA because bald eagles are highly mobile and transmission lines likely do not act as barriers to their movement.

Mortality due to collisions with the Project's electrical lines is expected, even with the implementation of mitigation such as the installation of reflectors where the line is in areas with no vegetation cover and within 1 km of large waterbodies. In addition, productivity of individuals with breeding ranges that overlap the RSA may decrease slightly. However, this species has been shown to adapt to human disturbance (Armstrong 2014). Overall, the negative incremental effects from the Project are expected to be well within the resilience and adaptability limits of this criterion. Consequently, effects from the Project on bald eagle populations that overlap the RSA are predicted to be not significant (Table 30).

7.4.2 Reasonably Foreseeable Development Case (RFD Case)

7.4.2.1 Habitat Availability

The Wataynikaneyap Phase 2 Project and the Project are predicted to reduce habitat availability for bald eagles in the RSA relative to Base Case. Cumulative effects of the Wataynikaneyap Phase 2 Project and the Project (limits of work) are conservatively predicted to result in the loss of approximately 1,094 ha (3.8%) of suitable breeding habitat in the RSA compared to Base Case (Table 31).

Forestry road development, forest harvesting, and construction of future transmission lines have the potential to reduce bald eagle habitat availability in the RSA through direct habitat loss and avoidance due to sensory disturbance. Fire suppression and climate change may mitigate the effects of forestry on habitat availability for the bald eagle because Ontario's forests are shifting towards mature forest stands (Carleton 2001), which may provide suitable nesting habitat for this species.

Climate change may benefit bald eagle populations by allowing this species to expand its range farther north into areas that currently contain suitable habitat and food conditions but have low eagle densities at Base Case due to a limited ice-free period (Grier et al. 2003). However, there is a large degree of uncertainty regarding the potential effects of climate change because predictions are based on many simulations that can be highly variable.

Table 31: Changes to Bald Eagle Habitat Availability in the Regional Study Area at RFD Case

Habitat Suitability[a]	Base Case [ha]	RFD Case [ha]	Change in Area [ha] [a]	Percent Change [%]
Moderate to High	28,968	27,875	-1,094	-3.8
Nil to Low	85,252	86,345	1,094	1.3

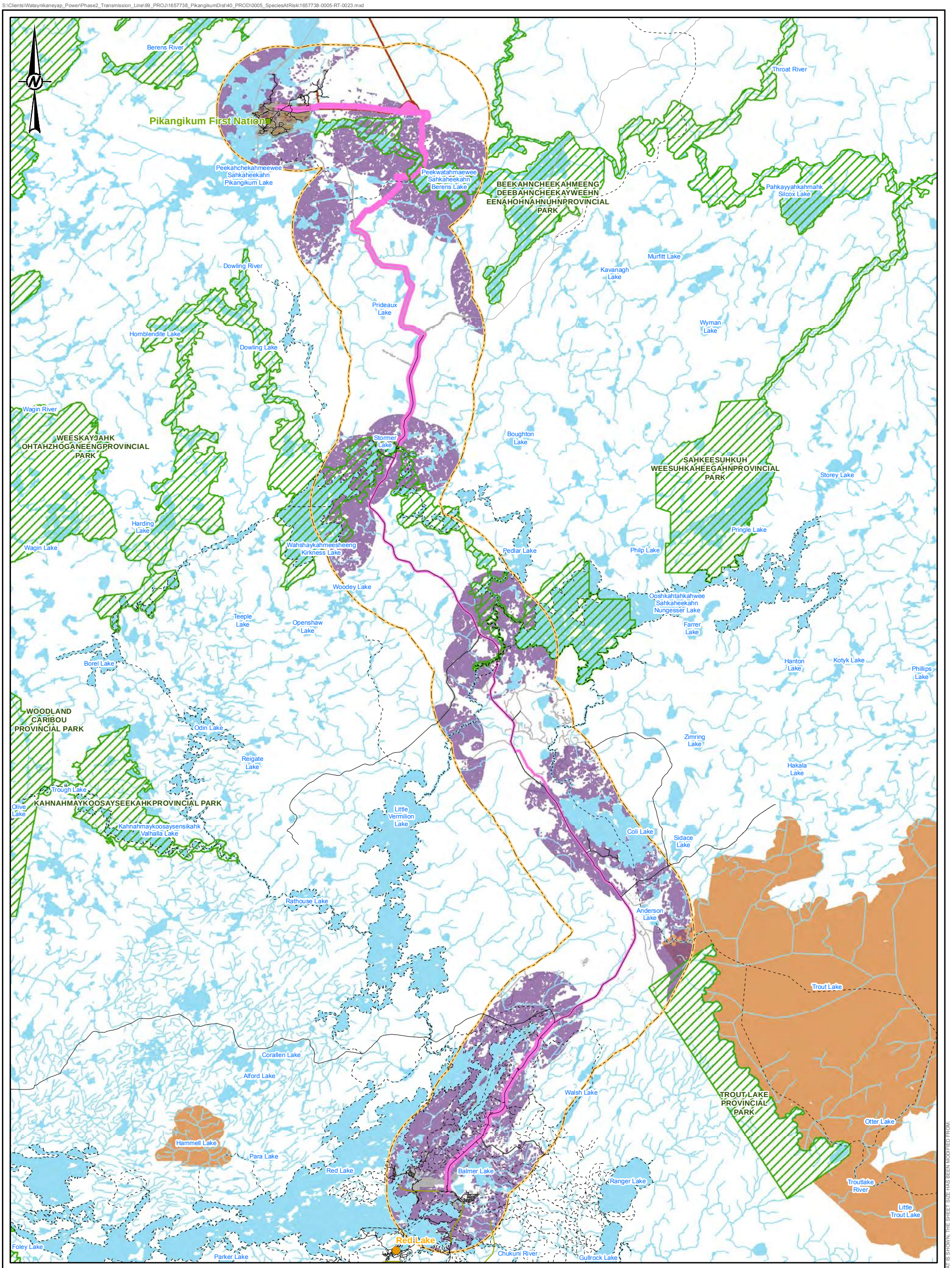
a) Changes in habitat area result from a conversion of moderate to high suitability habitat to lower suitability habitats (i.e., nil to low).

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

Note: The percent change is calculated using the total amount of moderate to high or nil to low habitat available at Base Case; percent change is not relative to the size of the study area.

ha = hectare; % = percent; RFD = reasonably foreseeable development.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area
- Base Case Disturbance
- RFD Case Disturbance
- Bald Eagle Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 5 10
1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
BALD EAGLE HABITAT IN THE REGIONAL STUDY AREA AT RESONABLY FORESEEABLE DEVELOPMENT CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	23

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7.4.2.2 Habitat Distribution

Reasonably foreseeable developments will alter the distribution of bald eagle habitat in the RSA compared to Base Case (Figures 22 and 23). Changes in habitat distribution from any given project in the RFD Case may alter territory sizes and locations (Fraser et al. 1985; Anthony and Isaacs 1989), but bald eagle populations that overlap with the RSA should remain well connected in the RFD Case. Effects from changes to bald eagle habitat distribution from human developments and natural factors are assumed to occur throughout the RFD Case because forest harvesting, the Project, and the Wataynikaneyap Phase 2 Project are expected to operate indefinitely. Climate change will also continue over the foreseeable future and may allow bald eagles to expand their ranges northward into areas that currently contain adequate food and nesting habitat but have a short ice-free period.

7.4.2.3 Survival and Reproduction

Reasonably foreseeable developments are predicted to reduce the carrying capacity of bald eagle habitat in the RSA. However, there is uncertainty in the conclusions due to a lack of information on the timing and location of forest harvesting and forestry access roads.

Bald eagles are thought to be somewhat resilient to climate change in terms of habitat availability and distribution, but may be less adaptable in terms of effects on food supply (Armstrong 2014). Drying and shrinking wetlands could reduce the availability of foraging habitat, and warm, wet springs may increase mercury levels in fish and bioaccumulation in bald eagles (Armstrong 2014). These adverse effects to bald eagle food supply may be partially offset by expanding ranges of warm water fish species, which may increase prey availability for bald eagles.

The Project and the Wataynikaneyap Phase 2 Project have the potential to increase bald eagle mortality through collisions with conductor lines. These effects are expected to be highest where the transmission lines pass within 1 km of large waterbodies and is not surrounded by forest. Mitigation such as installing reflectors on the line within these areas cover are predicted to reduce adverse changes in survival and reproduction.

7.4.2.4 Characterization of RFD Case Effects

Transmission lines will result in a continuous and permanent removal of suitable bald eagle habitat. Effects from changes to habitat availably from forest harvesting will be continuous and reversible in the long-term (Table 32). Reduced quality of nesting and roosting habitat and possible avoidance in close proximity to construction activities from sensory disturbance is probable to occur (not certain) as some individuals may acclimate to sensory disturbance (Table 32). Effects from sensory disturbance are expected to be continuous and reversible in the medium-term for all RFDs. Habitat avoidance due to sensory disturbance is expected to occur at the local scale if there is no temporal overlap between the construction of the Project and similar activities associated with other RFDs. However, overlap in the construction of the Project and the Wataynikaneyap Phase 2 Project or road construction and forestry harvesting in the Red Lake, Trout Lake, and Whitefeather forests may have regional effects on bald eagle.

Reasonably foreseeable developments may possibly result in a small shift in bald eagle territory sizes or locations (habitat distribution) but populations that overlap the RSA are anticipated to be remain well connected in the RFD Case. Bald eagle may expand their ranges northward with climate warming. Effects from changes to habitat distribution will be permanent and continuous at the regional scale (Table 32).

There may be a small reduction in the carrying capacity in the RSA, compared to Base Case, which could influence population survival and reproduction. Forest clearing and sensory disturbance may effect productivity of bald eagles with home ranges that overlap areas in close proximity to construction activities. Effects from habitat loss on productivity will be permanent for transmission line projects and reversible in the long-term for areas cleared for forestry; effects from sensory disturbance will be reversible in the medium-term for all RFDs. Effects from direct loss and sensory disturbance on productivity are anticipated to be continuous and possible to occur. Effects from direct loss will occur at the regional level, while effects from sensory disturbance may occur at the local or regional level, depending on overlap of sensory disturbance events (Table 32).

The Project and the Wataynikaneyap Phase 2 Project may increase the number of bald eagle mortalities from collisions with the transmission lines. Increases in mortality from collisions with the transmission lines should be reduced by implementing mitigation, such as placing reflectors on the lines in areas within 1 km of large waterbodies that are not surrounded by vegetation. However, mortality risk will not be completely removed and the effect is considered to be probable to occur continuously and permanently as the Project and the Wataynikaneyap Phase 2 Project will operate indefinitely (Table 32).

Effects to bald eagle habitat availability, habitat distribution, and survival and reproduction from climate change are possible to probable to occur. Effects from climate change occur continuously and permanently at the beyond regional scale. Effects from wildfire and other natural factors (e.g., severe storms) will be frequent, reversible in the long-term, and are probable to occur at the regional or beyond regional scale (Table 32).

Table 32: Description of Effects and Significance in the RFD Case for Bald Eagle.

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	Not Significant
		Magnitude	■ Direct loss of approximately 1,094 ha (3.8% of RSA Base Case) ■ Reduced quality of nesting habitat and possible avoidance from sensory disturbance during construction ■ Magnitude depends on the influences from climate change.	
		Geographic Extent	■ Regional (direct loss)[a] ■ Local to Regional (sensory disturbance)[b]	
		Duration/Reversibility	■ Long-term to Permanent (direct loss and natural factors) ■ Medium-term (sensory disturbance)	
		Frequency	■ Continuous (sensory disturbance) ■ Frequent to Continuous (direct loss and natural factors)	
		Probability of Occurrence	■ Certain (direct loss) ■ Probable (sensory disturbance and natural factors)	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	
		Magnitude	■ Slight shifts in territory sizes or locations due to increased human disturbance ■ Possible range expansion due to climate change	
		Geographic Extent	Regional [a]	
		Duration/Reversibility	Long-term to Permanent	
		Frequency	Frequent to Continuous (direct loss and natural factors)	
		Probability of Occurrence	Probable	
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability ■ Collisions with the transmission line causing injury or mortality to bald eagle	Direction	Negative	
		Magnitude	■ Small reduction in carrying capacity in the RSA compared to Base Case ■ Possible reduction in productivity of home ranges overlapping areas in close proximity to construction activities ■ Reduced survival due to collisions with electrical lines	
		Geographic Extent	■ Regional (direct loss, collisions with electrical lines, and natural factors)[a] ■ Local to Regional (sensory disturbance)[b]	
		Duration/Reversibility	■ Long-term to Permanent (direct loss and natural factors) ■ Permanent (collisions with electrical lines) ■ Medium-term (sensory disturbance)	
		Frequency	■ Continuous (sensory disturbance and collisions with electrical lines) ■ Frequent to Continuous (direct loss and natural factors)	
		Probability of Occurrence	■ Probable (collisions with electrical lines) ■ Possible (direct loss, sensory disturbance, and natural factors)	

Note: Natural factors include climate change and associated changes, inclement weather (e.g., storms), and wildfire.
a) Effects may be beyond regional due to climate change, other natural factors, forestry, and RFDs that occur within and beyond the RSA (i.e., the Wataynikaneyap Power Phase 2: Connecting 17 Remote First Nation Communities Project)
b) Local if no temporal overlap among activities associated with sensory disturbance; regional if temporal overlap among activities associated with sensory disturbance
ha = hectares; RSA = regional study area; RFD = reasonably foreseeable development

7.4.2.5 Determination of Significance

Reasonably foreseeable developments, including the Project, are predicted to have measurable effects on habitat availability, habitat distribution, and survival and reproduction for bald eagles. The Project and other RFDs have the potential to reduce bald eagle habitat availability in the RSA through direct habitat loss and avoidance due to sensory disturbance. Minor changes in habitat distribution in the RFD Case may have effects on territory sizes and locations and habitat use, but bald eagle populations that overlap with the RSA should remain well connected because this species is highly mobile. Reasonably foreseeable developments including the Project may result in a small reduction in bald eagle carrying capacity in the RSA as a result of the loss and degradation of suitable habitat. Mitigation in the Project and Wataynikaneyap Phase 2 Project ROWs, such as the retention of wildlife trees, where possible, should reduce effects from habitat loss.

Climate change is predicted to have varying effects on habitat availability, habitat distribution, and survival and reproduction of bald eagles in the RFD Case. In general, bald eagles are thought to be less vulnerable to climate change than other species with more specialized requirements and more limited distributions (Armstrong 2014). Applying a precautionary approach, climate change was assumed to have negative effects on bald eagle.

Overall, the cumulative effects from changes in habitat availability and distribution, and survival and reproduction in the RFD Case are expected to be within the resilience and adaptive capacity limits of this species. Bald eagle populations that overlap the RSA would continue to be self-sustaining and ecologically effective in the RFD Case, relative to the Base Case. Consequently, cumulative effects from past and present developments, the Project and other RFDs on bald eagles are predicted to be not significant (Table 32).

7.5 Eastern Whip-poor-will

7.5.1 Assessment of Project Effects (Project Case)

7.5.1.1 Habitat Availability

The limits of work contains 2,293 ha of suitable eastern whip-poor-will habitat, which is a loss of 4.6% in the RSA (Table 33). Habitat loss calculated for the Project Case is an overestimate because the limits of work is much larger than the anticipated Project footprint (4,355 ha for the limits of work versus 478 ha for the Project ROW). Additionally, existing roads and other linear disturbance features, including the Project ROW, were not included as suitable habitat for whip-poor-will in the habitat model (Section 3.1.3.5), even though whip-poor-will will use these habitats for nesting and foraging (COSEWIC 2009; English et al. 2016). Furthermore, non-vegetated habitat (i.e., suitable habitat for whip-poor-will, such as bare ground) will not likely need to be cleared for construction and direct habitat loss from the Project in non-vegetated habitat is likely to occur only where support structures, switching stations, and connection facilities will be built in these habitats. Footprints for transmission line poles are generally small (1.5 by 1.5 m), although larger footprints may be required for self-supporting steel structures. Switching stations and connection facilities have large footprints; cleared areas at these locations may provide suitable nesting habitat for eastern whip-poor-will (COSEWIC 2009).

Table 33: Changes to Eastern Whip-poor-will Habitat Availability in the Regional Study Area at Project Case

Habitat Suitability[a]	Base Case [ha]	Project Case [ha]	Change in Area Using the Limits of Work Footprint[a][b] [ha]	Percent Change Using the Limits of Work Footprint[b] [%]
Moderate to High	49,332	47,040	-2,293	-4.6
Nil to Low	64,887	67,180	2,293	3.5

a) Changes in habitat area result from a conversion of moderate to high suitability habitat to lower suitability habitats (i.e., nil to low).
b) The limits of work is approximately nine times larger than the anticipated Project ROW (4,355 ha for the limits of work versus 478 ha for the maximum anticipated Project ROW), but specific areas of disturbance had not been identified at the time of writing.
Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.
Note: The percent change is calculated using the total amount of moderate to high or nil to low habitat available at Base Case; percent change is not relative to the size of the study area.
ha = hectare; % = percent.

The Project ROW will be maintained in perpetuity as early to mid-successional vegetation communities, which may continue to provide functional habitat for whip-poor-will. Whip-poor-wills have been observed using transmission line corridors, presumably for foraging (COSEWIC 2009), and may benefit from the creation of forest edges (English et al. 2016) through the development of the ROW.

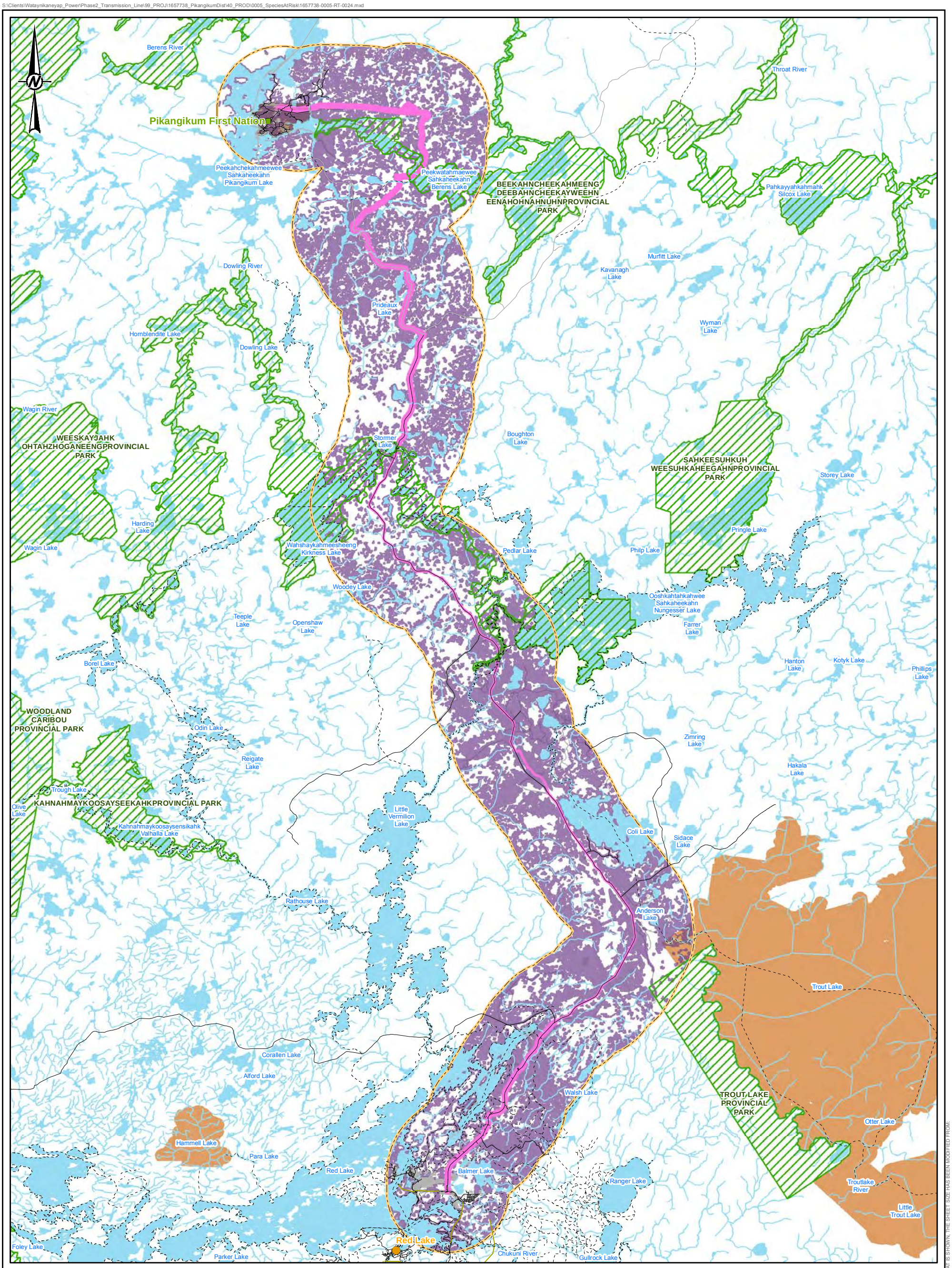
Sensory disturbance during construction may temporarily reduce whip-poor-will habitat availability close proximity to construction activities through avoidance. Noise levels greater than 50 dBA can negatively affect birds (ECCC 2016). Noise from blasting and construction equipment is expected to exceed 50 dBA. Habitat that is otherwise suitable for whip-poor-wills may be avoided in areas where noise levels exceed 50 dBA.

7.5.1.2 Habitat Distribution

Suitable eastern whip-poor-will breeding habitat is predicted to be removed during site clearing for the Project throughout the limits of work (Figure 24). However, this loss of habitat is likely an overestimate as unvegetated habitat will not need to be cleared for construction, whip-poor-wills use transmission line corridors for foraging (Cink 2002; COSEWIC 2009), and this species' abundance may be positively correlated with linear disturbance density (English et al. 2016).

The loss of suitable breeding habitat in the RSA is not predicted to have a measurable effect on whip-poor-will movement patterns. Although whip-poor-wills can show fidelity to breeding sites (Cink 2002), they are a highly mobile species and are capable of establishing territories in new locations when populations are below carrying capacity, which is likely the situation in the RSA. Individuals that are currently breeding in the limits of work may shift their home range sizes or locations to include the Project ROW (English et al. 2016).

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- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area
- Base Case Disturbance
- Eastern Whip-poor-will Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
4. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 5 10
1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
EASTERN WHIP-POOR-WILL HABITAT IN THE REGIONAL STUDY AREA AT PROJECT CASE

CONSULTANT

YYYY-MM-DD	2017-03-08
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	24

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
25mm
0

7.5.1.3 Survival and Reproduction

The loss of breeding habitat may affect reproductive success if individuals are displaced or return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or establish a territory in lower quality habitat. However, this is unlikely to have a measurable effect on whip-poor-will populations that overlap the RSA given the small area of predicted habitat loss (less than 5% of suitable habitat in the RSA). In addition, whip-poor-will habitat in the RSA appears to be abundant but unoccupied and the Project ROW may provide suitable habitat for this species (Cink 2002; COSEWIC 2009; English et al. 2016). As such, the predicted loss of habitat is expected to have no measurable effect on whip-poor-will reproduction and carrying capacity at the population level.

Sensory disturbance such as noise from construction may affect reproductive success and survival for individuals in close proximity to construction activities by raising stress levels and interfering with communications (e.g., reducing ability to hear approaching predators or intraspecific vocalizations) (Ortega 2012). Five whip-poor-will were recorded at two survey locations in the baseline study area during species-specific surveys in 2016. The two locations were approximately 12 m and 14 m from the proposed centerline of the transmission corridor. Mitigation to avoid effects to these areas would involve construction outside of the migratory bird breeding period.

7.5.1.4 Characterization of Net Effects

Negative effects from direct habitat loss of moderate and high suitability eastern whip-poor-will habitat due to the Project are certain to occur because the effect of habitat loss on wildlife populations is well understood and considered adverse (Table 34). However, breeding whip-poor-wills have been found to use powerline and roadway ROWs (COSEWIC 2009) and the abundance of whip-poor-will in southern Ontario was positively correlated with linear disturbance density (English et al. 2016). Effects from sensory disturbance (avoidance or reduction in habitat quality) are probable because some individuals may adapt to sensory disturbance. Effects from changes to habitat availability from direct loss and sensory disturbance are expected to occur continuously at the local scale. Effects from avoidance due to sensory disturbance are expected to be reversible within a few months after the end of construction activities (medium-term), while effects from direct loss will be permanent.

Negative effects from changes to habitat distribution are possible, not certain, as this species may use the Project ROW as nesting and foraging habitat. Individuals may prefer habitat in the ROW and may shift their territory size or location to include the Project ROW in their territory (Table 34). Effects from changes in habitat distribution will occur continuously at the local scale and will be permanent as vegetation in the Project ROW will be maintained in perpetuity as early to mid-successional vegetation communities.

Effects to whip-poor-will from changes to survival and reproduction associated with direct habitat loss and sensory disturbance are possible to occur. Habitat in the RSA is not likely at carrying capacity for this species, and so the Project is anticipated to result in no measurable changes to whip-poor-will reproduction and carrying capacity at the population level. Effects from changes to survival and reproduction due to sensory disturbance and direct habitat loss will occur continuously at the local scale and will likely be reversible in the medium-term and permanent, respectively (Table 34).

Table 34: Description of Effects and Significance in the Project Case for Eastern Whip-poor-will

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	Not Significant
		Magnitude	■ Direct loss of 2,293 ha (4.6%) of suitable nesting habitat in the RSA Base Case ■ Potential avoidance of nesting habitat in close proximity to construction activities due to sensory disturbance	
		Geographic Extent	Local	
		Duration/Reversibility	■ Permanent (direct loss) ■ Medium-term (sensory disturbance)	
		Frequency	Continuous	
		Probability of Occurrence	■ Certain (direct loss) ■ Probable (sensory disturbance)	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	
		Magnitude	Slight shifts in territory sizes or locations due to increased human disturbance	
		Geographic Extent	Local	
		Duration/Reversibility	Permanent	
		Frequency	Continuous	
		Probability of Occurrence	Possible	
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, corona related noise and light emissions, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	
		Magnitude	Small reduction in productivity from habitat loss and sensory disturbance	
		Geographic Extent	Local	
		Duration/Reversibility	■ Permanent (direct loss) ■ Medium-term (sensory disturbance)	
		Frequency	Continuous	
		Probability of Occurrence	Possible	

ha = hectares; RSA = regional study area.

7.5.1.5 Determination of Significance

The whip-poor-will is a mobile species that will use linear disturbance features for nesting and foraging. These characteristics suggest resilience and adaptive capacity to changes in habitat availability and distribution. Individual whip-poor-wills distributed across their breeding range are capable of sustaining the population or improving its abundance provided sufficient suitable habitat is available (Environment Canada 2015b). Population estimates specific to northern Ontario are unavailable; however, the evidence suggests that the population(s) that overlap the whip-poor-will RSA are likely self-sustaining and ecologically effective at Base Case.

For the primary pathways influencing habitat availability, habitat distribution and survival and reproduction, the net effects are restricted to close proximity to the Project footprint, which implies that at least a portion of the population is affected during any given year, but likely not the entire population every year. The Project (limits of work) is conservatively predicted to remove 2,293 ha (4.6%) of suitable habitat in the RSA during construction. Additional suitable habitat in close proximity to construction activities may be temporarily avoided due to sensory disturbance. However, the Project ROW may provide more suitable habitat in the RSA, relative to Base Case conditions, as this species abundance was found to be positively correlated with linear disturbance density in southern Ontario (English et al. 2016). Additionally, eastern whip-poor-will nest in open habitats. Small areas of non-vegetated habitats may be removed from use by whip-poor-will if tower structures need to be constructed in this habitat type.

The Project may result in changes in territory sizes or locations at the local scale but these changes are not expected to alter the spatial extent of occurrence of the population(s) that overlap with the RSA because whip-poor-wills are highly mobile and capable of using linear disturbances for breeding. Habitat is not likely limiting in the RSA, and with effective implementation of mitigation, the incremental changes due to the Project are predicted to result in no significant adverse net effects to whip-poor-will (Table 34).

7.5.2 Reasonably Foreseeable Development Case (RFD Case)

7.5.2.1 Habitat Availability

Reasonably foreseeable developments that were quantified in the RFD Case are the Wataynikaneyap Phase 2 Project and the Project. These RFDs will contribute to a loss of approximately 2,309 ha (4.7%) of moderate to high suitability habitat in the RSA relative to the Base Case (Table 35). However, this is likely an overestimate of habitat loss as eastern whip-poor-wills have been observed to use transmission line and road ROWs as foraging habitat (COSEWIC 2009) and abundance of whip-poor-wills is positively correlated with linear disturbance density (English et al. 2016).

In addition to development, natural factors such as climate change and wildfire may contribute cumulatively to influence habitat availability for whip-poor-will. Climate warming is expected to result in drier conditions in Ontario (Thompson et al. 1998), which could increase whip-poor-will habitat availability (Environment Canada 2015b). Fire suppression can improve habitat for whip-poor-will by creating a juxtaposition of early and late seral forests (COSEWIC 2009). The Ontario Wildland Fire Management System (OWFMS) includes managing fire to meet ecological and resource objectives (MNRF 2014f), and it is expected that over the long term, outcomes of OWFMS will change habitat availability for whip-poor-will differently than what might have otherwise occurred naturally.

Table 35: Changes to Eastern Whip-Poor-Will Habitat Availability in the Regional Study Area at RFD Case

Habitat Suitability[a]	Base Case [ha]	RFD Case [ha]	Change in Area [ha][a]	Percent Change [%]
Moderate to High	49,332	47,023	-2,309	-4.7
Nil to Low	64,887	67,197	2,309	3.6

a) Changes in habitat area result from a conversion of moderate to high suitability habitat to lower suitability habitats (i.e., nil to low).

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

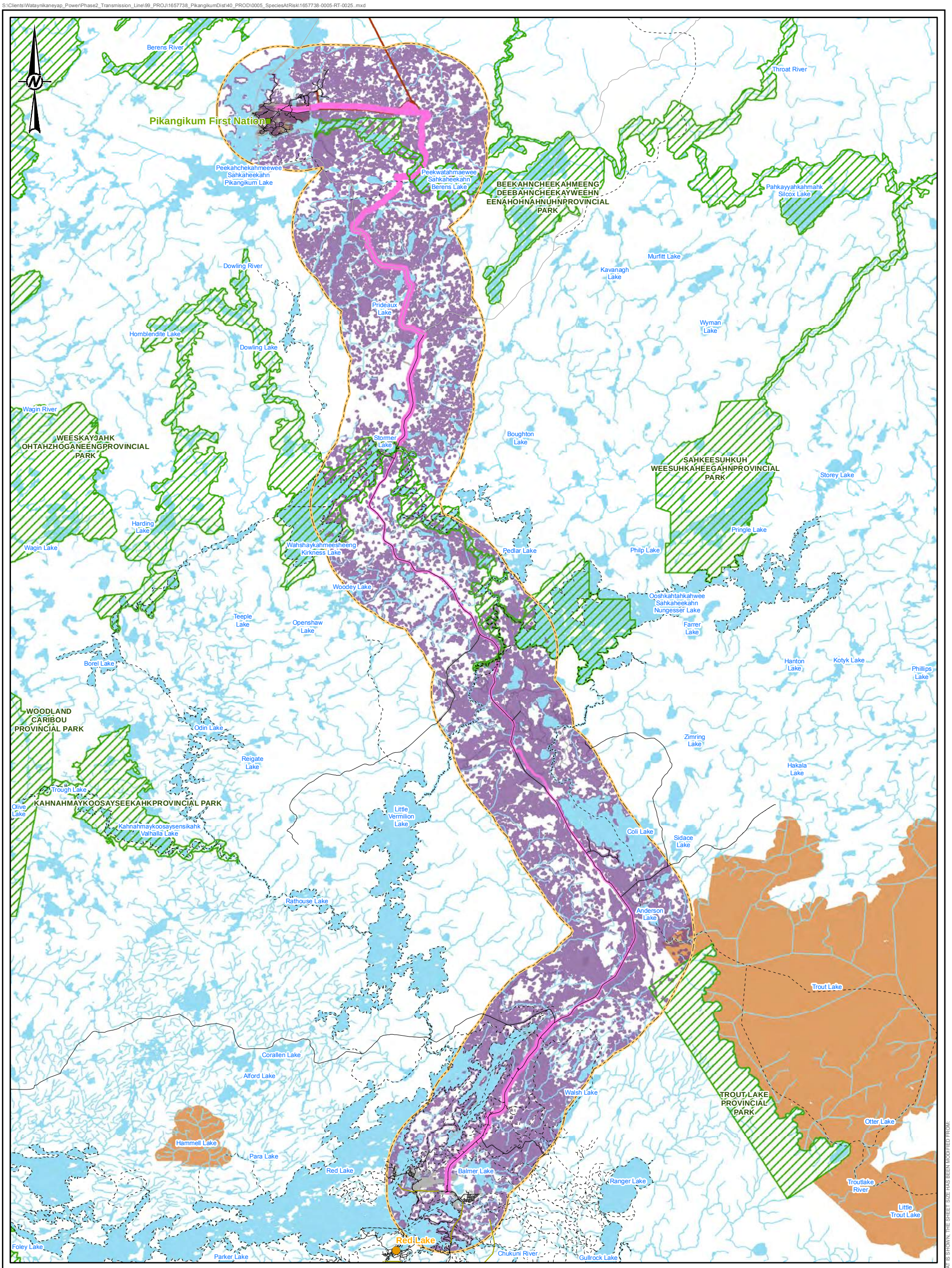
Note: The percent change is calculated using the total amount of moderate to high or nil to low habitat available at Base Case; percent change is not relative to the size of the study area.

ha = hectare; % = percent; RFD = reasonably foreseeable development.

7.5.2.2 Habitat Distribution

Habitat distribution in the RFD Case remains similar to Base Case conditions (Figures 24 and 25). Reasonably foreseeable developments such as forest harvesting, Wataynikaneyap Phase 2 Project, and the Project may increase whip-poor-will habitat as this species requires open and edge habitat for nesting. Additionally, this species has been found to have higher abundance in landscapes with higher linear disturbance density and may shift their territories to include ROWs (English et al. 2016). As such, the Project and other RFDs may result in a positive change in whip-poor-will habitat distribution, relative to the Base Case. It is assumed the RFDs will use mitigation that avoids, minimizes or offsets effects to whip-poor-will habitat and population connectivity.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area
- Base Case Disturbance
- RFD Case Disturbance
- Eastern Whip-poor-will Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 5 10
1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
EASTERN WHIP-POOR-WILL HABITAT IN THE REGIONAL STUDY AREA AT RESONABLY FORESEEABLE DEVELOPMENT CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	25

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm 0

7.5.2.3 Survival and Reproduction

In northern Ontario, climate change is expected to alter the onset of spring and summer. Spring and summer are expected to begin earlier and the growing season is expected to increase by 41 to 61 days in northern Ontario by the 2050s (Stewart 1990). These changes are likely to have a positive effect on eastern whip-poor-will as a longer growing season may allow for this species to frequently raise more than one clutch per year. However, climate change is also predicted to increase the frequency and intensity of extreme weather events, including droughts and heavy precipitation. Increases in the frequency and intensity of storms are predicted for the Great Lakes region (Stewart 1990). Extreme weather events during the breeding season can result in reduced fecundity and nest success. Individuals may also be susceptible to extreme weather events outside of the breeding season. The frequency and intensity of hurricanes are predicted to increase as a result of climate change, which may negatively affect individuals during fall migration and on wintering grounds.

Warmer and drier conditions in Ontario due to climate change may alter the onset of spring and summer and the timing of insect hatches (Nituch and Bowman 2013). Insectivorous long-distance migrants such as eastern whip-poor-wills often exhibit a strong synchronization between breeding and peak food abundance, and climate change may impact this timing by creating a temporal mismatch between reproduction and optimal foraging conditions for prey (Both et al. 2009; COSEWIC 2009). However, uncertainty is high regarding the potential effects of climate change because predictions are based on simulations that can be highly variable.

7.5.2.4 Characterization of Net Effects

Negative effects from direct habitat loss of moderate and high suitability eastern whip-poor-will habitat are considered certain (Table 36). This is precautionary approach as it assumes complete habitat loss for transmission line ROWs and forestry. However, this species can use powerline and roadway ROWs and clear cuts as breeding habitat (COSEWIC 2009), and whip-poor-will abundance may be positively correlated with linear disturbance density (English et al. 2016). The direct loss of eastern whip-poor-will habitat availability in the RFD Case is conservatively assumed to be continuous and permanent at the regional scale.

Effects from avoidance or reduction in habitat quality from sensory disturbance are probable because some individuals may adapt to sensory disturbance. Effects from habitat avoidance due to sensory disturbance are expected to be reversible at the end of construction activities (medium-term) for projects where most sensory disturbance occurs during construction (e.g., pipelines and transmission lines) or for short durations (e.g., forest harvesting) (Table 36). Habitat avoidance due to sensory disturbance is expected to occur at the local scale if there is no temporal overlap between the construction of the Project and similar activities associated with other RFDs. However, overlap in the construction of the Project and the Wataynikaneyap Phase 2 Project or road construction and forest harvesting in the Red Lake, Trout Lake, and Whitefeather forests may results in regional effects on whip-poor-will.

Negative effects from changes to habitat distribution are considered possible, not certain, to occur as this species is highly mobile and may favour the linear disturbance ROWs and clearcuts for foraging and nesting habitat (Table 36). Effects from RFDs that are expected to exist on the landscape for the foreseeable would occur continuously and indefinitely at the regional scale. Effects from forest harvesting may be reversible in the long-term.

Effects from changes in eastern whip-poor-will survival and reproduction associated with direct habitat loss and sensory disturbance from RFDs are possible to occur and may occur continuously at the regional scale. Effects are reversible in the medium-term for sensory disturbance, while effects from direct loss are permanent (Table 36).

Effects from changes in habitat availability and distribution due to climate change and other natural factors (e.g., declining insect populations) on whip-poor-will populations are predicted to be permanent, continuous, and possible to occur at the beyond regional scale. Effects from changes to habitat availability and distribution due to natural factors such as wildfire will occur frequently at the regional to beyond regional scale (Table 36).

Table 36: Description of Effects and Significance in the RFD Case for Eastern Whip-poor-will.

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, corona related noise and light emissions, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	Not Significant
		Magnitude	■ Suitable habitat is predicted to decrease by approximately 2,309 ha (4.7%) in the RSA, relative to Base Case. ■ Magnitude depends on the influences from climate change.	
		Geographic Extent	■ Regional (direct loss and natural factors)[(a)] ■ Local to Regional (sensory disturbance)[(b)]	
		Duration/Reversibility	■ Long-term to Permanent (direct loss and natural factors) ■ Medium-term (sensory disturbance)	
		Frequency	Continuous	
		Probability of Occurrence	■ Certain (direct loss) ■ Probable (sensory disturbance) ■ Possible (natural factors)	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	
		Magnitude	■ Slight shifts in territory sizes or locations due to increased human disturbance ■ Possible range expansion due to climate change	
		Geographic Extent	Regional[(a)]	
		Duration/Reversibility	Long-term to Permanent	
		Frequency	Frequent to Continuous	
		Probability of Occurrence	Possible	
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	
		Magnitude	■ Small reduction in productivity from habitat loss and sensory disturbance ■ Magnitude depends on the influences from climate change	
		Geographic Extent	■ Regional (direct loss and natural factors)[(a)] ■ Local to Regional (sensory disturbance)[(b)]	
		Duration/Reversibility	■ Permanent (direct loss and natural factors) ■ Medium-term (sensory disturbance)	
		Frequency	■ Frequent to Continuous (direct loss and natural factors) ■ Continuous (sensory disturbance)	
		Probability of Occurrence	Possible	

Note: Natural factors include climate change and associated changes, inclement weather (e.g., storms), and wildfire.
a) Effects may be beyond regional due to climate change, other natural factors, forestry, and RFDs that occur within and beyond the RSA (i.e., the Wataynikaneyap Power Phase 2: Connecting 17 Remote First Nation Communities Project)
b) Local if no temporal overlap among activities associated with sensory disturbance; regional if temporal overlap among activities associated with sensory disturbance
ha = hectares; RSA = regional study area; RFD = reasonably foreseeable development.

7.5.2.5 Determination of Significance

The cumulative direct disturbance to moderate to high suitability whip-poor-will habitat from previous and existing disturbance, the Project, and other RFDs is predicted to be 4.7% (2,309 ha) in the RSA, relative to the Base Case. Habitat loss estimates in the RFD Case are overestimated because the limits of work was used as the Project footprint in the habitat model; the limits of work is approximately nine times larger than he anticipated Project ROW. Additionally, this species can use human linear disturbances for nesting and foraging.

Currently, sufficient numbers of individuals that are capable of reproduction are available to sustain the population and increase abundance in Canada (Environment Canada 2015b). Climate warming is predicted to result in drier forests and longer summers in northern Ontario, which could positively affect eastern whip-poor-will survival and reproduction.

The combined evidence concerning the cumulative changes in habitat availability and distribution, and survival and reproduction in the RSA from the Base Case to the RFD Case indicates that whip-poor-will populations would continue to be self-sustaining and ecologically effective. Consequently, cumulative effects on eastern whip-poor-will populations that overlap the RSA in the RFD Case are predicted to be not significant (Table 36).

7.6 Common Nighthawk

7.6.1 Assessment of Project Effects (Project Case)

7.6.1.1 Habitat Availability

The limits of work contains 2,380 ha of suitable habitat for common nighthawk, which is a measured loss of 4.7% of the RSA, relative to Base Case conditions (Table 37). This is an overestimate of habitat loss as the limits of work was used as the Project footprint; the limits of work is approximately nine times larger than the anticipated Project ROW. Additionally, the Project ROW may provide suitable foraging and nesting habitat for this species (Peck and James 1983; COSEWIC 2007a; Brigham et al. 2011). Furthermore, existing disturbances that may provide suitable habitat for common nighthawk (e.g., road ROWs) were not included as potential suitable habitat for common nighthawk in the habitat model. Also, unvegetated habitat (i.e., suitable habitat for nighthawk) will not likely need to be cleared for construction and direct habitat loss from the Project in unvegetated habitat is likely to occur only where support structures, switching stations, and connection facilities will be built in these habitats. Footprints for transmission line poles are generally small (1.5 by 1.5 m), although larger areas may be required for self-supporting steel structures. Switching stations and connection facilities have large footprints but cleared areas and flat building rooftops at these locations may provide suitable nesting habitat for common nighthawk.

Table 37: Changes to Common Nighthawk Habitat Availability in the Regional Study Area at Project Case

Habitat Suitability[a]	Base Case [ha]	Project Case [ha]	Change in Area Using the Limits of Work Footprint[a][b] [ha]	Percent Change Using the Limits of Work Footprint[b] [%]
Moderate to High	50,910	48,530	-2,380	-4.7
Nil to Low	63,309	65,690	2,380	3.8

a) Changes in habitat area result from a conversion of moderate to high suitability habitat to lower suitability habitats (i.e., nil to low).

b) The limits of work is approximately nine times larger than the anticipated Project ROW (4,355 ha for the limits of work versus 478 ha for the maximum anticipated Project ROW), but specific areas of disturbance had not been identified at the time of writing.

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

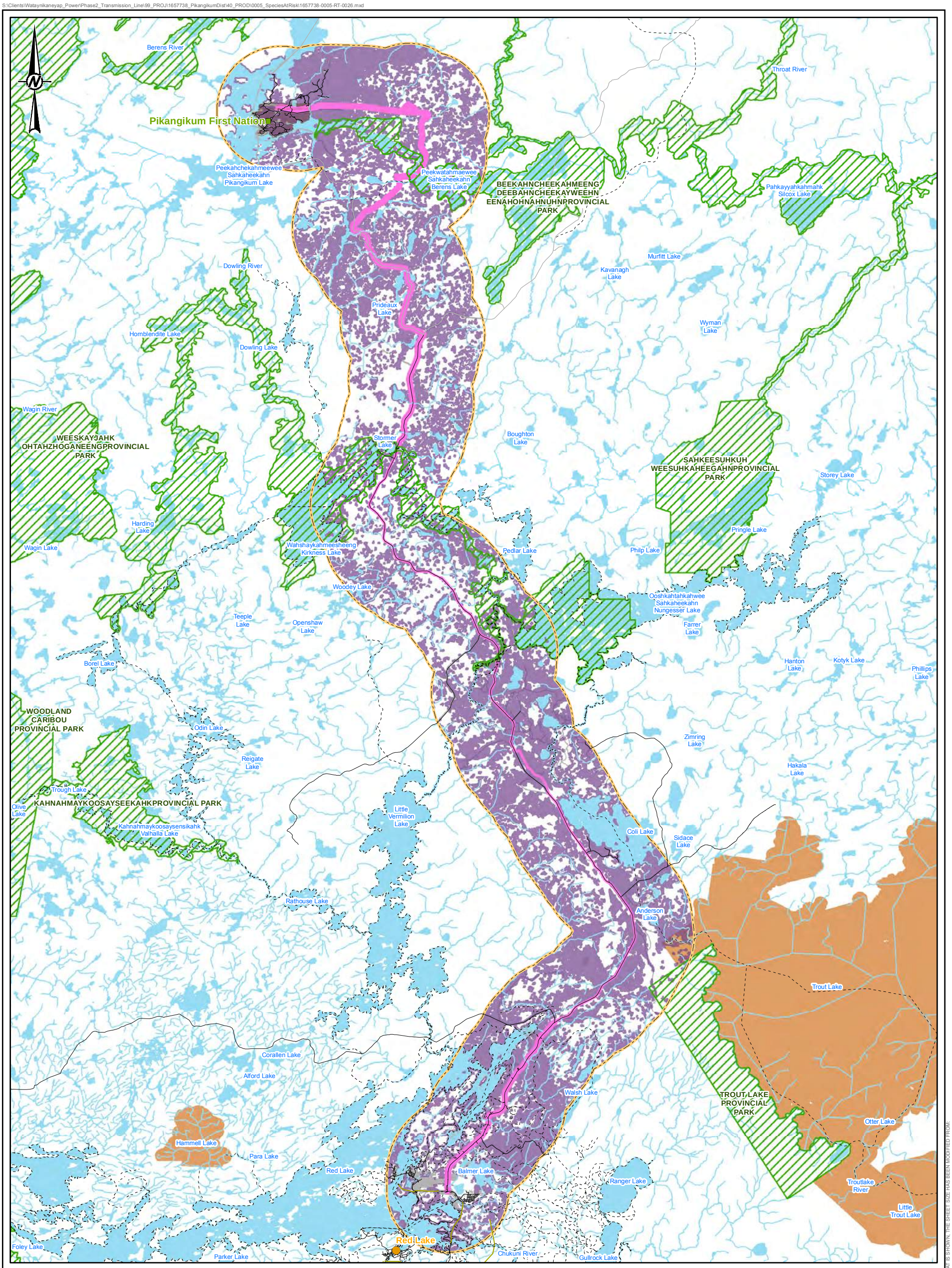
Note: The percent change is calculated using the total amount of moderate to high or nil to low habitat available at Base Case; percent change is not relative to the size of the study area.

ha = hectare; % = percent.

7.6.1.2 Habitat Distribution

Suitable common nighthawk habitat is predicted to be removed during site clearing for the Project throughout the limits of work (Figure 26). The loss of suitable breeding habitat in the RSA is unlikely to have a measurable effect on common nighthawk movement patterns. As breeding occurs in open areas, vegetation clearing for the Project may increase nesting habitat availability following the completion of construction activities. Nevertheless, common nighthawk have been known to show fidelity to breeding sites (Dexter 1961; Brigham et al. 2011) and clearing may affect breeding habitat distribution if individuals return to breeding grounds to find habitat removed.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
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- Regional Study Area
- Base Case Disturbance
- Common Nighthawk Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 5 10
1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
COMMON NIGHTHAWK HABITAT IN THE REGIONAL STUDY AREA AT PROJECT CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	26

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7.6.1.3 Survival and Reproduction

The loss of breeding habitat may affect reproductive success if individuals are displaced or return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or establish a territory in lower quality habitat. In the Project Case, the carrying capacity of the RSA is predicted to be reduced by two individuals (from 36 to 34) compared to the Base Case (see Section 3.2.7.3 for estimation method). Common nighthawk habitat in the RSA appears to be abundant, but not fully occupied. As such, the loss of habitat is predicted to have no measurable effects on common nighthawk reproduction and carrying capacity at the population level.

Sensory disturbance such as noise from construction activities may affect reproductive success and survival of individuals in close proximity to construction activities by raising stress levels and interfering with communications (e.g., reducing ability to hear approaching predators or intraspecific vocalizations) (Ortega 2012).

7.6.1.4 Characterization of Net Effects

Negative effects to common nighthawk from direct changes to habitat availability and distribution are possible to certain to occur at the local scale, continuous, and permanent (due to the indefinite operation phase of the Project), although this species uses recently disturbed areas for nesting and foraging (Table 38). Effects from changes to habitat availability due to sensory disturbance are probable to occur continuously at the local scale and will be reversible within a few months after construction has ended (i.e., medium-term in duration). Inspection and maintenance of the preferred route ROW during the operation phase may also result in sensory disturbance, but such events will be infrequent, isolated, and temporary.

Effects to common nighthawk survival and reproduction from direct habitat loss and sensory disturbance are possible at the local scale (Table 38). Nighthawks were conservatively assumed to be affected by sensory disturbance from construction activities continuously for the entire construction period, even though noise effects should be isolated to portions of the limits of work due to construction being completed sequentially down the line. Construction activities will typically occur during one 12-hour shift per day (from 07:00 to 19:00); however, night-time work may be occasionally required to make up for schedule delays. Effects from sensory disturbance are anticipated to be reversed a few months after completion of construction (i.e., reversible in the medium-term). Effects on survival and reproduction from direct habitat loss are anticipated to be permanent and continuous.

Table 38: Description of Effects and Significance in the Project Case for Common Nighthawk

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	Not Significant
		Magnitude	■ Direct loss of 2,380 ha of suitable nesting habitat (4.7%) of RSA Base Case ■ Potential avoidance of nesting habitat in close proximity to construction activities due to sensory disturbance	
		Geographic Extent	Local	
		Duration/Reversibility	■ Permanent (direct loss) ■ Medium-term (sensory disturbance)	
		Frequency	Continuous	
		Probability of Occurrence	■ Certain (direct loss) ■ Probable (sensory disturbance)	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	
		Magnitude	Slight shifts in territory sizes or locations due to increased human disturbance	
		Geographic Extent	Local	
		Duration/Reversibility	Permanent	
		Frequency	Continuous	
		Probability of Occurrence	Possible	
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	
		Magnitude	■ Small reduction in productivity from habitat loss and sensory disturbance ■ Reduction in carrying capacity by 2 individuals in the RSA, from Base Case	
		Geographic Extent	Local	
		Duration/Reversibility	Permanent (direct loss) Medium-term (sensory disturbance)	
		Frequency	Continuous	
		Probability of Occurrence	Possible	

ha = hectares; RSA = regional study area.

7.6.1.5 Determination of Significance

The common nighthawk is a mobile species that will use anthropogenic features (e.g., clear-cuts, linear disturbances) for foraging and nesting habitat. These characteristics suggest resilience and adaptive capacity to changes in habitat availability and distribution. Individual common nighthawks distributed across their breeding range are capable of sustaining the population or improving its abundance provided sufficient suitable habitat is available (Environment Canada 2016b). Population estimates specific to northern Ontario are unavailable; however, the weight of evidence suggests that common nighthawk populations that overlap the RSA are self-sustaining and ecologically effective at Base Case.

For the primary pathways influencing habitat availability, habitat distribution and survival and reproduction, net effects are predicted to be negative and restricted to the Project footprint or limits of work in geographic extent. The limits of work contains 2,380 ha (4.7% of the RSA) of suitable habitat. Additional suitable habitat in close proximity to construction activities may be temporarily avoided due to sensory disturbance. The Project may result in slight shifts of territory sizes or locations at local scales. These changes are not expected to alter the spatial extent of occurrence of the population(s) that overlap with the RSA because common nighthawks are highly mobile, this species is capable of using anthropogenic disturbances for breeding, and habitat is not limiting in the RSA. Mitigation, such as spanning areas with compatible habitat (e.g., bedrock outcrops), will likely limit effects on common nighthawk from changes to habitat availability and distribution.

The incremental changes due to the Project are predicted to not adversely affect the resilience and adaptive capacity of common nighthawk populations that overlap the RSA, relative to the Base Case (i.e., populations remain self-sustaining and ecologically effective). Consequently, effects on common nighthawk from changes to habitat availability, habitat distribution, and survival and reproduction in the Project Case are predicted to be not significant (Table 38).

7.6.2 Reasonably Foreseeable Development Case (RFD Case)

7.6.2.1 Habitat Availability

For RFDs that were quantified in the RFD Case (i.e., the Project and the Wataynikaneyap Phase 2 Project), there is predicted to be a loss of approximately 2,402 ha (4.7%) of suitable habitat in the RSA, compared to the Base Case (Table 39). This is likely an overestimate common nighthawks use open areas, such as transmission line ROWs, for nesting and foraging and reasonably foreseeable human developments may provide additional habitat for this species.

Although climate change is expected to increase the frequency and intensity of wildfires, fire suppression efforts in the RSA will likely be increased proportionally. Fire suppression activities in the RSA will likely continue to decrease common nighthawk habitat availability in the RSA into the future (Environment Canada 2016b). It is expected that over the long term, outcomes of OWFMS will also change habitat availability for common nighthawk differently than what might have otherwise occurred naturally.

Table 39: Changes to Common Nighthawk Habitat Availability in the Regional Study Area at RFD Case

Habitat Suitability[a]	Base Case [ha]	RFD Case [ha]	Change in Area [ha][a]	Percent Change [%]
Moderate to High	50,910	48,508	-2,402	-4.7
Nil to Low	63,309	65,712	2,402	3.8

a) Changes in habitat area result from a conversion of moderate to high suitability habitat to lower suitability habitats (i.e., nil to low).

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

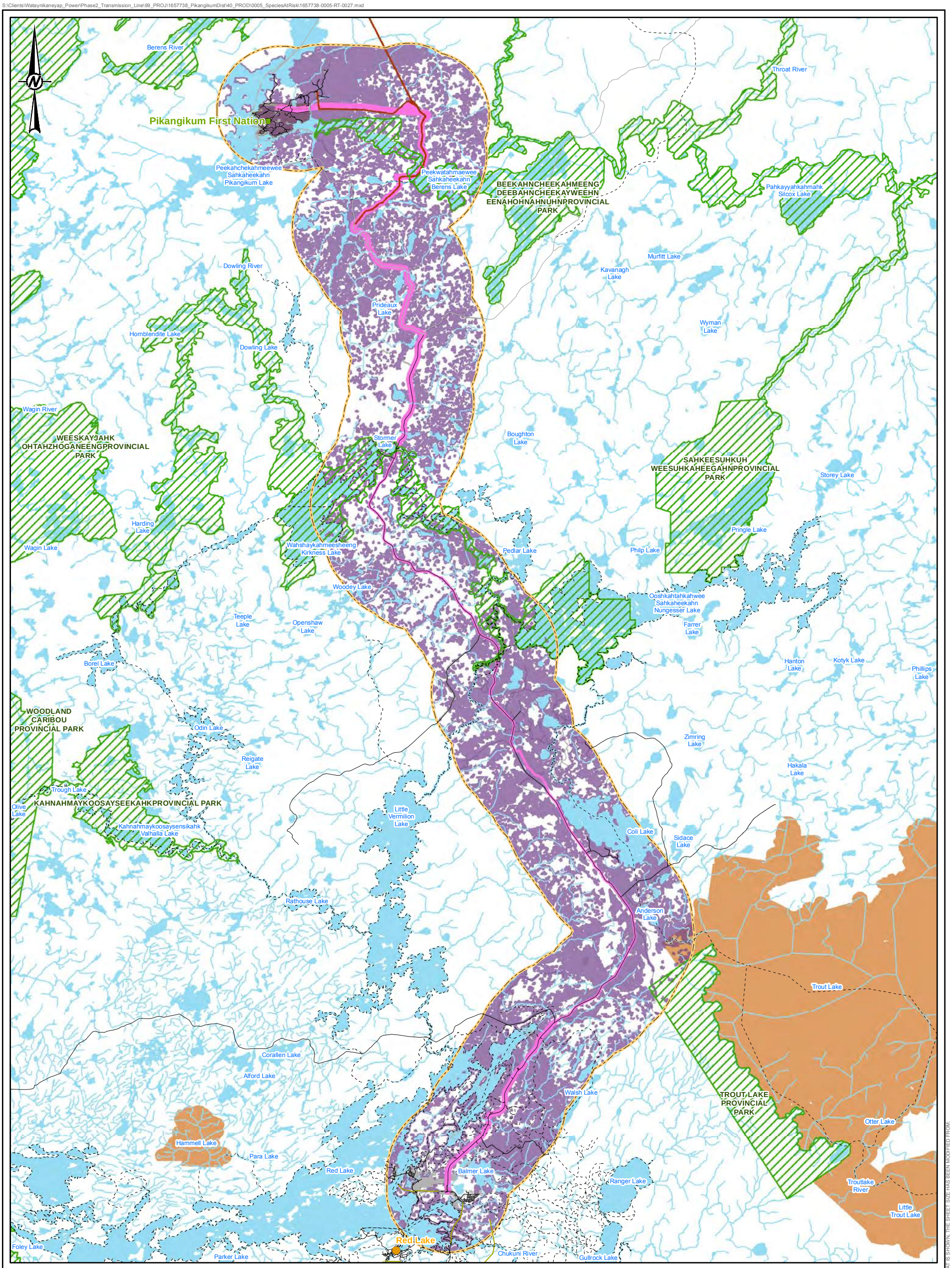
Note: The percent change is calculated using the total amount of moderate to high or nil to low habitat available at Base Case; percent change is not relative to the size of the study area.

ha = hectare; % = percent; RFD = reasonably foreseeable development.

7.6.2.2 Habitat Distribution

Suitable habitat for common nighthawk remains well distributed in the RSA at the RFD Case (Figures 26 and 27). Reasonably foreseeable developments such as forest harvesting, the Wataynikaneyap Phase 2 Project, and the Project are expected to increase suitable habitat for common nighthawk as this species requires open and edge habitat for nesting. The Project and other reasonably foreseeable human developments may result in a positive change in nighthawk habitat distribution, relative to the Base Case. It is assumed the RFDs will use mitigation that avoids, minimizes or offsets effects to common nighthawk habitat.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area
- Base Case Disturbance
- RFD Case Disturbance
- Common Nighthawk Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
4. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 5 10

1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
COMMON NIGHTHAWK HABITAT IN THE REGIONAL STUDY AREA AT RESONABLY FORESEEABLE DEVELOPMENT CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	27

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
25mm
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7.6.2.3 Survival and Reproduction

Reasonably foreseeable developments that were quantified in the RFD Case are predicted to reduce the carrying capacity of common nighthawk habitat in the RSA from 36 individuals in the Base Case to 34 individuals in the RFD Case; no change from Project Case (see Section 3.2.7.3 for estimation method). There is no reduction in carrying capacity from Project Case to RFD Case because the Wataynikaneyap Phase 2 Project was predicted to remove 2.2 km^2 (22 ha) of suitable habitat for common nighthawk in the RFD Case. According to common nighthawk density data for OBBA Regions 39 and 44, there is approximately 1 nighthawk per 14 km^2 in the regions surrounding the RSA.

Extreme weather events (e.g., storms, periods of prolonged cold temperatures or rain) are expected to occur more frequently due to climate change. These events may negatively impact common nighthawks during migration and the breeding season as this species is an aerial insectivore that relies on warm weather for flying insects (Environment Canada 2016b). Declines in common nighthawk populations have been recorded in Massachusetts and British Columbia after inclement weather events (Firman et al. 1993; Environment Canada 2016b).

Climate change is also expected to increase the length of summers in northern Ontario. The growing season in northern Ontario is predicted to increase by 41 to 61 days (Stewart 1990). These changes are likely to have a positive effect on common nighthawk because this species is one of the last landbird species to arrive on breeding grounds (Environment Canada 2016b). A longer growing season may allow for common nighthawks to raise more than one clutch per year, which is currently not possible with the timing of this species' migration patterns (Environment Canada 2016b).

Warmer and drier conditions from climate change in Ontario may alter the timing of insect hatches (Nituch and Bowman 2013). Long distance migrants, such as common nighthawks, exhibit synchronization between breeding and peak food abundance. Earlier warming in the breeding range for the common nighthawk may create a temporal mismatch between reproduction and optimal foraging conditions for prey (Both et al. 2009; Environment Canada 2016b). There is high uncertainty about the potential effects of climate change.

7.6.2.4 Characterizaion of Cumulative Effects

Negative effects from direct habitat loss are considered certain to occur. Changes to habitat availability and distribution from transmission lines are anticipated to have permanent, continuous effects at the regional scale. Effects from changes due to forest harvesting will be continuous at the regional scale but likely reversible in the long-term (Table 40).

Sensory disturbance from construction of the Project and the Wataynikaneyap Phase 2 Project may cause common nighthawks to avoid suitable habitat at the local scale. There is currently no overlap in the construction schedule of these two projects and there is little sensory disturbance during operation of transmission lines. However, if there are delays in the construction of the Project and there is overlap with the construction of the Wataynikaneyap Phase 2 Project, effects from habitat avoidance would likely occur at the regional scale. Effects from sensory disturbance will be continuous during the construction phase and are expected to be reversed soon after construction of projects (medium-term). Effects from sensory disturbance are probable (not certain) to occur as some individuals may acclimatize to sensory disturbance (Table 40).

Effects to common nighthawk survival and reproduction from direct habitat loss are possible to occur continuously, at the regional scale, and will be permanent (e.g., transmission lines) or reversible in the long-term (e.g., forest harvesting). Changes to survival and reproduction from sensory disturbance will have continuous effects at the local to regional scale that will be reversible in the medium-term (Table 40).

Effects from changes in habitat availability and distribution due to climate change and other natural factors (e.g., declining insect populations) on common nighthawk populations are predicted to be permanent, continuous, and possible to occur at the beyond regional scale. Effects from changes to habitat availability and distribution due to natural factors such as wildfire will occur frequently over the long term at the regional to beyond regional scale (Table 40).

Table 40: Description of Effects and Significance in the RFD Case for Common Nighthawk.

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	Not Significant
		Magnitude	■ Suitable habitat will decrease by 2,402 ha (4.7%) in the RSA from Base Case to RFD Case ■ Magnitude depends on the influences from climate change.	
		Geographic Extent	■ Regional (direct loss)[a] ■ Local to Regional (sensory disturbance)[b]	
		Duration/Reversibility	■ Long-term to Permanent (direct loss and natural factors) ■ Medium-term (sensory disturbance)	
		Frequency	■ Continuous (sensory disturbance) ■ Frequent to Continuous (direct loss and natural factors)	
		Probability of Occurrence	■ Certain (direct loss) ■ Probable (sensory disturbance) ■ Possible (natural factors)	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	
		Magnitude	■ Slight shifts in territory sizes or locations due to increased human disturbance ■ Possible range expansion due to climate change	
		Geographic Extent	Regional[a]	
		Duration/Reversibility	Long-term to Permanent	
		Frequency	Frequent to Continuous	
		Probability of Occurrence	Possible	
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	
		Magnitude	■ Small reduction in productivity from habitat loss and sensory disturbance ■ Reduction in carrying capacity by 2 individuals in the RSA, from Base Case. ■ Magnitude depends on the influences from climate change	
		Geographic Extent	■ Regional (direct loss)[a] ■ Local to Regional (sensory disturbance)[b]	
		Duration/Reversibility	■ Long-term to Permanent (direct loss and natural factors) ■ Medium-term (sensory disturbance)	
		Frequency	■ Continuous (sensory disturbance) ■ Frequent to Continuous (direct loss and natural factors)	
		Probability of Occurrence	Possible	

Note: Natural factors include climate change and associated changes, inclement weather (e.g., storms), and wildfire.
a) Effects may be beyond regional due to climate change, other natural factors, forestry, and RFDs that occur within and beyond the RSA (i.e., the Wataynikaneyap Power Phase 2: Connecting 17 Remote First Nation Communities Project)
b) Local if no temporal overlap among activities associated with sensory disturbance; regional if temporal overlap among activities associated with sensory disturbance
ha = hectares; RSA = regional study area; RFD = reasonably foreseeable development

7.6.2.5 Determination of Significance

Currently, sufficient numbers of individuals that are capable of reproduction are available to sustain the common nighthawk population and increase abundance in Canada (Environment Canada 2016c). Habitat appears to be widespread but not completely occupied in the RSA at Base Case.

In the RFD Case, the cumulative direct disturbance to suitable habitat is predicted to be 4.7% (2,402 ha) in the RSA, relative to Base Case. Reasonably foreseeable developments, including the Project, the Wataynikaneyap Phase 2 Project, and forest harvesting in the Red Lake, Trout Lake, and Whitefeather forests may increase suitable habitat for common nighthawk relative to Base Case conditions by creating early successional habitats. Reasonably foreseeable developments may result in local changes to common nighthawk survival and reproduction in the RSA due to direct habitat loss and sensory disturbance; however, it is assumed that the RFDs will implement mitigations that avoid, minimize or offset these effects. An example of mitigation is clearing vegetation outside of the breeding bird season.

Climate warming is predicted to result in drier forests and longer summers in northern Ontario, which could positively affect common nighthawk survival and reproduction. Climate change will likely alter habitat availability, habitat distribution and survival and reproduction of common nighthawks in the RFD Case. However, the effects were not quantified in this assessment and there is a large amount of uncertainty regarding the potential effects of climate change because predictions are based on simulations that can be highly variable and many scenarios are possible.

Overall, the weight of evidence from the analysis of the primary pathways predicts that changes to common nighthawk habitat availability, habitat distribution, and survival and reproduction are within the resilience and adaptability limits of the species. The cumulative effects in RFD Case should not adversely influence the ability of common nighthawk populations that overlap the RSA to remain self-sustaining and ecologically effective, relative to the Base Case. Consequently, cumulative effects from the Project and other past, present and reasonably foreseeable developments on common nighthawk are predicted to be not significant (Table 40).

7.7 Olive-Sided Flycatcher

7.7.1 Assessment of Project Effects (Project Case)

7.7.1.1 Habitat Availability

The limits of work contains 444 ha of suitable habitat for olive-sided flycatcher, which is a loss of 3.4% of the suitable habitat present in the RSA at Base Case (Table 41). This is a highly conservative estimate of habitat loss as the limits of work was used as the Project footprint in the habitat model; the limits of work is 4,355 ha and the anticipated Project ROW is 478 ha. One additional disturbance area will be required for the substation. This area is anticipated to be relatively small (approximately 2 ha).

Table 41: Changes to Olive-sided Flycatcher Habitat Availability in the Regional Study Area at Project Case

Habitat Suitability	Base Case [ha]	Project Case [ha]	Change in Area Using the Limits of Work Footprint[(a)(b)] [ha]	Percent Change Using the Limits of Work Footprint[(b)] [%]
Moderate to High	13,068	12,624	-444	-3.4
Nil to Low	101,152	101,596	444	0.4

a) Changes in habitat area result from a conversion of moderate to high suitability habitat to lower suitability habitats (i.e., nil to low).
b) The limits of work is approximately nine times larger than the anticipated Project ROW (4,355 ha for the limits of work versus 478 ha for the maximum anticipated Project ROW), but specific areas of disturbance had not been identified at the time of writing.
Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.
Note: The percent change is calculated using the total amount of moderate to high or nil to low habitat available at Base Case; percent change is not relative to the size of the study area.
ha = hectare; % = percent.

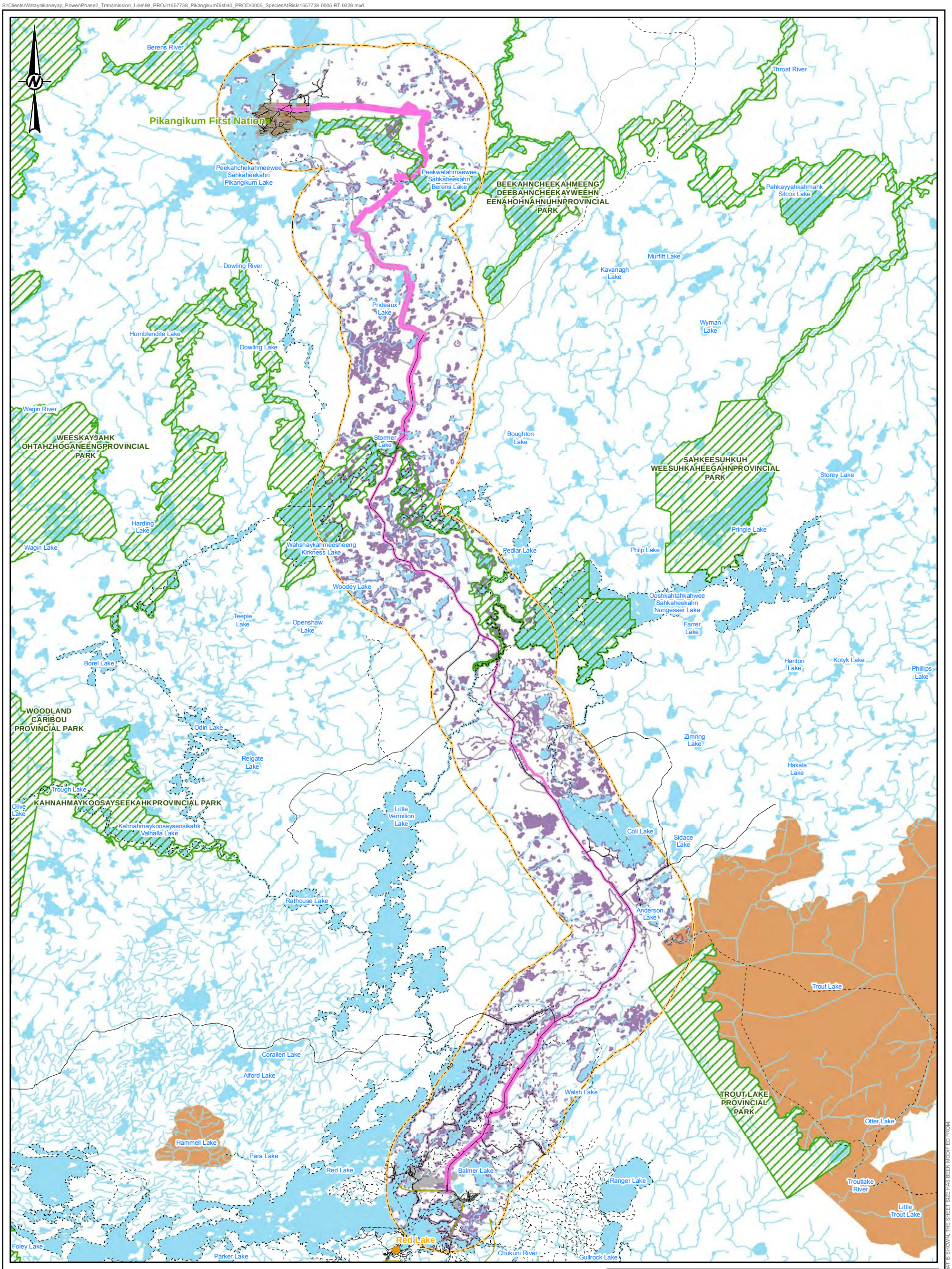
7.7.1.2 Habitat Distribution

As an edge adapted species, olive-sided flycatcher is thought to benefit from habitat fragmentation; however, Haché et al. (2014) found that the density of olive-sided flycatcher was negatively affected by linear disturbances on the landscape. Haché et al (2014) also found that road side surveys overestimate olive-sided flycatcher density, which supports the association of this species with edge habitat. The effects of linear disturbance on this species may be scale and habitat dependent. Therefore, there is a high level of uncertainty associated with the direction of the response of olive-sided flycatcher abundance to habitat fragmentation in the Project Case.

Suitable olive-sided flycatcher breeding habitat remains similarly distributed in the Base Case and Project Case (Figures 10 and 28). The Project may slightly alter the sizes and locations of olive-sided flycatcher territories in close proximity to the power line ROW and other infrastructure. A study in the boreal forest of the Northwest Territories found that some passerine bird species move their territories away from human disturbance features (Machtans 2006).

This species is predicted to continue to fly directly over the Project ROW when dispersing, foraging, or searching for suitable nesting sites. Forest birds have been found to cross gaps of up to 200 m (St. Clair et al. 1998). The preferred route ROW will be an average 40 m in width, and where the alignment is adjacent to the Nungesser Road or Pikangikum All-Season Road, the effective ROW width may be up to 100 m wide. The loss of less than 4% of suitable breeding habitat in the RSA is predicted to have no ecological effect on olive-sided flycatcher territory spacing or population connectivity.

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LEGEND

- City
- Town
- First Nation Community
- Watay Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Substation Area
- Project Limits of Work
- Regional Study Area
- Base Case Disturbance
- Olive-sided Flycatcher Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

0 5 10
1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
OLIVE-SIDED FLYCATCHER HABITAT IN THE REGIONAL STUDY AREA AT PROJECT CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	28

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25mm
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7.7.1.3 Survival and Reproduction

The loss of suitable breeding habitat due to the Project is predicted to result in a small reduction in the carrying capacity of the RSA. Applying a density estimate of 1.19 individuals/km² (see Section 3.2.8.3 for estimation method) to the amount of suitable habitat remaining in the Project Case results in an abundance estimate of 150 individuals within the RSA. The carrying capacity of the RSA is reduced by six individuals at Project Case compared to the Base Case (from 156 to 150 individuals in the RSA). This small change is unlikely to have a measurable effect on olive-sided flycatcher populations that overlap with the RSA.

The effects of sensory disturbance on the abundance of olive-sided flycatchers are unknown. Noise levels above 48 dB have been shown to result in reduced abundance and pairing success for some songbird species (Bayne et al. 2008; Habib et al. 2007). Other potential effects from noise could include interference with communication (e.g., reducing ability to hear approaching predators or intraspecific vocalizations) (Ortega 2012). Sensory effects were not identified as an important factor in the federal recovery strategy for olive-sided flycatcher (Environment Canada 2016b).

7.7.1.4 Characterization of Net Effects

Effects from direct Project-related changes to habitat availability are considered certain to occur continuously at the local scale. Effects will be permanent as the Project will be operation for the foreseeable future (Table 42). Changes to habitat availability due to avoidance are probable to affect some individuals present in the limits of work (local scale); some individuals may also acclimatize to sensory disturbance. Effects would be continuous and reversible in the medium-term; likely end within a few months after completion of construction activities (Table 42).

Effects to olive-sided flycatcher from changes to habitat distribution are conservatively considered probable to occur continuously and permanently at the local scale (Table 42). Some passerine bird species shift their territory sizes or locations away from human disturbance features, including features with low sensory disturbance (e.g., seismic lines, transmission lines) (Machtans 2006).

Changes in survival and reproduction associated with alteration in habitat availability possible and would continuously occur at the local scale. Effects from sensory disturbance on survival and reproduction will likely be reversed in the medium-term, while effects from reduction in carrying capacity are predicted to be permanent (Table 42).

Table 42: Description of Effects and Significance in the Project Case for Olive-sided Flycatcher

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	Not Significant
		Magnitude	■ Direct loss of 3.4% of suitable nesting habitat of RSA Base Case ■ Potential avoidance of nesting habitat in close proximity to construction activities due to sensory disturbance	
		Geographic Extent	Local	
		Duration/Reversibility	■ Permanent (direct loss) ■ Medium-term (sensory disturbance)	
		Frequency	Continuous	
		Probability of Occurrence	■ Certain (direct loss) ■ Probable (sensory disturbance)	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change wildlife habitat use and movement patterns ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	
		Magnitude	Slight shifts in territory sizes or locations due to increased human disturbance	
		Geographic Extent	Local	
		Duration/Reversibility	Permanent	
		Frequency	Continuous	
		Probability of Occurrence	Probable	
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	
		Magnitude	■ Small reduction in productivity from habitat loss and sensory disturbance ■ Reduction in carrying capacity by 6 individuals in the RSA, compared to Base Case.	
		Geographic Extent	Local	
		Duration/Reversibility	■ Permanent (direct loss) ■ Medium-term (sensory disturbance)	
		Frequency	Continuous	
		Probability of Occurrence	Possible	

ha = hectares; RSA = regional study area.

7.7.1.5 Determination of Significance

Combined effects of past and present disturbance identified in the Base Case have reduced habitat availability, habitat distribution, and survival and reproduction for olive-sided flycatcher in the RSA relative to historical conditions. However, olive-sided flycatcher habitat does not appear to be limiting even though it is patchily distributed in the RSA at Base Case. Olive-sided flycatchers are well adapted to highly fragmented landscapes and some disturbances can increase habitat by providing edge habitat (McGarigal and McComb 1995). The olive-sided flycatcher is designated as Threatened in Canada (COSEWIC 2007b) and under Schedule 1 of SARA (Government of Canada 2002). The short-term population objective for olive-sided flycatcher is to halt the decline in Canada by 2025, while ensuring the population does not decrease more than 10% over this time (Environment Canada 2016b). Despite declining population trends, olive-sided flycatchers are considered common throughout the species' range and the Canadian population is estimated to be approximately 900,000 individuals (Environment Canada 2016b). Moreover, Environment Canada (2016b) states that "there are currently adequate numbers of individuals to sustain the species in Canada or increase its abundance with the implementation of proper conservation actions." As such, olive-sided flycatcher populations that overlap the RSA at Base Case are predicted to be self-sustaining and ecologically effective.

The incremental changes to habitat availability and distribution, and survival and reproduction from the Project are predicted to be within the resilience and adaptability limits of this criterion because most of its potential breeding habitat (i.e., over 96% at the RSA scale) would remain unchanged, and the reduction in carrying capacity by six individuals should have no ecological measurable effect on the population(s). Mitigation such as spanning areas of compatible vegetation and selective vegetation clearing in the Project ROW will avoid and limit effects to olive-sided flycatcher populations that overlap the RSA. The combined evidence indicates that olive-sided flycatcher populations will continue to be self-sustaining and ecologically effective in the Project Case, relative to the Base Case. Consequently, effects from the Project and previous and existing developments on olive-sided flycatcher populations that overlap the RSA are predicted to be not significant (Table 42).

7.7.2 Reasonably Foreseeable Development Case (RFD Case)

7.7.2.1 Habitat Availability

The Project and the Wataynikaneyap Phase 2 Project are predicted to remove 445 ha of potential suitable habitat, which is 3.4% of suitable habitat present in the RSA at Base Case (Table 43). This is an overestimate of habitat loss as the Project limits of work was used in the habitat model; the limits of work is anticipated to be approximately nine times larger than the anticipated Project ROW.

Forestry and fire suppression activities in the RSA will continue to have positive and negative effects on olive-sided flycatcher habitat. Selective harvesting will likely continue to create habitat that is attractive to this species; however, there has been a recent downturn in the forest sector, which has resulted in reduced harvesting and renewal levels (MNR 2012). Fire suppression will continue to limit the creation of high quality post-burn habitat favoured by olive-sided flycatcher (Environment Canada 2016b). Fire suppression has also generally resulted in older, broad-leaved-dominated forests replacing the conifer-dominated forest historically present in the RSA (Carleton 2001). Climate change may exacerbate this latter scenario because longer summers favour the persistence of broad-leaved species and limits invasion of poplar stands by conifers (Carleton 2001). Over the long term, reduced forestry activity combined with fire suppression activities and climate change could result in a shift to artificially old, broad-leaved forests (MNR 2012). The effect of this shift will not likely be favourable for

olive-sided flycatcher because the species prefers open coniferous or mixed-coniferous stands (Altman and Sallabanks 2012).

Sensory disturbance from RFDs would reduce the quality of breeding habitat adjacent to developments.

Table 43: Changes to Olive-Sided Flycatcher Habitat Availability in the Regional Study Area at RFD Case

Habitat Suitability	Base Case [ha]	RFD Case [ha]	Change in Area[a] [ha]	Percent Change [%]
Moderate to High	13,068	12,622	-445	-3.4
Nil to Low	101,152	101,598	445	0.4

a) Changes in habitat area result from a conversion of moderate to high suitability habitat to lower suitability habitats (i.e., nil to low).

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

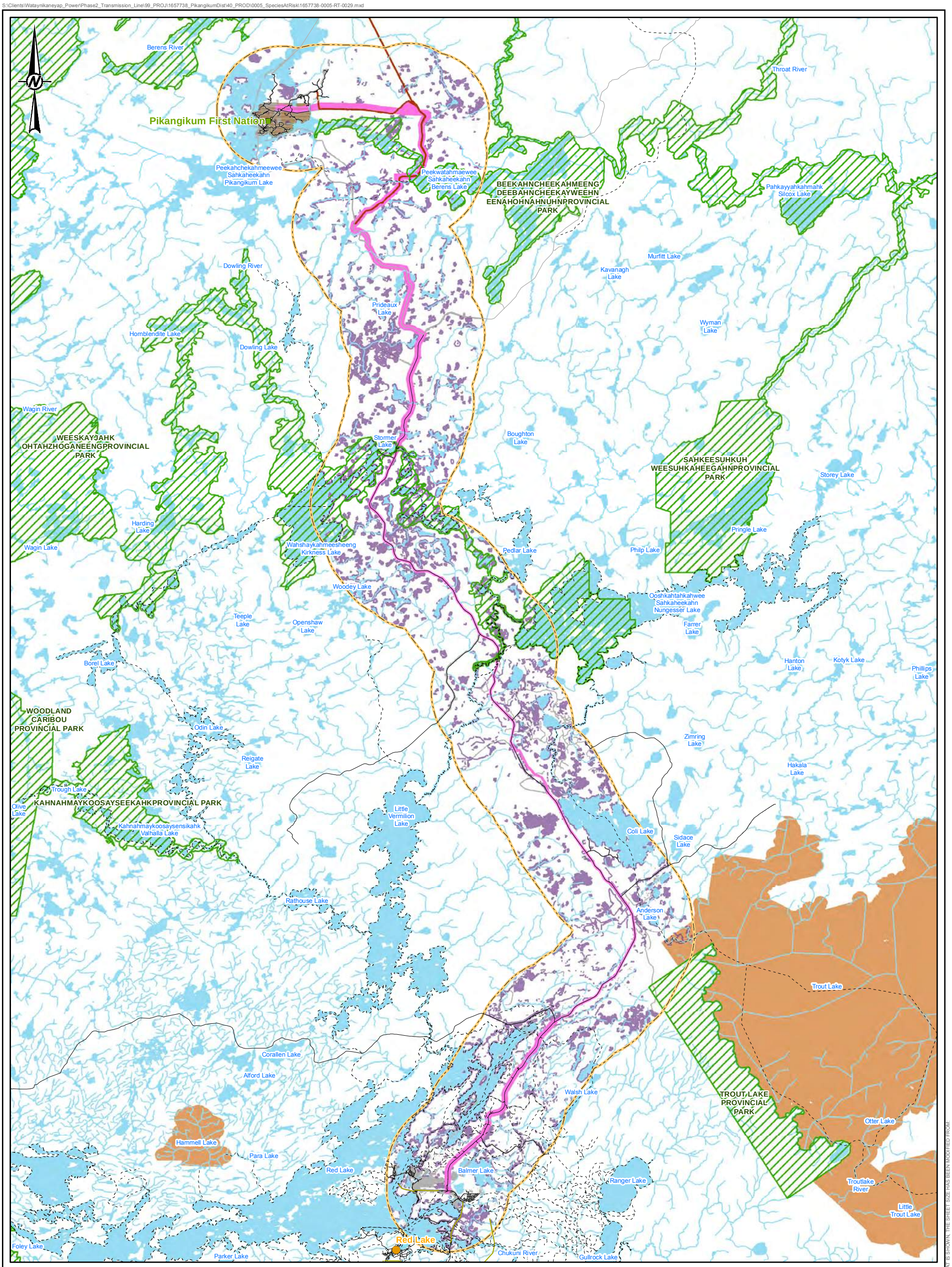
Note: The percent change is calculated using the total amount of moderate to high or nil to low habitat available at Base Case; percent change is not relative to the size of the study area.

ha = hectare; % = percent; RFD = reasonably foreseeable development.

7.7.2.2 Habitat Distribution

Reasonably foreseeable developments including the Project are not likely to result in a large reduction in habitat connectivity for olive-sided flycatcher in the RSA. Habitat is similarly disturbed in the RFD Case and Base Case (Figures 28 and 29). There may be slight shifts in the locations and sizes of olive-sided flycatcher territories in close proximity to the Project ROW but habitat is not limiting in the RSA and these small shifts in territory location or size are not anticipated to have measurable ecological effects at the population level. Additionally, olive-sided flycatchers are highly mobile and are therefore predicted to continue to fly directly over or around new developments while searching for suitable nesting sites. Consequently, olive-sided flycatcher habitat connectivity through the RSA should be preserved in the RFD Case and flycatcher populations that overlap with the RSA are expected to continue inter-breeding within the remaining suitable habitat in the RSA.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area
- Base Case Disturbance
- RFD Case Disturbance
- Olive-sided Flycatcher Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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0 5 10
1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
OLIVE-SIDED FLYCATCHER HABITAT IN THE REGIONAL STUDY AREA AT RESONABLY FORESEEABLE DEVELOPMENT CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	29

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
25mm
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7.7.2.3 Survival and Reproduction

Reasonably foreseeable developments including the Project may adversely affect olive-sided flycatcher survival and reproduction in the RSA by removing habitat and increasing sensory disturbance. Sensory disturbance has been shown to result in reduced abundance and pairing success for some songbird species (Bayne et al. 2008; Habib et al. 2007).

The loss of suitable breeding habitat due to RFDs is predicted to result in a small reduction in the carrying capacity of the RSA from 156 individuals at Base Case to 150 individuals in the RFD Case (see Section 3.2.8.3 for estimation methods); no change from Project Case. This small change is unlikely to have a measurable effect on olive-sided flycatcher populations that overlap with the RSA. There is no reduction in carrying capacity from Project Case to RFD Case because the Wataynikaneyap Phase 2 Project was predicted to remove 0.01 km^2 (1 ha) of suitable habitat for olive-sided flycatcher in addition to the amount of habitat present in the limits of work at Project Case. Using OBBA data for Regions 39 and 44 there is approximately 1 olive-sided flycatcher per 0.8 $km/^2$ in the regions surrounding the RSA.

In northern Ontario, climate change is expected to alter the onset of spring and summer and the timing of insect hatches (Nituch and Bowman 2013). Insectivorous long-distance migrant species such as olive-sided flycatcher often exhibit a strong synchronization between breeding and peak food abundance, and climate change may impact this timing by creating a temporal mismatch between reproduction and optimal foraging conditions for prey (Both et al. 2009; COSEWIC 2007b). Reduced availability of insect prey is identified as a major threat in the olive-sided flycatcher recovery strategy plan, but it is not clear if climate change is the leading cause of changes in prey availability (Environment Canada 2016b).

Climate change is also predicted to increase the frequency and intensity of extreme weather events, including droughts and heavy precipitation. Increases in the frequency and intensity of storms are predicted for northern Ontario (Stewart 1990). Extreme weather events during the breeding season can result in reduced fecundity and nest success, particularly for aerial insectivores. Individuals may also be susceptible to extreme weather events outside of the breeding season. The frequency and intensity of hurricanes are predicted to increase as a result of climate change, which may negatively affect individuals during fall migration and on wintering grounds.

7.7.2.4 Characterization of RFD Case Effects

Changes to habitat availability from direct loss due to RFDs that are anticipated to be in operation for perpetuity, such as the Wataynikaneyap Phase 2 Project and the Project, will have continuous, permanent effects on olive-sided flycatchers at the regional scale (Table 44). Effects from direct loss of habitat due to forestry are expected to continuous at the regional scale and reversible in the long-term.

Effects from changes to habitat availability due to avoidance from sensory disturbance are expected to be reversible in the medium-term as all RFDs will have little sensory disturbance during operations (e.g., transmission lines) or will be of short duration (e.g., forestry harvesting). Effects will be local or regional, depending on the temporal overlap of activities in the RSA (Table 44). Changes to habitat distribution are expected to affect olive-sided flycatchers permanently or over the long-term (direct loss) or over the medium-term (sensory disturbance). Effects from changes to habitat distribution are possible to occur continuously (Table 44).

Changes to survival and reproduction from direct habitat loss and sensory disturbance are possible and occur continuously. Effects to survival and reproduction from direct habitat loss will occur at the regional scale, while effects from sensory disturbance can be local or regional, depending on temporal overlap of activities from RFDs (Table 44). Direct loss of habitat from forest harvesting and forestry roads will influence survival and reproduction (i.e., reduction in carrying capacity in the RSA) and will be reversible over the long-term. Effects to survival and reproduction associated with direct loss from permanent features such as transmission lines will not be reversible. Sensory disturbance effects on olive-sided flycatcher survival and reproduction will be reversible over the medium-term as all RFDs are either of short duration (e.g., forestry harvesting) or will have little sensory disturbance during operations (e.g., transmission lines).

Effects from changes in habitat availability and distribution due to climate change and other natural factors (e.g., declining insect populations) on olive-sided populations are predicted to be permanent, continuous, and possible to occur at the beyond regional scale. Effects from changes to habitat availability and distribution due to natural factors such as wildfire and severe storms will occur frequently over the long term at the regional to beyond regional scale (Table 44).

Table 44: Description of Effects and Significance in the RFD Case for Olive-sided Flycatcher.

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	Not Significant
		Magnitude	■ Suitable habitat is predicted to decrease by approximately 445 ha (3.4%) in the RSA from Base Case to RFD Case. ■ Magnitude depends on the influences from climate change.	
		Geographic Extent	■ Regional (direct loss and natural factors)[(a)] ■ Local to Regional (sensory disturbance)[(b)]	
		Duration/Reversibility	■ Long-term to Permanent (direct loss and alterations natural factors) ■ Medium-term (sensory disturbance)	
		Frequency	■ Continuous (sensory disturbance) ■ Frequent to Continuous (direct loss and natural factors)	
		Probability of Occurrence	■ Certain (direct loss) ■ Probable (sensory disturbance and natural factors)	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	
		Magnitude	■ Slight shifts in territory sizes or locations due to increased human disturbance ■ Magnitude depends on the influences from climate change	
		Geographic Extent	Regional[(a)]	
		Duration/Reversibility	Long-term to Permanent	
		Frequency	Frequent to Continuous	
		Probability of Occurrence	Possible	
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	
		Magnitude	■ Small reduction in productivity from habitat loss and sensory disturbance ■ Reduction in carrying capacity by 6 individuals in the RSA, compared to Base Case ■ Magnitude depends on the influences from climate change	
		Geographic Extent	■ Regional (direct loss and natural factors)[(a)] ■ Local to Regional (sensory disturbance)[(b)]	
		Duration/Reversibility	■ Long-term to Permanent (direct loss and natural factors) ■ Medium-term (sensory disturbance)	
		Frequency	■ Continuous (sensory disturbance) ■ Frequent to Continuous (direct loss and natural factors)	
		Probability of Occurrence	Possible	

Note: Natural factors include climate change and associated changes, inclement weather (e.g., storms), and wildfire.

a) Effects may be beyond regional due to climate change, other natural factors, forestry, and RFDs that occur within and beyond the RSA (i.e., the Wataynikaneyap Power Phase 2: Connecting 17 Remote First Nation Communities Project)

b) Local if no temporal overlap among activities associated with sensory disturbance; regional if temporal overlap among activities associated with sensory disturbance

ha = hectares; RSA = regional study area; RFD = reasonably foreseeable development.

7.7.2.5 Determination of Significance

Reasonably foreseeable developments including the Project are predicted to reduce habitat quantity and quality for olive-sided flycatcher in the RSA. Suitable breeding habitat is predicted to be reduced by approximately 445 ha (3.4%) in the RSA in the RFD Case relative to the Base Case. Loss of breeding habitat is not identified as a high threat for this species, while loss of nonbreeding habitat is considered a more likely limiting factor (Environment Canada 2016b).

The loss of suitable breeding habitat due to RFDs is predicted to result in a small reduction (6 individuals) in the carrying capacity of the RSA compared to the Base Case. This small change is unlikely to have a measurable effect on olive-sided flycatcher populations that overlap with the RSA. Habitat loss is assumed to be permanent because the Project and the Wataynikaneyap Phase 2 Project will operate indefinitely. Selective vegetation clearing and spanning areas of compatible vegetation are expected to limit effects from changes to habitat availability and distribution.

The loss of suitable habitat in the RFD Case is expected to be within the olive-sided flycatcher's resilience and adaptability limits because this species is adaptable to many changes in forest structure (i.e., it is not a mature or old growth forest obligate), and some types of disturbance create habitat by increasing edge. There may be slight shifts in olive-sided flycatcher territory sizes and locations to move away from areas of human disturbance (Machtans 2006). However, functional connectivity of olive-sided flycatcher populations is not anticipated to be affected by changes in habitat distribution in the RFD Case because patches of suitable habitat remain well distributed in the RSA, and olive-sided flycatchers are highly mobile and would be able to disperse to new and vacant territories.

Changes in the abundance of olive-sided flycatcher are not predicted to exceed the short-term population objective, particularly in view of the results from the Boreal Avian Monitoring Project, which found no evidence for a decline in olive-sided flycatcher density across Canada from 1997 to 2013 (Haché et al. 2014). Overall, the combined evidence on changes in habitat availability, distribution, and survival and reproduction in the RSA indicates that olive-sided flycatchers would continue to be self-sustaining and ecologically effective in the RFD Case, relative to the Base Case. Consequently, cumulative effects on olive-sided flycatcher populations that overlap the RSA are predicted to be not significant (Table 44).

7.8 Canada Warbler

7.8.1 Assessment of Project Effects (Project Case)

7.8.1.1 Habitat Availability

The limits of work contains 1,291 ha of moderate to high suitability habitat for Canada Warbler (Table 45). This is a loss of 4.4% of suitable habitat in the RSA, relative to Base Case conditions, but a conservative estimate as the limits of work used in the habitat model is approximately nine times larger than the anticipated Project ROW.

Table 45: Changes to Canada Warbler Habitat Availability in the Regional Study Area at Project Case

Habitat Suitability[a]	Base Case [ha]	Project Case [ha]	Change in Area Using the Limits of Work Footprint[a][b] [ha]	Percent Change Using the Limits of Work Footprint[b] [%]
Moderate to High	29,642	28,352	-1,291	-4.4
Nil to Low	84,578	85,868	1,291	1.5

a) Changes in habitat area result from a conversion of moderate to high suitability habitat to lower suitability habitats (i.e., nil to low).

b) The limits of work is approximately nine times larger than the anticipated Project ROW (4,355 ha for the limits of work versus 478 ha for the maximum anticipated Project ROW), but specific areas of disturbance had not been identified at the time of writing.

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

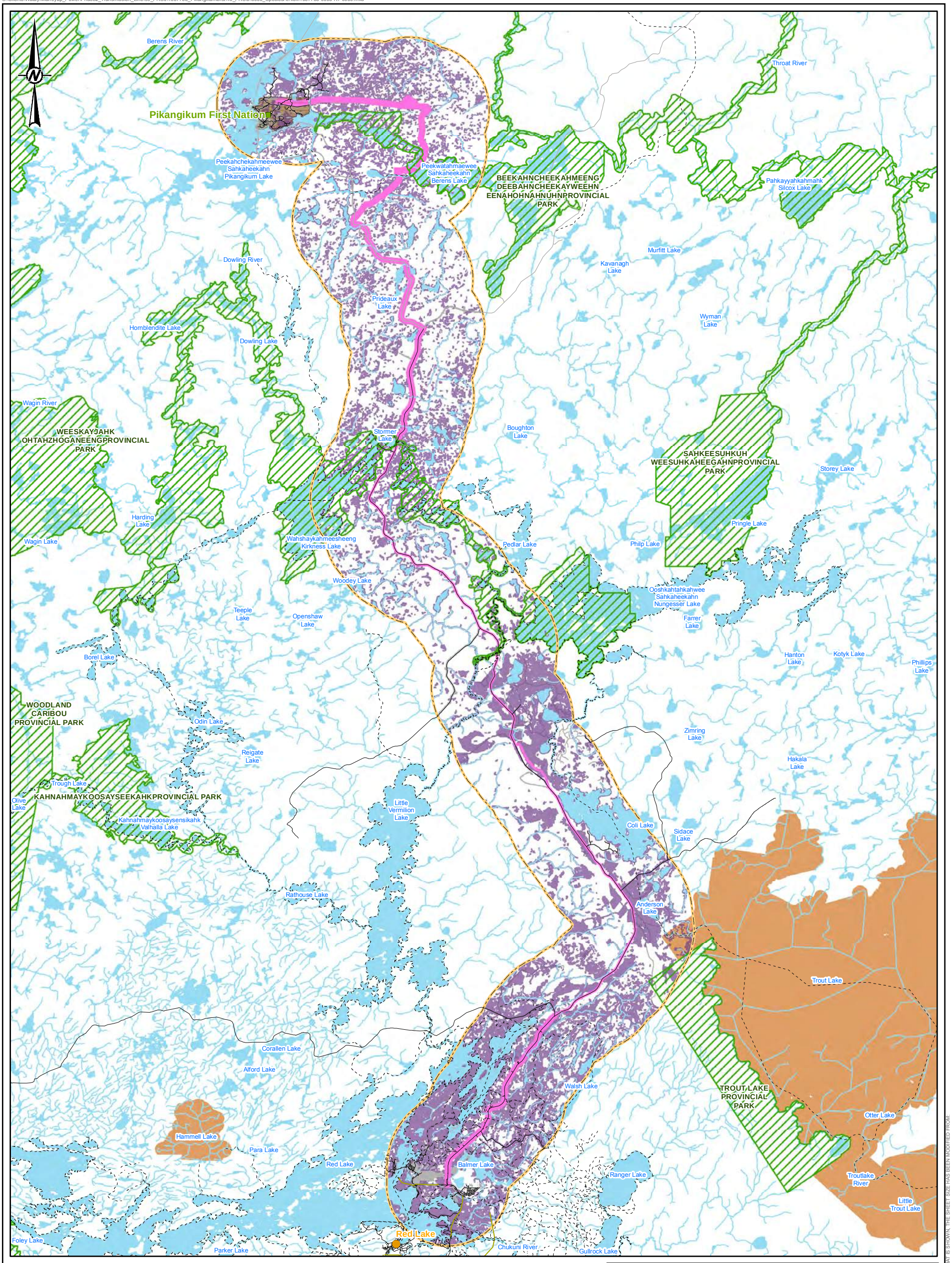
Note: The percent change is calculated using the total amount of moderate to high or nil to low habitat available at Base Case; percent change is not relative to the size of the study area.

ha = hectare; % = percent.

7.8.1.2 Habitat Distribution

Suitable habitat for Canada warbler is similarly distributed in the RSA at Base Case and Project Case (Figures 11 and 30). Some songbird species may shift their territory locations to avoid areas of human disturbance (Machtans 2006). As such, the Project may result in a slight shift in Canada warbler territory boundaries near the Project ROW. These shifts are not anticipated to be have measurable ecological effects at the population level. Additionally, Canada warblers are highly mobile and the Project ROW is not likely to be a barrier to species movements as songbirds in the boreal forest were found to cross gaps of up to 200 m (the Project ROW will be 40 m) (St. Clair et al. 1998). Based on the above information, the Project is not anticipated to result in a measurable change to Canada warbler habitat distribution or population connectivity in the Project Case.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area
- Base Case Disturbance
- Canada Warbler Habitat

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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1:280,000 Kilometers

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
CANADA WARBLER HABITAT IN THE REGIONAL STUDY AREA AT PROJECT CASE

CONSULTANT

YYYY-MM-DD	2017-03-21
DESIGNED	JMC
PREPARED	JMC/PR
REVIEWED	LD
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	30

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7.8.1.3 Survival and Reproduction

The loss of breeding habitat may affect reproductive success if individuals are displaced or return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or establish a territory in lower quality habitat. The loss of suitable breeding habitat due to the Project is predicted to result in a small reduction in the carrying capacity of the RSA from 148 individuals in the Base Case to 141 individuals in the Project Case (see Section 3.2.10.3 for estimation methods). This small change is unlikely to have a measurable ecological effect on Canada warbler populations that overlap with the RSA.

Sensory disturbance such as noise from construction of the Project may potentially affect reproductive success and survival in close proximity to construction activities by raising stress levels and interfering with communications (e.g., reducing ability to hear approaching predators or intraspecific vocalizations) (Ortega 2012). However, sensory disturbance will be isolated and of short duration across the limits of work due to construction being completed sequentially along the line.

The Project may also increase edge effects, such as increased nest parasitism risk. Fragmentation of forests in eastern North America has increased accessibility for brown-headed cowbirds, which prefer more open habitats (Lowther 1993). Canada warbler is considered to be particularly susceptible to parasitism by brown-headed cowbirds but little information is available (Reitsma et al. 2009). Canada warblers are susceptible to nest parasitism in areas with high cowbird densities. For example, 20% of Canada warbler nests were found to be parasitized in southern Ontario (Peck and James 1983) where cowbird densities are around 10 cowbirds per km^2 (Cadman et al. 2007). Cowbird densities in northern Ontario are low; brown-headed cowbird density in OBBA Region 39 is 0.14 individuals/km^2, and no cowbirds were recorded in OBBA Region 44 during the second Atlas survey (Cadman et al. 2007). No brown-headed cowbirds were observed during field surveys in the baseline study area. As such, nest parasitism related to the Project is unlikely to pose a measurable effect to Canada warbler reproductive success. Increases in edge habitat are anticipated to have negligible effects on Canada warblers as this species is an interior forest breeder and is not commonly found in edge habitat (Lambert and Faccio 2005).

7.8.1.4 Characterization of Net Effects

Changes to habitat availability and distribution from direct habitat loss and fragmentation are predicted to have continuous, permanent effects on Canada warbler populations that overlap the RSA (Table 46). Effects from changes to habitat availability are certain, while effects from changes to habitat distribution are probable. Effects from changes to habitat availability and distribution will occur at the local scale. Effects from changes to habitat availability due to sensory disturbance are considered to be probable to occur continuously at the local scale. Effects will be reversible in the medium-term (i.e., likely within a few months after construction is complete) (Table 46).

Changes to Canada warbler survival and reproduction from reductions in carrying capacity and sensory disturbance are anticipated to possibly affect Canada warbler populations continuously at the local scale (Table 46). Effects from direct habitat loss are not reversible (i.e., permanent) and effects from changes due to sensory disturbance will be reversible in the medium-term. Effects from changes from increased nest parasitism risk are possible to occur permanently and continuously at the local scale.

Table 46: Description of Effects and Significance in the Project Case for Canada Warbler

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	Not Significant
		Magnitude	■ Direct loss of approximately 1,291 ha (4.4%) of suitable nesting habitat of RSA Base Case ■ Potential avoidance of nesting habitat in close proximity to construction activities due to sensory disturbance	
		Geographic Extent	Local	
		Duration/Reversibility	■ Permanent (direct loss) ■ Medium-term (sensory disturbance)	
		Frequency	Continuous	
		Probability of Occurrence	■ Certain (direct loss) ■ Probable (sensory disturbance)	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	
		Magnitude	Slight shifts in territory sizes or locations due to increased human disturbance	
		Geographic Extent	Local	
		Duration/Reversibility	Permanent	
		Frequency	Continuous	
		Probability of Occurrence	Probable	
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability ■ Vegetation clearing will result in an increase in edge habitat, which could increase nest parasitism risk for Canada warbler	Direction	Negative	
		Magnitude	■ Small reduction in productivity from habitat loss and sensory disturbance ■ Reduction in carrying capacity in the RSA by 6 individuals from Base Case ■ Small increase in nest parasitism risk	
		Geographic Extent	Local	
		Duration/Reversibility	Permanent (direct loss and nest parasitism risk) Medium-term (sensory disturbance)	
		Frequency	Continuous	
		Probability of Occurrence	Possible	

ha = hectares; RSA = regional study area.

7.8.1.5 Determination of Significance

Populations of Canada warblers that overlap the RSA are most sensitive to changes in habitat availability, accidental mortality, and changes in the availability of insect prey (Environment Canada 2016a). At Base Case, cumulative effects from these threats have likely adversely affected habitat availability, habitat distribution, and abundance of Canada warblers in the RSA. This species may have a low ability to adapt to changes because they produce a single-brood and arrive late on the breeding grounds and leave early. However, Canada warblers are highly mobile with the ability to produce many young, which increases resilience to changes in habitat availability and distribution. Despite ongoing declines, the number of individuals is currently considered to be adequate to sustain the species in Canada (Environment Canada 2016a). Additionally, habitat does not appear to be limiting for this species in the RSA and the use of early successional habitat may increase the resilience of Canada warblers to adapt to changes in habitat distribution, particularly from forestry activities. The weight of evidence suggests that Canada warbler populations that overlap the RSA are self-sustaining and ecologically effective at Base Case.

For the primary pathways influencing habitat availability, habitat distribution and survival and reproduction, the net effects are predicted to be negative and restricted to the Project footprint or limits of work, which implies that at least a portion of the population is affected during any given year, but likely not the entire population every year. The limits of work contains 1,291 ha (4.4%) of suitable Canada warbler habitat in the RSA. This is an overestimate of habitat loss as the limits of work is larger than the anticipated Project footprint (4,355 ha for the limits of work versus 478 ha for the anticipated Project ROW). Additionally, mitigation such as selective vegetation clearing and spanning areas of compatible vegetation (e.g., open and shrubby habitats) will limit effects from the Project on Canada warbler.

The loss of habitat would be experienced continuously during construction of the Project, but some of this disturbance would be temporary and functional early successional habitat would become available in six to ten years following completion of construction. Additional suitable habitat in close proximity to construction activities may be avoided by Canada warbler due to sensory disturbance.

With effective implementation of mitigation, the incremental changes to habitat availability and distribution, and survival and reproduction due to the Project are not predicted to adversely affect the resilience and adaptive capacity of populations of Canada warbler that overlap with the RSA (i.e., they are still self-sustaining and ecologically effective relative to the Base Case). Consequently, effects on Canada warbler populations in the Project Case are predicted to be not significant (Table 46).

7.8.2 Reasonably Foreseeable Development Case (RFD Case)

7.8.2.1 Habitat Availability

The Project (limits of work) and Wataynikaneyap Phase 2 Project are predicted to result in the loss of 1,303 ha (4.4%) of suitable Canada warbler breeding habitat in the RSA (Table 47). As noted, this prediction is conservative given that the limits of work is approximately nine times larger than the anticipated Project ROW. Forestry road development, forest harvesting, and construction of future transmission lines have the potential to reduce Canada warbler habitat availability in the RSA through direct habitat loss and avoidance due to sensory disturbance.

Forestry and fire suppression activities in the RSA will continue to have positive and negative effects on Canada warbler habitat. Initially forestry activities remove suitable habitat, while areas 6 to 30 years post-harvest that contained residual live trees will provide suitable habitat (Hagan et al. 1997; Hobson and Schieck 1999;

Schieck and Hobson 2000; Lambert and Faccio 2005; Hallworth et al. 2008; Environment Canada 2016a). There has been a recent downturn in the forest sector, which has resulted in reduced harvesting and renewal levels (MNR 2012). Fire suppression results in less early successional habitat, which is an important habitat for this species in the eastern portion of its range (Ball and Bayne 2014; Environment Canada 2016a). However, mature forests (>100 years) may have a dense shrub layer (Alaback 1982; McKenzie et al. 2000), which is suitable for Canada warbler. It is expected that over the long term, reduced forestry activity combined with fire suppression activities could result in a shift to artificially old forests (MNR 2012). The effect of this shift to old forests on Canada warbler is unknown and depends on the density of the shrub layer that will exist in old forests in the RSA. The OWFMS includes managing fire to meet ecological and resource objectives (MNRF 2014f), and it is expected that over the long term, outcomes of OWFMS will change habitat availability for Canada warbler differently than what might have occurred naturally.

Table 47: Changes to Canada Warbler Habitat Availability in the Regional Study Area at RFD Case

Habitat Suitability	Base Case [ha]	RFD Case [ha]	Change in Area[(a)] [ha]	Percent Change [%]
Moderate to High	29,642	28,340	-1,303	-4.4
Nil to Low	84,578	85,880	1,303	1.5

a) Changes in habitat area result from a conversion of moderate to high suitability habitat to lower suitability habitats (i.e., nil to low).

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

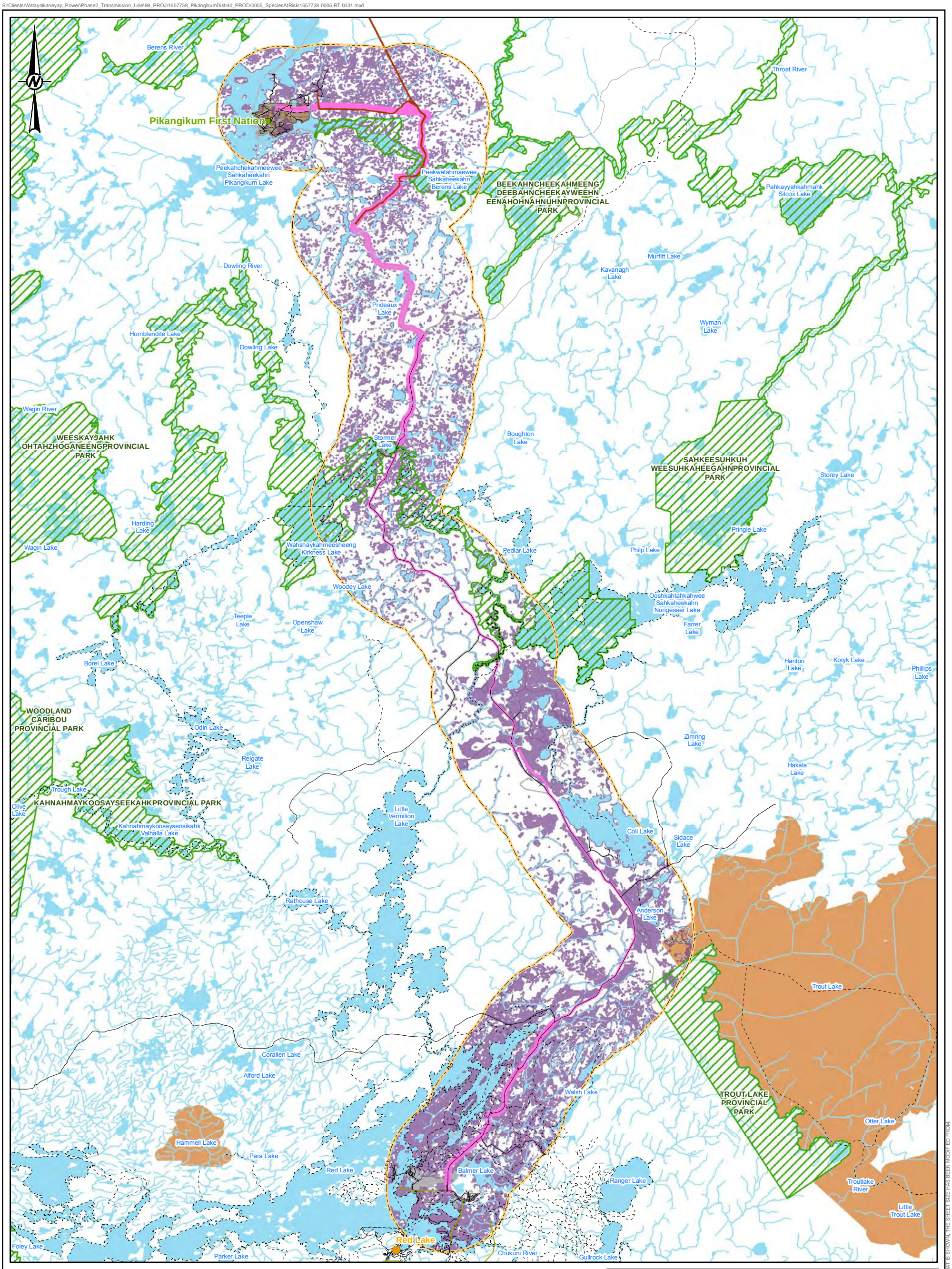
Note: The percent change is calculated using the total amount of moderate to high or nil to low habitat available at Base Case; percent change is not relative to the size of the study area.

ha = hectare; % = percent; RFD = reasonably foreseeable development.

7.8.2.2 Habitat Distribution

Reasonably foreseeable developments including the Project are not likely to result in a large reduction in habitat connectivity for Canada warbler in the RSA. Habitat in the RSA in the RFD Case is distributed similarly to the Base Case (Figure 31). There may be slight shifts in the locations and sizes of Canada warbler territories in the close proximity to the Project ROW but habitat is not limiting in the RSA and these minor shifts in territory location or size are not anticipated to have measurable ecological effects at the population level. Additionally, Canada warblers are highly mobile and are therefore predicted to continue to fly directly over or around new developments while searching for suitable nesting sites. The Project and Wataynikaneyap Phase 2 Project will have 40 m wide ROWs and songbirds have been found to cross gaps up to 200 m wide (St. Clair et al. 1998). Consequently, habitat connectivity in the RSA should be preserved in the RFD Case and Canada warbler populations that overlap with the RSA are expected to continue inter-breeding within the remaining suitable habitat.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- First Nation Reserve Land
- Waterbody
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Regional Study Area
- Base Case Disturbance
- RFD Case Disturbance
- Canada Warbler Habitat

REFERENCE(S)

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7.8.2.3 Survival and Reproduction

Reasonably foreseeable developments may negatively affect Canada warbler survival and reproduction in the RSA by removing habitat, increasing sensory disturbance, and increasing risk of nest parasitism from edge effects. Best management practices (e.g., vegetation clearing outside of the breeding season) are expected to limit effects to Canada warbler survival and reproduction.

Reasonably foreseeable developments that were quantified in the RFD Case are predicted to reduce the carrying capacity of Common warbler habitat in the RSA from 148 individuals in the Base Case to 141 individuals in the RFD Case; no change from Project Case (see Section 3.2.10.3 for estimation method). This small change is unlikely to have a measurable effect on Canada warbler populations as the change is expected to be distributed among the populations that overlap with the RSA. There is no reduction in carrying capacity from Project Case to RFD Case because the Wataynikaneyap Phase 2 Project is predicted to remove 1.2 km^2 (12 ha) of suitable Canada warbler nesting habitat, additional to the habitat that is present in the limits of work at Project Case. According to data in the OBBA Regions 39 and 44; there is 1 Canada warbler per 2 km^2 in the regions surrounding the RSA.

Canada warblers may be less sensitive to increased nest parasitism risk due to increased edge from RFDs because they are interior forest nesters. However, habitat availability will be decreased with increased edge and changes to habitat availability are considered the largest threat to Canada warbler populations (Environment Canada 2016a). The loss of breeding habitat may affect reproductive success if individuals are displaced or return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or establish a territory in lower quality habitat.

In northern Ontario, climate change is expected to alter the onset of spring and summer. Spring and summer are expected to begin earlier and the growing season is expected to increase by 41 to 61 days by the 2050s (Stewart 1990). These changes are likely to have a positive effect on Canada warbler because this species is one of the last warbler species to arrive on breeding grounds (COSEWIC 2008). A longer growing season may allow for Canada warblers to raise more than one clutch per year, which is currently not possible with the timing of this species' migration patterns (COSEWIC 2008). However, climate change is also predicted to increase the frequency and intensity of extreme weather events, including droughts and heavy precipitation. Extreme weather events during the breeding season can result in reduced fecundity and nest success. Individuals may also be susceptible to extreme weather events outside of the breeding season. The frequency and intensity of hurricanes are predicted to increase as a result of climate change, which may negatively affect individuals during fall migration and on wintering grounds.

Warmer and drier conditions in Ontario due to climate change may alter the onset of spring and summer and the timing of insect hatches (Nituch and Bowman 2013). Insectivorous long-distance migrant species such as Canada warblers often exhibit a strong synchronization between breeding and peak food abundance, and climate change may impact this timing by creating a temporal mismatch between reproduction and optimal foraging conditions for prey (Both et al. 2009; COSEWIC 2008). However, confidence in the potential effects of climate change is low because predictions are based on simulations that can be highly variable.

7.8.2.4 Characterization of RFD Case Effects

Changes to habitat availability from direct loss due to RFDs that are anticipated to be in operation for perpetuity, such as the Wataynikaneyap Phase 2 Project, will have continuous, permanent effects on Canada warbler populations that overlap the RSA (regional scale) (Table 48). Effects from direct loss of habitat due to forestry are expected to continuous at the regional scale and reversible in the long-term.

Effects from changes to habitat availability due to sensory disturbance are expected to be reversible in the medium-term as all RFDs will have little activity during operations (e.g., transmission lines) or will be of short duration (e.g., forestry harvesting) (Table 48). Effects will be local or regional, depending on the temporal overlap of activities in the RSA.

Changes to habitat distribution are expected to affect Canada warblers permanently (e.g., transmission lines) or over the long-term (e.g., forestry). Effects from changes to habitat distribution are possible to occur continuously (Table 48).

Changes to survival and reproduction from direct habitat loss and sensory disturbance are possible and will likely occur continuously (Table 48). Effects to survival and reproduction from direct habitat loss will occur at the regional scale, while effects from sensory disturbance can be local or regional. Direct habitat loss from forest harvesting and forestry roads will influence survival and reproduction and should be reversible over the long-term. Effects from direct habitat loss from permanent features such as transmission lines will not be reversible (i.e., permanent). Sensory disturbance effects to survival and reproduction will be reversible over the medium-term as all RFDs are either of short duration (e.g., forestry harvesting) or will have little sensory disturbance during operations (e.g., transmission lines).

Effects from changes in habitat availability and distribution due to climate change and other natural factors (e.g., declining insect populations) on Canada warbler populations are predicted to be permanent, continuous, and possible to occur at the beyond regional scale. Effects from changes to habitat availability and distribution due to natural factors such as wildfire and severe storms will occur frequently over the long term at the regional to beyond regional scale (Table 48).

Table 48: Description of Effects and Significance in the RFD Case for Canada Warbler

Indicators	Effect Pathway	Characteristic	Rating/Effect Size	Significance Determination
Habitat Availability	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability	Direction	Negative	Not Significant
		Magnitude	■ Suitable habitat will decrease by 1,303 ha (4.4%) in the RSA from Base Case to RFD Case ■ Magnitude depends on the influences from climate change	
		Geographic Extent	■ Regional (direct loss and natural factors)[(a)] ■ Local to Regional (sensory disturbance)[(b)]	
		Duration/Reversibility	■ Long-term to Permanent (direct loss and natural factors) ■ Medium-term (sensory disturbance)	
		Frequency	■ Continuous (sensory disturbance) ■ Frequent to Continuous (direct loss and natural factors)	
		Probability of Occurrence	Probable	
Habitat Distribution	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, dust, human activity, corona-related noise and light emissions, viewscape) can change wildlife habitat availability, which can lead to changes in wildlife abundance and distribution	Direction	Negative	
		Magnitude	■ Slight shifts in territory sizes or locations due to increased human disturbance ■ Magnitude depends on the influences from climate change	
		Geographic Extent	Regional[(a)]	
		Duration/Reversibility	Long-term to Permanent	
		Frequency	Frequent to Continuous	
		Probability of Occurrence	Possible	
Survival/Reproduction	■ Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution ■ Sensory disturbance (lights, smells, noise, corona related noise and light emissions, dust, human activity, viewscape) can change wildlife habitat availability ■ Vegetation clearing will result in an increase in edge habitat, which could increase nest parasitism risk for Canada warbler	Direction	Negative	
		Magnitude	■ Small reduction in productivity from habitat loss and sensory disturbance ■ Reduction in carrying capacity by 6 individuals in the RSA, compared to Base Case ■ Small increase in nest parasitism risk ■ Magnitude depends on the influences from climate change	
		Geographic Extent	■ Regional (direct loss and nest parasitism risk)[(a)] ■ Local to Regional (sensory disturbance)[(b)]	
		Duration/Reversibility	■ Long-term to Permanent (direct loss, natural factors, and nest parasitism risk) ■ Medium-term (sensory disturbance)	
		Frequency	■ Continuous (sensory disturbance and nest parasitism risk) ■ Frequent to Continuous (direct loss and natural factors)	
		Probability of Occurrence	Possible	

Note: Natural factors include climate change and associated changes, inclement weather (e.g., storms), and wildfire.

a) Effects may be beyond regional due to climate change, other natural factors, forestry, and RFDs that occur within and beyond the RSA (i.e., the Wataynikaneyap Power Phase 2: Connecting 17 Remote First Nation Communities Project)

b) Local if no temporal overlap among activities associated with sensory disturbance; regional if temporal overlap among activities associated with sensory disturbance

ha = hectares; RSA = regional study area; RFD = reasonably foreseeable development.

7.8.2.5 Determination of Significance

In the RFD Case, approximately 1,303 ha (4.4%) of suitable Canada warbler habitat in the RSA will be lost, relative to Base Case conditions. Forestry is predicted to further reduce habitat availability for this species until areas are at least six years post-harvest. Fire suppression activities may increase Canada warbler habitat if old forests have a dense shrub layer. The Project combined with RFDs has the potential to result in local changes in habitat connectivity, but not throughout the RSA. Reasonably foreseeable developments may also result in local changes to Canada warbler survival and reproduction in the RSA; however, it is assumed that the RFDs will implement mitigations that avoid, limit or offset effects.

Climate change will likely alter habitat availability, habitat distribution and survival and reproduction of Canada warbler in the RFD Case. However, the effects were not quantified in this assessment and there is a large amount uncertainty regarding the potential effects of climate change because predictions are based on simulations that can be highly variable and many scenarios are possible.

Overall, available evidence indicates that the cumulative effects from the Project and other past, present and reasonably foreseeable developments should not have an adverse influence on the resilience and adaptive capacity of Canada warbler populations that overlap the RSA (i.e., populations remain self-sustaining and ecologically effective, relative to the Base Case). Consequently, cumulative effects on Canada warbler in the RFD Case are predicted to be not significant (Table 48).

8.0 PREDICTION CONFIDENCE IN THE ASSESSMENT

Prediction confidence refers to the degree of certainty in the net effects predictions and associated determination of significance. The EA deals with predictions of future circumstances, and predicts interactions of the Project and other developments or activities within complex ecosystems. Scientific inference is associated with uncertainty, and prediction confidence (level of confidence in the assessment results) depends on the degree of uncertainty and how it is addressed. Primary factors affecting confidence in the predictions made in the wildlife assessment include:

- availability and accuracy of baseline data;
- accuracy of vegetation maps (Land Cover 2000 data) and wildlife habitat models;
- level of understanding of the strength of effects pathways (i.e., mechanisms) on each criterion;
- level of certainty associated with the effectiveness of proposed mitigation; and
- level of understanding of the cumulative drivers of change in measurement indicators and associated effects on assessment endpoints (e.g., climate change).

The level of certainty is considered during the effects assessment, and how uncertainty was addressed to increase the level of confidence so that net effects will not be worse than predicted, such as building conservatism into the analysis and assessment. Uncertainty in the assessment was managed by:

- conducting quality assurance and control on baseline data;
- reviewing regional information such as FMPs and caribou IRAs;
- using the limits of work (4,355 ha) as the Project footprint due to the uncertainty of the final corridor routing;
- acquiring local and regional data from provincial government departments to understand ecological relationships relevant to potential pathways, and inform the assessment;
- using the best available land cover data across the RSAs;
- using data to make inferences about ecological interactions and mechanisms of change; and
- comparing assessment results to relevant published literature.

Remaining uncertainty was primarily addressed by making assumptions that overestimated rather than underestimated potential effects of the Project and RFDs (i.e., a precautionary assessment). For the purpose of this assessment the loss of wildlife habitat due to the Project and RFDs is assumed to be permanent and irreversible because the Project and Wataynikaneyap Phase 2 Project are expected to operate indefinitely. Although vegetation under the transmission conductors will be maintained at heights consistent with safety guidelines, residual low shrub and/or tree cover is expected to provide forage and movement paths for some wildlife species (e.g., wolverine and Canada warbler). The uncertainty in the location and timing of forest harvesting was also managed using conservative assumptions. For example, although no forest harvesting has been completed in the Whitefeather FMU, to date, it was assumed that forest harvesting will occur in this FMU in the RFD Case. Similarly, forest harvesting was assumed to overlap the criterion-specific RSAs at the RFD Case.

Therefore, the confidence in predictions concerning effects to wildlife from changes in habitat availability and distribution due to the Project is moderate to high.

There is likely low accuracy of the Land Cover 2000 data as this dataset does not represent current conditions on the landscape (e.g., Land Cover data were collected in 2000). For wildlife, the uncertainty is managed by completing the assessment using habitat models that combine ecosites into broad-scale categories of moderate to high and negligible to low habitat suitability. Therefore, predicted effects to wildlife from the incremental and cumulative changes of the Project and other developments have a moderate level of confidence.

Although climate change models predict an increase in average global temperatures in the Project Case and the RFD Case, the effect of these changes on ecosystem processes is uncertain (Deser et al. 2010; Walther 2010). Predicting how an ecosystem or an individual species will cope with climate change is difficult and many scenarios are possible (Dawson et al. 2011). Boreal tree species (e.g., black spruce, Jack pine, white spruce, balsam fir and trembling aspen) are predicted to migrate northwards; however, because trees are long-lived species with slow migration rates some trees are likely to have decreasing adaptive capacity to unfavourable climate conditions making them susceptible to mortality (Canadian Council of Forest Ministers 2010). Changes in water levels and flows are uncertain, and may result in negative or positive effects to wildlife. An increase in wildfire is predicted with climate change. The number, frequency, and severity of wildfires in many parts of the world have increased from 1960 to 2013 (Bladon et al. 2014). Climate change and fire suppression practices are thought to be the largest contributors to the trend. A recent prediction for Canada indicates the potential for a 74% to 118% increase in average burn area by the end of this century (Flannigan et al. 2005). Fire alters many components of the environment including air quality, water quality, soil characteristics, vegetation cover, and hydrological processes.

For most species, climate change will have both positive and negative effects on habitat availability, habitat distribution and survival and reproduction (Nituch and Bowman 2013). For example, climate change is expected to alter the onset of spring and summer. Spring and summer are expected to begin earlier and the growing season is expected to last longer (Stewart 1990). These changes may provide migratory birds with opportunities to produce second broods or re-nest if the first attempt fails. However, climate change is also predicted to increase the frequency and intensity of extreme weather events which can result in reduced fecundity and nest success for many bird species (Conrey et al. 2016; George et al. 1992). As expected, there is a low level of confidence in predicted effects from climate change to wildlife. However, where there was ambiguity in the response of a species to climate change, the assessment considered a precautionary outcome for each criterion (i.e., adverse effect of climate change on wildlife populations in the RFD Case).

9.0 FOLLOW-UP, INSPECTION, AND MONITORING

The objectives of follow-up, inspection and monitoring programs include:

- evaluate the effectiveness of mitigation and reclamation, and modify or enhance measures as necessary through adaptive management;
- identify unanticipated potentially adverse effects, including possible accidents and malfunctions; and
- contribute to continual improvement.

Wataynikaneyap will retain an environmental monitor during clearing activities to identify incidental sensitive features (e.g., rare vegetation communities or species, bat hibernacula) that have not previously been identified within the Project footprint, if any. In the event that a sensitive feature is suspected, work will cease and the Ministry of Natural Resources and Forestry or Environment and Climate Change Canada will be contacted. Additional activities to be completed by the environmental monitor will include:

- erosion and sedimentation control measures will be monitored to avoid and minimize sediment mobilization from disturbed areas to drainages, wetlands or watercourses;
- soil piles (including topsoil) will be monitored for weeds; and
- reclamation concerns would be monitored and managed, and include soil erosion, re-vegetation and slope stability.

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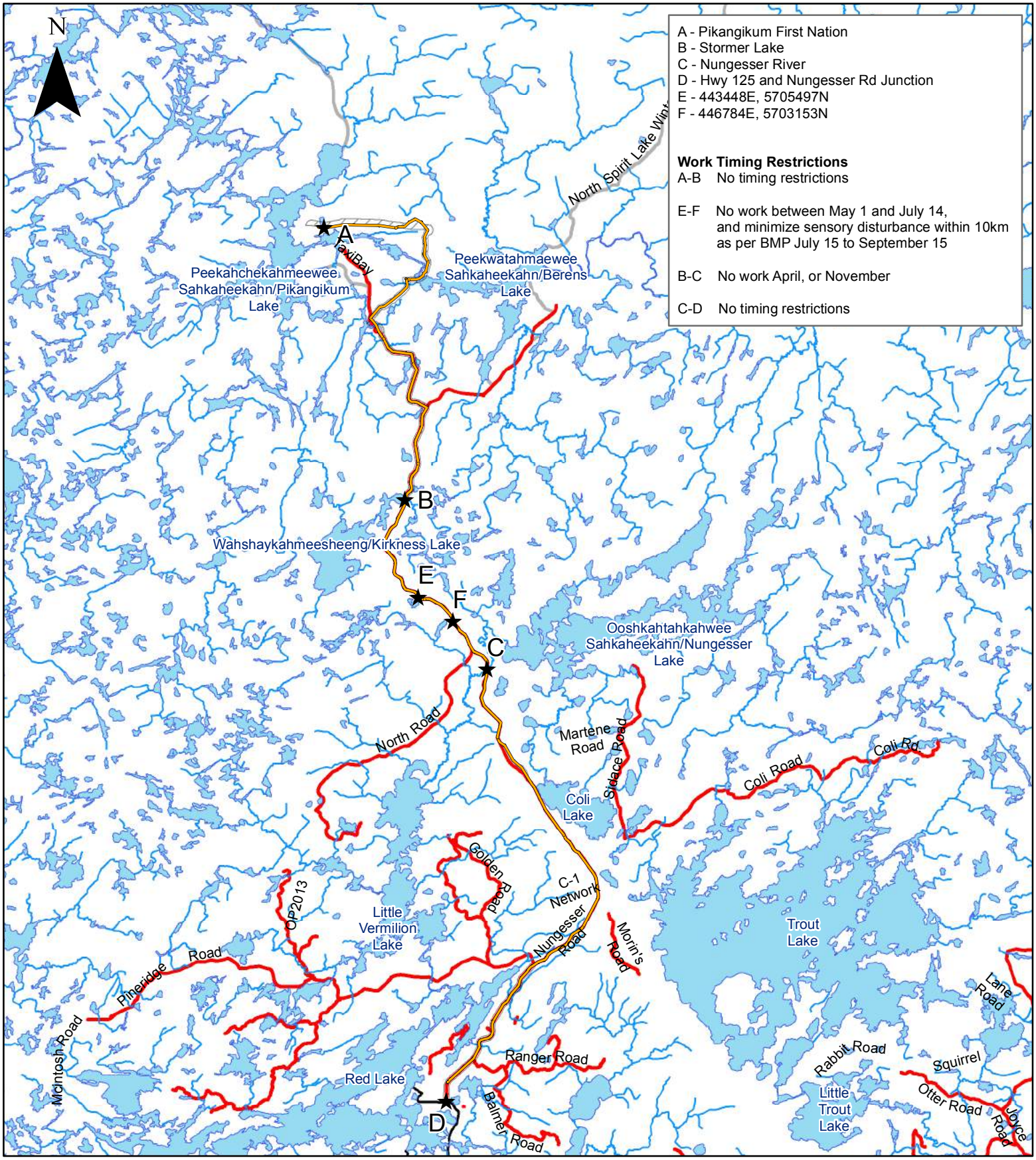
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ATTACHMENT A

Woodland Caribou Timing Restrictions Map

August 2017
Report No. 1657738



Proposed Pik Hydroline
Caribou timing restrictions

Legend

- Proposed Hydroline
- Project Limit of Work
- Waterbody
- Watercourse
- Primary roads
- Highways
- Winter roads

0 5 10 20 Kilometers

Ontario

This map is illustrative only.
Do not rely on it being a precise indicator of features, nor as a guide to navigation

Prepared by the Ministry of Natural Resources and Forestry - Red Lake District
May 25, 2017
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APPENDIX C

Aboriginal Engagement Plan

June 2017

FINAL ABORIGINAL ENGAGEMENT PLAN

Pikangikum Distribution Line Project

Submitted to:
Wataynikaneyap Power L.P.

PROJECT

Project Number: 1657738

Distribution:

1 e-copy - Wataynikaneyap Power L.P.
1 e-copy - Ministry of Natural Resources and Forestry
1 e-copy- Golder Associates Ltd.

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1.0 INTRODUCTION

Pikangikum First Nation (Pikangikum) is a remote settlement approximately 100 km north of Red Lake in Northwestern Ontario. The community has a reserve land base of 1,808 ha with no year-round road access. The community currently relies upon a diesel generating station to provide electricity to the community. It is currently operating at 94% capacity, thereby constraining future growth. This form of generation has proved over time to be unreliable; the outcomes of a system failure are inconvenient and costly. Fuel costs have increased in recent years and the resulting high cost to the community has a net effect of reducing funds available for the maintenance of other community infrastructure assets.

The Pikangikum Distribution Project (the Project) will serve to mitigate risks and costs associated with the existing generating system by providing access to more affordable and consistent electricity while providing additional power to meet future increases in electrical load, thereby supporting Pikangikum's socio-economic growth.

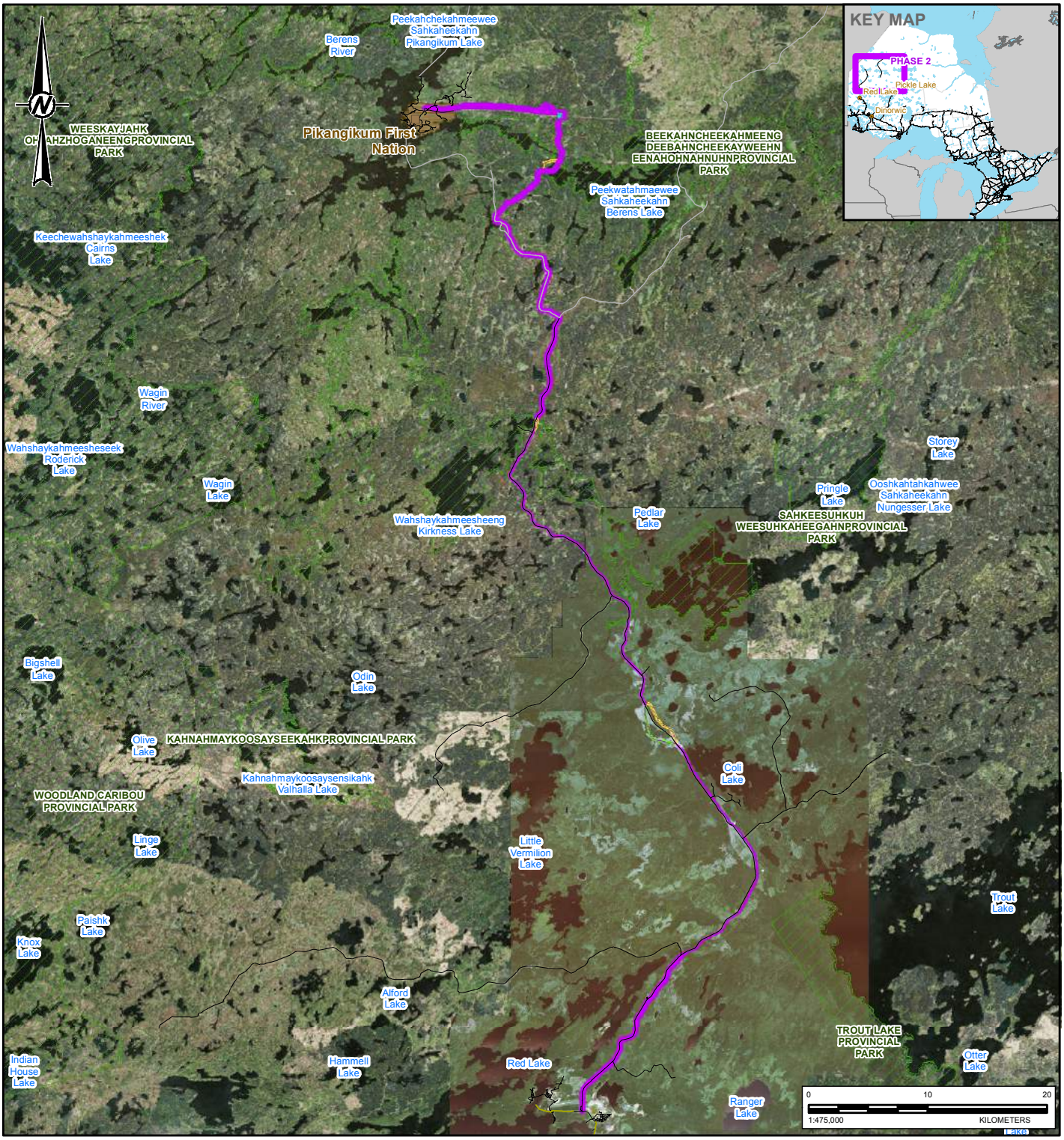
This document presents the Aboriginal Engagement Plan (AEP) for the Project. The AEP provides a description of the engagement regulatory requirements, engagement process and methods, roles and responsibilities, evaluation and ongoing engagement.

1.1 Project Proponent

Wataynikaneyap Power Limited Partnership (Wataynikaneyap) is a transmission company equally owned by 22 First Nations communities in partnership with FortisOntario. The company will develop, own, and operate new transmission facilities in Northwestern Ontario in order to connect 17 remote First Nation communities currently powered by diesel generation. On August 4, 2016, Pikangikum First Nation joined Wataynikaneyap and mandated Wataynikaneyap to develop the Pikangikum Distribution Line Project. Wataynikaneyap is the proponent for this Project.

1.2 Project Overview

Wataynikaneyap is proposing to construct, operate and maintain a 44 kV and 25 kV distribution line, the Project. The Project will provide a distribution connection between Pikangikum First Nation and an existing transmission line at Red Lake. The Project is located in northwestern Ontario (Figure 1). Connection to First Nation remote communities, including Pikangikum First Nation, is identified in Ontario's *Long-Term Energy Plan* (LTEP) (Ministry of Energy 2013).



LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Existing Electrical Transmission Line
- Major Roads and Highways
- Winter Road
- Railway
- Watercourse
- First Nation Reserve Land
- Waterbody
- Proposed Substation Area
- Pikangikum Distribution Line Corridor - Centreline
- Pikangikum Distribution Line Corridor - Limits of Work
- Pikangikum Distribution Line Corridor - Option A
- Pikangikum Distribution Line Corridor - Option B

REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P. AND SENES
3. FIRST NATION COMMUNITIES FROM INDIAN AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
4. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION PROJECT

TITLE
PIKANGIKUM DISTRIBUTION LINE CORRIDOR V1.0

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-12-14
DESIGNED	JMC
PREPARED	JMC
REVIEWED	BT
APPROVED	AE

PROJECT NO.	CONTROL	REV.	FIGURE
1657738	####	####	1

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2.0 REGULATORY REQUIREMENTS FOR ENGAGEMENT

2.1 Provincial

Ontario, as the Crown, has a legal obligation to consult with Aboriginal peoples where it contemplates decisions or actions that may adversely impact asserted or established Aboriginal or treaty rights. The duty to consult, and where appropriate accommodate, is rooted in:

- the Honour of the Crown (a legal principle that commits government to act with integrity)
- the protection of Aboriginal and treaty rights under section 35 of the Constitution Act, 1982

The Crown may delegate procedural aspects of consultation to a proponent, but the ultimate legal responsibility to meet the duty to consult lies with the Crown.

A Memorandum of Understanding (MOU) was signed on November 23, 2016 between Wataynikaneyap and the Ministry of Energy. The MOU delegates procedural aspects of consultation to Wataynikaneyap and its purpose is to clarify which rights-based Aboriginal consultation activities will be carried out respectively by the Crown and Wataynikaneyap. Consultation undertaken in the course of fulfilling environmental assessment requirements assists the Crown representatives in meeting their duty to consult with respect to rights and interests on the Project. The MOU lists the Aboriginal communities to be engaged and details the roles and responsibilities of the Crown and Wataynikaneyap in relation to rights-based consultation. These activities will also include relationship-building activities that extend beyond the procedural requirements of consultation, and will therefore be termed 'engagement'. As mentioned above, it is recognized that the ultimate responsibility for meeting any duty to consult rests with the Crown.

2.1.1 Environmental Assessments

The Project is subject to several environmental assessment (EA) processes as described below that will ensure that the potential environmental effects of the project are considered. The EA requirements will also help Wataynikaneyap to fulfill the delegated procedural aspects of the Crown's Duty to Consult, as well as guide interest-based engagement. Section 13.1 of Ontario's EAA (Part II.1, Class Environmental Assessments) states that when preparing a Class EA, the applicant shall consult with such persons as may be interested (e.g., individuals or organizations with an interest in a particular undertaking) 1996, c. 27, s. 3. Subject to Subsection (3), the proposed Class Environmental Assessments must contain a description of the process to be used by a proponent of a proposed undertaking to consult with the public and with persons who may be affected by the undertaking.

Ministry of Natural Resources and Forestry Class EA for Resource Stewardship and Facility Development

A Resource Stewardship and Facility Development (RSFD) Class Environmental Assessment (EA) was carried out for the project in 2009 and a *Statement of Completion* was issued on August 20, 2009. Since five years have passed since the *Statement of Completion* was issued, Section 5.7 of the Class EA: Proceeding with Projects – After Statement of Completion of the Ministry of Natural Resources and Forestry (MNRF) RSFD, applies. In addition, Wataynikaneyap is proposing modifications to the project which result in the application of Section 5.8: Modification to Project Files or ESRs. MNRF therefore requires a revised Project Description from Wataynikaneyap so that they can review the proposed modifications against the screening criteria in Table 3.1 of the RSFD Class EA. Once the screening is complete, MNRF will issue a revised *Notice of Completion* (Notice) (in addition to a

Notice of Completion under the PPCR Class EA) which will be posted in a local newspaper and mailed to all who earlier expressed interest in the Project. The response period for this Notice will be 30 days and will include the opportunity to submit a Part II Order request. If no request is received, the MNRF will file a *Revised Statement of Completion*.

Where a project modification raises new issues that MNRF believes may be of interest to agencies, groups or individuals that did not previously express interest, these additional parties will be contacted.

Ministry of Natural Resources and Forestry Class EA for Provincial Parks and Conservation Reserves

The Project crosses the Beekahncheekahmeeng Deebahncheekayweehn Eenahohnahnuhn (formerly Cultural Landscape Waterways) dedicated protected area (BDE-DPA) that is regulated under the Provincial Parks and Conservation Reserves Act (PPCRA); this is a new government policy since 2009 when the Statement of Completion under RSFD Class EA was filed. Therefore, the project is now subject to the requirements of the Class EA for Provincial Parks and Conservation Reserves (PPCR). There are three potential crossings of the BDE-DPA at the Nungesser River, Kirkness Creek, and Berens River. A Notice of Completion (combined with a revised Notice of Completion under RSFD Class EA) will be posted by the MNRF once the screening of the revised Project Description has been completed.

2.2 Federal

Canadian Environmental Assessment Act

The Project is not captured by the CEAA 2012 Regulations Designating Physical Activities, as the voltage of the transmission line is below 345 kV and the Project is not located within a) a wildlife area, as defined under the Wildlife Area Regulations, or b) a migratory bird sanctuary, as designated under the Migratory Bird Sanctuary Regulations.

A portion of the Project is located on Pikangikum First Nation Reserve land and, therefore, the Project is subject to Section 67 of the CEAA 2012, which states:

"An authority must not carry out a project on federal lands, or exercise any power or perform any duty or function conferred on it under any Act of Parliament other than this Act that would permit a project to be carried out, in whole or in part, on federal lands, unless:

- *the authority determines that the carrying out of the project is not likely to cause significant adverse environmental effects; or*
- *the authority determines that the carrying out of the project is likely to cause significant adverse environmental effects and the Governor in Council decides that those effects are justified in the circumstances under subsection 69(3)."*

This engagement plan will be shared with Indigenous and Northern Affairs Canada (INAC) to verify any additional engagement to meet CEAA's Section 67 requirements. .

3.0 ENGAGEMENT PLAN

Meaningful and respectful Aboriginal engagement is being undertaken for this Project to build solid relationships with First Nation communities and to improve the Project based on their input. Identifying and engaging with First Nation communities early in the process, and developing an AEP to act as a guidance document for engagement activities, are important steps in the process.

This AEP has been prepared to help Wataynikaneyap meet regulatory requirements, and to provide the foundation for an effective Aboriginal engagement program. This Plan will be used to guide the Aboriginal engagement activities undertaken by the Project team (defined as Wataynikaneyap and their EA consultant, Golder Associates Ltd. [Golder]) throughout the EA process and is prepared to meet the engagement requirements identified in Section 2.0 above.

This plan is meant to be flexible and describe an overarching engagement approach for multiple First Nations communities. The plan is considered a dynamic document that will evolve and be updated as necessary for the duration of the Project, under the control of Wataynikaneyap, and according to community-specific requirements. Where practical, Wataynikaneyap will work with individual communities to develop community-specific engagement strategies that address their issues and meet their needs.

4.0 PRINCIPLES, THEMES AND OBJECTIVES FOR ENGAGEMENT

Early and meaningful engagement with those who may be affected by or have an interest in the Project is an integral component of the EA process. To facilitate meaningful engagement and relationship-building, this engagement plan is guided by a series of principles and themes defined by Wataynikaneyap. As well, clear, explicit objectives have been defined to guide the implementation of this engagement plan.

4.1 Principles

The following principles have been identified by Wataynikaneyap as fundamental for the successful development:

Respect

Respect for the Traditional Knowledge of the Peoples. There must be an understanding that Traditional Knowledge is based on thousands of years of empirical experience on the lands, traditional laws, and thanksgiving to the Creator and Spirits. Without this depth of Traditional Knowledge, First Nations Peoples would not have survived so successfully, creating society and culture in these vast northern lands. In addition, Wataynikaneyap will respect Tribal sovereignty.

Protocols

The First Nations have their own traditional cultural and social practices, which include laws and governance protocols. They are usually delivered orally. Aboriginal Laws have been in place for generations and cannot be diminished by Treaties. Wataynikaneyap will work with communities to understand and adhere to their preferred methods of engagement respecting both written and cultural protocols when identified. Table 1 lists the publically available consultation protocols for the communities to be engaged.

Table 1: Initially Identified Community Protocols and Documentation related to Engagement of Identified Communities

Community	Community Protocol
Wabauskang First Nation	Draft Consultation and Accommodation Protocol

Preferred Languages and Dialects

Wherever possible, written and oral communication with First Nations will be in their preferred language and dialect as identified by each community.

Treaties

The Project is located in Treaty 3 and Adhesions and Treaty 5. The terms of these treaties, the implications on First Nation people and the interpretation of these documents by the First Nation peoples will need to be considered with respect to engagement and the Project. The First Nations interpretation of land use and rights may differ from the Crown's interpretation. Engagement will reflect First Nation perspectives on the land and treaty rights.

4.2 Themes

Based on an understanding of the communities and Wataynikaneyap's relationship with them, the following themes are integral to successful engagement:

- Wataynikaneyap understands that their People have Aboriginal, Treaty and Inherent rights, as well as Aboriginal Laws, customs and conventions.
- With respect to the Duty to Consult and the delegation of procedural aspects by the Crown, Wataynikaneyap will exercise due diligence in its delegated aspects. It is recognized that ultimate responsibility for meeting any Duty to Consult rests with the Crown.
- Community engagement must respect community protocols, principles, community autonomy and Traditional Knowledge.
- The communities must be involved at an early stage.
- "Ground-up" community engagement from start to finish must be open and inclusive.
- Both parties need to take responsibility in community engagement and exercise due diligence.
- Wataynikaneyap will follow joint engagement driven by First Nations designed to incorporate community needs and meet Class EA regulatory requirements.
- Engagement of First Nations with traditional lands impacted by the Project must continue through construction.
- Benefits to communities, including skills development and employment, must be meaningful.

4.3 Objectives

The Project team has identified a series of objectives specific to the Aboriginal engagement program. These objectives are based on the concepts and themes defined above, and most importantly an understanding of the needs, values and expectations of potentially affected communities and rights holders:

- engage all identified First Nation communities early in the project process and continue engagement throughout the Class EA regulatory process, as well as during construction and operation;
- seek input from First Nation communities on how they would like to participate in the engagement process;
- seek input from First Nation communities on the potential effects of the Project on their Aboriginal or Treaty Rights;
- facilitate an understanding of the EA process and how First Nation communities' input will influence the Project and the EA process;
- provide First Nation communities with transparent and easy-to-understand project information in a timely and culturally sensitive manner;
- provide opportunities for Aboriginal participants to communicate with the Project team on any issues or concerns regarding the Project;
- provide opportunities for the Project team to respond coherently and appropriately to issues and concerns, reduce or mitigate effects of the Project on Aboriginal interests; and increase benefits to First Nation communities where appropriate;
- identify and pursue First Nation community involvement in the project through community readiness and employment initiatives, where possible; and
- develop genuine relationships, built upon mutual respect and trust, with First Nation communities, throughout the project.

5.0 IDENTIFICATION OF PARTICIPANTS

In accordance with Appendix C of the MOU signed between Wataynikaneyap and the Ministry of Energy; the following three Aboriginal communities are to be consulted for the project: Pikangikum First Nation, Lac Seul First Nation and Wabauskang First Nation.

6.0 ENGAGEMENT APPROACH AND TIMELINES

6.1 Project Timeline

The estimated schedule for the Project and engagement is summarized in Table 2. Required permitting and engagement will be developed in parallel with the EA process, realizing final permit approval will not be granted until the completion of the Class EA. Construction will begin upon approval of the EA and permits.

Table 2: Estimated Project Schedule

Milestone or Key Activity	Date or Duration
Collect baseline data and information	Spring and Summer 2016
Round 1 Engagement – Scoping and Project Design	Fall 2016 and winter 2017
Submit Revised Project Description	May 2017
Round 2 Engagement – Revised Project Description	June 2017
MNRF Issues Revised Notice of Completion	June 2017
30 day Review Period	June to July 2017
Anticipated Revised Statement of Completion	August 2017
Permits Acquired	August 2017
Construction Commencement	September 2017

6.2 Engagement Approach

The following engagement approach and activities are intended to: satisfy engagement requirements of the Class EA process; execute procedural aspects of the Crown's Duty to Consult Aboriginal Peoples; and build positive relationships based on mutual trust and understanding that meet the expectations of Wataynikaneyap, First Nation communities and other Aboriginal organizations. Engagement will ultimately be undertaken to respect principles described previously. Engagement will also respect any existing community protocols (Table 1).

6.3 Engagement Activities

Two engagement rounds have been identified to allow for First Nation communities' views and concerns to be considered in Project design and the EA process.

6.3.1 Round 1: Scoping and Traditional Land and Resource Use Input

This round of engagement occurred in October and November of 2016 in conjunction with engagement for the Wataynikaneyap Phase 2: Connecting 17 Remote First Nation Communities. The focus of this engagement round was to provide information and receive feedback on:

- The Project including the project history, the proponent, and project timelines;
- Regulatory processes (including EA and permitting processes);
- The proposed routing of the transmission line;
- The community's traditional land and resource use (TLRU) values; and
- Identification of issues and concerns.

The following activities were completed during Round 1:

- **Notice** was given to communities in advance of community meetings; either by email, phone, poster, or radio show.

- **Meetings** held in Pikangikum, Wabauskang and with Lac Seul First Nation community members in Red Lake on October 26, 2016, November 16, 2016 and November 23, 2016, respectively. The meetings provided attendees an opportunity to interact with the Project team, voice their concerns or issues and ask questions about the Project and EA process; provide traditional land and resource use data and information and input into Project location and design. The meetings included presentations by Wataynikaneyap and Golder, posters, handout materials and large scale project maps to facilitate input into Project location. All meetings included the opportunity for participants to complete comment and meeting evaluation forms to provide comments on the Project, the EA and the effectiveness of the meeting. Both forms were available in English, Oji-Cree and Ojibway. Oral translation into local languages and dialects was provided when requested.
- Collection of TLRU data and information (either provided at the First Nation meetings or through separate process).
- The **Project Website (www.wataypower.ca)** contains information on the Project and EA process; and will be continually updated, as required, throughout the Class EA process with announcements, new information about the Project, the EA and engagement events.
- **Email** communication may be used as an efficient method of communication to respond to questions or concerns, discuss logistics for engagement activities and to supplement other engagement activities.

6.3.2 Round 2: Revised Project Description

This round of engagement is scheduled to occur in April to June 2017 to present and solicit comments on the revised Project Description. The focus of this engagement will be with the three (3) First Nation communities.

6.3.2.1 Community Meetings

The following activities associated with the community meetings will be completed:

- **Invitations** will be sent to communities to attend community meetings. Community meeting notices will be sent to and posted in communities.
- The **meetings** will provide attendees an opportunity to interact with the Project team, provide comments on the results of the effects assessment and to voice their concerns or issues. All meeting attendees were provided with the opportunity to complete evaluation and comment forms. Translation into local languages and dialects was provided when requested.
- The **Project Website (www.wataypower.ca)** will be updated to include the revised Project Description and engagement events notices.
- **Email** communication may be used as an efficient method of communication to respond to questions or concerns, discuss logistics for engagement activities and to supplement other engagement activities.

6.3.2.2 Revised Notice of Completion / Notice of Completion

Following community meetings, and any revisions to the updated Project Description, a **Revised Notice of Completion for the MNRF RSFD Class EA** and a **Notice of Completion for the PPCR Class EA** will be issued by the MNRF in the local newspaper and mailed to all who have expressed an earlier interest in the Project. The Notices will include: a description of proposed changes to the project, reasons for the changes, any changes to

the predicted environmental effects, and a contact name should somebody want to request a copy of the Updated Project Description. The Notices will allow 30 days to provide comments.

6.4 Materials

Plain language written materials will be developed for engagement. This material will be made available at face-to-face activities and on the Project website. The Project team acknowledges that the technical details relating to the proposed Project may be unfamiliar to some people. Effective and transparent communication will require descriptions of the proposed Project and its implications that are absent of technical jargon. Care will be taken so that materials are provided at an appropriate level of detail. Select members of the Project team, including EA and/or environmental specialists and engagement facilitators, will also be available at all meetings to further explain technical matters relating to the Project and respond to questions and concerns. Materials will include a combination of:

- Presentations;
- Poster boards;
- Project maps, including transmission corridor tile maps;
- Hard copy draft Revised Project Description;
- List of potential provincial, federal and municipal permits and authorizations;
- Comment and evaluation forms; and
- Sign-in sheets, with opportunity to provide contact details to receive further information from Wataynikaneyap.

6.5 Consideration of Identified Concerns and Reporting

Integrating the results of Aboriginal engagement with the requirements of the Class EAs is very important for achieving the goals of the EA (e.g., designing a Project that is acceptable to the proponent and interested and/or affected persons).

All comments and concerns will be considered in the development of the updated PD and will become part of the public record in the Record of Aboriginal Engagement.

The purpose of integrating the results of engagement into Project technical work is threefold:

- to reassure participants that their input is valued and has influenced the analysis and choices made by the Project team;
- to determine that relevant legislation and policies administered by government agencies are considered; and
- to demonstrate to participants the value of the Class EA process.

The engagement activities described above will be responsive to community concerns and issues. Key issues, questions and comments will be collected using comment forms, written notes, and email throughout all engagement activities, and documented in an issues tracking database. A two-way internal communication process will be followed in which the Wataynikaneyap engagement team supported by Golder, will work as the

liaison between First Nation communities, or their representatives, and Wataynikaneyap. This two-way communication process will facilitate the integration of engagement input into technical work and the integration of technical input into engagement materials and activities.

Participants who have provided feedback to the Project team will receive a response to their comments in one of the following ways:

1) Participants who comment at scheduled meetings will either:

   - receive a response at these engagement activities; or
   - will be informed that a response to their comment/question will become part of the public record in the Record of Aboriginal Engagement; or

2) Participants who provide comments in writing will receive a written response to their question where contact information has been provided.

If Wataynikaneyap and Aboriginal peoples identify that specific issues warrant further attention, additional engagement activities/events may be scheduled, as required.

Any potential effects to Aboriginal rights and interests identified during engagement will be considered in the Project design to avoid the potential effect where possible. If avoidance is not possible, potential effects to Aboriginal rights and interests will be assessed, and mitigation measures will be identified to reduce or eliminate effects. These will be documented in the updated PD. Where significant net effects are identified subsequent to mitigation measures, accommodation will be considered in consultation with the Crown.

6.6 Ongoing Engagement

The Project team understands that Aboriginal engagement and communication does not end when the EA process is completed. Should the Class EA be approved, ongoing discussions with First Nation communities, traditional land-based rights holders, and other Aboriginal groups will continue. Following the completion of the Class EA additional engagement may be required during project implementation for provincial permits or authorizations that were not explicitly consulted on during the EA engagement process. Additional engagement may also be warranted during initiation of the Project construction and/or operation and maintenance phases. The form and schedule of these activities will be dependent on the timing and terms of any approvals or agreements.

7.0 ROLES AND RESPONSIBILITIES

Aboriginal people have constitutional rights and must be consulted by the Crown[1] about their rights and interests. Consultation is the Duty of the Crown; however Wataynikaneyap as the proponent of the Project is committed to undertaking engagement with First Nation communities and other Aboriginal groups to fulfil procedural aspects of this duty. Wataynikaneyap, as a First Nation owned company understands, acknowledges and respects the inherent rights of First Nation communities. Wataynikaneyap is open to discussing the potential effects of the Project on Aboriginal and Treaty Rights, as identified by the First Nation communities. The Memorandum of Understanding signed between Wataynikaneyap and the Ministry of Energy in November 2016 regarding Aboriginal Community consultation for the Project outlines the roles and responsibilities of the Crown and Wataynikaneyap. Section 3.1 of the MOU states that *Wataynikaneyap is responsible for*:

a) *preparing and executing a Consultation Plan [this Engagement Plan] for the Project in accordance with Section 5 of the* MOU;

b) *providing the Aboriginal Communities with timely notice of the Project for the purposes of considering possible impacts on their Rights Under Section 35 of the Constitution Act (Section 35);*

c) *providing Aboriginal Communities with information about the Project and the role that Wataynikaneyap will play in Crown consultation on the Project;*

d) *following up on the notice and provision of information in paragraphs (b) and (c) immediately above, if Wataynikaneyap has not received a timely response or acknowledgement from an Aboriginal Community;*

e) *explaining to the Aboriginal Communities the regulatory and approval processes that apply to the Project;*

f) *taking reasonable steps to foster positive relationships with the Aboriginal Communities;*

g) *offering Aboriginal Communities reasonable assistance, including financial assistance where appropriate as determined by Wataynikaneyap, for the purpose of participating in consultation on the Project;*

h) *meeting with, and receiving and considering correspondence or other written materials from the Aboriginal Communities in order to identify any concerns they may have regarding the potential impact of the Project on their Rights Under Section 35;*

i) *where appropriate, discussing with the Aboriginal Communities accommodation, including mitigation and other measures to address potential adverse effects of the Project on Rights Under Section 35;*

j) *where appropriate, developing and discussing with the Crown appropriate accommodation measures;*

k) *maintaining records and providing information to the Crown in accordance with Section 4 of the MOU; and*

l) *filing documents, attending regulatory hearings, presenting records and other appropriate evidence of activities undertaken by the Crown and Wataynikaneyap to fulfill any Duty in relation to the Project, and making both written and oral submissions, as appropriate, to the regulatory entity regarding the fulfillment of any Duty.*

[1] (c) "Crown" means Her Majesty the Queen in right of Ontario.

8.0 EVALUATION

The effectiveness of the engagement process is evaluated by the Project team internally to allow for continuous improvement as a best practice measure. This process is not required to be documented under the provincial EA processes. Improvements made in the engagement process for Phase 1 and Phase 2 will also inform the approach taken for the Project, and vice versa.

Project Signature Page

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AE/KS/AB/wlm

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APPENDIX D

Stage 1 Archaeological Assessment

June 2017

STAGE 1 ARCHAEOLOGICAL ASSESSMENT

Wataynikaneyap Power L.P. Pikangikum Distribution Line Project, District of Kenora, Ontario

Submitted to:
Juan Anderson
Wataynikaneyap Power L.P.

REPORT

Licensee: Bradley Drouin, M.A., Golder Associates Ltd.

Licence: P311

PIF Number: P311-0311-2017

Report Number: 1657738

Distribution:

1 Hard Copy - Wataynikaneyap Power L.P.
1 Hard and e-Copy - Ministry of Tourism, Culture and Sport
1 e-Copy- Golder Associates Ltd.

Golder Associates

Executive Summary

The Executive Summary highlights key points from the report only; for complete information and findings, as well as the limitations, the reader should examine the complete report.

Golder Associates Ltd. (Golder) was retained by Wataynikaneyap Power L.P. (Wataynikaneyap), a partnership equally owned by 22 First Nation communities, in partnership with FortisOntario Inc. (FortisOntario) to conduct a Stage 1 archaeological assessment for Wataynikaneyap proposed Pikangikum Distribution Project (the Project), as part of an update to an existing Class Environmental Assessment required under the Ontario *Environmental Assessment Act* (1990) (EAA). Wataynikaneyap is proposing to construct, operate and maintain a 44 kV and 25 kV distribution line, the Pikangikum Distribution Project (the Project). The Project will provide a distribution connection between Pikangikum First Nation and the existing distribution system from Red Lake, Ontario. The Project is located in northwestern Ontario. The assessment local study area (LSA) varies in width from 200 m to 500 m width, which represents the limits of work for the Project. The LSA includes the distribution line right-of-way (ROW) and the substation location. The Project will connect Pikangikum to the provincial power grid. The line will originate from an existing 44 kV feeder on the Nungesser Road, approximately 2 km from its intersection with Highway 125, and travel north to Pikangikum First Nation community. There are a number of small deviations where the proposed route is adjusted to avoid a sensitive feature. Southeast of Prideaux Lake, the LSA deviates in a northeast direction of Nungesser Road and travels northward crossing the Berens River and then east to the Pikangikum First Nation community.

The Stage 1 assessment involved a review of the environmental background of the LSA, previous archaeological research work in the general vicinity of the Project, research into the pre- and post-contact cultural history, and a review of the archaeological sites database at the Ministry of Tourism, Culture and Sport (MTCS) within and in the vicinity of the LSA. Stream order data (MNRF 2016) and Ministry of Natural Resources and Forestry (MNRF) archaeological potential modelling were analysed to provide an accurate determination of archaeological potential within the LSA. The MNRF potential models were provided to Golder by MNRF on 10 April 2017. Additionally, ortho imagery was used to further refine areas of archaeological potential within the LSA.

Numerous areas within the LSA exhibit high potential for archaeological resources and are recommended for Stage 2 archaeological assessment, as indicated on Maps 10 (Tiles 1-7). Any portion of these areas recommended for Stage 2 archaeological assessment that may potentially be impacted by ground disturbance associated with Project construction activities should be assessed by a Stage 2 test pit survey strategy for northern Ontario and the Canadian Shield as described in Section 2.1.5 of the 2011 *Standards and Guidelines (S&Gs) for Consultant Archaeologists* (MTCS 2011). All remaining areas have been determined to have low archaeological potential and no archaeological survey of these areas is required.

The MTCS is requested to review and indicate their satisfaction with the results and recommendations presented herein, with regard to the 2011 *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011) and the terms and conditions for archaeological licences, and to enter this report into the Ontario Public Register of Archaeological Reports.

Project Personnel

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1.0 PROJECT CONTEXT

1.1 Development Context

Golder Associates Ltd. (Golder) was retained by Wataynikaneyap Power L.P. (Wataynikaneyap), a partnership equally owned by 22 First Nation communities, in partnership with FortisOntario Inc. (FortisOntario) to conduct a Stage 1 archaeological assessment for Wataynikaneyap proposed Pikangikum Distribution Project (the Project), as part of an update to an existing Class Environmental Assessment required under the Ontario *Environmental Assessment Act* (1990) (EAA). Wataynikaneyap is proposing to construct, operate and maintain a 44 kV and 25 kV distribution line, the Pikangikum Distribution Project (the Project). The Project will provide a distribution connection between Pikangikum First Nation and the existing distribution system from Red Lake, Ontario. The Project is located in northwestern Ontario.

The assessment local study area (LSA) varies in width from 200 m to 500 width, which represents the limits of work for the Project. The LSA includes the distribution line right-of-way (ROW) and the substation location. The Project will connect Pikangikum to the provincial power grid. The line will originate from an existing 44kV feeder on the Nungesser Road, approximately 2 km from its intersection with Highway 125, and travel north to Pikangikum First Nation community. There are a number of small deviations where the proposed route is adjusted to avoid a sensitive feature. Southeast of Prideaux Lake, the LSA deviates in a northeast direction of Nungesser Road and travels northward crossing the Berens River and then east to the Pikangikum First Nation community.

1.1.1 Potential Ground Disturbance Associated with the Project

Clearing and grading, as required, will be completed along the distribution line right-of-way (ROW) and for the substation. Clearing will consist of cutting tree trunks parallel to, and within 15 centimetre (cm) of the ground or lower, as well as the removal of all shrubs, debris and other such materials. Grubbing will likely only occur at structure foundation locations, and will be required for the substation. Clearing and grading of the distribution line ROW and the substation location will take into consideration the location of known archaeological sites.

1.1.1.1 Power Lines and Associated Structures

The power line includes approximately 96.3 km of 44 kV and 17.8 km of 25 kV of overhead single circuit line and associated components. The northern approximately 91 km of the 44 kV portion of the line will be designed and built to be able to operate at 115 kV in the future should separate approvals be obtained for such higher voltage operation. Line structures will be single-pole, double-pole (H-frame), triple-pole (possible at sharp corners, water crossings, or long spans) or a combination. Poles may be wood, metal, concrete, resin, or a hybrid concrete-steel hybrid.

Subject to surveying, geotechnical analysis, preliminary design, and a land rights assessment, approximately 32 km of the southern-most section of line is expected to be constructed on single poles in and/or adjacent to the existing Nungesser Road ROW. A major portion of the power line structures and associated conductors and anchors will be installed within or adjacent to the road ROW. Any requirements for poles or anchors outside of the power line ROW will be appropriately dealt with as they occur in the field during detailed design.

1.1.1.2 Access Roads

Existing access options are relatively abundant and their utilization will be maximized in the final Project design as a means of minimizing potential Project effects. Primary access will be from Nungesser Road, the Pikangikum All Season Road, and any newly cleared portions of all-season roads that are planned to be constructed under the Whitefeather Forest Management Plan. Approved Whitefeather Forest Management Plan all-season roads or clearings will be utilized (if constructed) to access the existing utility clearing on the north side of the Berens River and the proposed substation area. An ice crossing across the Berens River may also be utilized should ice conditions permit. Approximately 0-3 km of new access apart from the Project ROW clearing are anticipated to be constructed for the Project

Substation

A distribution station (substation) is proposed to be located south of the Berens River. The location is proposed to avoid having to transport materials and equipment across the Berens River and/or along the existing utility clearing running east out of Pikangikum First Nation; and therefore reduce environmental effects to the river, and risks to the Project schedule. The substation will have an approximately 70 m x 80 m footprint.

Helicopter Landing Pad and Staging Area

A helicopter landing pad and a permanent equipment staging area may be required at the substation location. A helicopter landing pad would have a minimum area of approximately 30 m x 30 m, subject to terrain and vegetation conditions as well as aeronautical approval requirements. In total, the staging area and helicopter pad require approximately 100 m x 100 m of cleared area in addition to the substation fenced area above.

Additional Temporary Project Components

Additional temporary Project components will be required during construction, which will include the following:

- **Aggregate Sources** – subject to geotechnical and engineering analysis, substation foundations and pole foundation backfill may consist of either native soil (if deemed suitable), or contain concrete and/or aggregate. Aggregate will be sourced from either local existing facilities, or will be taken from a new hole dug near the pole foundation hole for the purposes of swapping subgrade with the pole foundation hole. Concrete will likely be sourced from supplier(s) in Red Lake, or will be brought to the site in dry format and mixed in small quantity near each foundation hole using water provided from off-site delivery trucks.
- **Construction Worker Housing** – Construction workers may be housed in existing private accommodations such as the Stormer Lake Camp owned by Pikangikum First Nation, and / or in the Municipality of Red Lake, and/or in Pikangikum First Nation.

  If necessary, temporary accommodations may be established and separately permitted by the selected constructor. Should this be the case, the following activities are assumed:

  - Power source is anticipated to be a portable diesel generating station;
  - Water will be sourced from either off-site delivery trucks or separately permitted local source; and
  - All liquid and solid waste will be appropriately stored onsite and transported to facilities licensed to dispose of the waste. There will be no discharge of liquid waste from the temporary accommodation unless separately permitted and approved.

All applicable permits and approvals will be acquired for any temporary accommodation, should it be required.

- **Laydown Areas** – apart from the substation area, temporary laydown areas for the storage of materials and equipment will be located on existing cleared areas within the limits of work, or areas reachable by existing roads originating within the limits of work, with appropriate set back distances from sensitive environmental features.
- **Watercourse Crossing** – It is anticipated that there will not be a requirement for new watercourse crossings for Project construction as the ROW follows existing and planned roads or existing ROW area. If the planned Whitefeather Forest Management Plan roads are not constructed prior to construction timing of the Project, or the Whitefeather Forest Community Resource Management Authority is unable to construct the roads in accordance with their approvals; there may be a requirement for new watercourse crossings. If required, mitigation measures including minimizing removal of bank stabilizing vegetation where possible, will be employed during construction of the watercourse crossings considering Ministry of Natural Resources Environmental Guideline for Access Roads and Water Crossings (MNR 1990).
- **Refueling Areas** – refuelling areas will be located in the Municipality of Red Lake, the Pikangikum First Nation community, or other private facility unless separate permits are obtained for a temporary construction camp.

1.1.2 Development Context Summary

Considering the length and width of the up to 40-m-wide transmission line ROW the potential for ground disturbance associated with the Project is minimal. Because of the relatively flat nature of the landscape covered by the LSA, minimal grading will likely be required in association with the construction of the distribution line ROW and associated access roads. Construction of the distribution structure foundations will result in small, localized ground disturbances (up to approximately 3 x 3 m) every 100-200 metres. Attempts will be made to locate temporary construction camps and laydown areas in areas with low or no archaeological potential based on this Stage 1 archaeological assessment.

1.2 Stage 1 Archaeological Assessment Objectives

This Stage 1 archaeological assessment was completed to identify and evaluate the known and potential archaeological resources that may be located within the area of the planned development. The objectives of a Stage 1 investigation generally flow from principles outlined in the *Ontario Heritage Act* (Consolidated 2007), the *Standards and Guidelines for Consulting Archaeologists* (2011) and the *Archaeological Assessment Technical Guidelines* (1993). More specifically, studies were completed with the following objectives:

- Completion of the appropriate level of background assessment for the areas within the LSA;
- Evaluation of the potential impacts to the archaeological resources that could result from the proposed development;
- Recommendation as to whether additional archaeological investigations (i.e., Stage 2) are required; and
- Strategy for recommended additional work.

This report provides detailed description of the background information collected on the archaeological resources and sites within and in the vicinity of the LSA, as well as identification of the property's archaeological potential. This discussion is followed by a brief summary and recommendations for future protection and or management of archaeological resources at the site, should they be required.

2.0 HISTORICAL CONTEXT

2.1 Pre-Contact Indigenous Culture History

The occupation of northwest Ontario has been sub-divided into a series of phases (Periods). These are based upon the material remains that survive within the archaeological record that allow the re-construction and differentiation of past life-ways. These subdivisions are an archaeological convenience to help better understand the development and change of cultures across the region, and benefit from the broad brush of hindsight and generalisation without the fine detail of local variation (Dalla Bonna et al. 1994a (5)).

The broadest pre-contact archaeological periods corresponding to northwest Ontario will be referred to as Plano-Indian, Archaic, Middle Woodland and Late Woodland, within which further temporal and regional subdivisions exist. The nomenclature utilized in this report corresponds to the chronology defined within Hamilton & Larcombe (1995) due to the locational proximity of their research to the LSA. Two other excellent overviews are provided by Wright (1999) and Bursey et al (2013).

In discussing pre-contact northwest Ontario, there are a number of themes and issues that are relevant across all phases which are also relevant to the determination of areas of archaeological potential within the LSA:

- The general acidity of the soil on the Canadian Shield leads to a lack of organic preservation. As a consequence, there are large gaps in the understanding of various aspects of past cultures, ranging from mortuary practices and skeletal morphology through to diet and subsistence strategies. A huge portion of the non-lithic technologies developed in response to the demands of the environment leave no trace; with perishable organics such as bone tools, bark storage containers, hide clothing and birch canoes, all archaeologically invisible. Aside from rare occasions of survival due to waterlogged or chemically altered soils, such ephemeral yet crucial aspects must be inferred through site locations and the general survival requirements of people within a harsh climate.
- All inhabitants of northern Ontario have used the multitude of interconnected watercourses as a transport network to some degree, hypothetically either by birch bark canoe or as trails when frozen in the winter. The affiliation with water also extends to the constant utilization of fish as a stable and dependable resource, without which habitation of the Shield would be virtually impossible.
- The highly mobile, multi-resource oriented, hunting and gathering lifestyle is a consistent theme throughout the pre-contact history of northern Ontario. The very nature of the landscape and its dispersed resources mean that there are no other options to this flexible strategy in most of the Canadian Shield (Wright 1995:294). This results in a very widespread and relatively homogenous set of subsistence patterns and attendant tool kit across the boreal forests of northern Ontario. This is not to define the area as stagnant or culturally backward, but rather acknowledge the complexity and mobility required to populate such an expanse of ‘micro ecological zones’ (Hamilton and Larcombe 1995).
- A combination of thin soils, bioturbation, frost action and regular forest fires have resulted in the disturbance and mixing of any previously stratified sites, with artifacts congregating at the mineral/organic soil interface (Hinshelwood 1996). This has greatly hindered attempts to separate occupation phases and the research into the temporal and spatial chronologies of such sites. This issue is discussed by Wright (2004), and investigated in finer detail by Hinshelwood (1996).

- Settlement patterns consist of small social groups engaged in seasonal subsistence hunting and gathering, with the more productive late spring and summer seasons able to support greater concentrations of population. Winter hunting camps consisted often of a single family unit or groups of two to three at most. The stability and easily available resources associated with large fishing sites enabled the congregation of people to conduct ceremonies and trade, serving as community focal points within an otherwise dispersed routine;
- Habitation probably consisted of a form of shelter constructed from wood, animal hides and/or birch bark, in keeping with early ethnographic accounts (Wright 1999). These shelters do not survive archaeologically (Wright 2004) at best leaving a hearth, post moulds and weight stones. They are, however, highly mobile and ideally suited to the Boreal adapted way of life. Large permanent settlement does occur further south during the Woodland period (Dawson 1983a), but within the study areas there was likely little need for change until the encroachment of Europeans produced a reliance on trade goods and the pursuit of furs.
- Unlike southern Ontario, agriculture, permanent settlement, and large societies did not become established in the north during the pre-contact phase, except for the areas immediately adjacent to the Minnesota border along the Rainy River. Here, settlement and ceremonial mound building has been linked to a southern Hopewell influence and the access to wild rice and maize. Otter Castle, 30 km south of Ignace is an example of a large scale ceremonial site of the Late Woodland period (Dawson 1983a).

2.1.1 Plano or Paleo-Indian

9,000 before present (BP) to 7,000 BP – Also referred to as Plano and Early Shield, Period II

Initial habitation of southern Ontario follows the retreat of the ice sheets at the end of the Late Pleistocene 11,000 BP; however, the LSA for this Project was fully covered by ice and not open to inhabitation until the Holocene transition approximately 2,000 years later.

Groups of hunter-gatherers moved north following caribou and other arctic species that colonized the tundra-like margins of the glacial lakes. Late Paleo-Indian people of the Plains Plano culture moved north and east into the Thunder Bay area around 9,000 BP (Dawson 1983b) with settlement concentrated along the strandlines of the retreating glacial Lake Agassiz. Population density was very low and large parts of what became the province were still under ice or water; as a consequence, late Paleo-Indian sites are rare within northwest Ontario, mostly congregated within the Rainy River watershed, close to what is now the Manitoba/Minnesota border (Wright 1972:10, Reid 1980) or along the northern edge of Lake Superior (Dawson 1983b). The retreat of the Lake Agassiz shoreline across the project area during this period (Thorleifson 1996) likely provided ideal habitation for the northern movement of Plano people.

The incoming large game hunting populations ambushed migratory caribou herds at the various bottlenecks caused by the lakes and rivers of the region (Wright 1972a), with small family groups following game across the tundra landscape in a varied and highly flexible manner. Site location has also been linked to raw material resource locations found in bedrock outcrops within northwestern Ontario, which were utilized in the production of distinctive unfluted, ribbon flaked, lanceolate spear points, and knives. These lithic resources were often obtained by quarrying and used to produce blades, spear points, large scrapers, and bifaces (Dawson 1983b). There are a number of known sources of fine-grained lithic materials available in northern Ontario. Based on available

information, the primary stone types utilized included Lake of Woods chert, Gunflint Silica, Kakebaca chert, Jasper Taconite, Rossport chert, and Hudson Bay Lowland chert. Other stone material commonly recovered from archaeological sites in the North and Far North include rhyolites, siltstones, argillite, slate, greywacke, quartz, quartzites, pipestone and greenstone (Fox 2009).

2.1.2 Archaic

7,000 BP to 3,000 BP – Also referred to as Early Shield & Middle Shield, Period II & III

The retreat of the Laurentide Ice Sheet northwards, due to the onset of the Holocene, brought with it a change in environmental conditions that consisted of the establishment of coniferous forests to a milder mixed and deciduous forest cover with open grasslands to the south (M. McLeod 2009). This facilitated a corresponding change in material culture and subsistence strategies. The migratory caribou herd dominated lifestyle of the Plano Indians was replaced by a more seasonally shifting hunting and gathering of caribou, deer, elk, moose, fish, and plant resources. This is reflected in the archaeological record by a decrease in the size and change in style of projectile points, and the appearance of hooks and net sinkers. With specific regard to projectile points, this change appears linked with the adoption of the atlatl (spearthower) identified by the transition from stemmed to notched points (M. McLeod 2009). In adapting to a forested environment, new woodworking tools such as axes, adzes and chisels were also developed (Dawson 1983b).

A defining technological change of the Archaic Period was the development of copper tools, produced from near surface copper deposits found on the shores of Lake Superior and traded all across eastern North America. Copper work of this period consisted of heating and hammering the ore to a desired form, rather than smelting and casting. This was achievable because Lake Superior copper ore is unusually pure, allowing it to be malleable at lower temperatures and shaped with simpler tools. The earliest evidence of copper working comes from South Fowl Lake on the Ontario/Minnesota border, providing a radiocarbon date of 6,800 BP for the wooden haft of a copper projectile point (Wright 1995). One of the most complete copper assemblages for Northwestern Ontario comes from the McCollum burial site south of Lake Nipigon (Pollock 2000).

The Holocene induced melting of the glaciers and ice sheets covering northern Ontario resulted in a complex and changing arrangement of glacial lakes and meltwater flow. Artificially high water levels were a result of ice blocking the flow of melt water northwards along the watershed gradient, forming glacial Lake Agassiz over the LSA. Eventual ice mass wastage around 6,000 BP removed this blockage resulting in a dramatic draining episode and a drop in lake levels of around 100 m. This has important implications for Archaic Period archaeological sites within northern Ontario due to their concentration in proximity to the lakeshores and watercourses during this period. Water levels gradually rose to their presently observable level by around 4,000 years BP, therefore submerging the majority of waterside occupation sites dating between 9,000 and 4,000 years BP.

The earliest evidence of people in far Northern Ontario comes from several skeletons at the Wapekeka First Nation Reserve that were accidently discovered during construction of an airstrip. These skeletons were dated between 6,000 and 7,000 years BP (Pollock 2000).

2.1.3 Middle Woodland

3,000 BP to 1,000 BP – Also referred to as Late Western Shield, Initial Woodland, Laurel, Period IV

Northwest Ontario is distinct in that it is divided into the Middle and Late Woodland and is more influenced by Plains cultures emanating from the south and west.

For archaeologists, the adoption of pottery marks the beginning of the Woodland Period. It is important to stress that this provides a marker within the archaeological record that is convenient to use as a subdivision. It is not indicative of a change of people through migration, rather a continuing development of the Plano Indian and Shield Archaic way of life by encompassing new technological advancements.

The introduction of pottery 2,200-2,300 BP (Wright 1999) is postulated to have diffused into northwestern Ontario from the southwest or east and, with it, the development of the Laurel culture within the northern forests of the Canadian Shield, running east from Saskatchewan to northwestern Quebec.

Laurel ceramics were manufactured using the coil method and were stylistically conical with a tapering base. Decoration was restricted to the upper portion of the vessel's exterior surface and consisted of a variety of techniques that left impressions or drag marks, with initial ceramic vessels being relatively crude and thick walled.

In addition to the introduction of pottery, the bow and arrow began to replace the atlatl as the dominant hunting technology, resulting in a change of projectile point morphology. Chipped stone technology was dominated by small side-notched arrowheads and a wide range of scraper varieties (Wright 1999). Tools were based mainly on relatively small nodular chert cores with a heavy reliance upon Hudson Bay lowlands nodular chert (ibid) in contrast to the previously quarried rhyolite and quartzite. This resulted in a marked decrease in the size of all tool types and decline in the occurrence of biface knives, along with an increase in projectile points and scrapers (Wright 1995).

A well-developed bone technology toolkit is suggested for Laurel culture by the unusually well preserved Heron Bay site on the north shore of Lake Superior, with hafted beaver incisors, bone awls, toggle harpoons, needles, beads and snowshoe netting recovered (Dawson 1983b). Copper tools were concentrated around the Lake Superior area and were traded further afield for exotic stone, obsidian and marine shell into Manitoba, southern Ontario and the northern United States (Ross 1979; Harris 1987).

The spread of Laurel culture has been linked to the northward expansion of wild rice due to late Holocene cooling, although no Laurel components have been found associated with microfloral evidence of rice or rice processing features. Recent microfossil analysis on middle and late woodland pottery fragments has revealed the preparation and consumption of maize on sites within the southern edge of the boreal forests. No evidence for agriculture survives at these sites; however, the results suggest trade networks linked to the maize producing cultures upon the plains to the south (Boyd & Surette 2010).

Within northwestern Ontario, the Laurel culture is accepted as ancestral to the following Late Woodland complexes, and subsequent Ojibwa and Western Cree (Wright 1999).

2.1.4 Late Woodland

1,000 BP to 400 BP - Also referred to as Northern Algonquian, Terminal Woodland Algonkian, Period V

The Late Woodland Period in northern Ontario is arbitrarily based on ceramic distinctions. With the climate and landscape prohibiting the adoption of agriculture, with the exception of wild rice, above the Rainy River area, there does not appear to have been the same profound change in lifestyle that occurred amongst the agriculturally dominant populations to the south. The Boreal forests and lichen woodlands of the shield are environmental constraints on the density of population that can be supported (Wright 1999), and also deterministic of the subsistence methods of such populations. Fish and large game were, as before, essential to supporting human existence within northern Ontario during this period.

Settlement patterns reflect this focus on fishing and caribou hunting, with fish sought in the spring, summer and fall, and caribou hunted in the fall and early winter. Occupation sites were predominately located on level, well drained ground with protection from northwest winds, and access to canoe landing beaches. Larger summer encampments were located in proximity to favourable fishing locations such as lake narrows and rapids, while the probable location of dispersed winter camps on frozen creeks has led to a lack of surviving archaeological information (Wright 2004).

It is tempting to view the late woodland in northwest Ontario as comprising discrete ceramic-producing cultures; however, aside from variation in ceramic decoration there is very little observable difference in lithic tools or settlement patterns.

Eschewing the gender trap, it is reasonable to assume that ceramic production and decoration can be seen as a female product and, therefore, changes in ceramics on a site are indicative of female mobility within family groups. The movement of women through marriage served to construct blood ties between various wide ranging bands, with long distance kinship functioning as a safety net against the unreliable resources of the north (Wright 2004). The stability of the lithic assemblages further suggests that men as the hunters were matrimonially immobile, requiring intimate knowledge of the surrounding landscape to succeed (Wright 1965). Late Woodland sites with any significant amount of ceramics generally have more than one tradition represented, again highlighting the mobility of women through inter-complex marriage (Wright 2004).

The Late Woodland Period did not appear uniformly over northern Ontario. In some areas, it can be identified around 1,500 BP while in other (usually remote) areas, Laurel-type pottery continues until 1,000 BP. A variety of pottery types are typically found at Late Woodland sites, ranging from Iroquoian through to vessels originating from Michigan and Wisconsin, and provide evidence of trade networks and contacts with the south (Dawson 1983a, Wright 2004).

Wild rice has a substantial place in Aboriginal culture. Archaeological evidence for its use by the Ojibwa and related Anishinaabe peoples extends to as early as 3000 BP (Reid and Rajnovich 1991). In the Lake of the Woods region, rock art depicting an anthropomorphized rice grain has been found on Painted Rock Island (Kinew 1995). The Ojibwa developed practices to regulate and enhance its production (Moodie 1990) and have historically placed their villages and reserves next to their rice fields (Kinew 1995; Vennum 1988).

The cultivation of wild rice in the area of Lac Seul has been documented as early as 1888 when the procedures used by the Lac Seul Ojibwa to create new fields were recorded in a report made by Ebeneezer McColl, the Inspector for Indian Agencies of the Manitoba Superintendency. McColl (1888) observed the scattering of wild rice in a shallow lake between Lac Seul and Vermillion Lakes where the rice was allowed to grow over multiple seasons to increase the area where rice could be cultivated (McColl 1888). Following the signing of Treaty 3 in 1873 between Canada and the Anishinabe people living in the English and Winnipeg River basins, 18 dams were constructed over the following 70 years to provide power for mines, mills, and the City of Winnipeg. These dams irreversibly altered the flow of water in the basins. In the Lac Seul area, the dams resulted in the flooding of marsh areas that were traditionally used by the Ojibwa in the harvesting of wild rice as well as hunting wild game (Usher 2003). The diversion of upper Albany River to augment water storage in the English-Winnipeg Basin in the mid-20th century provided additional issues for the cultivation of wild rice due to rapid fluctuations in water levels and flow rates. The degradation of natural water systems in the Lac Seul region greatly diminished the Ojibwa ability to continue wild rice cultivation.

Blackduck

The Blackduck complex is a Late Woodland entity dating between 1,200 to 400 BP and widely distributed across the southern Precambrian Shield from Quebec to Saskatchewan, and southwest into the prairie-parkland of southern Manitoba. This cultural complex is primarily defined on the existence of a contrasting pottery tradition to Laurel (Hamilton et al 2007). These large globular vessels were manufactured using the paddle and anvil technique, or formed inside textile containers. Decoration is diverse, consisting of horizontal and/or oblique lines along with circular indentations or puncates, and is present on the neck, rim, lip or inner rim of the container.

Tools associated with the Blackduck culture include small triangular and side-notched arrowheads, a large array of scrapers, both stone and bone, ovate knives, stone drills, smoking pipes, bone awls, needles and harpoons, and variant copper tools.

The development of Blackduck material culture components from the preceding Laurel is generally accepted (Wright 2004:1501) and extends through the southwest part of northern Ontario, Manitoba, northern Minnesota and eastern Saskatchewan.

Selkirk

The Selkirk complex is also characterized by its pottery, similar in form and manufactured with the same techniques as Blackduck, but distinguished only by decoration. When decorated, these vessels usually comprise a single row of puncates or impressed with a cord wrapped stick (Dawson 1983a). The non-ceramic assemblage associated with Selkirk is almost identical to that found on Blackduck sites, with the two often being found together in northern Ontario.

The Selkirk are represented as the ancestors of the present-day Cree (K.D. McLeod 2009:14), although it must be noted that inferring ethnicity based on pottery traditions is problematic. The interchangeable nature of both cultures purported to precede the Cree and Ojibwa in northwest Ontario highlights this issue and provides caution against focusing on a single technological element when interpreting a cultural construct, such as ethnicity. It is possible to identify the Selkirk and Blackduck as ancestral to a Cree-Ojibwa complex but further separation can be misrepresentative (Wright 2004).

Selkirk pottery is found mainly in northwestern Ontario and into northern Manitoba, Saskatchewan and northeastern Alberta. Attempts to produce a ceramic chronology in relation to the Blackduck complex have been hampered by the lack of stratified sites and the validity of carbon-dating attempts. It is now generally accepted that Selkirk is slightly later, and did not develop directly from Blackduck, but rather likely diffused from the northwest as opposed to developing out of existing traditions.

A number of other traditions have been identified based on additional decoration variation, however the uniformity present within the non-ceramic assemblages suggests caution against over-emphasising small differences and the subscription to regional patriarchy (Wright 2004).

Rock Art

The Late Woodland also witnessed the emergence of rock art as an expression of spiritual life and ritual. Rock paintings, known as pictographs, comprised of red ochre mixed with a binding agent such as bear fat or sunflower oil, are typically found within western Ontario on the vertical faces of cliffs where they enter a body of water (Rajnovich 1994). Pictographs constitute a form of written language, signifying sounds, objects and ideas in reference to subsistence, geography, climate, history and also sacred or religious beliefs and visions (Bursey et al 2013), although they could have served a variety of cosmological functions and even political ones including marking territorial boundaries (Wright 2004). The damming of lakes and rivers by the timber and hydroelectric industries may have undoubtedly drowned many sites, while the fragile nature of the paintings themselves, when exposed to the elements, also reduces their chances of survival. Rock etchings, or petroglyphs, are relatively rare within the Canadian Shield, with most examples occurring within the southern and eastern portions of the province. To date, one example of a petroform, or artificial arrangements of stones in pits or cairns, has been identified within the LSA, evidenced by the presence of a Thunderbird nest (further discussed in Section 3.2).

Representative pictographs have been identified in the general vicinity of the LSA including the representation of a hare on a rock wall identified just above the existing water line north of Red Lake (Image 1).

2.2 Early European Exploration in Northern Ontario

European exploration of northern Ontario in the Lake Superior region began in the early 1600s. The first European to reach Lake Superior was most likely Etienne Brulé, an interpreter employed by Samuel de Champlain (Stuart 2003). It would be several decades before Lake Superior and its surrounding region were more thoroughly explored by the Europeans. These early European explorations relied heavily on knowledge of existing territorial routes provided by the local Indigenous inhabitants, which were based on extensive trade among the First Nations. The first known European explorers on the lake were Pierre Esprit Radisson and Médard Court. They set off in 1658 and returned two years later with *"a rich cargo of furs and the knowledge that the best furs could be obtained to the north and west of Superior"* (Stuart 2003).

European exploration of the James Bay region began in 1610 with Henry Hudson, who entered the area while exploring what would come to be called Hudson Bay. James Bay would later be named for the British captain who explored the area more extensively from 1630-1631. During these voyages only one isolated encounter occurred with an Indigenous person, involving Henry Hudson. It has been suggested that although Hudson had to winter his ship along the coast, the lack of encounters with Indigenous people through the winter months indicates the use of coastal areas was likely restricted to summer fishing camps (Julig 1988).

The British formally initiated trading on James Bay in 1668 when Fort Rupert was established on the Rupert River. Moose Fort (Factory) and Fort Albany followed in 1673 and 1675, both located on the south end of James Bay. Trading post journals record the extent that Indigenous peoples were travelling to trade at these posts, with one record from Gloucester House (operated from 1777-1818) indicating that Indigenous people were travelling to the trade post from up to 600 miles away (Newton & Mountain 1980).

The earliest European exploration of north-central Canada occurred along the shores of the bays and the major river systems, with further inland exploration occurring at a later date. In the early decades of European exploration northern North America was explored by both the British and the French. The British focused their efforts of exploration in and around Hudson Bay and James Bay, and further inland along the watershed systems emanating from these bays. The French concentrated their efforts further south and moved inland along the St. Lawrence waterway before exploring the Great Lakes area further inland. The LSA is located in a region that was first explored between 1775 and 1821 in association with the river-based transportation corridor leading from Lake St. Joseph to Lake of the Woods and further west (University of Toronto 2010). Map 2 illustrates the geographical spread of European exploration throughout the eighteenth and nineteenth century in northern Ontario.

2.3 The Fur Trade and Euro-Canadian Settlement in Northern Ontario

The northern portions of Ontario, north of Lake Superior and south and west of Hudson Bay and James Bay have had a number of successive exploration ventures beginning in 1610 with the Hudson's Bay Company (HBC), but more extensively in the mid-eighteenth century. Henry Kelsey was the first of the European explorers to venture into the northern part of Ontario and further east. On Kelsey's second expedition (1690-1692), he explored from York Fort in Hudson Bay and extended the HBC trade west to the Saskatchewan River. Anthony Henday was the second explorer of European descent to venture into the Petit Nord of Ontario, penetrating further west and well into the Prairies. The boundaries of the Petit Nord are approximately described as being James Bay and Hudson Bay to the north, the divide between the Moose and the Albany River drainages to the east, Lake Superior and the boundary waters between Lake Superior and Lake Winnipeg to the south and Lake Winnipeg and the Hayes River system to the west (Hackett 2002).

During the time of initial European exploration, Charles II granted the Hudson Bay Company (HBC) exclusive rights for British trading in the land drained by rivers flowing into Hudson's Bay, referred to as Rupert's Land, in 1670. Rupert's Land was composed of a number of different physiogeographic regions that included the Hudson Bay Lowlands, located along Hudson and James Bays consisting of marshy lowlands with slow-moving rivers and the Canadian Shield located to the south, east and west of the Hudson Bay Lowlands, consisting of rugged terrain, exposed bedrock, glacial features and numerous lakes. Further to the west were the Prairies and to the south, the Great Lakes region (Harris 1987).

Unlike the HBC, French interests within the area were supported by independent traders and voyagers from Montreal and the St. Lawrence venturing into western and northern Ontario through the Great Lakes. Both the British HBC and the French St. Lawrence traders (SLT) vied for control over the rich and highly productive resources of Rupert's Land. In 1686, French forces from the St. Lawrence captured Fort Albany and a few years later, took York Factory and Fort Severn on Hudson Bay. These victories enabled a French monopoly on the lucrative fur trade in the Hudson Bay region until 1713 when the Treaty of Utrecht relegated the French to the southerly St. Lawrence – Great Lakes route into Ontario's hinterland, while the English regained control over their forts and over the northern Hudson Bay routes (Harris 1987).

Intermixed within the network of expanding HBC and SLT posts were groups of highly mobile boreal forest adapted First Nations groups, consisting mainly of Cree and Ojibway, with Assiniboine located further to the west around Lake Winnipeg. In the early period of the fur trade, First Nations groups acted as middlemen, trading furs for European goods such as firearms, ammunition, blankets, tobacco and various other objects between European traders and other First Nations groups further afield. As hostilities arose between the SLT and the HBC, tensions also developed between local First Nations groups. Settlement and warfare patterns changed with local Cree families and communities settling beside or within close proximity to established forts and trading posts. These families supplied the posts with provisions and locally obtained furs. Eventually, the First Nations and Europeans intermixed giving rise to a population that is now referred to as the Métis.

With these increased tensions between the HBC and SLT, First Nations groups allied with the different trading companies. In doing so, traditional lands shifted as First Nations groups expanded and retracted, vying for control over important trapping routes and transportation corridors. By 1720, the majority of the HBC lands were controlled by Cree bands. The Cree in these areas had a number of allies, including the Siouan-speaking Assiniboine to the west and the Algonquian-speaking Ojibway to the south. The Cree's prime rivals were the Athabaskan speaking Chipewyan who were located to the north of the Churchill River. However, by 1740 the Ojibway expanded north and east of Lake Superior and occupied the territory between Lake Winnipeg and Hudson Bay, which was traditionally Cree territory. This displaced the Assiniboine who moved westward and occupied the parkland areas as far north as the Saskatchewan River (Harris 1987).

A major impact upon First Nations populations was the spread of epidemic diseases through the movement of people and the transport of goods. A 1737-1738 smallpox outbreak killed up to two-thirds of some groups within the Petit Nord. A further 1781-1783 outbreak claimed half to two-thirds of the Ojibway in northwest Ontario. Measles, whooping cough, influenza and tuberculosis all took their toll at various times well into the twentieth century, with disease most commonly spread along the trading routes of the fur companies (Hackett 2002).

The state-organized French fur trade within the region ended in 1769 when Montreal surrendered to the English, however French fur traders continued to work independently and forced the HBC to set up more inland posts. It was around this time that the North West Company (NWC) was created to quell the HBC westward advances. From the early part of the 1770s until 1821, strong competition developed between the two groups. With both companies unable to sustain the prolonged and intense competitions, they eventually amalgamated into a single operation under the overall banner of the HBC (Klimko 1994).

William Tomison (1767–1780) explored areas from Fort Severn south and west towards Sandy Lake, Deer Lake and Poplar Hill, then further west to Lake Winnipeg. Tomison joined the HBC in 1760 and worked his way through the ranks to become the first "Chief, Inland". His primary responsibility was to spread the company's activities to the interior from Hudson Bay Forts. Around the same time, groups associated with the SLT and voyagers began exploring the vast hinterland north and west from the shore of Lake Superior.

Two of the most relevant European explorers during this time period were G. Sutherland and David Thompson. Sutherland, who worked for the NWC in the later part of the 1770s explored from Lake Nipigon, north then west through Sturgeon Lake, Lac-Seul, Trout Lake, Red Lake and into Lake Winnipeg. David Thompson was initially employed by the HBC, beginning in the 1770s. During his tenure with HBC, he refined his skills as a surveyor and mathematician and in 1774 was promoted to Chief Surveyor for the Company. In 1797, after much frustration with the politics of the HBC, Thompson quit and walked 80 kilometres to a NWC post where he finished out his days

as a fur trader and surveyor. It was during this time that Thompson surveyed areas from the western shore of Lake Superior west through Rainy River, Lake of the Woods and into Lake Winnipeg, in 1797 and 1804, respectively.

During this time of initial exploration, both the HBC and the French SLT began to create forts and houses along the fur trade routes, which were primarily established along various navigable water thoroughfares (Burpe 1914) (Map 3). The primary corridors that the various groups (Map 4) utilized for trade and transport are mapped by the distribution of forts, company houses and trade posts. Major routes utilized by traders included the waterways connecting York Factory south along the Hayes River to Lake Winnipeg. The eastern side of Lake Winnipeg and the water ways from Fort Albany in James Bay, east down the Albany River, through Osnaburgh House, Lac-Seul and Bas-de-la-Rivière into the south end of Lake Winnipeg were also well travelled. Numerous other small or secondary corridors by the traders connected various other forts, houses and depots within the Petit Nord.

Based on documents reviewed, no forts are located within the LSA as this area was not located on any of the major transport routes. However, two forts are located in the vicinity of the LSA: Red Lake contained two forts, one associated with the HBC and the other for the NWC. Information on either of the names could not be obtained, but both appear to have been used for over 15 years, with the HBC post constructed in 1790 and the SLT post between 1774 and 1789.

During the latter part of the eighteenth century and the beginning of the nineteenth century, neither trading group could dislodge the other and they competed on an even footing. Between 1774 and 1821 there were over 600 posts, most of them only being occupied for only a few years, and at the time of the merger of the NWC and HBC in 1821 only 125 posts remained in operation, 68 of which were controlled by the HBC. This number was further reduced to eliminate the unprofitable posts, lowering the overall number to 45 in 1825 (Wynn 2007:72). A mainstay of the newly united trade companies remained the beaver pelt, representing approximately 40% of their overall trade. Several of these forts and trade posts have been subject to archaeological excavation, most notably Fort Albany on James Bay starting in 1960 (Kenyon 1986), Gloucester House on the Albany River (Newton & Mountain 1980) and Martin's Falls, also located on the Albany River (Vyvyan 1980).

The exploitation of fur bearing and game animals in the northern interior to facilitate the trade for imported items was unsustainable. The depopulation of natural resources led to an increased focus on smaller game such as snowshoe hare and wildfowl, and placed First Nations populations at the mercy of the cyclic nature of the smaller species. The decline of deer, elk, caribou and moose also removed many of the raw materials needed for the boreal subsistence requirements, further increasing the dependence on goods from trade posts (Rogers & Smith 1994). The increased reliance upon fishing and trapping, and the inexorable pull of the trade posts resulted in an increasingly settled lifestyle that was compounded by the Treaty System, the creation of reserves and the introduction of the snowmobile in the 1960s. Many current First Nations community's locations correlate with the fur trade posts and infrastructure that depended on them and in turn provided them with what became the essentials of a more settled existence.

Air travel essentially opened up the north and replaced the previous reliance upon waterways and most northern communities are now accessible by air. Any wrecks encountered, either submerged or on land could potentially be of significance for future generations with regards to the opening up of Canada's North and should be reported.

Outlined below is a brief summary of HBC and STL posts located within vicinity of the Project. None of these posts are located within the LSA nor will any potential archaeological resources related to them be impacted by the Project.

2.3.1 St. Lawrence Traders and Hudson's Bay Company Posts

There was a North West Company post at the north end of Red Lake during the eighteenth century. The post was mentioned by Duncan Cameron in 1786 and is suggested to have been located near the east end of the lake. This post was taken over by the Hudson Bay Company in 1821 (Voorhis, 1930).

The Hudson's Bay Company Red Lake House trading post was established in 1790 in order to compete more effectively with the North West Company that had been trading in the area for several years. Closed, reopened and relocated numerous times, the post was finally located in the town of Red Lake in 1933 (OHT 2017) (Images 2 and 3).

2.4 First Nations Treaties Context

Prior to European exploration and settlement in northern Ontario, the lands were occupied by Indigenous people. The official policy in Ontario, as outlined in the Royal Proclamation of 1763, has been to recognize title to the lands occupied by Indigenous communities.

As part of this recognition of Indigenous title, compensation has been provided for portions of land surrendered by First Nations, and reservations have been set aside. Treaty-making in Ontario generally started in the south, moving north as the European population grew and found more uses for northern lands and resources. Hunting pressures due to increased access to the North through the Canadian Pacific Railway was a driving force to the treaty signing. The Project area is located in land that forms part of Treaty Number 5.

2.4.1 Treaty Number 5

The Ojibwe speaking *Ahneesheenahbeg* of the Berens River signed Treaty Number 5 in 1875. While this was eventually to profoundly influence all of them, for many decades life along the upper Berens River system remained relatively unchanged (Hamilton and Taylor-Hollings 2010).

In 1888, a reserve was surveyed for the people of Pikangikum, though they were still considered to be part of the Little Grand Rapids Band. According to Government records, a Chief was not elected at Pikangikum until 1926. Before that, Chief Berens, and later his son, continued to be the Chief for the Berens River Band and the Pikangikum Band.

Shortly after the Treaty No. 5 signing, the Crown received numerous requests and petitions from other First Nations living outside the original Treaty No. 5 boundaries to also be taken into treaty and receive treaty benefits. These requests were marked with concerns by the First Nations people on the pending development in the area, the decline of fur-bearing animals, and the settler movement that encroached on First Nation traditional lands.

Through the late nineteenth century, government officials considered what would be appropriate provisions for the extension of Treaty No. 5. Pressures due to increased development in the region and the settler expansion led the government to seriously look at the need to take Treaty with the people living north of the original Treaty No. 5 boundaries. As well, the governments of Manitoba, Ontario and Canada were negotiating the extension if Manitoba and Ontario's boundaries northward to the coast of Hudson's Bay.

The government began taking Treaty with the First Nations in Oxford House, God's Lake and Island Lake in 1909. The following year, preparations were made by the government to take treaty with the people living in Fork York, Churchill and Deer Lake (Nishnawbe Aski Nation 2017).

Treaty No. 5 essentially had its roots in two separate treaty processes, one influenced significantly by the Indigenous population and the other implemented by and serving the interests of the federal government. This particular treaty is unique in the western treaty process as it straddles the two separate periods in treaty negotiations in the region and combines very clearly the different influences, attitudes and expectations of the Indigenous population and the government (Coates and Morrison 2010).

2.5 Northern Communities and Existing First Nation Reserves

There are a number communities and First Nation Reserves that are located along or within close proximity to the LSA. Each of these communities has a rich and diverse history. Even though the histories of the these communities may only go back a hundred years or less, they represent some of the first European settlements in the area and as a result the buildings and structures associated with the early pioneers are of heritage value.

Municipality of Red Lake

Indigenous people had been residing within the Red Lake region prior to the establishment of the North West Company trading post in the area in 1786 (Richthammer 2007). The Hudson Bay Company recognized the lucrative trade occurring in the area and established the Red Lake trading post in 1790 in order to compete more effectively with the North West Company that had been trading in the area for several years. Eventually the two posts were merged and relocated numerous times.

The first discovery of gold in the Red Lake area was made in 1897 around Slate Bay although it never really amounted to significant gains (Richthammer 2007). Based on encouraging geological studies prospecting continued in the region and in July 1925 a group of prospectors made a significant gold discovery in Howey Bay, Red Lake. News broke about the major discovery of gold in Red Lake the following year effectively inciting the "Red Lake Gold Rush" (Richthammer 2007), with more than 3,000 people converging on Red Lake at the height of the gold rush in 1926 (RLRHC 2017).

Discovery of gold gave rise in the 1930s to the boom town of Red Lake, on the fringes of which arose a shack town attracted by work in the mines (Macfie and Johnston, 1991:84). Mining companies including the Red Lake Gold Shore Mine (Image 4), the McKenzie Red Lake Mines Ltd. (Image 5), the Gold Eagle Shaft and Mine complex (Image 6) and the Madsen Red Lake Gold Mines (Image 7) were all operating in the area during this period.

Although it was located at Johnson's Point, where it was only accessible by water, the Hudson's Bay post were responsible for outfitting the arriving prospectors. Due to the financial benefits afforded by the arriving prospectors the HBC post was granted "full status" in 1933 and moved into a new two-storey modern frame structure on the main street of the town of Red Lake (Richthammer 2007:34).

Eventually the bush plane came to dominate travel to the goldfields. In 1936, Howey Bay, in the heart of Red Lake, was the busiest airport in the world with aircraft on floats or skis transporting freight and passengers in and out of the area in fifteen minute intervals (RLRHC 2017).

Due to the rapidly growing population in the area, a local law enforcement team and a post office were soon established. Eventually, churches, banks, hotels, restaurants, dance halls and a school were built to accommodate the mining community (Richthammer 2007).

Although the indigenous Anishinaape continued to hunt, fish and trap during this period, it became increasingly difficult to maintain their traditional lifestyle with some working as guides, miners or labourers in the local extraction facilities (Richthammer 2007).

By the late 1930s, many of the gold mining operations were closing due to the devaluation of the commodity and the loss of many young men to the armed forces to participate in World War II (Richthammer 2007). Today, the Red Lake District is composed of five communities, all built around former or currently operating gold mines. As of July 2014, approximately 27 million troy ounces (839 tons) of gold have been mined from the Red Lake area (RLRHC 2017)

Pikangikum First Nation

Archaeological evidence indicates the community inhabitants have occupied the area for at least 2,000 years and were part of the Treaty Number 5 enactment in 1875. Missionaries began arriving Pikangikum in the 1920s with the purpose of introducing the Christian lifestyle, including residential schools. In 1939, the Pikangikum First Nation was placed under the authority of the Sioux Lookout Indian Agency. By 1946, Pikangikum children began attending school and the local trading post opened making European goods readily accessible (Shearer 2008). The local post office was established in 1953 (Scott 2004).

Today, Pikangikum is one of the largest First Nations communities in Northern Ontario with the highest on-reserve population in Northern Ontario, encompassing approximately 2,300. An estimated 75% of the population is under 25 years of age (IFNA 2017).

3.0 ARCHAEOLOGICAL CONTEXT

3.1 Previous Archaeological Research and Assessments

There has been a relative paucity of work within the LSA (Hinshelwood, Hamilton, pers. comm.); however, this should not be taken to mean that there is a lack of archaeological sites. In fact, the opposite is the case with a large number of potential sites remaining within the general region.

An extensive overview of archaeological research in northern Ontario up to 1983 has been provided by Dawson (1984) who indicated that virtually no archaeological work was carried out in northern Ontario prior to the 1940s. Systematic studies were initiated in the 1970s, following the direct involvement of the Provincial government in archaeological fieldwork. Work conducted post-1983 is split between academic research and Cultural Resource Management (CRM) based assessments.

A significant amount of archaeological investigations have been completed within northwest Ontario, primarily concentrated within the Lake Superior and Lake Nipigon regions, along with the southwest portion of the province containing the Rainy River, Quetico Park and the Lake of the Woods area. Pollack conducted the initial surveys of the Northwest interior and published the first cultural sequence for the mid-northeast region (Dawson 1984), in addition to the more northern Winsk River drainage system, along with Pugh (1971).

Historical archaeology has primarily been concentrated on fur-trade posts, with work relevant to the LSA undertaken upon the Severn River (Pilon 1981, 1982), Osnaburgh House (Bundy 2010), an overview study by Harris (1987) and a more detailed investigation by Lytwyn (1986).

General overviews of northern Ontario pre-history are provided by Dawson (1983) and Wright (1972a, 1972b, 1995, 1999, 2004). The predictive modelling study undertaken by Lakehead University also provides an excellent and detailed synopsis of the area (Larcombe 1994, Hamilton *et al* 1994).

Archaeological research has been conducted within the general vicinity of the LSA by Dawson (1976), Reid (1974), Smyk (1989-1994), Julig (1982), Wall (1978), Smith (1979), Dunlop (1985), Pollock (in Smith 1980), Pelleck (1980, 1981, 1983), McLeod (1992), Hinshelwood (1996), and Taylor-Hollings (2004).

Cultural Resource Management Projects have been carried out by Lennox (1987, 1994), Pollock (1992), Stewart (1993), Settlement Surveys Inc. (1986), Hamilton (2004), and M. McLeod (2009).

At least four CRM archaeological assessments are known to have been completed within 50 m of the LSA.

In 2011, Golder (Golder 2011) completed a Stage 1 Archaeological Assessment for a number of different fiber optic corridors within northern Ontario, one of which follows a very similar route to the proposed LSA Corridor Alternatives detailed in this report. This report included lands within 50 m of the LSA and provided the following recommendations:

1) *That a Stage 2 assessment be undertaken by a licensed archaeologist in areas that will be disturbed and have been identified within the study area as possessing archaeological potential;*

2) *That the Stage 2 testing consists of hand excavated test pits placed at intervals of five and ten metres following the standards identified in the Ontario Ministry of Culture's Standards and Guidelines for Consulting Archaeologists (2010);*

3) *That should the route change to corridors outside the present study area following submission of the Stage 1 report, additional Stage 1 assessments of those areas will be required. Should deeply buried archaeological deposits be found within the study area for the proposed project during any construction activities, the Ministry of Tourism and Culture must be notified immediately; and*

4) *In the event that human remains are encountered during the construction activities, both the Ministry of Tourism and Culture and the Registrar or Deputy Registrar of the Cemeteries Regulations Unit of the Ministry of Small Business and Consumer Relations must be notified immediately.*

The second archaeological assessment known to have been completed within 50 m of the LSA is the Stage 1 archaeological assessment for a proposed Ministry of Transportation (MTO) aggregate expansion application east of Kirkness Lake along Nungesser Road (BHC 2014). The Stage 1 assessment indicated low potential for archaeological resources within the assessed area and provided the following recommendation:

1) *The proposed area for expansion for MTO aggregate source Site 11, Kirkness Lake #1, K29-001, does not exhibit archaeological potential therefore it is recommended that it does not require further archaeological assessment.*

The third archaeological assessment completed within 50 m of the LSA was a Stage 1 archaeological assessment for the proposed Berens River bridge crossing and associated road extensions in the Berens Lake area (Hamilton and Taylor-Hollings 2010). This assessment identified areas of high archaeological potential for Indigenous cultural resources and made the following recommendations:

1) *We recommend that Pikangikum First Nation and Jimmy Keeper be contacted to discuss archaeological survey and excavation work in their traditional territory. Community members would also be very helpful in learning about the landscape.*

2) *Zone 1, specifically the stream and headwater lake margins that drain west into Pikangikum Lake, should be examined during a walking survey. As a winter road bed has already been established in much of this area, some degree of damage may have occurred already to the ground surface. This might provide sufficient visibility to determine whether archaeological deposits are located here.*

3) *Zone 2 defines an area where the existing winter road route (Route B) crosses an extensive bog and small stream. While the wetland area is unlikely to contain heritage resources, it is also unlikely that a permanent road will be built along the length of this muskeg. Instead, it will likely be built upon well-drained ground adjacent to the wetland, and these areas should be subjected to a walking survey with periodic test pit excavation once the most likely route is determined.*

4) *Zone 3 is an area of high archaeological potential with one site (EkKk-4) already recorded at Dog Rib Falls. The west banks of Berens Lake and also the peninsula forming Dog Rib Falls should first be subjected to ground inspection to identify the most attractive areas for past settlement, and those areas should then be evaluated with five metre interval test pit excavations. This sampling should also extend along the northeast shore of Berens Lake (east of Dog Rib Falls) for about 500 m where the proposed road corridor (Route C) runs close (within 100 m) to the shore, and across the current portage. Given the extent of earth moving required to prepare suitable approaches for the bridge, this testing should be expansive (well beyond the final road bed) in order to identify all vulnerable archaeological deposits. This subsurface testing will be quite*

time-intensive and if archaeological deposits are encountered, significant lead time will be required to undertake Stage 3 and 4 excavations.

5) *Zones 4 and 5 are two places where the proposed road corridor intercepts small streams. We suggest that walking survey inspection supplemented with test pit excavations should be undertaken depending upon local sedimentary and drainage conditions. Zone 5 appears to be the most attractive locale given the high well-drained banks and near proximity to a small lake.*

6) *A walking transect of accessible portions of Route B and C should be undertaken with special attention paid to documenting upland Pleistocene epoch landscape features, and inspection of areas with disturbed vegetation and sediment. If the ground surfaces along the existing winter road and hydro transmission corridors have been disturbed, visual inspection should offer sufficient visibility to identify archaeological deposits. Areas of archaeological potential (i.e., Pleistocene features) identified during the walking survey that are not already disturbed should be inspected with periodic test pit excavations.*

A fourth archaeological assessment completed within the LSA is the 1997 report by Allyne Gliddon titled "Archaeological Assessment of Two (2) Water Crossing Locations Along the Proposed Pikangikum Transmission Line Corridor, North of Red Lake, Ontario, District of Kenora, Ontario" completed under PIF AHG2-097. Attempts were made to contact the licensed archaeologist to review the report but it was not provided. Furthermore, all attempts to acquire the report through the MTCS were also declined.

3.2 Known and Registered Archaeological Sites

The primary source of information regarding known archaeological sites within the province is the MTCS's archaeological site database (ASDB). This database contains archaeological sites registered according to the Borden system. Under the Borden system, Canada is divided into grid blocks based on latitude and longitude. A Borden Block is approximately 13 kilometres east to west and approximately 18.5 kilometres north to south. Each Borden Block is referenced by a four-letter designator and sites within a block are numbered sequentially as they are found.

A search of the ASDB indicated that ten sites are located within four kilometres of the LSA; one of which located directly within the LSA.

- **EgKk-3** – Middle Woodland Laurel tradition campsite containing 4 Hudson Bay Lowland chert artifacts and one broken scraper situated 3.1 km west of LSA on the east side of an island between McKenzie and Bruce Channels on Red Lake.
- **EgKk-4: MacKenzie Channel** – Post-confederation site located 2.38 km west of LSA on the east side of MacKenzie channel on Red Lake, containing 14 artifacts
- **EgKk-5: Bruce Channel** – Post-confederation structure located on the east side of Bruce Channel on Red Lake, approximately 3.6 km west of LSA.
- **EgKk-6** – Pre-contact Selkirk Tradition fishing/campsite located at the north end of the western shore of McFinley Bay on Red Lake, approximately 2.25 km west of the LSA. The site contained 38 artifacts.

- **EgKk-7: Hell's Acres** – Pre-contact site located approximately 2.6 km south of LSA on cleared land associated with a homestead on McNeely Peninsula on Red Lake. The site contained a single quartzite biface.
- **EhKj-1: Coli Lake Cabin** – Site of unknown period located on the east side of a long northwest facing peninsula on Coli Lake across from two small islands, approximately 1 km east of the LSA.
- **EjKl-1: Kirkness Area 1** – Pre-contact site located approximately 3 km west of LSA on the north shore of an island at the northeast corner of Kirkness Lake. The site contained one endscraper and one flake.
- **EjKl-4: Kirkness Area 6** – A large multi-component pre-contact and historic site located on a raised terrace near the junction of Stormer and Kirkness Lakes, approximately 1.75 km west of LSA. This site was investigated on the basis of information provided by the Pikangikum Elders and included Blackduck and Laurel components, as well as Euro-Canadian material (Hamilton et al 2007:114)
- **EiKk-1: Barnes** – Site of unknown period located approximately 2.8 km east of LSA on the north bank of the Nungesser River.
- **EkKk-4: Berens Lake Portage** – This site is located within the LSA corridor at the west end of Berens Lake, south of the rapids and was originally recorded during the West Patricia Land Use Study archaeology project. All cultural material was recovered from the surface, with a portion of the site identified as having been previously disturbed by extensive use of the portage on which it lies. The site has been classified as a chipping station of unknown cultural affiliation since only six lithic flakes were recovered, consisting of three unused quartz, two unused Hudson Bay Lowland chert and one used rhyolite. No subsurface testing was completed at this site and much more material is suggested to exist within the general vicinity of the rapids and nearby portage (Hamilton and Taylor-Hollings 2010).

Although not officially registered as archaeological sites, additional archaeological resources have been identified by local community members in the vicinity of the LSA, including the discovery of a stone projectile point beside the Berens River (Macfie and Johnston 1991).

The landscape around Kirkness Lake is also identified as the historical location of a summer village for Pikangikum people, and the historical occupation of this area is supported by the two registered archaeological sites in this landscape (EjKl-1 and EjKl-4). Culturally significant Thunderbird nests are also known to be located within the Kirkness Lake landscape (PFN 2006). A Thunderbird nest was also identified along Nungesser Road, north of Coli Lake, during a site visit by a representative of Wataynikaneyap (Image 8).

3.3 Paleo-environment

At the peak of the Last Glacial Maximum (LGM) 11,000 BP all of the project sites would have been located under the Laurentide Ice Sheet (Harris 1987). During deglaciation and warming between 11,000 BP and 10,500 BP, the ice sheet retreated and advanced numerous times over the project areas before finally retreating north with the establishment of the Holocene (Maps 5 and 6).

Large glacial lakes were formed by melt water, with Lake Agassiz covering over a third of northern Ontario (Baldwin et al 2000) and the Tyrell Sea covering the Hudson Bay Lowlands to the north. Lake Agassiz gradually drained, exposing the LSA around 9,300 BP (Thorleifson 1996) and making it available for colonization by flora and fauna (Map 5).

As Lake Agassiz receded, the newly exposed land would have become vegetated, pollen cores suggest first with a spruce-dominated landscape that also included birch, poplar, larch and elm, before giving way to jack and red pine along with birch.

During the period between 9,500 and 6,400 BP, the climate became warmer and drier than currently being experienced, with this episode identified as the Atlantic Climatic. This period is characterized by the opening up of previously forested land to the south, giving way to grassland with stands of pine and poplar, and the advancement north of spruce forests into the tundra. Water levels were also at their lowest during this period due to the draining of glacial lakes following the eventual melt of the ice sheets blocking outflow north into Hudson Bay (Maps 5 and 6).

The current Boreal forest vegetation has been established since 3,600 BP with temperatures and seasonality also stabilizing at current levels around at this time (Map 6). Minor cooling episodes around 2,500 BP and 500 BP resulted in the southerly retreat of the forests and corresponding development of peat and muskeg, while minor warming around 1,500 BP resulted in a temporary advance north of the tree line (Dawson 1984, Wright 1999).

While agreement as to the exact timing, extent and even nomenclature of Northern Ontario's climatic episodes and patterns varies, general consensus based on the archaeological record points to the contemporary nature of major climatic changes and major cultural changes within the Boreal Forest populations (Dawson in Steegman 1983).

3.4 Current Environmental Setting

The LSA is located within the Boreal Forest Ecozone and more specifically within the Lac Seul Uplands Ecoregion.

The dominant vegetation within the LSA is mixed forest, characterized by stands of white and black spruce (*Picea glauca* and *P. mariana*, respectively), balsam fir (*Abies balsamea*), jack pine (*Pinus banksiana*), trembling aspen (*Populus tremuloides*), and white birch (*Betula papyrifera*) (Environment Canada 2005). Dry sites are dominated by jack pine with secondary quantities of black spruce. In warmer locations, red and white pine (*Pinus resinosa* and *P. strobus*, respectively) occur. Wet sites contain tamarack (*Larix laricina*) and black spruce with a ground cover of moss and lichen. Wetlands are prevalent along the west and north shores of Lake Nipigon (Environment Canada 2005). Coniferous forest dominates the Lac Seul Uplands Ecoregion, characterized by a closed canopy of black spruce, along with some white spruce, balsam fir, and trembling aspen (Environment Canada 2005). Drier sites are typified by open stands of jack pine, trembling aspen, and white birch with some black and white spruce. Labrador tea (Ledum groenlandicum), blueberry (*Vaccinium angustifolium* and *V. myrtilloides*), bog rosemary (*Andromeda polifolia*), and sphagnum mosses (*Sphagnum* sp.) dominate poorly drained, peat-filled depressions. More than 50% of this Ecoregion is covered by wetlands (Environment Canada 2005).

The Northern Coniferous sub-region is an area affected by considerable glacial action. The topography is irregular, consisting of parallel rocky ridges that separate the numerous poorly drained depressions and narrow lakes of the region. Black spruce is the dominant tree cover in the large areas of thin or poorly drained soils. Jack pine and tamarack are associated with the deeper soils and better drainage, along with a scattering of white birch. In optimal areas, such as river valleys, lakeshores and south-facing slopes, intermixed stands of white spruce, balsam fir, trembling aspen and balsam poplar occur, given sufficient soil depth.

Forest cover throughout the region has been directly influenced by logging and an increase in forest fires due to settlement and railway traffic. Forest fires have the effect of further degrading any thin soils, while also allowing the establishment of more vigorous pioneer species such as trembling aspen and balsam fir. This sequence of tree cover replacement is also encountered after the disturbance of logging operations. Without disturbance, natural or man-made, black spruce forest dominates the upland areas of the region (Winterhalder 1983).

Jack pine and white spruce prefer well-drained sandy sites and are therefore indicative of areas with higher potential for pre-contact habitation sites. Black spruce forests are the primary habitat for caribou and as such provided an important hunting resource for pre-contact populations. White spruce roots are pliable yet strong and were used to sew together birch bark canoes (Hosie 1979). Tannin, used for the tanning of leather goods, can be obtained from the bark of the tamarack tree, while its roots may be used in lieu of the white spruce for construction purposes. The tough yet pliable white birch bark provides the raw material needed for canoe and shelter construction, along with containers and vessels. White birch is a very successful colonizer and is much more common and widespread now than 200 years ago, with logging and burning having created many suitable sites (Kershaw 2001).

The Berens River system, located in the northern portion of the LSA, is a primary environmental feature and is a prominent transportation corridor and an important food/water source for the Pikangikum and other nearby Aboriginal communities (Hamilton and Taylor-Hollings 2010).

3.5 Geological Setting

Nature Resource Values Information System (NRVIS) data received from the MNRF in 2010 was used to delineate the geology of the LSA.

The Project LSA is underlain by the Precambrian rock of the Canadian Shield, and is located within its oldest area, known as the Superior Province. The topography has a low total relief and drainage patterns that have been heavily altered by glacial action, resulting in poor overall drainage. The glacial deposits on the southern Shield are predominantly sandy to silty till, in contrast to the northern Shield, which is dominated by lake deposits of clayey till and silty till. These poorly-draining deposits have allowed the formation of large areas of peat and other organic muskeg.

Glacial erosion and post-glacial deposition have formed the present landscape. The Canadian Shield was originally an area of high relief, with extensive mountains rising up to 12,000 m; however, millennia of erosion has resulted in its current low topographic relief (Clark 1999).

A consequence of the exposure of the underlying volcanic activity is the near surface location of the extensive mineral deposits that occurred as a result of high temperature and pressure upwelling during mountain formation.

The Canadian Shield is one of the world's richest areas of minerals and mining deposits, which have also been augmented by at least two meteor impacts.

This mineral abundance has produced a history of mining activity within the area, from the pre-contact mining of near surface copper and siliceous rock, through to the gold rush of the late nineteenth century to today's intensive mineral exploration.

Deposition by glacial streams and lakes account for the majority of soil development and the subsequent composition of supported flora and fauna. Till material deposited by rivers entering lakes formed deltaic plains, while glacial action left high relief features such as moraines, drumlins and eskers. These raised areas provide better drainage compared to the surrounding low lying land and often form a locally distinct environmental landscape capable of supporting drier ecosystems.

The Project LSA overlie large areas of exposed or thinly covered bedrock to the north, along with glacial till to the south. Large portions of the route also follow gravel and sand ridges associated with glaciofluvial ice-contact deposits (Map 7). These features represent the remains of the retreating ice sheet and subsequent glacial lake formation and attendant river systems.

Although the granitic and minor constituents of gnessic rocks in this area tend to be unsuitable for stone tool production, some intrusive pegmatite dykes of quartz and feldspar may have been available, especially when exposed near the shorelines. Quartz is a commonly used lithic material found in archaeological sites in areas of the Whitefeather Forest and nearby Woodland Caribou Signature site, with the Red and Favourable lakes likely representing the closest sources for convenient extraction of chert, rhyolite and chlorite schists that may have been used by Indigenous flintnappers. Additional stone tool raw resources likely included cryptocrystalline pebbles and cobbles found in the overlying glacial sediments (Hamilton and Taylor-Hollings 2010).

4.0 FIELD METHODS

4.1 Optional Property Inspection

Due to the large area and inaccessible nature of portions the LSA, a ground property inspection was not completed. However, a portion of the LSA was visited by a representative of Wataynikaneyap in late August, 2016 and photographs were taken within the LSA. The photographs were used to provide a general sense of the landscape within the LSA.

In addition to the above mentioned site visit, Golder staff completed a flyover between April 23 and 27, 2016 on along a proposed transmission corridor approximately 190 km to the east, which provided details on the general terrain and vegetation for this portion of northwestern Ontario. In general, the environment of the northern portion of the LSA, contains a large amount of peatland that is dominated by a forest regime of black spruce (*Picea mariana*) mixed with larch (tamarack) (*Larix laricinia*) with the occasional trembling aspen (*Populus tremuloides*).

The central and southern portion of the LSA has a similar forest regime, dominated by black spruce (*Picea mariana*) with secondary populations of larch (tamarack) (*Larix laricinia*) and trembling aspen (*Populus tremuloides*). Also present are small numbers of eastern white pine (*Pinus strobus*), white birch (paper birch) (*Betula papyrifera*), black ash (*Fraxinus nigra)* and eastern white cedar (*Thuja occidentalis*).

In general, all small streams (stream order 1 and 2) and most small ‘lakes’ or basins within the LSA are surrounded by several metres, and sometimes tens of metres, of active peatland which is difficult, and potentially hazardous, to traverse and contains low archaeological potential.

In addition to the client site visit, detailed ortho imagery was acquired in November 2016 for nearly the entirety of the LSA; one area around the Nungesser River did not have ortho imagery and Golder is still in the process of acquiring this imagery. The availability of the ortho imagery provided exceptional detail of the terrain and allowed for a refinement of the areas of archaeological potential and areas recommended for Stage 2. The following provides a general review of specific areas of the proposed alignment where, based on MNRF data and MTCS criteria, areas were identified as having archaeological potential but were removed as a result of the ortho imagery review.

There are six small ponds that, based on MTCS criteria, trigger archaeological potential. However, in reviewing the available ortho imagery, it is clear that these six areas are small isolated ponds with no access in or out and would likely not have been an area of focus or travel during the Pre-Contact or Historic period, as such archaeological potential has been removed. Images 9 to 14 identify each of these six locations in detail and can be referenced on Maps 10-1 through to 10-7, as Locations A through F. The green circle around each of the six identified areas represents a 50 m set back where archaeological potential was originally identified. The pink area represents the LSA and the black dotted line is the proposed construction 50-metre-wide right of way.

5.0 ANALYSIS AND CONCLUSIONS

The potential for archaeological resources with cultural heritage value or interest to be located within the LSA is analysed in this section considering general MTCS archaeological potential criteria, as defined in the S&Gs (MTCS 2011), and information presented in Sections 1 through 4 of this report. Further analysis, to refine the areas of archaeological potential associated with the general MTCS criteria, was performed using stream order data (Map 8), MNRF archaeological potential modelling (Map 9), and ortho imagery, to arrive at a rigorous model of archaeological potential within the LSA. Finally, regionally specific MTCS special condition criteria for the assessment of property on the Canadian Shield and in 'Remote Areas' are applied to develop a map of the LSA indicating where further archaeological assessment is recommended prior to ground disturbance related to the Project (Map 10).

5.1 Potential for Euro-Canadian Archaeological Resources

The criteria used by the MTCS to determine potential for historical archaeological sites of relevance to this analysis are evidence for:

- Early Euro-Canadian industry (e.g., fur trade, logging, prospecting, mining);
- Early Euro-Canadian settlement including pioneer homesteads, isolated cabins, pioneer churches and early cemeteries; and
- Early historical transportation routes (e.g., trails, passes, roads, railways, portage routes) (MTCS 2011).

Property listed on a municipal register or designated under the *Ontario Heritage Act* or that is a federal, provincial or municipal historic landmark or site is also indicative of archaeological potential. A search of the *Ontario Heritage Act Register*, maintained by the Ontario Heritage Trust, indicates that no property within the LSA is listed or designated under the *Ontario Heritage Act* and no historic landmarks are known to exist within the LSA.

Given the location of the Project LSA to known fur trade transportation routes and mapped Hudson's Bay and St. Lawrence Traders posts, the potential for historical post-contact Indigenous and Euro-Canadian archaeological resources is generally moderate to high along navigable streams and lakes. In addition to the fur trade related areas, there is also evidence of early twentieth-century mining at the southern terminus of the LSA and a number of waterway trails and portage routes cross the LSA.

5.2 Potential for Pre-Contact Indigenous Archaeological Resources

A number of factors are employed when determining archaeological potential within a particular area. In addition to the proximity to known archaeological sites, factors for determining Indigenous archaeological potential includes watershed area (primary and secondary watercourses), distance from water, drainage patterns, identification of past water sources (beach ridges, river beds, relic creeks, ancient shorelines, etc.), elevated topography, identification of significant physiological and geological features (knolls, drumlins, eskers, plateaus, etc.), soil geomorphology, distinctive land formations (mounds, caverns, waterfalls, peninsulas, etc.), known burials sites and cemeteries, historic transportation routes (navigable waterways, historic trails, portages, etc.) and associated biological features (distribution of food and animal resources before colonization).

While known archaeological sites documented in Section 3.2 provide evidence of historically significant Indigenous occupation within the general LSA vicinity, all property within 150 m of a registered archaeological site in the Canadian Shield is considered to possess archaeological potential. This includes the 150 metre radius around the Berens Lake Portage (EkKk-4) site currently situated within the LSA.

A 150 metre radius around known or potential cultural heritage resources is also determined to possess archaeological potential. This includes the Thunderbird nest along Nungesser Road, north of Coli Lake, identified during a general site visit for the EA project.

Cultural Heritage Landscapes are also considered to represent features of archaeological potential. The Kirkness Lake, Nungesser Lake, and Berens Lake Cultural Heritage Landscapes have been designated (PFN 2006:87) within the LSA and trigger archaeological potential, in addition to a 150 metre buffer around these designated landscape boundaries.

Waterways also trigger archaeological potential as defined by the MTCS Standards and Guidelines (2011). These waterways have historically been a focal point in the Indigenous culture (PFN 2006:21) with lands surrounding the waterways utilized as a reliable source of water for nearby traditional camps and habitation sites. These waterways have also utilized for subsistence extraction strategies such as hunting and fishing, with potential evidence representing these activities such as fish weirs or netsinkers and projectile points located within the waterway zones. Navigable waterways within the LSA vicinity have also been historically employed as reliable transportation routes both in the summer by boat and in the winter as ice pathways. Stream orders designated as greater than 3 would be considered to possess high archaeological, while streams designated as 1 or 2 within the ordering system would be considered to possess low archaeological potential.

5.2.1 Stream Ordering

Stream ordering is a method used to assign a numerical order to branches in a stream network. Ordering allows for the identification and classification of stream types to infer their characteristics. First-order streams are the smallest streams and have no tributaries. When two first-order streams meet, the upstream portion of the watercourse is classified as a second-order stream. For this analysis, stream order was calculated from the Provincial Enhanced Flow Direction (EFDir) grids, provided to Golder by the MNRF, which are composed of the Archydro Stream and Flow Direction grids. The EFDir grids were analysed in ArcGIS Spatial Analyst software using the Strahler method to create the stream orders presented in Map 8, respectively.

Stream order may be used as a rough proxy for channel flow and navigability. Navigability is a key component of archaeological potential modelling within the boreal forest because travel of any significant distance in the region would have been exceedingly difficult without the use of the waterway system as a travel corridor. In the spring, summer and fall, small crafts were used on navigable waterways while in winter the waterway acted as a cleared, frozen footpath.

Streams with very low stream orders 1 or 2 are small, with limited channel flow, and have limited navigability. In the vicinity of these small streams in the past; the low relief, poor drainage conditions and shallow post-glacial organic soil formation in the LSA has led to their formation in huge quantities. Plant gathering, in particular, is known from ethnographic sources to have taken place primarily in swamps, bogs, small streams and lake margins (Larcombe 1994). From an archaeological potential modelling perspective; however, there is little to recommend one small stream over another in the landscape. From an archaeological perspective, the large number of small,

low stream order watercourses in the boreal forest generally, and in the LSA in particular, and their frequent association with very wet, poorly drained peatland greatly reduces their value as features with archaeological potential (Hamilton and Larcombe 1995). This is particularly true considering the ethnographic evidence that suggests that base camps were almost always located on lake margins (both in summer and winter) or along larger rivers (in the winter). In addition, the large number of these small streams and the saturated nature of their surrounding soils present serious practical obstacles to archaeological assessment. Small streams with stream orders of 1 or 2 are very unlikely to show archaeological evidence of occupation (Hyslop pers. comm. 2013). Therefore, streams with a stream order of 1 or 2 are considered to have low archaeological potential and are not recommended for further assessment.

The highly mobile nature of past inhabitants of the landscape, on the other hand, indicates that streams with higher stream orders, 3 or greater, reflecting greater channel flow and higher navigability would have been important to the population for movement across the landscape. All streams within the LSA with a stream order of 3 or greater are considered to have archaeological potential and are recommended for further archaeological assessment.

5.2.2 Ministry of Natural Resources Archaeological Potential Modeling

The MNRF prepares archaeological potential area modelling, during forestry management planning work using the MNRF Heritage Assessment Tool (HAT) (MNRF 2007). The HAT combines numerous datasets and allows for the calibration of individual data layers, based on landscape features, by assigning an analytical ‘weight’ to each layer according to the statistical likelihood that an individual landscape feature may contain an archaeological site. For example, archaeological sites are typically located on fairly level ground so areas with low slope angles have a higher weighted value than areas with steep slopes.

Archaeological potential is determined by plotting known archaeological site locations on the weighted potential model developed for the forestry region in question. The location of known archaeological sites may also provide extra “weight” to certain landscape features as part of an iterative modelling process. The distribution of archaeological sites within the model is examined to determine whether the initial archaeological potential model is suitable. Weights may be adjusted until a maximum number of archaeological sites are captured within a minimum area of land designated as containing archaeological potential.

Preliminary archaeological potential mapping is analysed by an MNRF provincial cultural heritage specialist who may perform several more runs of the model with adjusted data weights or the addition of local heritage and landscape knowledge. This process leads to the development of a final archaeological potential map. The final archaeological potential map is modified in the event that mapped landscape features are subsequently determined not to accurately reflect the conditions on the ground. All areas of archaeological potential designated on the final archaeological potential map must have their top 30 cm of mineral soil protected during forestry operations to avoid destruction of potential subsurface cultural features (MNRF 2007). A small amount of disturbance to mineral soil (up to 5%) is allowed, averaged across an individual forestry block.

The archaeological potential models developed by the MNRF for forestry management purposes are not sufficient, on their own, to determine areas of archaeological potential to meet current MTCS S&Gs unless the project in question is a forestry project situated on Crown land covered under a specific forest management plan. Nevertheless, they represent the most sophisticated archaeological potential modelling occurring in the boreal forest of Ontario and are based on decades of archaeological potential modelling research (for example: Dalla Bonna 1994a, 1994b; Ebert and Kohler 1988; Hamilton 2000; Hamilton and Larcombe 1995;

Larcombe 1994); and therefore provide a key data source for use in large-scale archaeological assessments in the region.

The MNRF archaeological potential within the LSA passing through the LSA is presented in Map 9, and are incorporated into the determination of areas recommended for further archaeological assessment as indicated in Map 10.

5.2.3 Alternatives for Archaeological Potential Evaluation in Special Conditions: Remote Areas

Section 1.3.4 of the MTCS S&Gs contains two Standards that apply when evaluations of archaeological potential are made for areas of the province that are remote and difficult to access.

Standard 1: The degree of remoteness must be documented in sufficient detail to demonstrate that there are practical obstacles to achieving success. This will be primarily a matter of distance and a lack of available transportation infrastructure (i.e., roads, trails) along with factors of visibility (e.g., forest cover).

Standard 2: Aerial photos, detailed engineering plans or other detailed mapped information may be used to determine that areas are of low potential.

For this Project, it is assumed that any portion of the LSA a minimum of 10 km from a road is sufficiently remote to "present practical obstacles to achieving access," considering the difficulty in traversing large areas of the boreal forest on foot. Portions of the LSA, particularly those in the northern area, that extend around Berens Lake are greater than 10 km from all transportation routes.

5.3 Compliance with MTCS 2011 Standards and Guidelines for Consultant Archaeologists: Determining Archaeological Potential in the Boreal Forest

Section 2.1.5 provides alternative strategies for Stage 2 test pit survey in northern Ontario and on Canadian Shield terrain:

Standard 1: Where the identified feature of archaeological potential is a modern water source, test pitting is required between 0 and 50 m from the feature. Space test pits at maximum intervals of 5 m. Survey is not required beyond 50 m.

Standard 2: For features of archaeological potential other than modern water sources (e.g., historic water sources such as glacial shorelines), test pitting is required as follows:

a) space test pits at maximum intervals of 5 m between 0 and 50 m from the feature of archaeological potential

b) space test pits at maximum intervals of 10 m between 50 and 150 m from the feature of archaeological potential

c) survey is not required beyond 150 m

Standard 3: While maintaining standard survey grids as closely as possible, the consultant archaeologist may vary from standard survey grids as necessary, based on professional judgement. Document and explain the rationale for all variation in the Stage 2 report.

Because of the large number of modern water sources in northern Ontario, not all of them are considered features of significant archaeological potential. Archaeological potential is limited within this assessment to modern water sources defined as 'primary water sources' (e.g., lakes, rivers, streams, creeks) (Section 1.3.1, S&Gs). A further restriction of navigability is identified as a pre-requisite for a watercourse to possess significant archaeological potential. Navigability is determined through a combination of stream order data, a review of ortho imagery and mapping of known river and lake canoe trails. No watercourse with a stream order value of less than 3 is considered to possess high archaeological potential. In association with navigability, the water course must be a viable transportation route, leading from somewhere to somewhere in a sensible fashion, including portages if necessary, for it to be deemed to possess high archaeological potential. There are hundreds of potentially navigable water courses within the LSA that are dead-ends, cul-de-sacs, or minor, isolated creeks whose banks have virtually no potential for the recovery of archaeological remains (Ross pers. comm. 2013) and are not considered to have high archaeological potential, not least because they occur in areas of wet, acidic peatlands, as are common in the boreal forest region. This is not to say that these small areas of wetland and associated streams were not the site of plant gathering or other important but ephemeral activities in the past, but that ethnographically, occupation sites were rarely located in these areas and archaeologically, sites are rarely recovered from these areas. The archaeological potential of these areas is predicted to be very low.

Areas of elevated topography have been attractive to people in the past as areas to settle or collect resources otherwise unavailable in the surrounding landscape. Ethnographic data indicate that winter camps in the boreal forest were occasionally located at inland, upland locations because these were good locations to find moose during that season. Nevertheless, we also know from the ethnographic and archaeological record that settlement in the boreal forest was primarily influenced by water resources rather than elevation.

In discussing archaeological predictive modelling, Dalla Bonna suggests that mapping with elevation contour intervals of less than 15 m provides sufficient detail to indicate the nature of the terrain (Dalla Bonna 1994a, b). The LSA is mapped at elevation contours of 10 m. There are no mapped drumlins or eskers that overlap with the LSA. There is one "linear trend of end moraine crest" that extends north along the Nungesser Road by Coli Lake. However, this feature is low in relief (less than 10 m in elevation compared to the surrounding terrain) and as such does not represent an area of true potential as this feature is similar in relief to the surrounding terrain (Map 10; Tiles 2-3).

To comply with all Sections of the S&Gs, it will be recommended within this report that the relevant Standards within Section 1.4.1 are followed when determining areas requiring Stage 2 test pit survey. Despite this recommendation, because the Project LSA is located in northern Ontario on Canadian Shield terrain, and because portions of the LSA are remote and difficult to access, Sections 1.3.3, 1.3.4 and 2.1.5 are directly applicable to the LSA and it will also be recommended within this report that the relevant Standards within these Sections are applied to modify the Stage 2 test pit survey strategy of the LSA. The relevant Standards in Sections 1.3.3., 1.3.4 and 2.1.5 of the S&Gs will supersede the Standards within Section 1.4.1 and it will be the Standards within Sections 1.3.3, 1.3.4 and 2.1.5 that will determine the recommended modified Stage 2 test pit survey strategy. This application of the S&Gs has been reviewed and approved on a number of transmission projects for the same

overall undertaking. These Standards, combined with the analysis of level of archaeological potential described above, have been used to determine areas within the LSA that are recommended for Stage 2 archaeological assessment as depicted on Map 10: Tiles 1-7, respectively.

6.0 RECOMMENDATIONS

Based on the results of the Stage 1 archaeological assessment, it has been determined that archaeological potential is low for the majority of the Project LSA. Nevertheless, potential for both pre-contact and post-contact era archaeological resources exists for specific areas within the LSA.

The following recommendations are made:

1. As per Section 1.4.1 of the S&Gs:

    a) *No areas within 300 m of the following features of archaeological potential, located either on or adjacent to the property (defined here as the LSA), are recommended for exemption from further assessment: previously identified archaeological sites; water sources; areas of early Euro-Canadian settlement; locations identified through local knowledge or informants.*

    b) *No areas within 100 m of early historic transportation routes are recommended for exemption from further assessment.*

    c) *No areas within the property containing the following features of archaeological potential are recommended for exemption from further assessment: elevated topography; pockets of well-drained sandy soil; distinctive land formations; resource areas.*

    All of the areas of the LSA described here in 1.a and 1.b are recommended for further archaeological assessment subject to modification by the relevant Standards set out in Sections 1.3.3, 1.3.4, and 2.1.5 of the S&Gs, and as described in Section 3.3 of this report, and recommendations 2 through 5 below.

2. The LSA is defined as being located on the Canadian Shield (Map 1), and as such the entire LSA is eligible for both a reduction in Stage 2 survey area and for the application of alternative Stage 2 survey strategies, with the exception of small landscape features that may possess differing characteristics from the surrounding environment, as per Section 1.3.3 of the S&Gs. Where such landscape features are identified a complete assessment and systematic survey of the feature should be undertaken. These landscape features include, but are not limited to, sand plains, clay plains and glacial beach ridges. A complete assessment and systematic survey is here defined as the Stage 2 survey strategy identified for use in northern Ontario and Canadian Shield terrain as described in Section 2.1.5 of the S&Gs.

3. All areas of the LSA determined to be remote and difficult to access, as defined in Sections 3.2.3 and 3.3 of this report, have been assessed through detailed mapping and review of ortho imagery as being of low potential, other than where specifically indicated on Map 10: Tiles 1-7 and do not require Stage 2 archaeological assessment, as per Section 1.3.4 of the S&Gs.

4. All areas of the LSA identified as having sufficiently high archaeological potential to require further archaeological assessment, as described in Section 5.2 of this report, are shown on Map 10: Tiles 1-7, respectively. Any portion of these areas recommended for Stage 2 archaeological assessment that may potentially be impacted by ground disturbance associated with Project construction activities should be assessed by the Stage 2 test pit survey strategy for northern Ontario and the Canadian Shield as described in Section 2.1.5 of the S&Gs.

5. All areas of the LSA not indicated on Map 10: Tiles 1-7, respectively as requiring further archaeological assessment have been determined to have low archaeological potential and no archaeological survey of these areas is required.

6. Should the route of the Project LSA corridor change following submission of this Stage 1 report, such that it no longer falls within the LSA assessed within this report as indicated on Map 10: Tiles 1-7, respectively, Stage 1 archaeological assessment of all new areas will be required. Should ground disturbance activity related to the Project prove necessary outside of the LSA assessed within this report, Stage 1 archaeological assessment and any further stages of assessment as necessary will be required prior to construction.

7. The registered archaeological site within the LSA (EkKk-4) and the Thunderbird nest identified along Nungesser Road should be avoided and protected.

8. If registered archaeological site EkKk-4, or and land within 150 metres of this site is to be impacted, the recommendations detailed in the Stage 1 Archaeological Assessment report for the proposed Berens River Bridge Crossing at Dog Rib Falls should be addressed. As these recommendations were prepared prior to 2011, additional intensive testing may be required to comply with the updated MTCS S&G's (2011).

9. A marine archaeological assessment should be completed if in-water impacts are to occur for the two navigable streams located within the designated Cultural Heritage Landscapes encompassing Kirkness Lake and Berens Lake due to the high archaeological potential recognized for these two river crossings.

10. Consultation with local First Nations communities where Stage 2 Archaeological Assessment field testing will occur within their traditional territory should occur prior to any archaeological fieldwork. Local and traditional knowledge may be gleaned from traditional community members which may identify areas for potential archaeological resources not sufficiently addressed in published accounts or officially registered with the MTCS.

7.0 ADVICE ON COMPLIANCE WITH LEGISLATION

This report is submitted to the Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism, Culture and Sport, a letter will be issued by the Ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and, therefore, subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Funeral, Burial and Cremation Services Act*, 2002, R.S.O. 2002, c.33 require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence.

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9.0 IMAGES



Image 1: Snowshoe hare pictograph identified at Deer Lake, north of Red Lake, June 1956 (Adopted from Ontario Archives).



Image 2: Hudson's Bay Trading Post, Red Lake, 1925 (Adopted from Library and Archives Canada).



Image 3: Hudson Bay Post, Red Lake (Adopted from Library and Archives Canada).



Image 4: Red Lake Gold Shore Mine, Red Lake, Ontario, September 1937 (Adopted from Library and Archives Canada).



Image 5: McKenzie Red Lake Mines Ltd., Red Lake, Ontario, 1935 (Adopted from Library and Archives Canada).



Image 6: Gold Eagle Shaft and Mine Buildings, Red Lake, Ontario, August 1936 (Adopted from Library and Archives Canada).

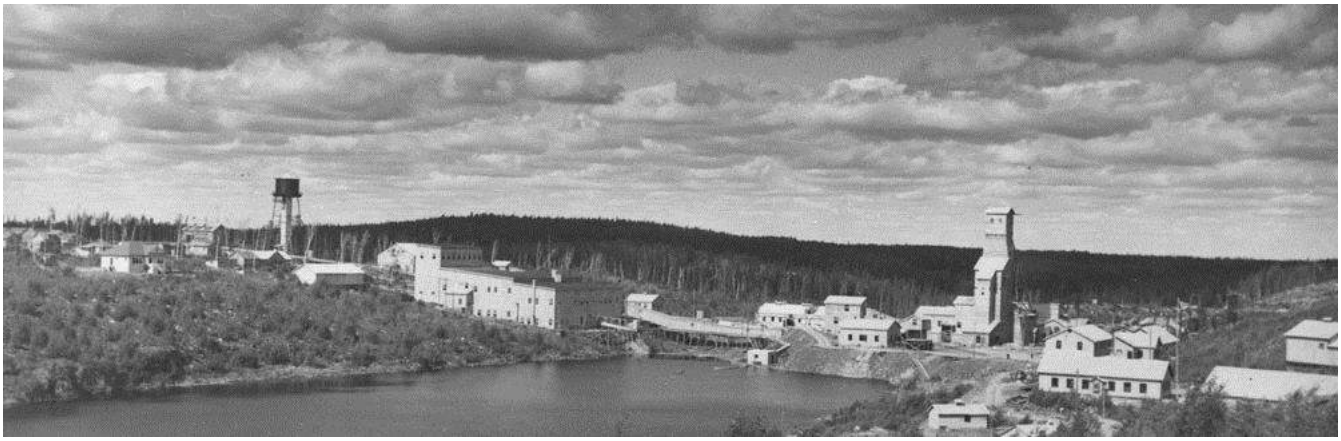


Image 7: Panoramic View of Madsen Red Lake Gold Mines, Ontario, 1944 (Adopted from Library and Archives Canada).



Image 8: Thunderbird Nest Observed along Nungesser Road, North of Coli Lake.



Image 9: Ortho Imagery of Unnamed Pond Overlapping the Local Study Area. Location A, Map 10-1.



Image 10: Ortho Imagery of Unnamed Pond Overlapping the Local Study Area. Location B, Map 10-2.



Image 11: Ortho Imagery of Unnamed Pond Overlapping the Local Study Area. Location C, Map 10-4.

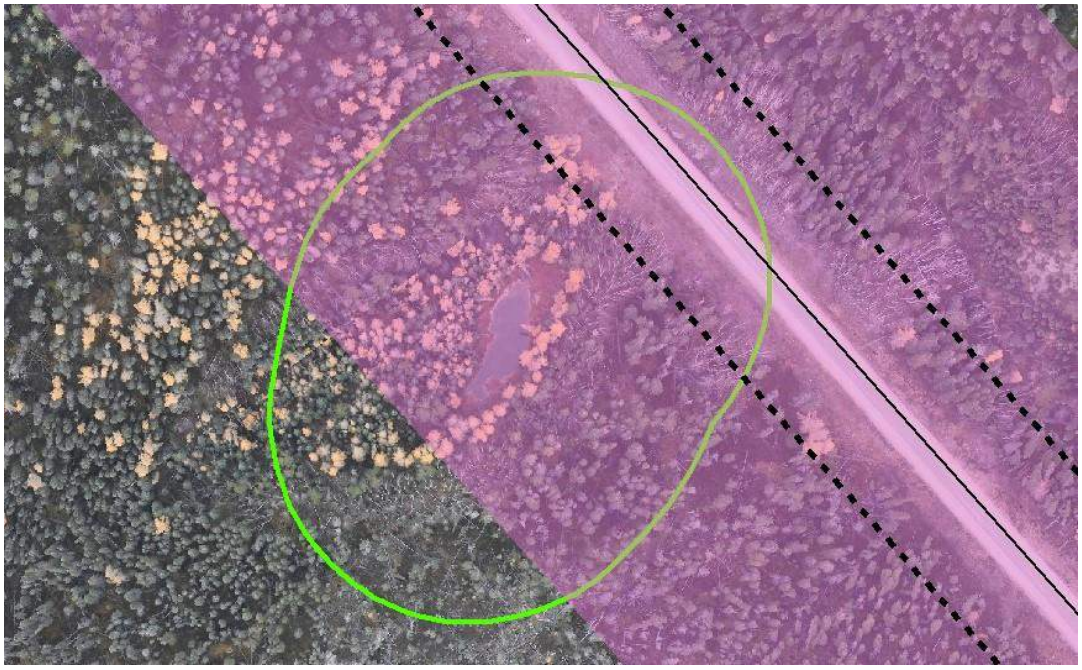


Image 12: Ortho imagery of Unnamed Pond Overlapping the Local Study Area. Location D, Map 10-4.

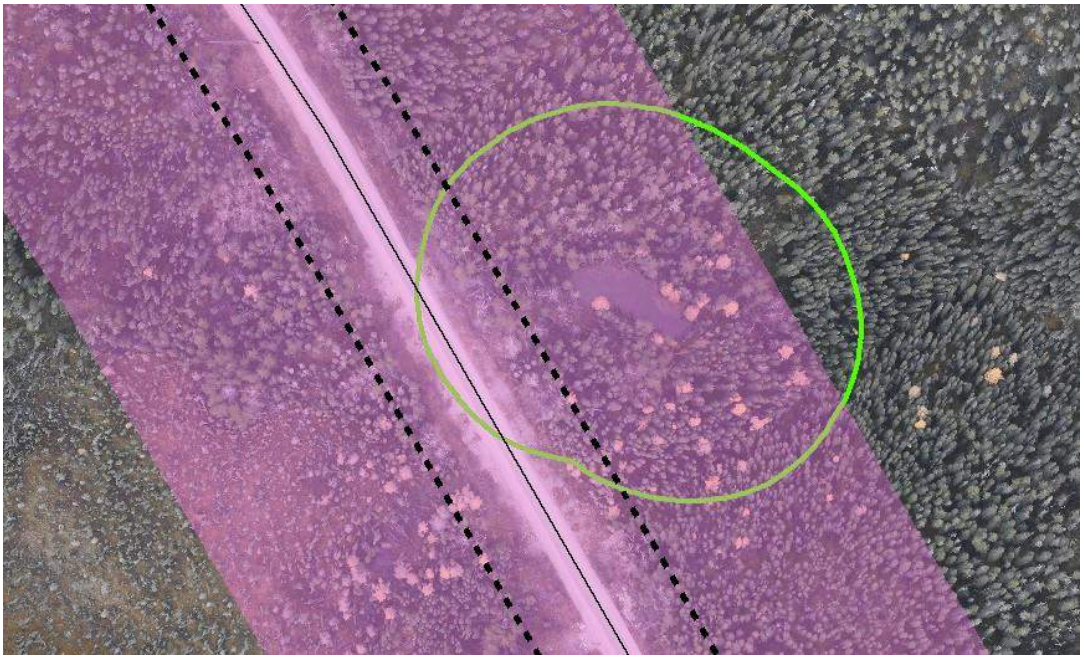


Image 13: Ortho Imagery of Unnamed Pond Overlapping the Local Study Area. Location E, Map 10-4.

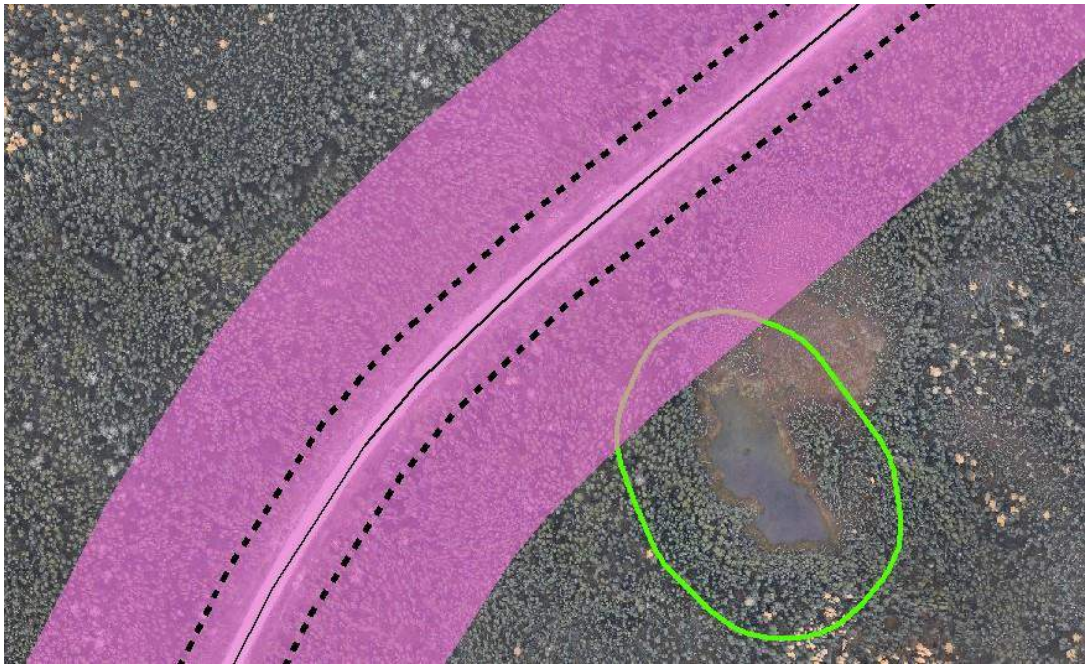
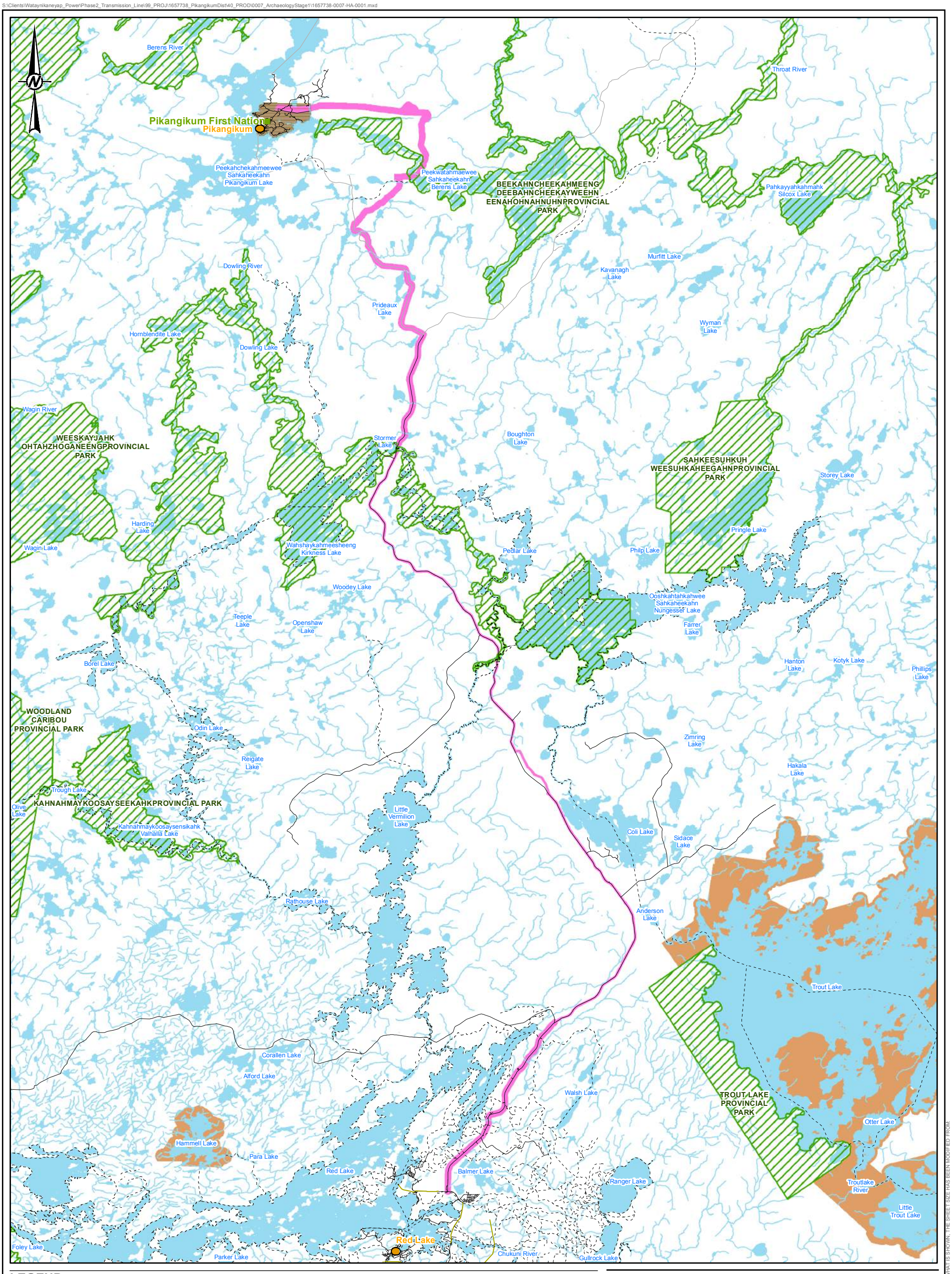


Image 14: Ortho Imagery of Unnamed Pond Overlapping the Local Study Area. Location F, Map 10-5.

10.0 MAPS

All maps follow on the succeeding pages.

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Watercourse
- Waterbody
- First Nation Reserve Land
- Conservation Reserve
- Provincial Parks
- Project Limits of Work

NOTE(S)
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3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
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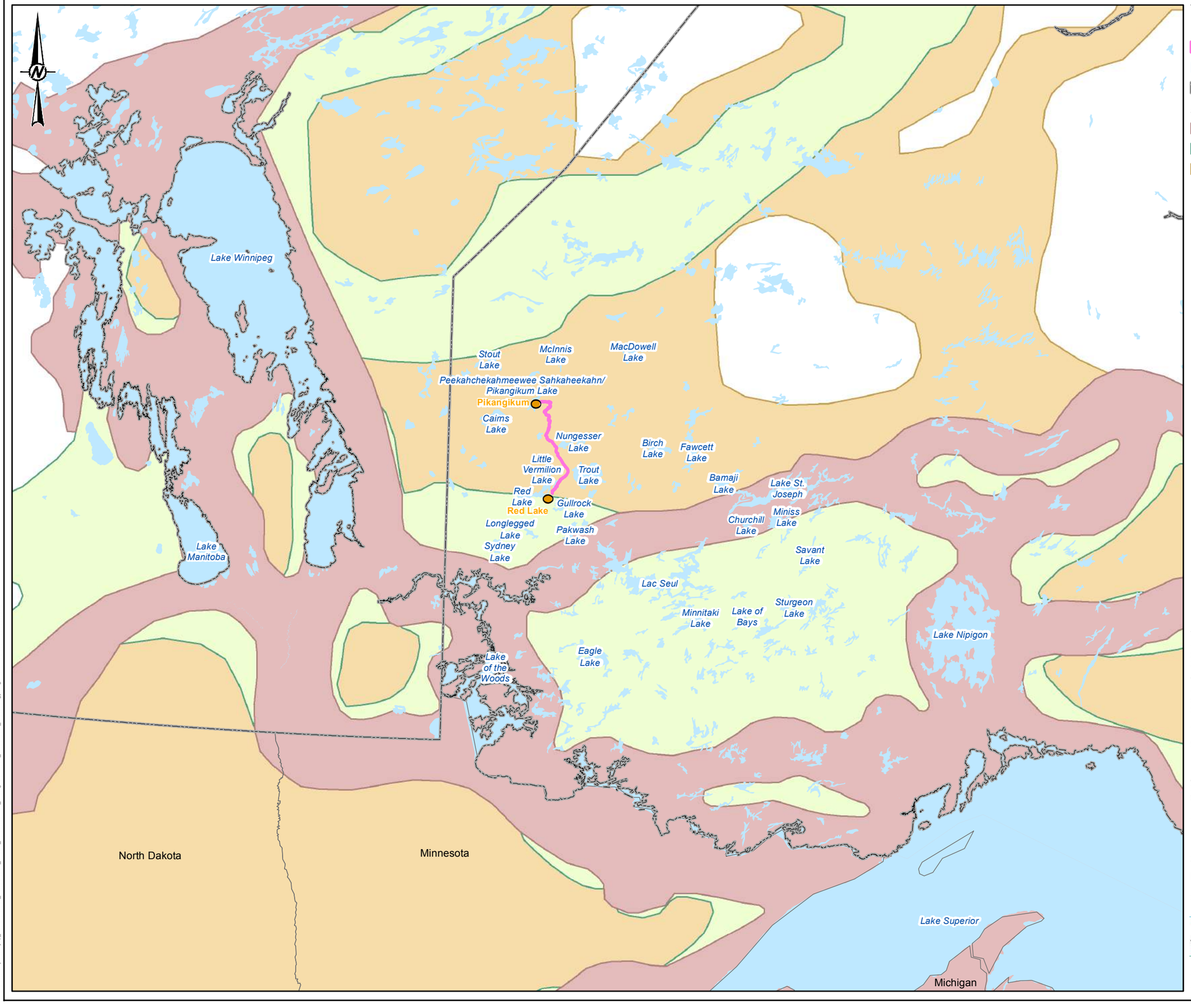
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PROJECT LOCATION – LOCAL STUDY AREA

CONSULTANT
Wataynikaneyap Power
Golder Associates

YYYY-MM-DD	2017-04-06
DESIGNED	JMC
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
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LEGEND

- Town
- Project Limits of Work
- Waterbody
- Province Boundary

Areas Explored and Mapped by Europeans

- Before 1751
- 1752 - 1774
- 1775 - 1821

0 20 40 80 120 160 200

1:3,500,000 KILOMETERS

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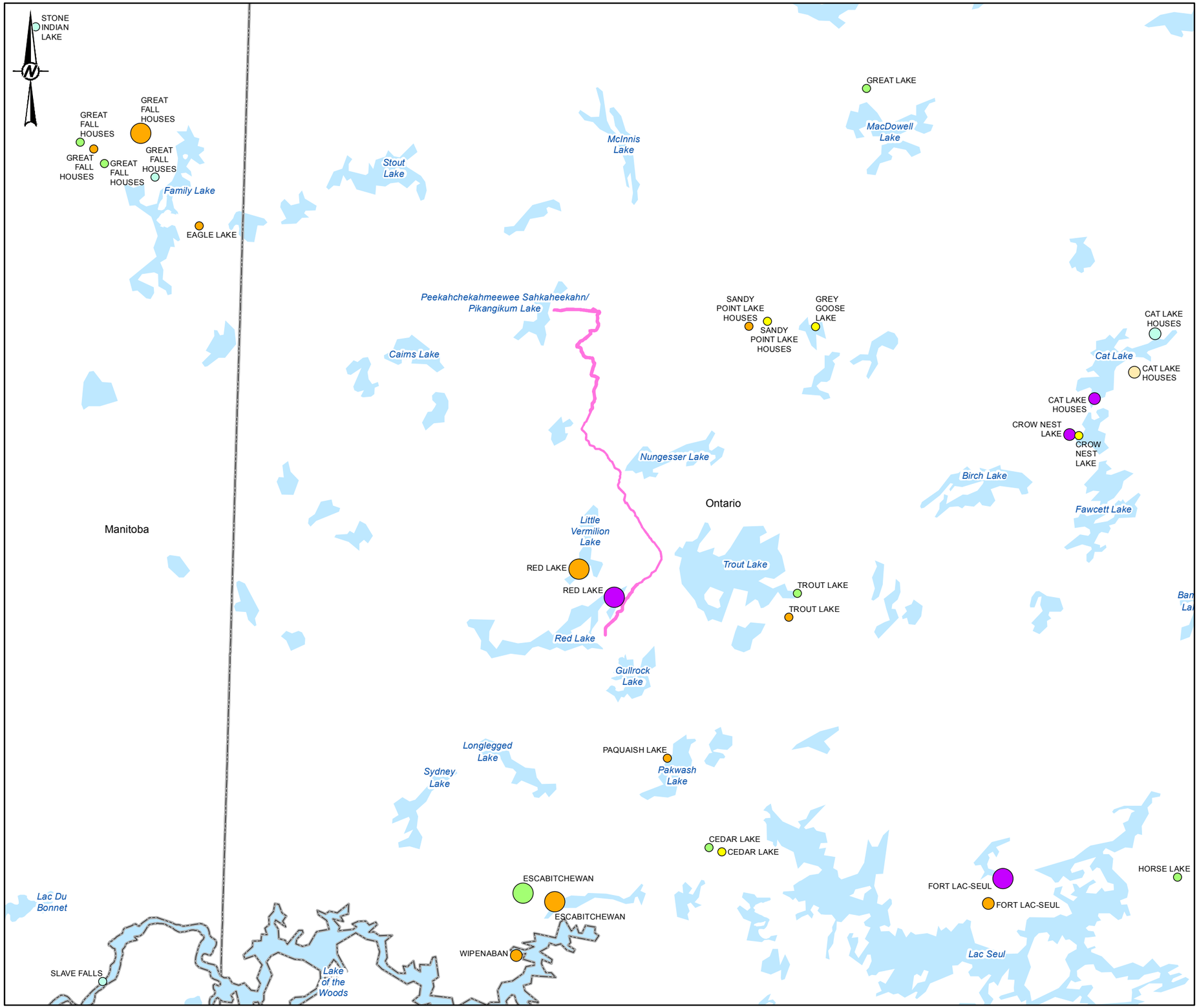
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LEGEND

- Project Limits of Work
- Waterbody
- Province Boundary

INITIAL OCCUPATION OF TRADING POST

HUDSON'S BAY COMPANY	ST. LAWRENCE TRADERS	DURATION OF POST
PRE-1774	PRE-1774	MORE THAN 15 YEARS
1774-1789	1774-1789	5-15 YEARS
1790-1805	1790-1805	LESS THAN 5 YEARS
1806-1821	1806-1821	

0 5 10 20 30 40 50

1:1,000,000 KILOMETERS

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2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
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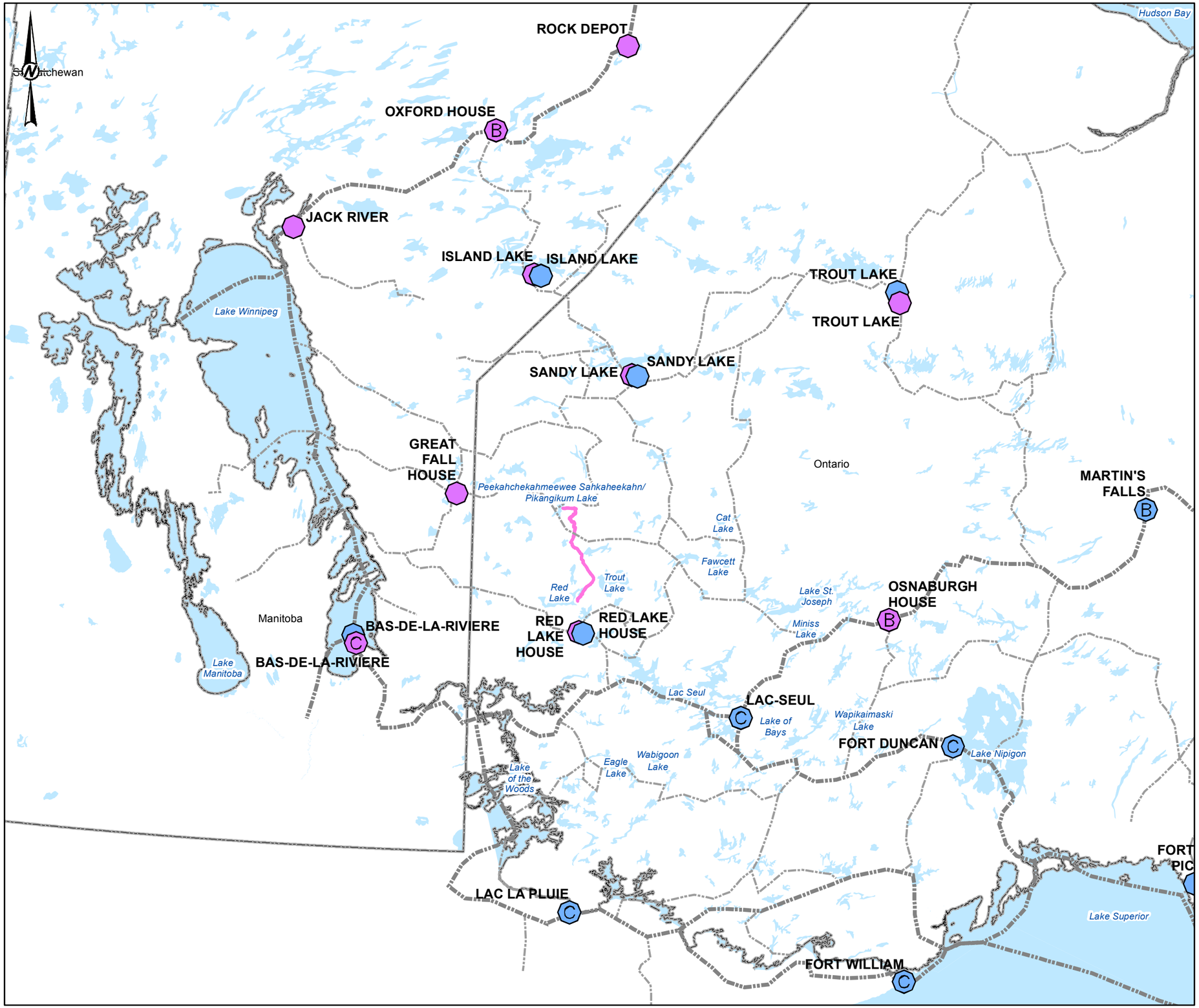
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LEGEND

- Project Limits of Work
- Province Boundary
- Waterbody

Type of Transportation Route

- Major Route
- Minor Route

Depots and/or Break-of-Bulk-Points

- Hudson's Bay Company
- St. Lawrence Traders
- (B) Major Boat-Building Centre
- (C) Major Canoe-Building Centre

0 20 40 80 120 160 200

1:3,500,000 KILOMETERS

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CONSULTANT

Wataynikaneyap Power

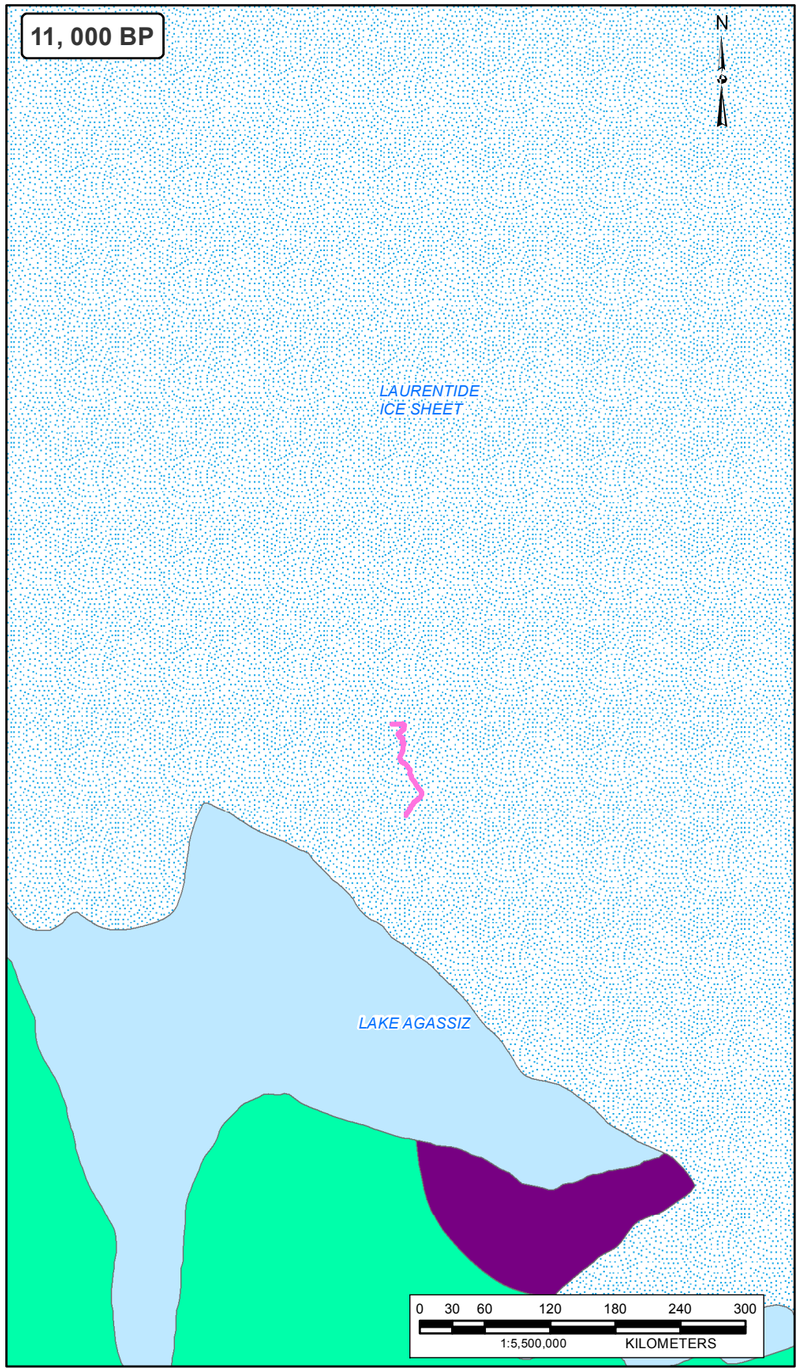
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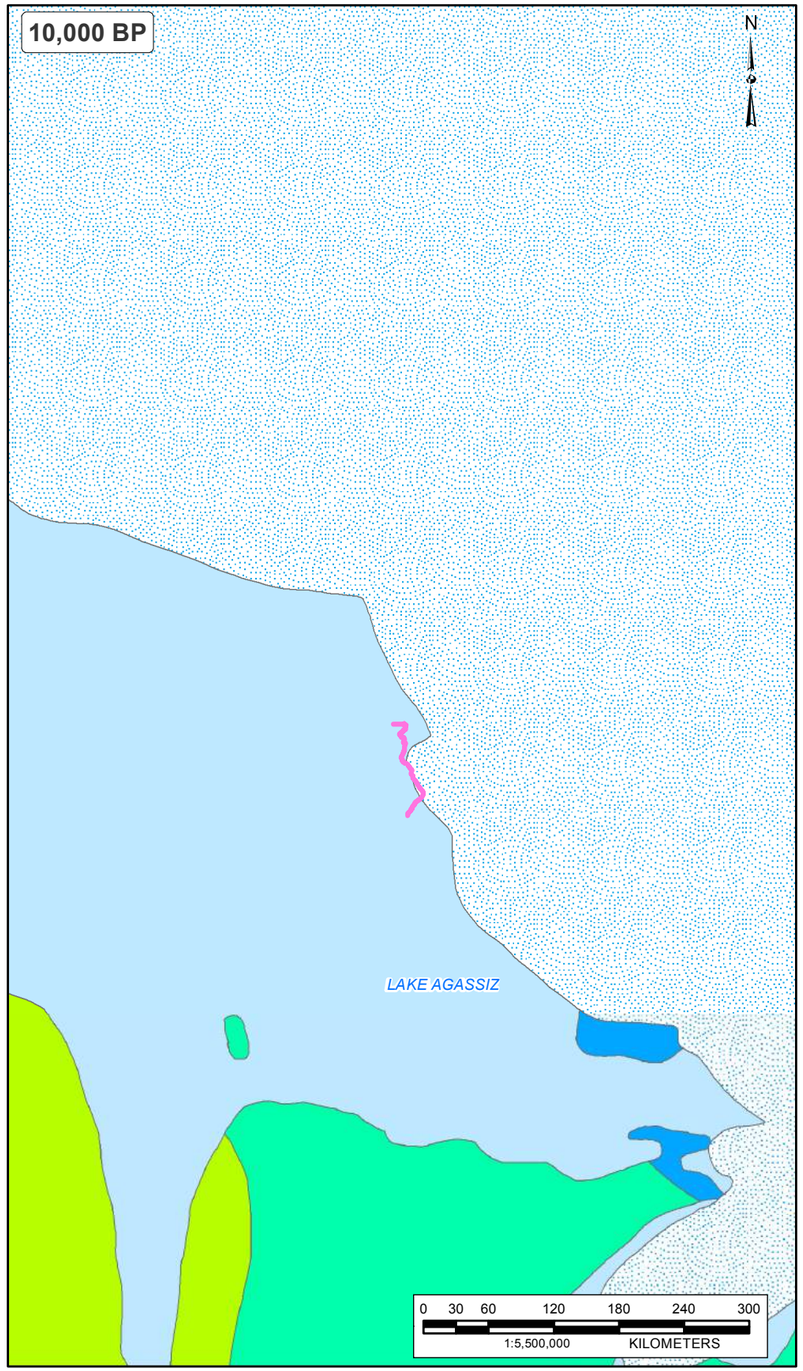
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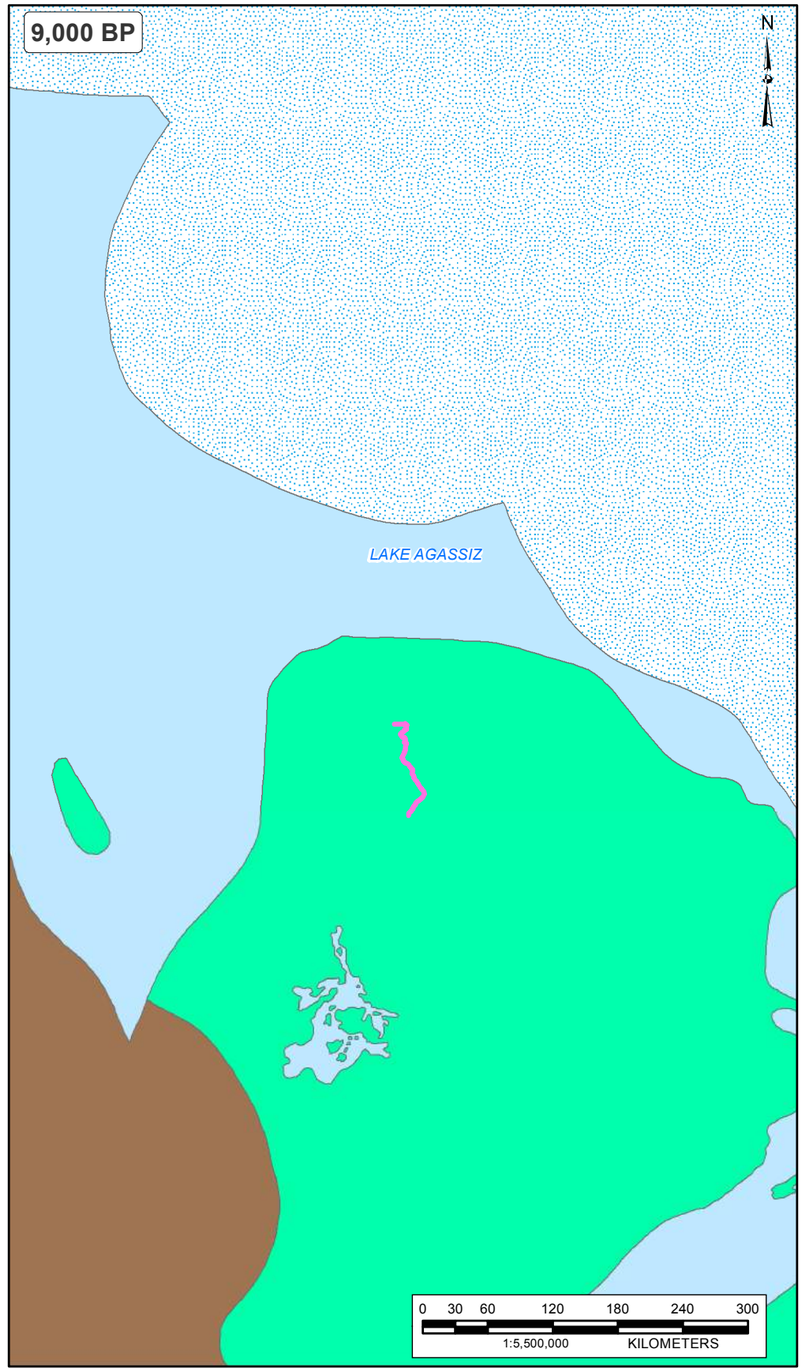
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LEGEND

- Shrub Tundra
- Forest Tundra
- Boreal Forest
- Boreal Parkland
- Grassland
- Ice
- Water
- Project Limits of Work

REFERENCES

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. PALEO-ENVIRONMENTAL RECORDS OF CLIMATE CHANGE ACROSS CANADA VEGETATION HISTORY, GLACIATED NORTH AMERICA. NATURAL RESOURCES CANADA, EARTH SCIENCES SECTOR, CENTRAL AND NORTHERN CANADA BRANCH - GEOLOGICAL SURVEY OF CANADA. 2010-01-28
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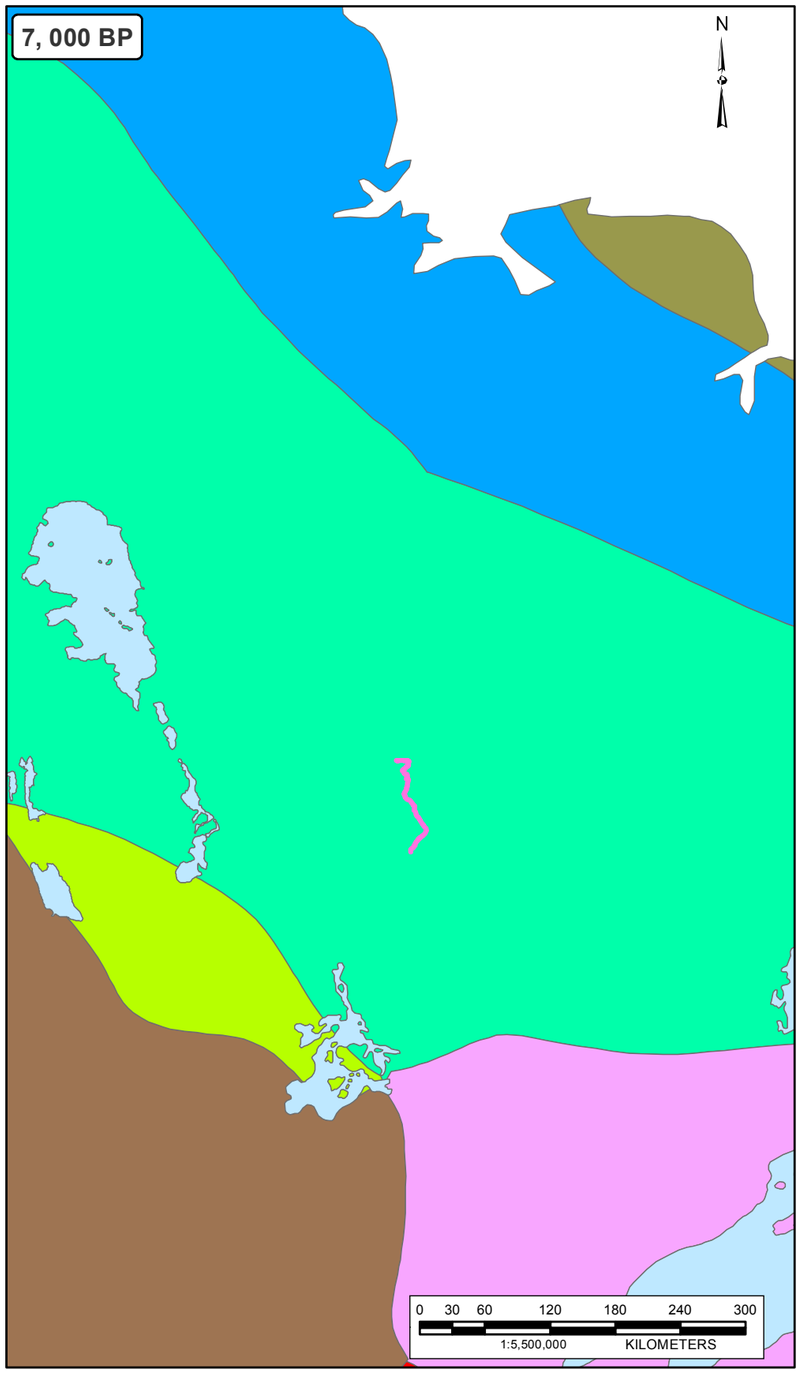
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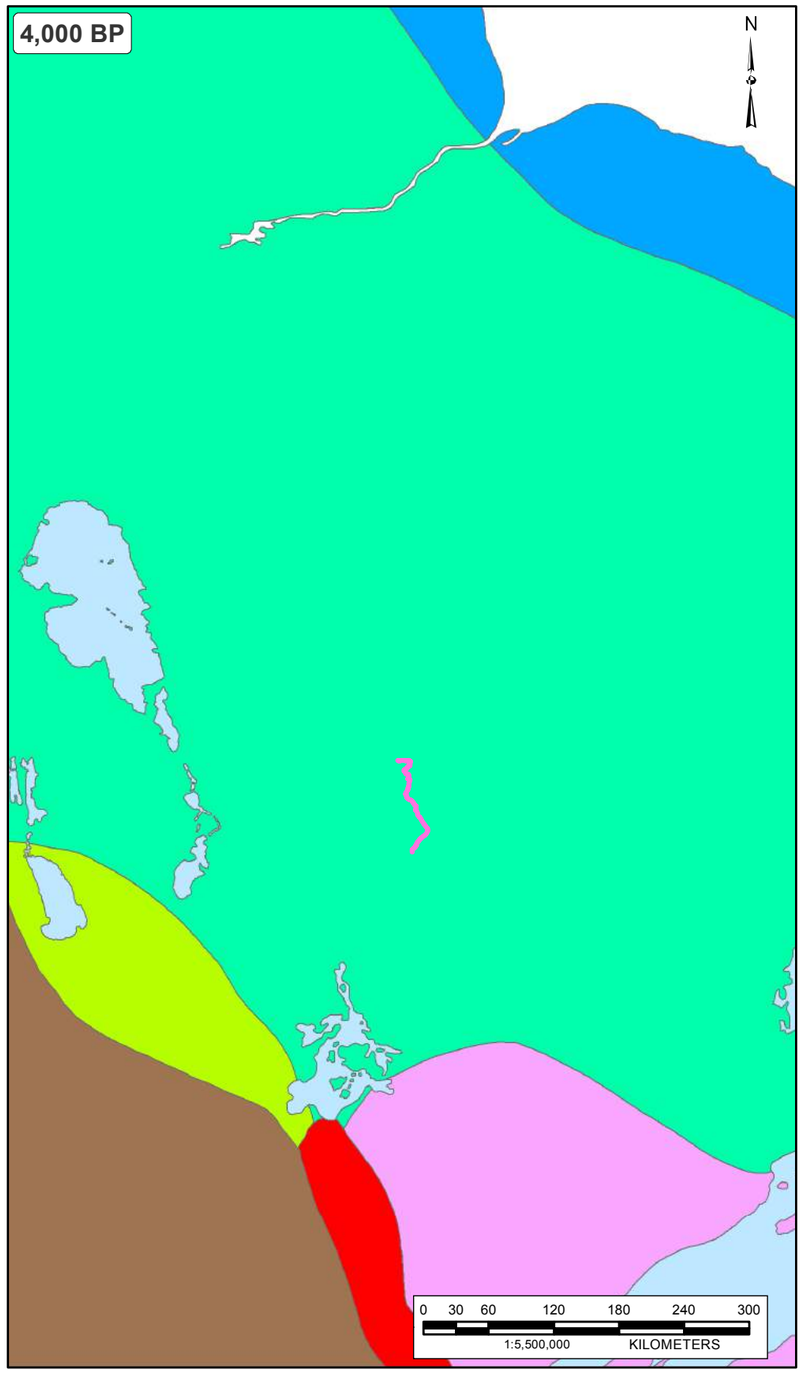
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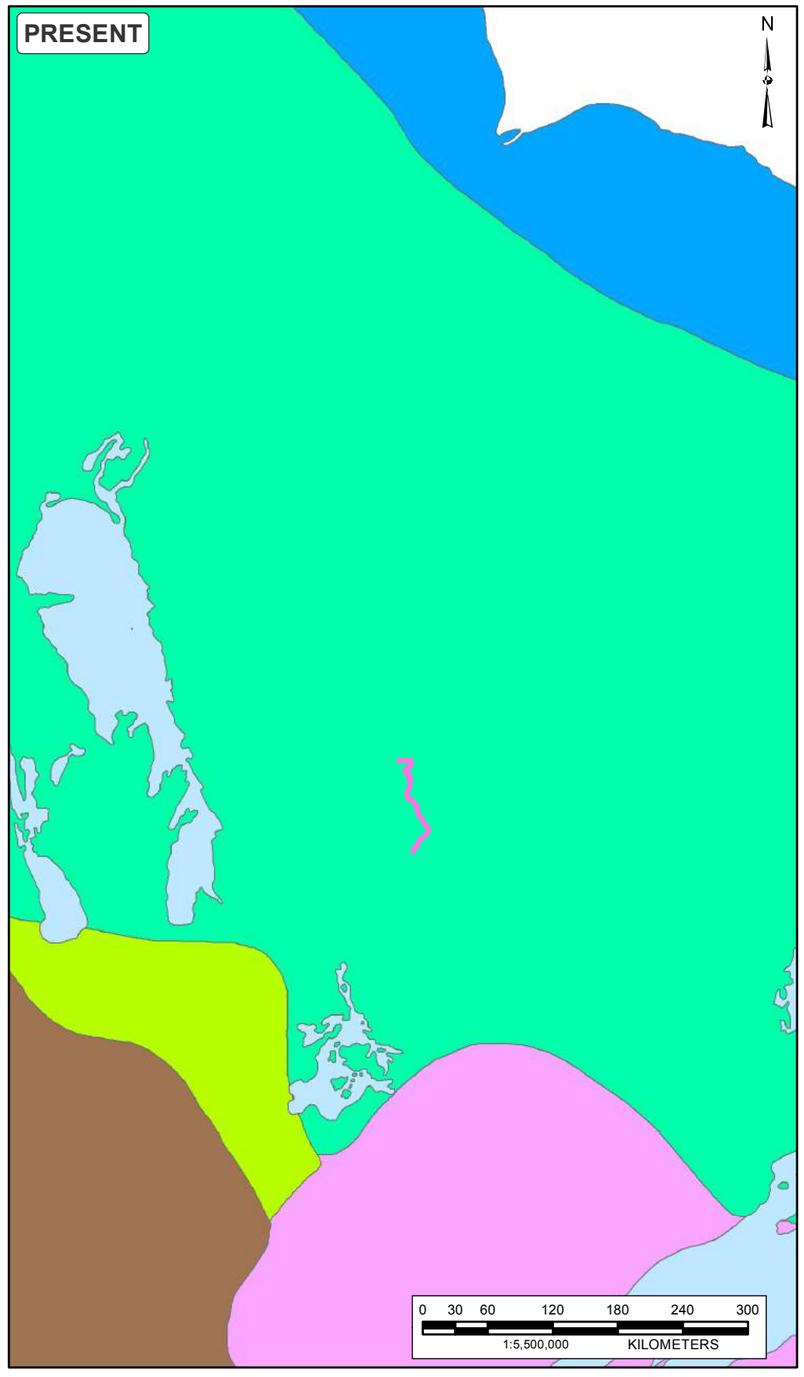
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LEGEND

- Forest Tundra
- Boreal Forest
- Boreal Parkland
- Mixed Forest
- Grassland
- Water
- Project Limits of Work

REFERENCES

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. PALEO-ENVIRONMENTAL RECORDS OF CLIMATE CHANGE ACROSS CANADA VEGETATION HISTORY, GLACIATED NORTH AMERICA. NATURAL RESOURCES CANADA, EARTH SCIENCES SECTOR, CENTRAL AND NORTHERN CANADA BRANCH - GEOLOGICAL SURVEY OF CANADA. 2010-01-28
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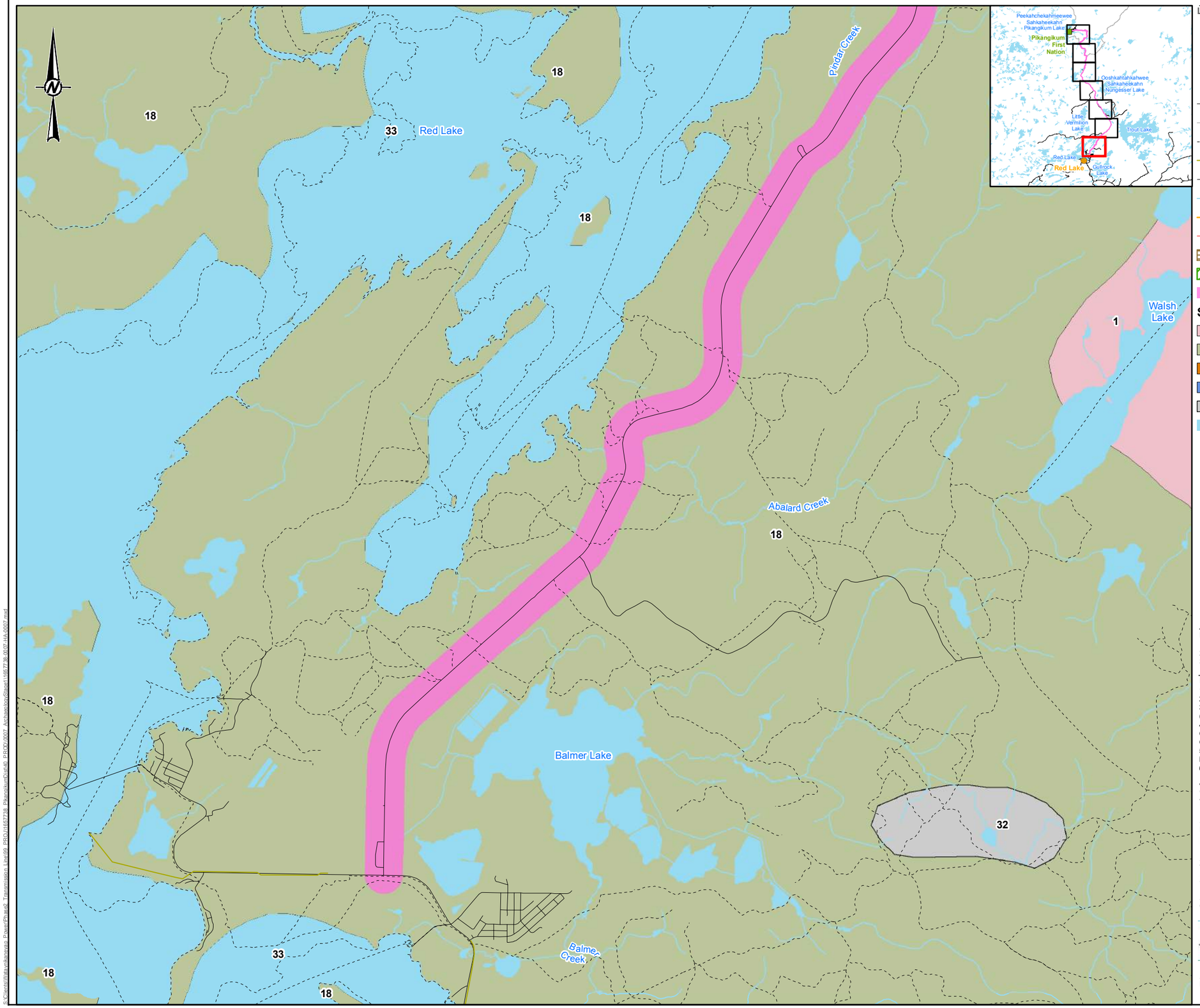
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PROJECT NO.	PHASE	REV.	MAP
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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Watercourse
- Trend of end moraine crest
- Area of DeGeer or minor moraine forms
- First Nation Reserve Land
- Provincial Parks
- Project Limits of Work

Surficial Geology (1:1,000,000)

- 1: Bedrock
- 18: Till
- 22: Glaciofluvial Ice
- 24: Glaciolacustrine deposits
- 32: Organic Deposits
- 33: Lakes

0 0.5 1 2 3

1:50,000 KILOMETERS

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1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.
2. ALL LOCATIONS ARE APPROXIMATE.
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REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
4. SURFICIAL GEOLOGY (1:1,000,000) - ONTARIO GEOLOGICAL SURVEY, 1997. QUATERNARY GEOLOGY, SEAMLESS COVERAGE OF THE PROVINCE OF ONTARIO: ONTARIO GEOLOGICAL SURVEY, DATA SET 14.
5. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2008
6. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

SURFICIAL GEOLOGY

CONSULTANT

Wataynikaneyap Power

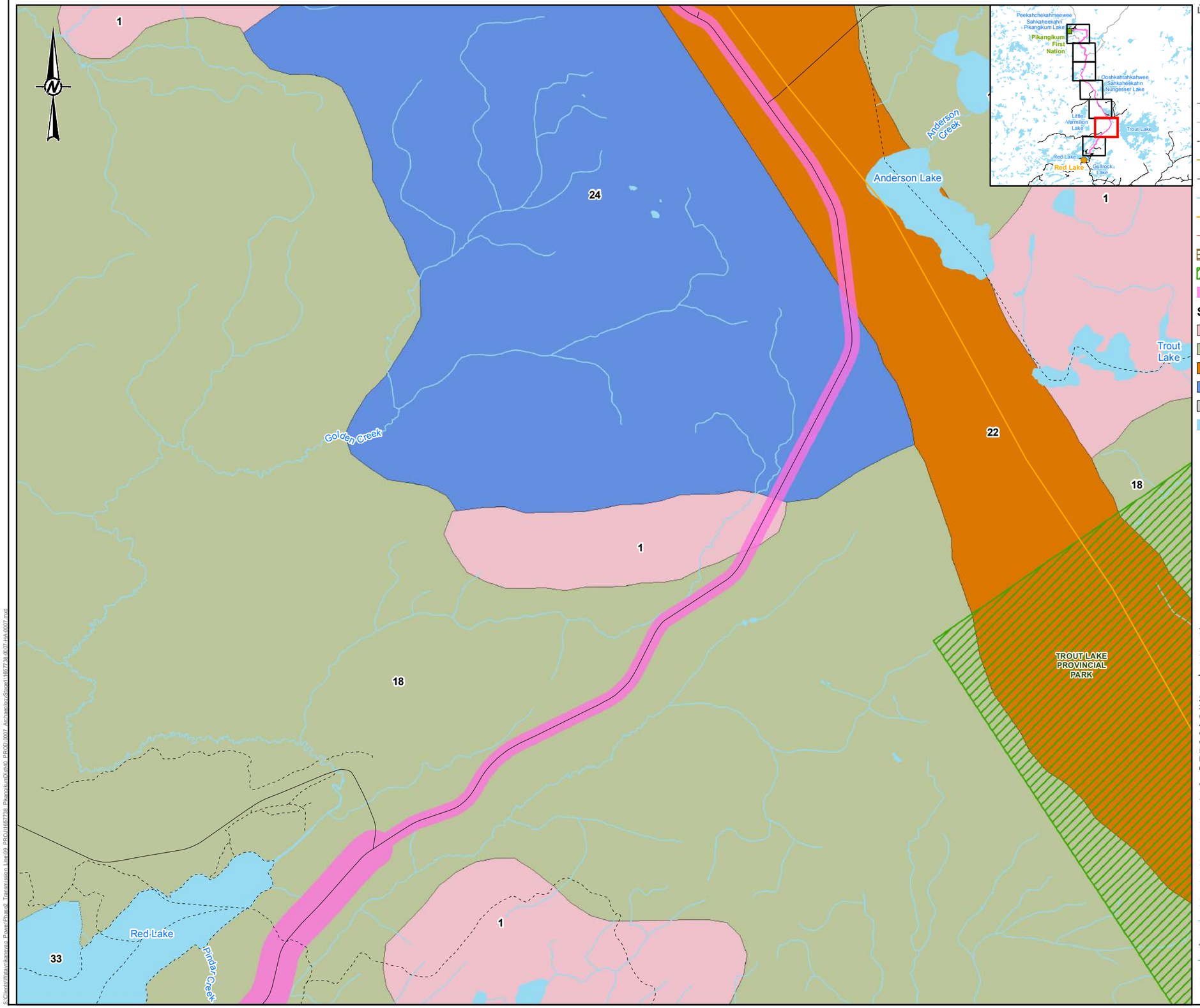
Golder Associates

YYYY-MM-DD	2017-04-10
DESIGNED	PR
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**7-1**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Watercourse
- Trend of end moraine crest
- Area of DeGeer or minor moraine forms
- First Nation Reserve Land
- Provincial Parks
- Project Limits of Work

Surficial Geology (1:1,000,000)

- 1: Bedrock
- 18: Till
- 22: Glaciofluvial Ice
- 24: Glaciolacustrine deposits
- 32: Organic Deposits
- 33: Lakes

0 0.5 1 2 3

1:50,000 KILOMETERS

NOTE(S)

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CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
SURFICIAL GEOLOGY

CONSULTANT

Wataynikaneyap Power

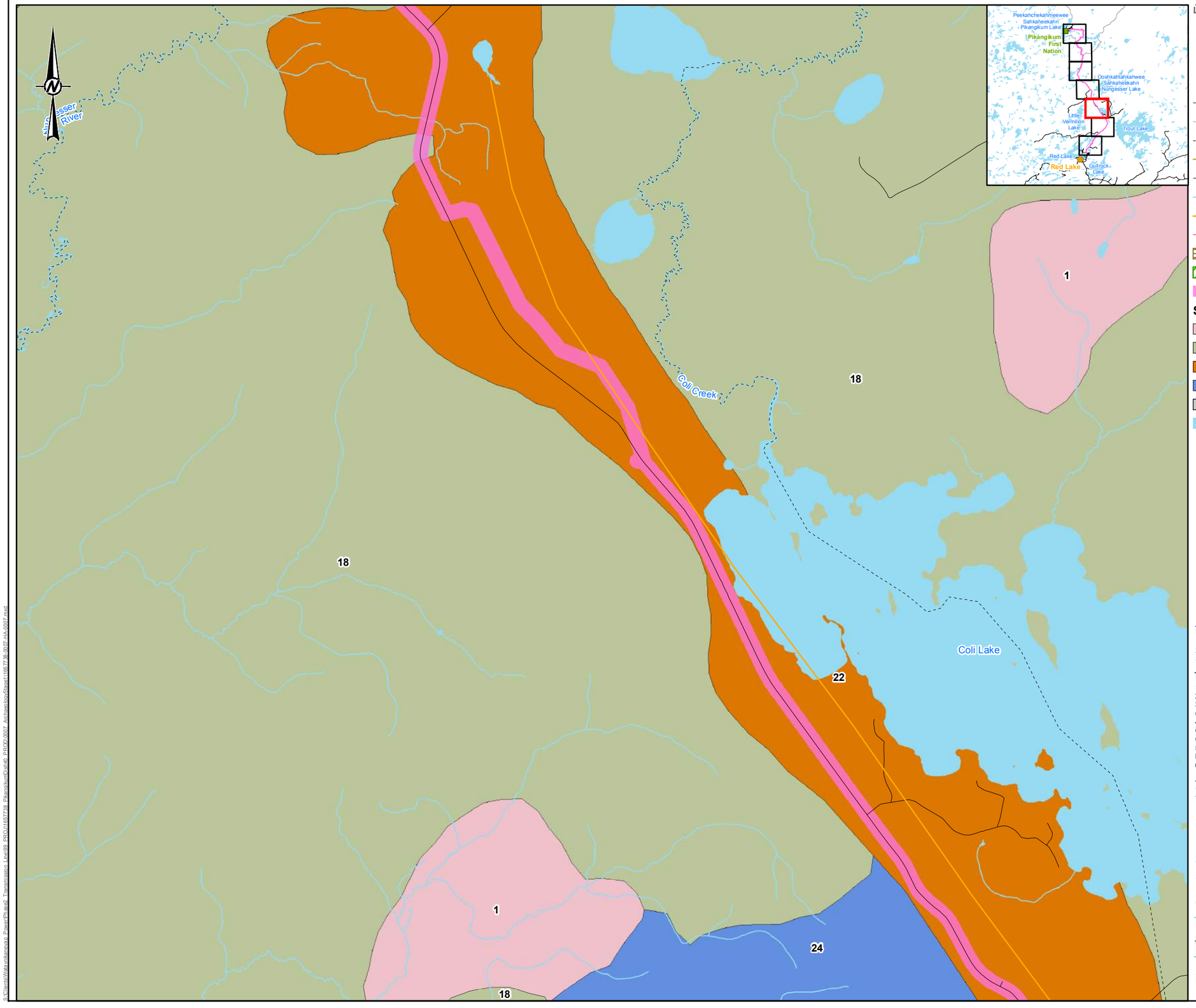
Golder Associates

YYYY-MM-DD	2017-04-10
DESIGNED	PR
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**7-2**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
25mm
0

S:\Clients\Wataynikaneyap Power\Projects\2 Transmission Line\09 PROJ\1657738 Pikangikum\Cad\MXD\1657738_00GIS-HA-0007.mxd



LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Watercourse
- Trend of end moraine crest
- Area of DeGeer or minor moraine forms
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CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
SURFICIAL GEOLOGY

CONSULTANT

Wataynikaneyap Power

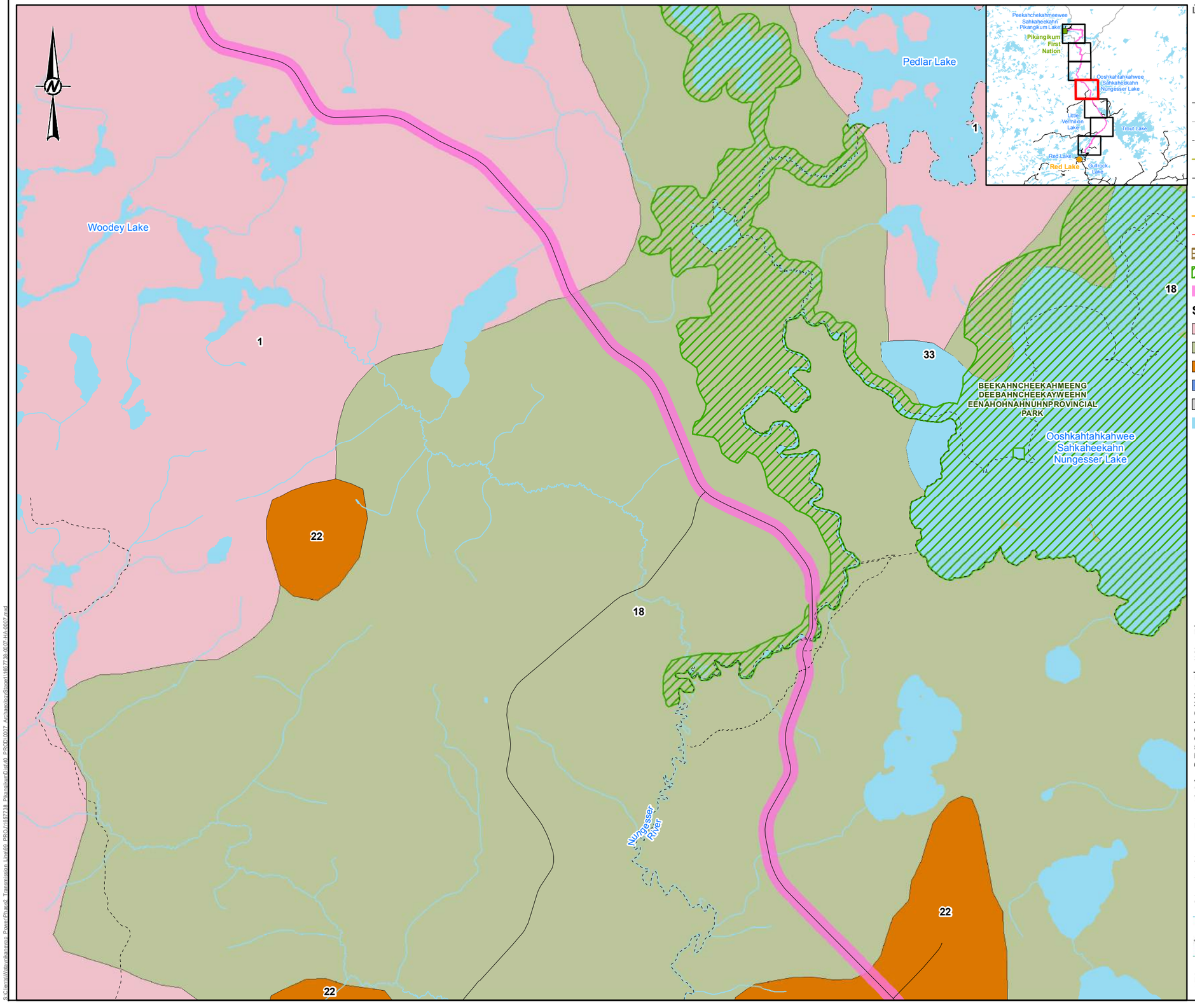
Golder Associates

YYYY-MM-DD	2017-04-10
DESIGNED	PR
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**7-3**

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Watercourse
- Trend of end moraine crest
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CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
SURFICIAL GEOLOGY

CONSULTANT

Wataynikaneyap Power

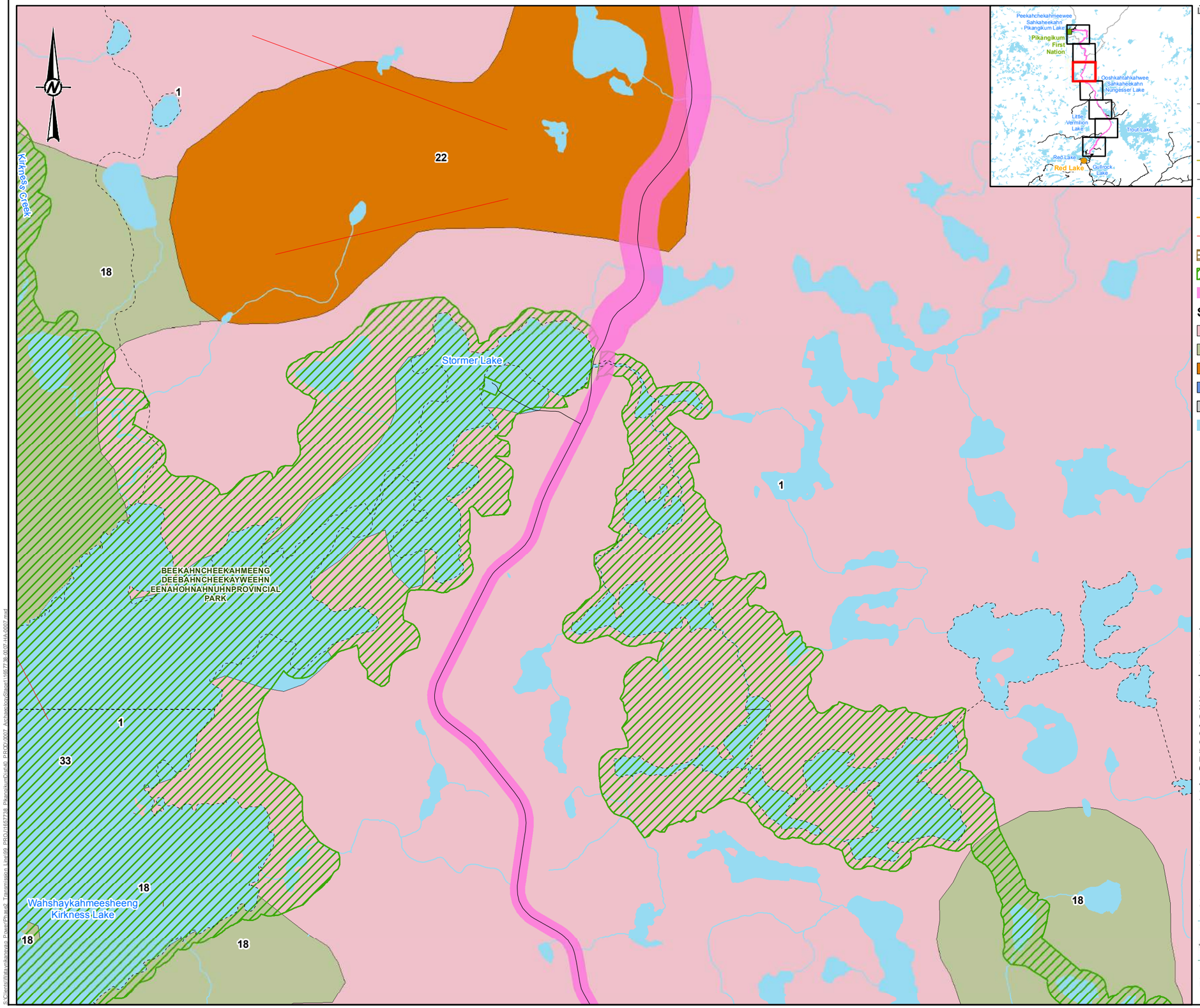
Golder Associates

YYYY-MM-DD	2017-04-10
DESIGNED	PR
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**7-4**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm 0

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Watercourse
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- 33: Lakes

0 0.5 1 2 3

1:50,000 KILOMETERS

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CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

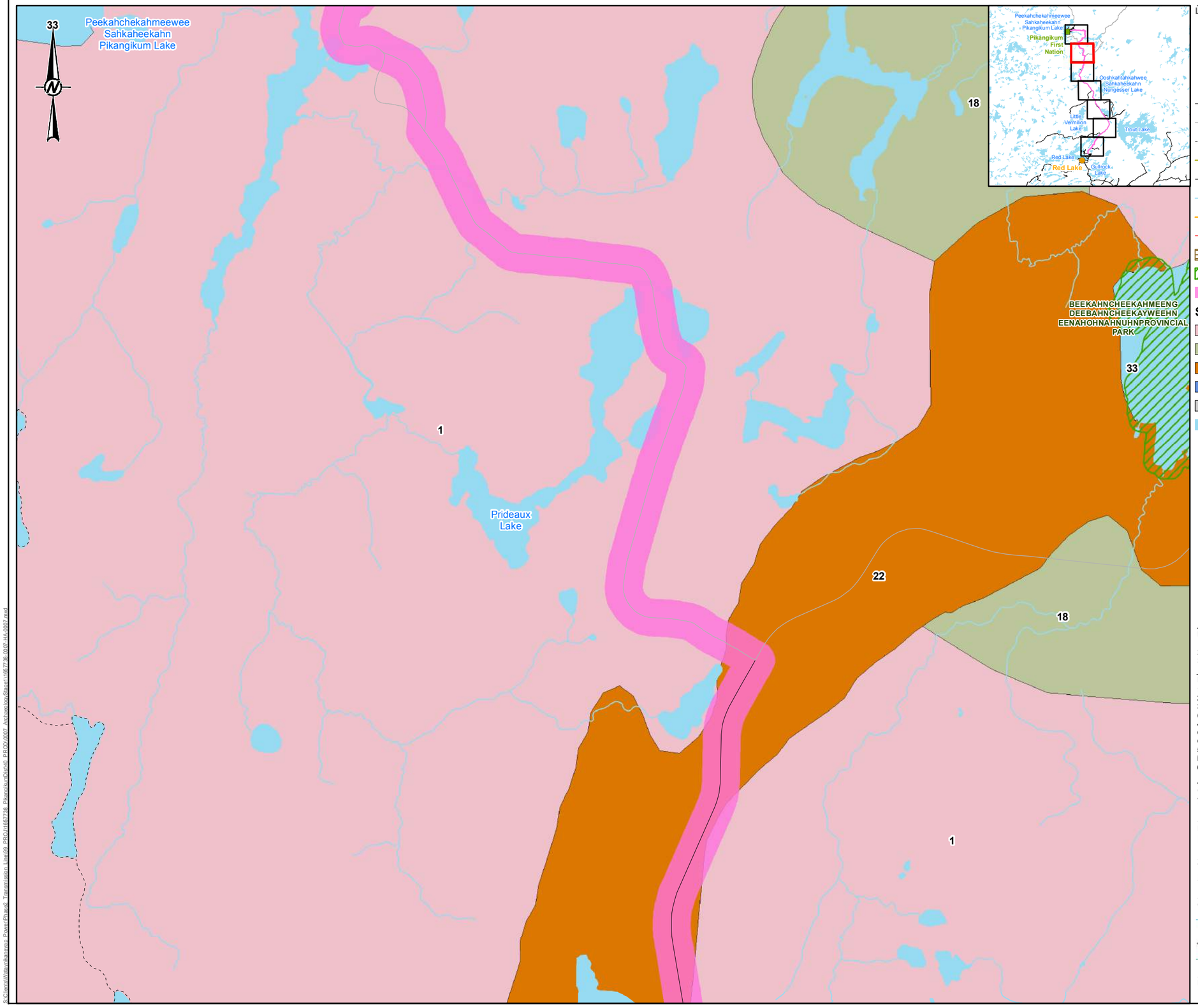
SURFICIAL GEOLOGY

CONSULTANT		
	YYYY-MM-DD	2017-04-10
	DESIGNED	PR
	PREPARED	PR/JMC
	REVIEWED	AM/BD
	APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**7-5**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
25mm
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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Watercourse
- Trend of end moraine crest
- Area of DeGeer or minor moraine forms
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Surficial Geology (1:1,000,000)

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CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
SURFICIAL GEOLOGY

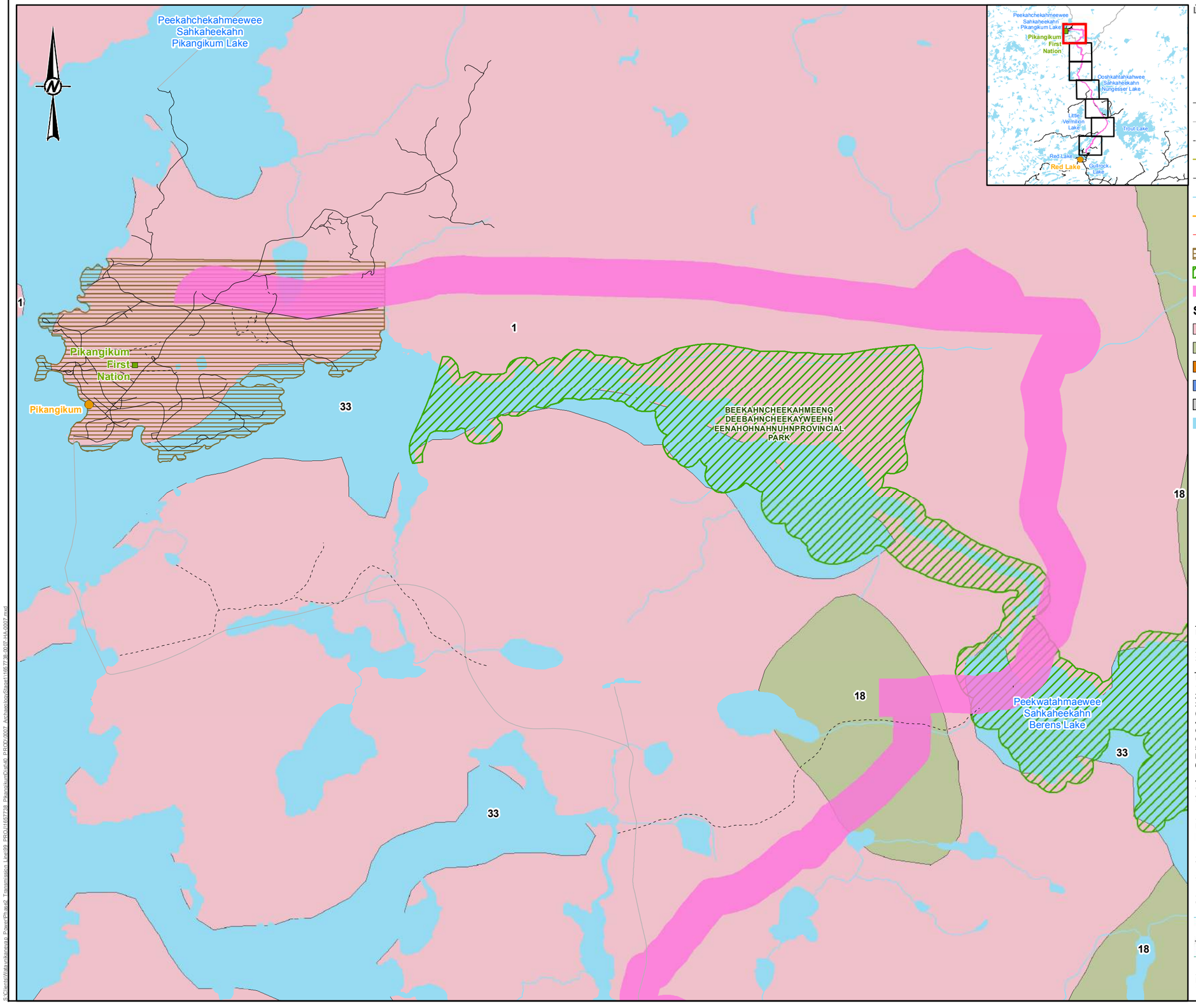
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YYYY-MM-DD	2017-04-10
DESIGNED	PR
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**7-6**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Watercourse
- Trend of end moraine crest
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- Project Limits of Work

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CLIENT
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PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
SURFICIAL GEOLOGY

CONSULTANT

Wataynikaneyap Power

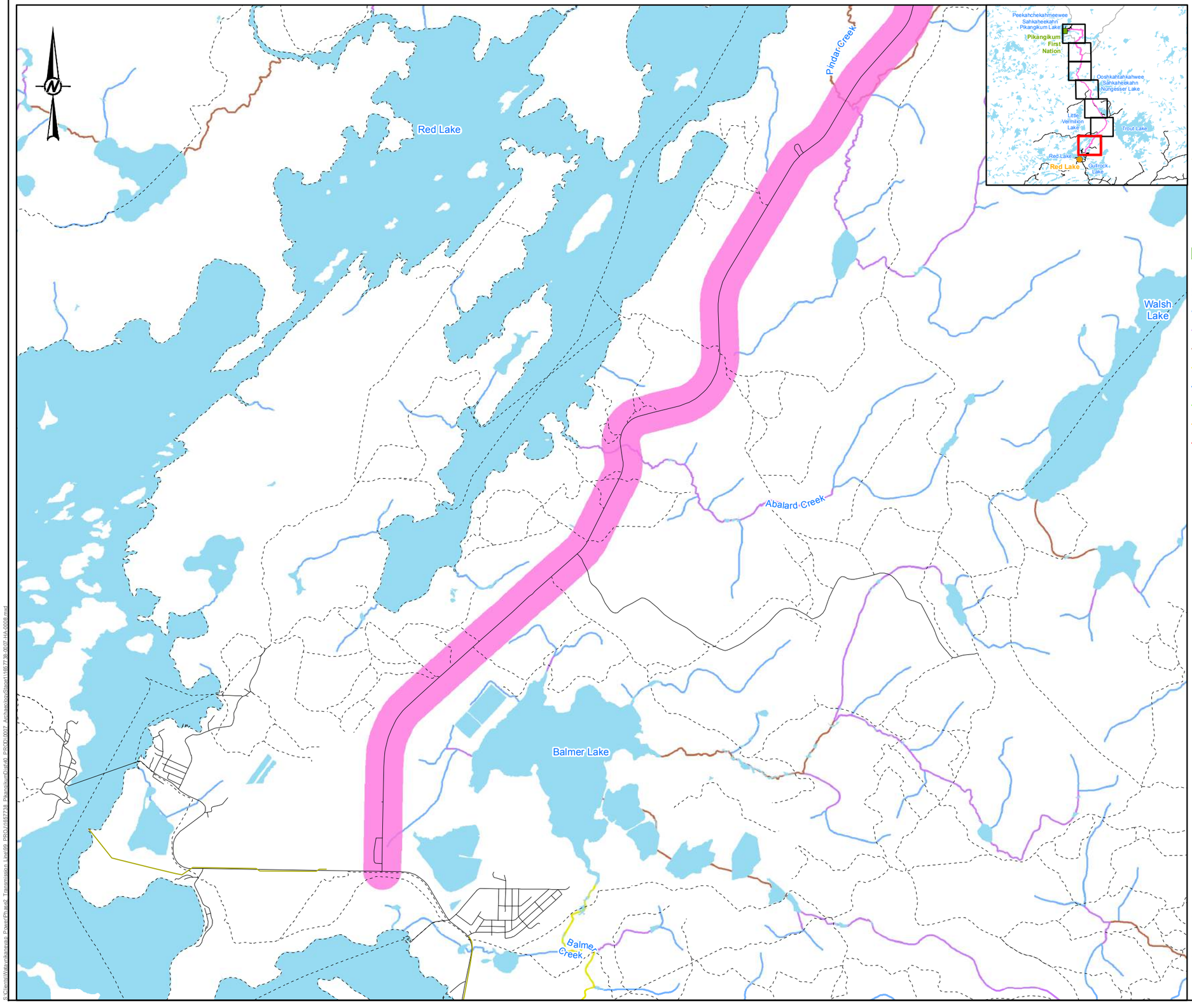
Golder Associates

YYYY-MM-DD	2017-04-10
DESIGNED	PR
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**7-7**

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Waterbody
- First Nation Reserve Land
- Conservation Reserve
- Provincial Parks
- Project Limits of Work

Stream Order

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8

0 0.5 1 2 3

1:50,000 KILOMETERS

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CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

MNRF ENHANCED FLOW DIRECTION GRID ARCHYDRO STREAM ORDER

CONSULTANT

Wataynikaneyap Power

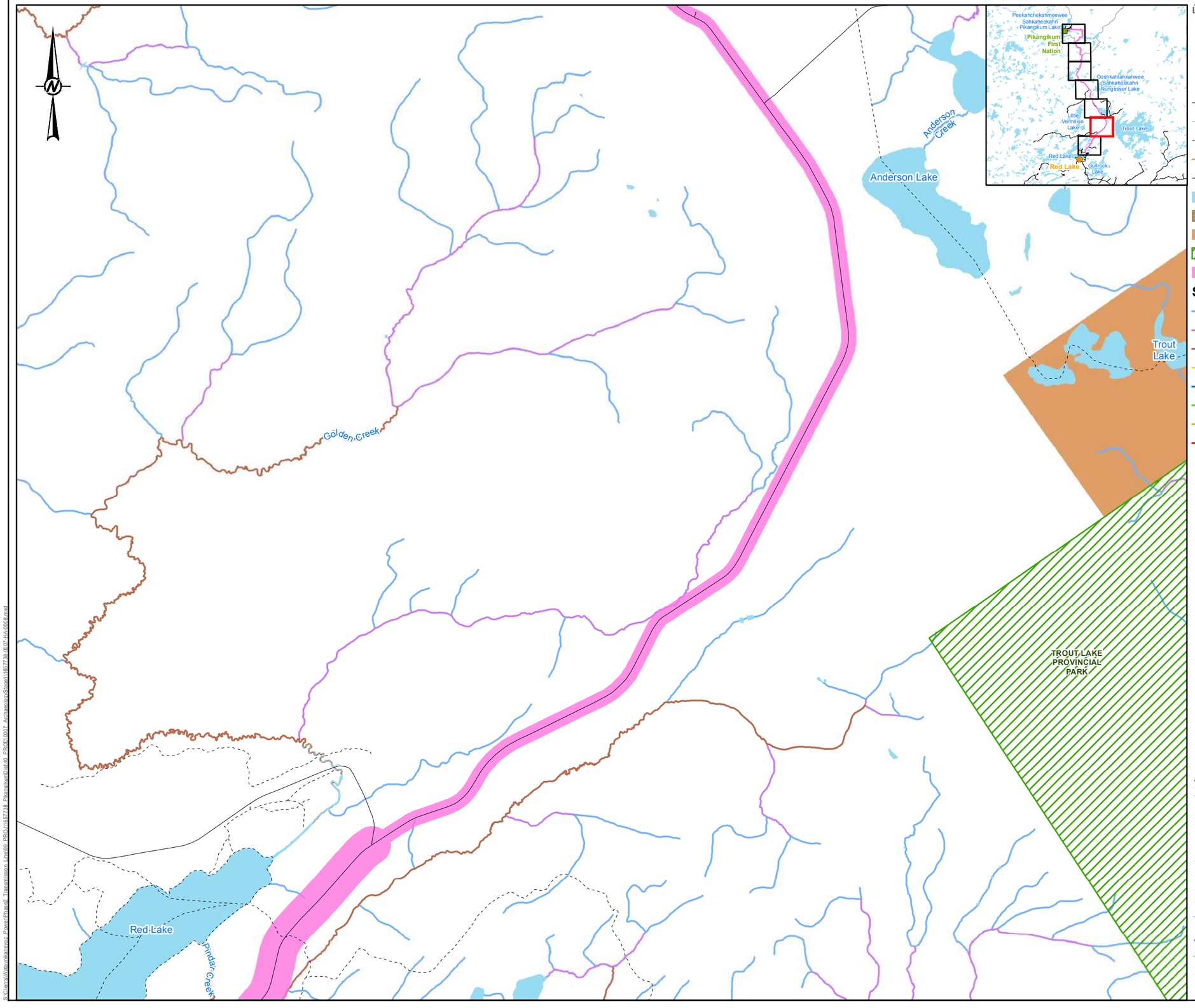
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YYYY-MM-DD	2017-04-17
DESIGNED	PR
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**8-1**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm 0

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Waterbody
- First Nation Reserve Land
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Stream Order

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CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

MNRF ENHANCED FLOW DIRECTION GRID ARCHYDRO STREAM ORDER

CONSULTANT

Wataynikaneyap Power

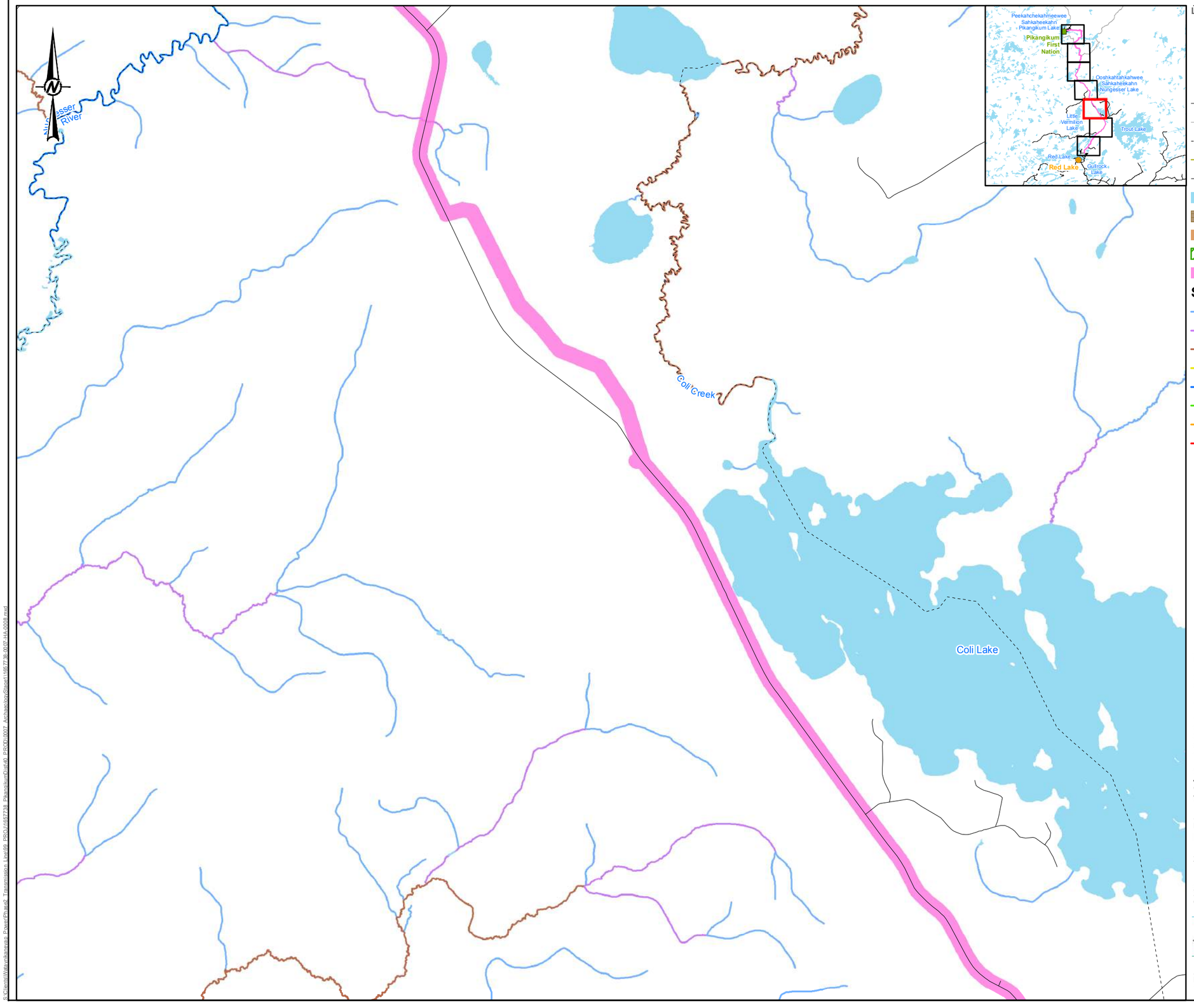
Golder Associates

YYYY-MM-DD	2017-04-17
DESIGNED	PR
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APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**8-2**

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Waterbody
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Stream Order

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CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

MNRF ENHANCED FLOW DIRECTION GRID ARCHYDRO STREAM ORDER

CONSULTANT

Wataynikaneyap Power

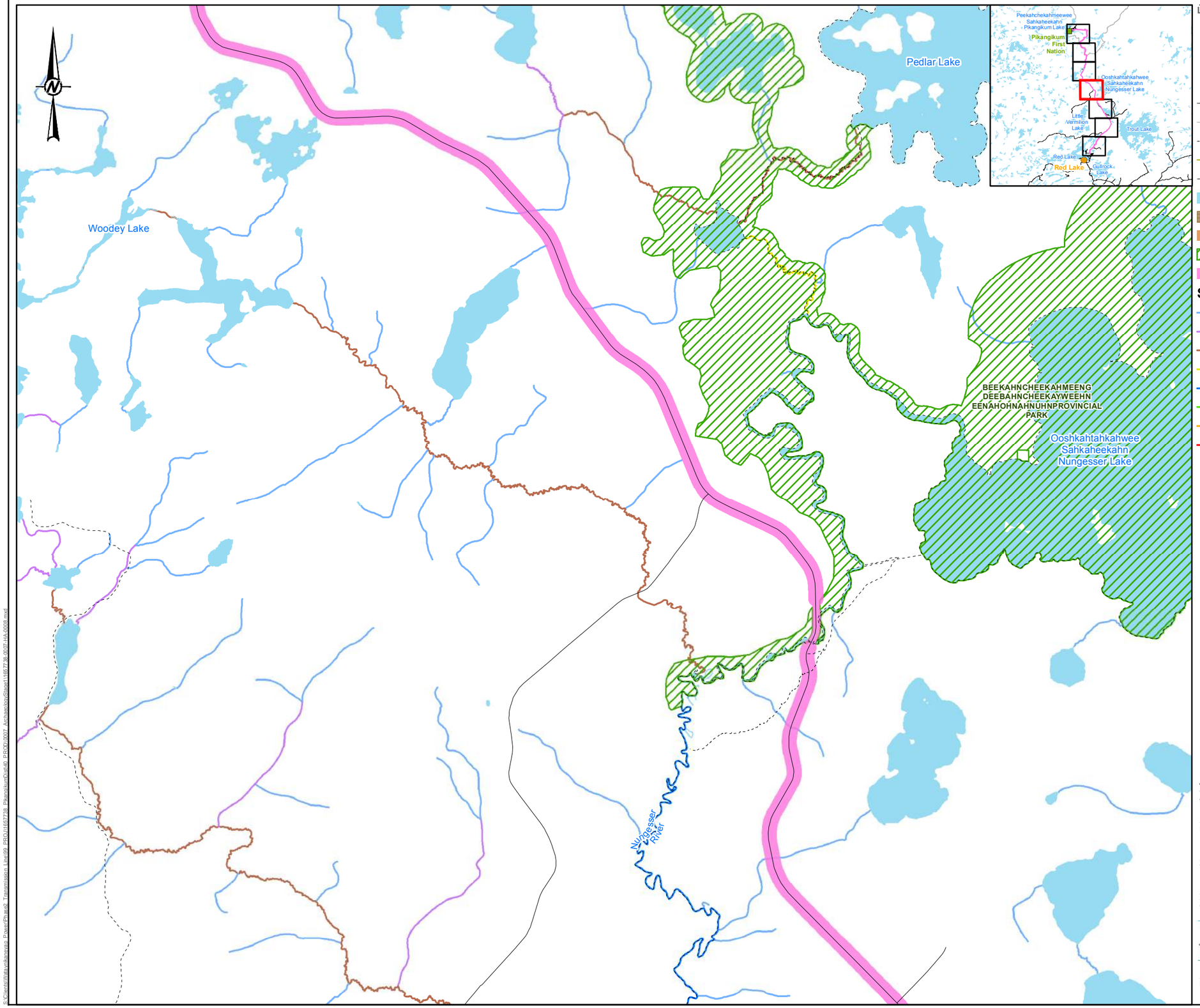
Golder Associates

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PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**8-3**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Waterbody
- First Nation Reserve Land
- Conservation Reserve
- Provincial Parks
- Project Limits of Work

Stream Order

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8

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1:50,000 KILOMETERS

NOTE(S)

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REFERENCE(S)

1. BASE DATA - MNR LIO, OBTAINED 2016, NTDB
2. TRANSMISSION ROUTES - PROVIDED BY WATAYNIKANEYAP POWER L.P.
3. FIRST NATION COMMUNITIES FROM INDIGENOUS AND NORTHERN AFFAIRS CANADA (WWW.AINC-INAC.GC.CA)
4. PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2008
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 15

CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

MNRF ENHANCED FLOW DIRECTION GRID ARCHYDRO STREAM ORDER

CONSULTANT

Wataynikaneyap Power

Golder Associates

YYYY-MM-DD	2017-04-17
DESIGNED	PR
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

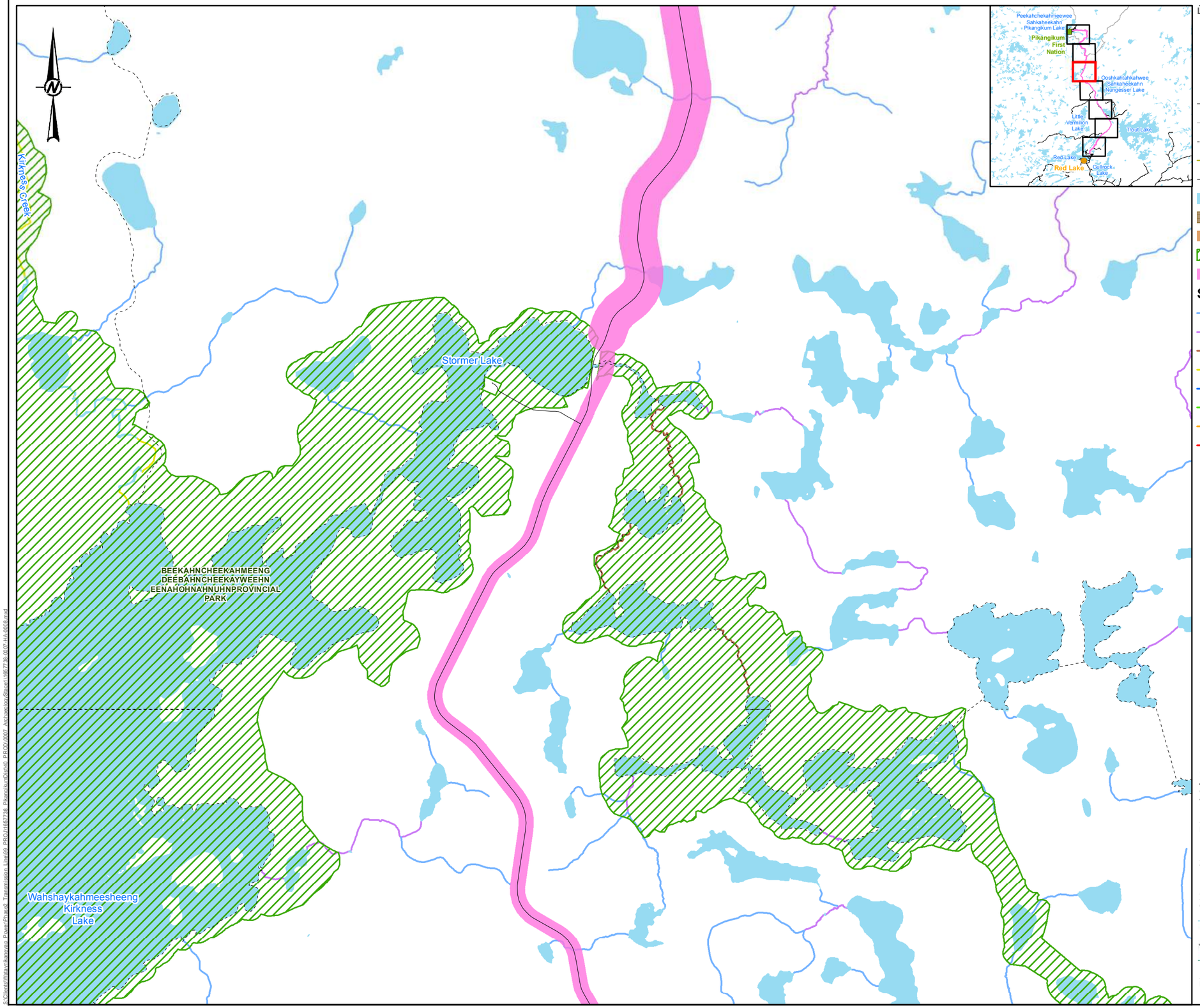
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Waterbody
- First Nation Reserve Land
- Conservation Reserve
- Provincial Parks
- Project Limits of Work

Stream Order

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CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

MNRF ENHANCED FLOW DIRECTION GRID ARCHYDRO STREAM ORDER

CONSULTANT

Wataynikaneyap Power

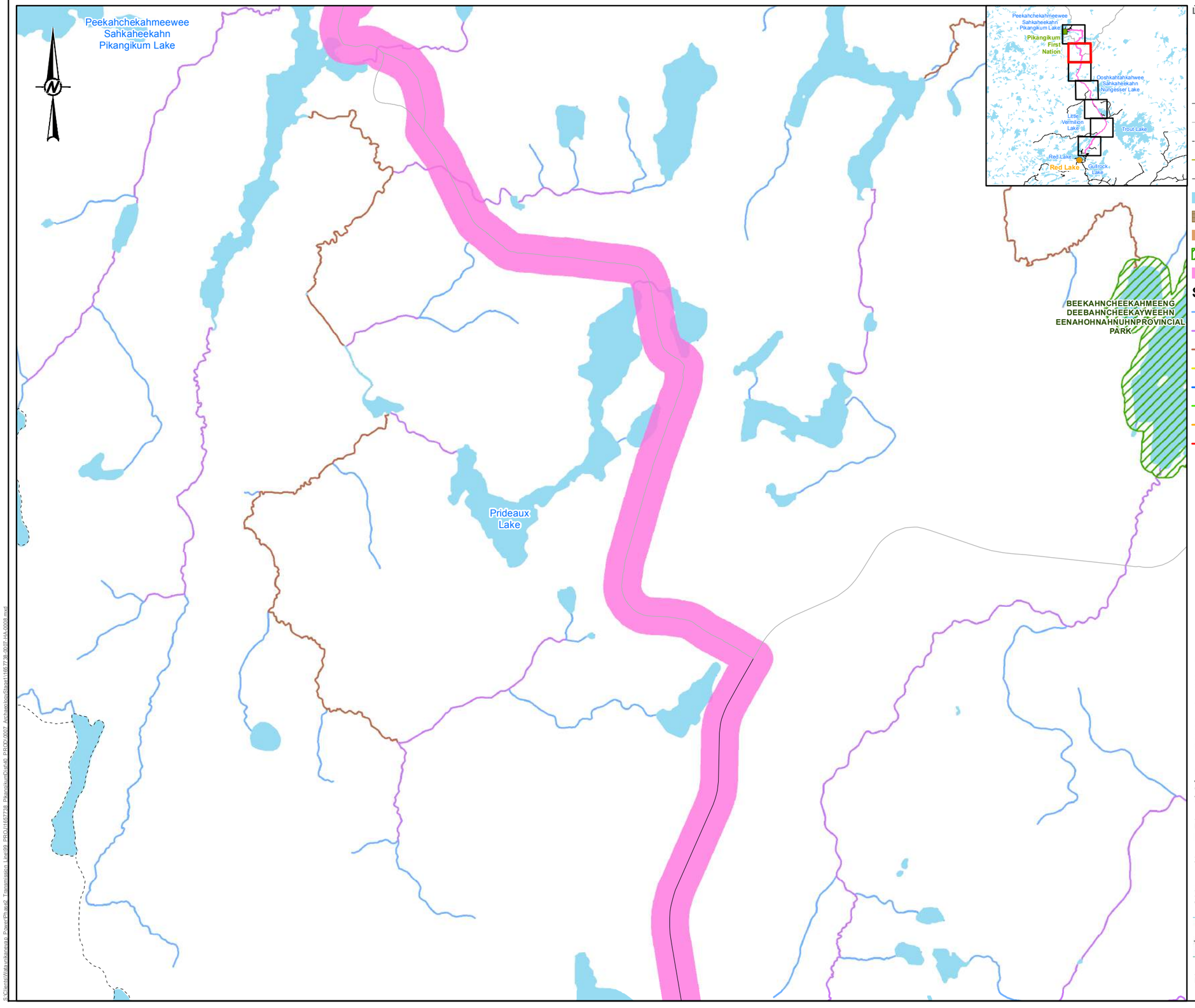
Golder Associates

YYYY-MM-DD	2017-04-17
DESIGNED	PR
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**8-5**

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Waterbody
- First Nation Reserve Land
- Conservation Reserve
- Provincial Parks
- Project Limits of Work

Stream Order

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CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

MNRF ENHANCED FLOW DIRECTION GRID ARCHYDRO STREAM ORDER

CONSULTANT

Wataynikaneyap Power

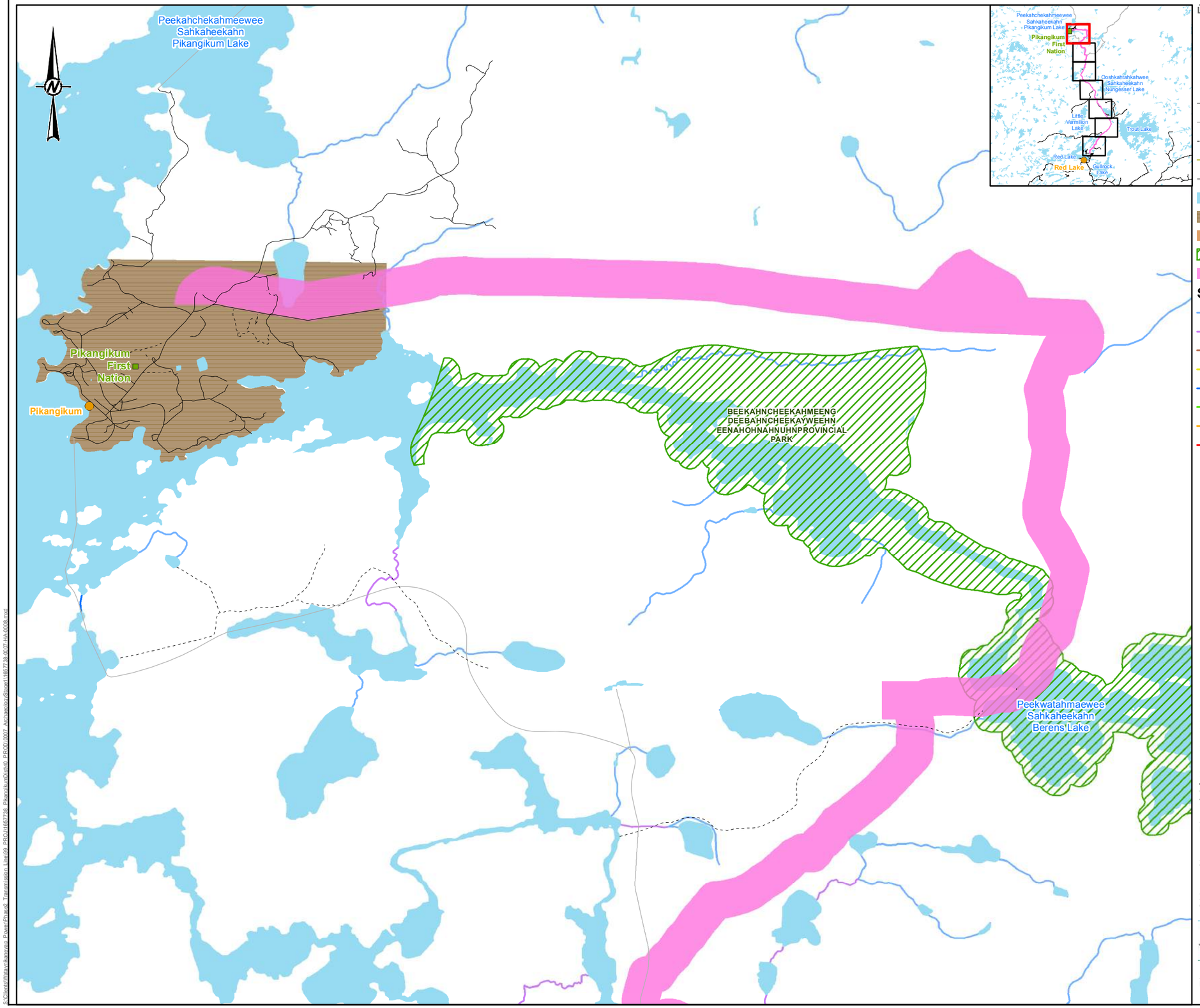
Golder Associates

YYYY-MM-DD	2017-04-17
DESIGNED	PR
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**8-6**

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Waterbody
- First Nation Reserve Land
- Conservation Reserve
- Provincial Parks
- Project Limits of Work

Stream Order

- 1
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CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

MNRF ENHANCED FLOW DIRECTION GRID ARCHYDRO STREAM ORDER

CONSULTANT

Wataynikaneyap Power

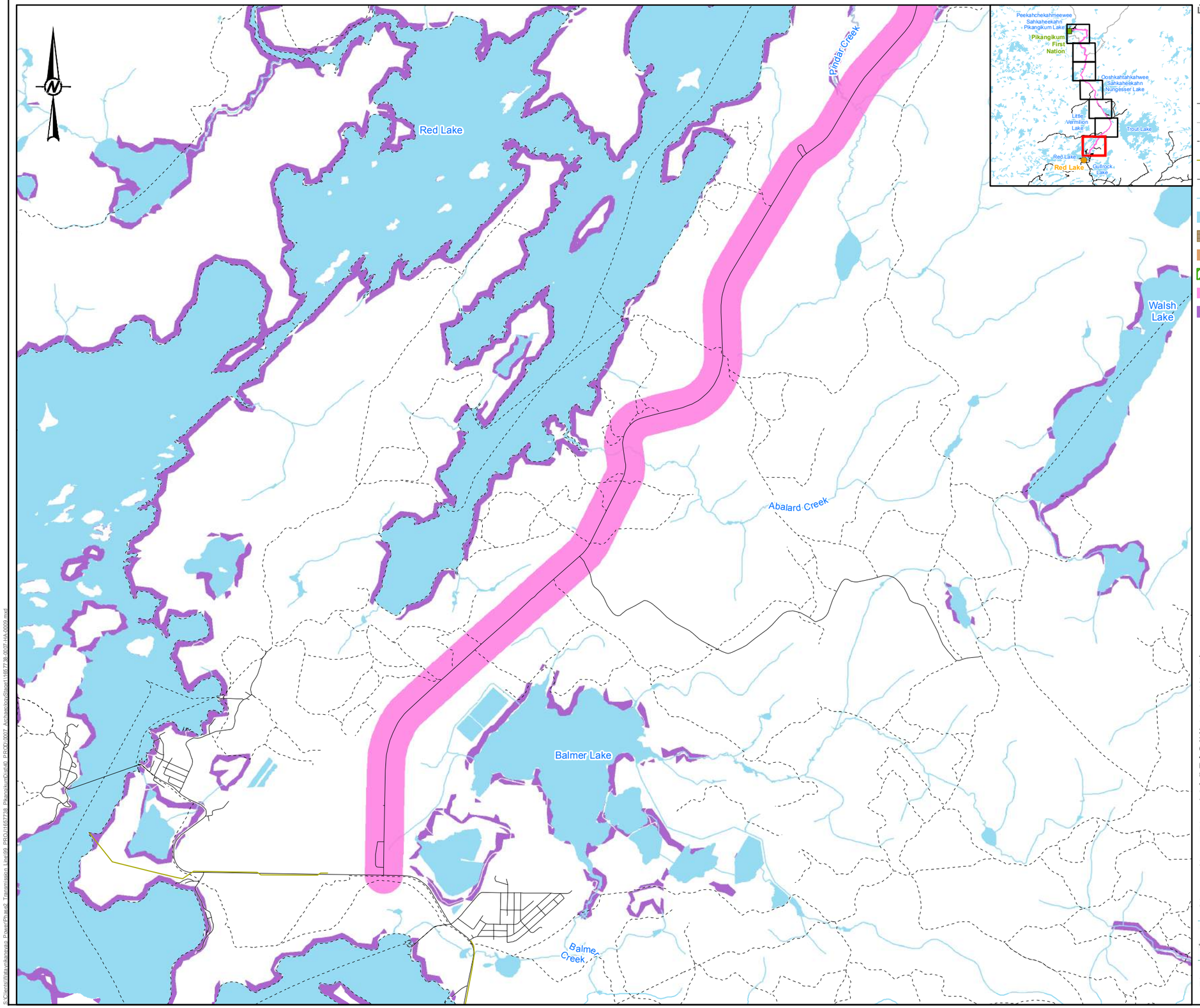
Golder Associates

YYYY-MM-DD	2017-04-17
DESIGNED	PR
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	8-7

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Watercourse
- Waterbody
- First Nation Reserve Land
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- MNRF Archaeological Potential Methods

0 0.5 1 2 3

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CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
MNRF ARCHAEOLOGICAL POTENTIAL

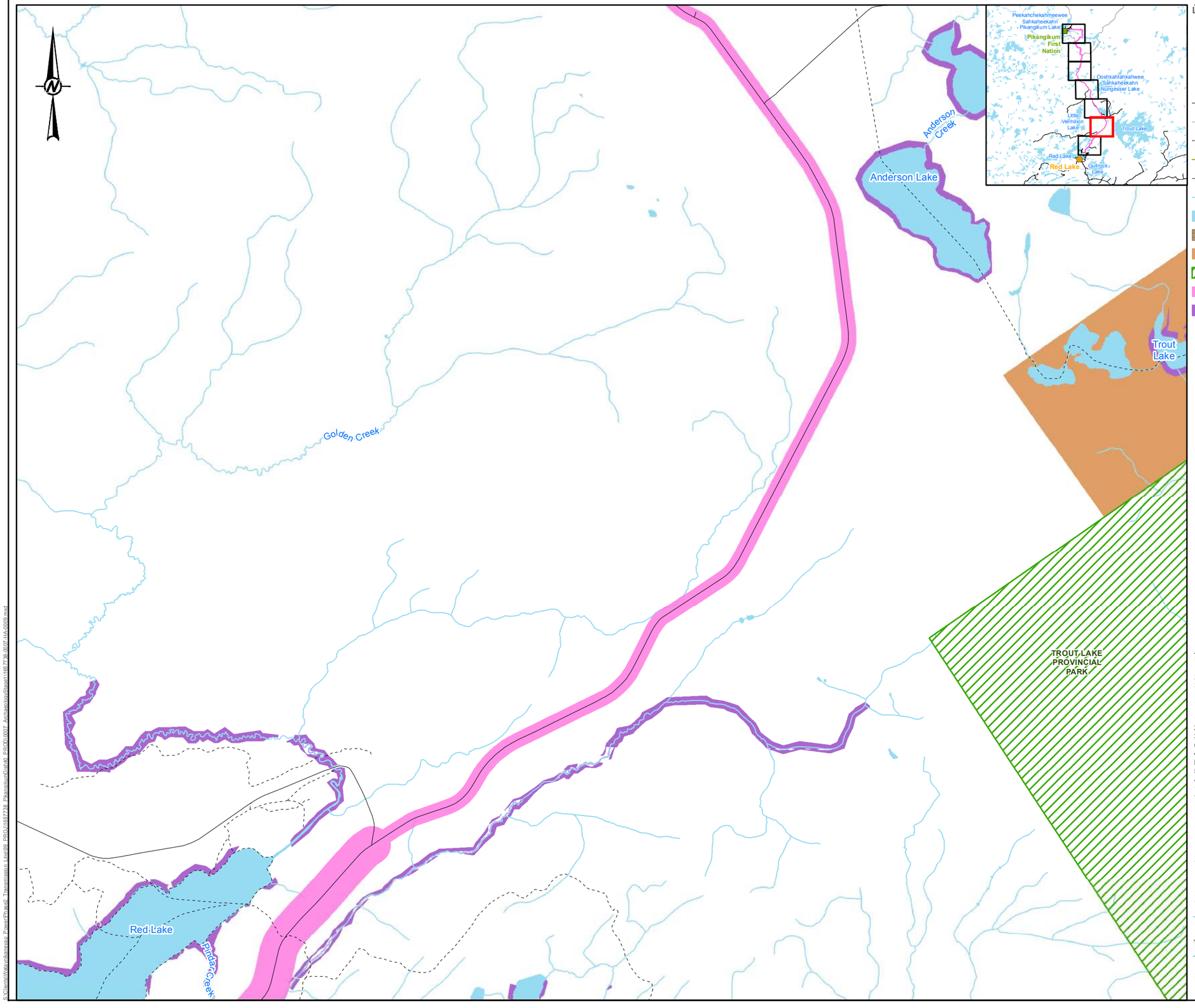
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YYYY-MM-DD	2017-04-17
DESIGNED	PR
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**9-1**

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Watercourse
- Waterbody
- First Nation Reserve Land
- Conservation Reserve
- Provincial Parks
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- MNRF Archaeological Potential Methods

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CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

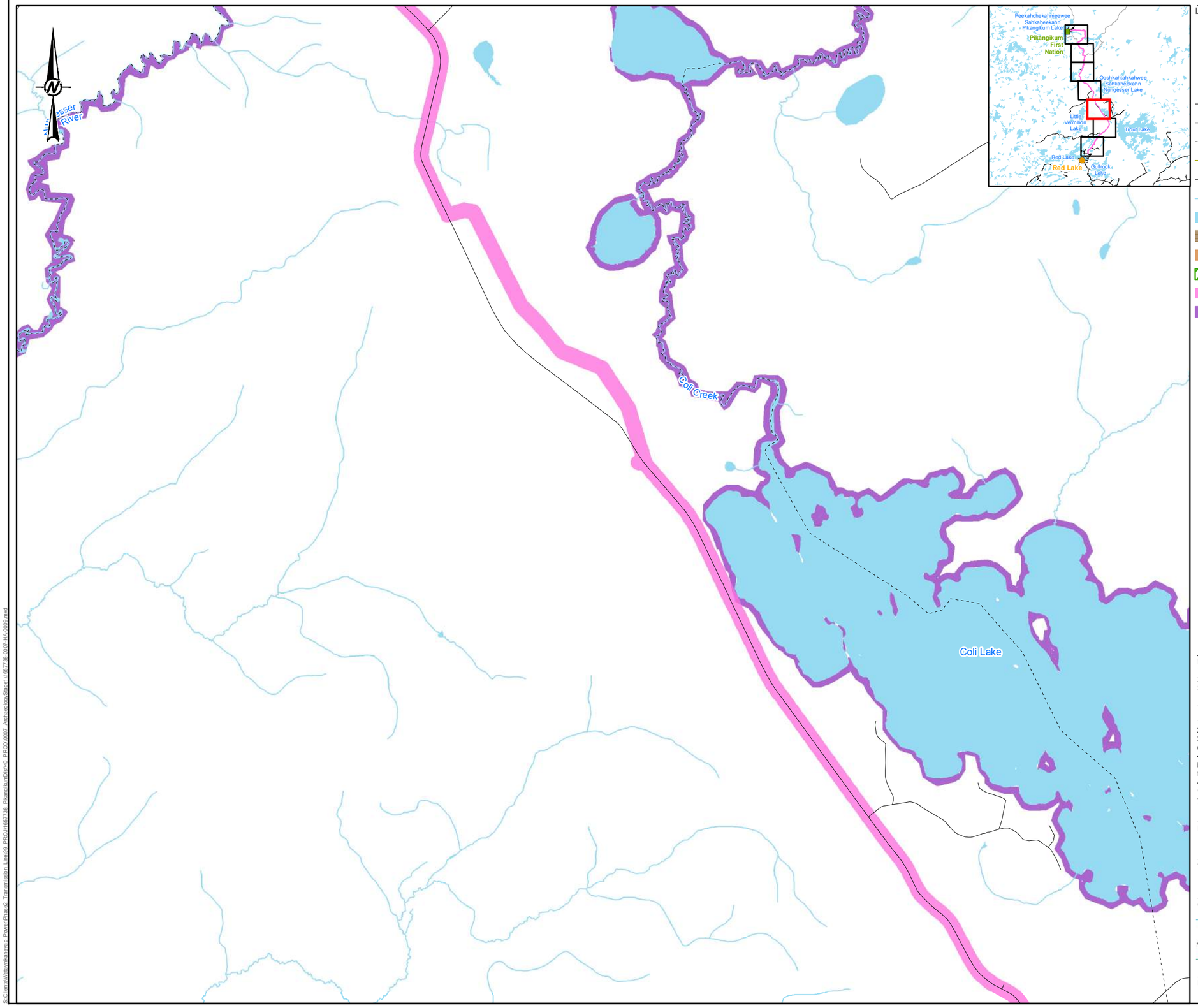
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CONSULTANT			
		YYYY-MM-DD	2017-04-17
		DESIGNED	PR
		PREPARED	PR/JMC
		REVIEWED	AM/BD
		APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**9-2**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm 0

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Watercourse
- Waterbody
- First Nation Reserve Land
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- MNRF Archaeological Potential Methods

0 0.5 1 2 3

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CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
MNRF ARCHAEOLOGICAL POTENTIAL

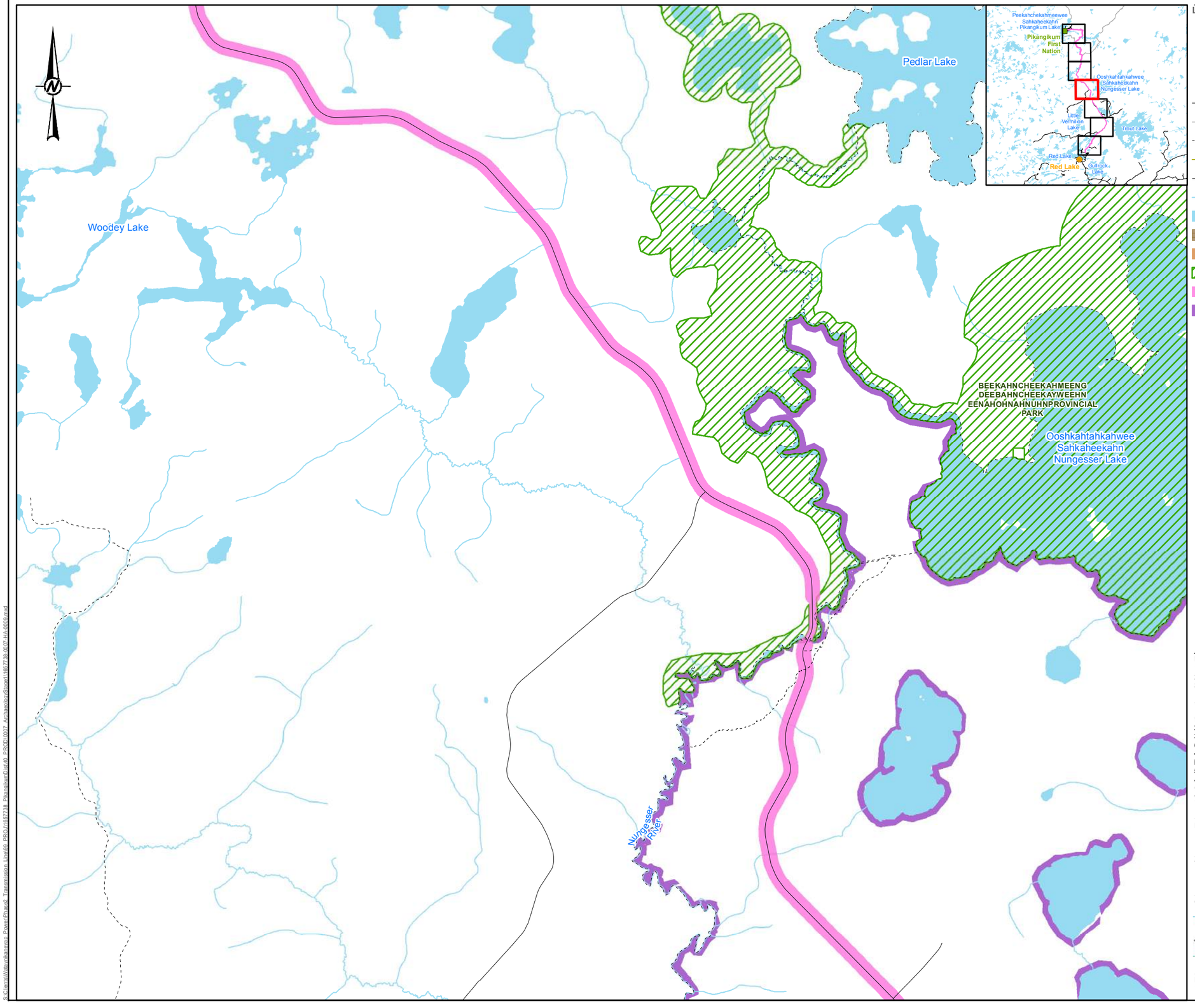
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PREPARED	PR/JMC
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APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**9-3**

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Watercourse
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CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

MNRF ARCHAEOLOGICAL POTENTIAL

CONSULTANT

Wataynikaneyap Power

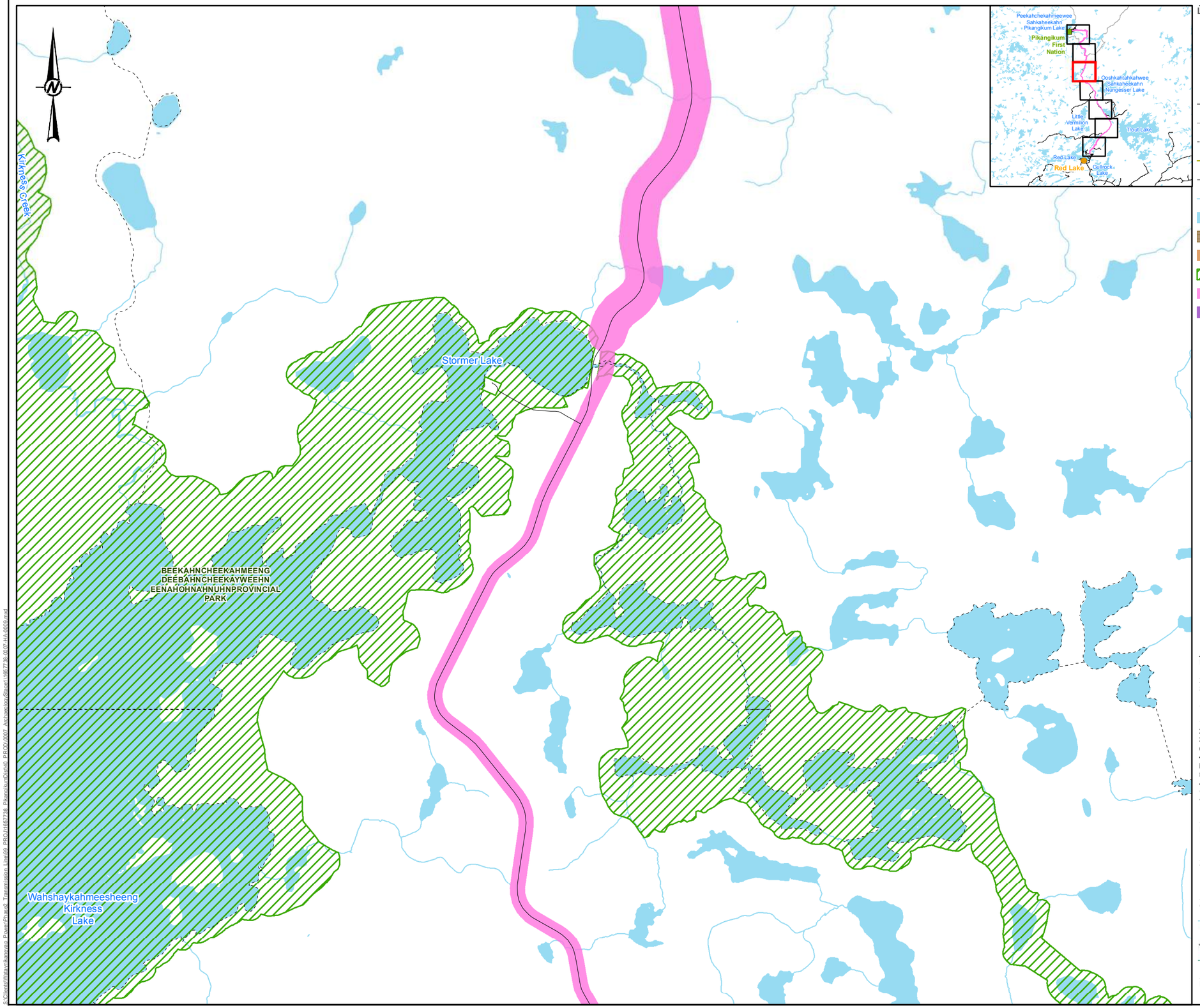
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YYYY-MM-DD	2017-04-17
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APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
1657738	-	-	**9-4**

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
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- Trail
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CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

MNRF ARCHAEOLOGICAL POTENTIAL

CONSULTANT

Wataynikaneyap Power

Golder Associates

YYYY-MM-DD	2017-04-17
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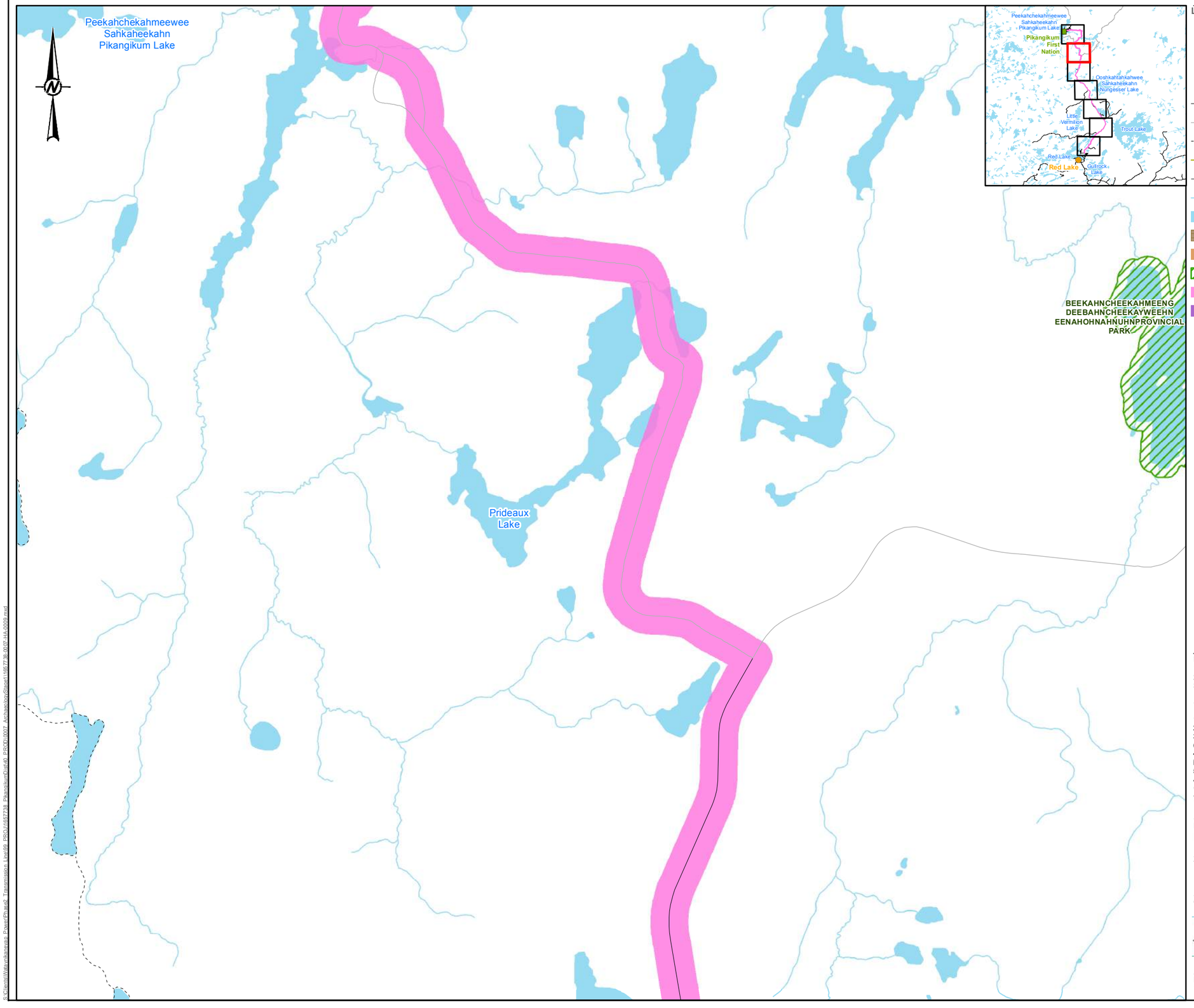
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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
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CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

MNRF ARCHAEOLOGICAL POTENTIAL

CONSULTANT

Wataynikaneyap Power

Golder Associates

YYYY-MM-DD	2017-04-17
DESIGNED	PR
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

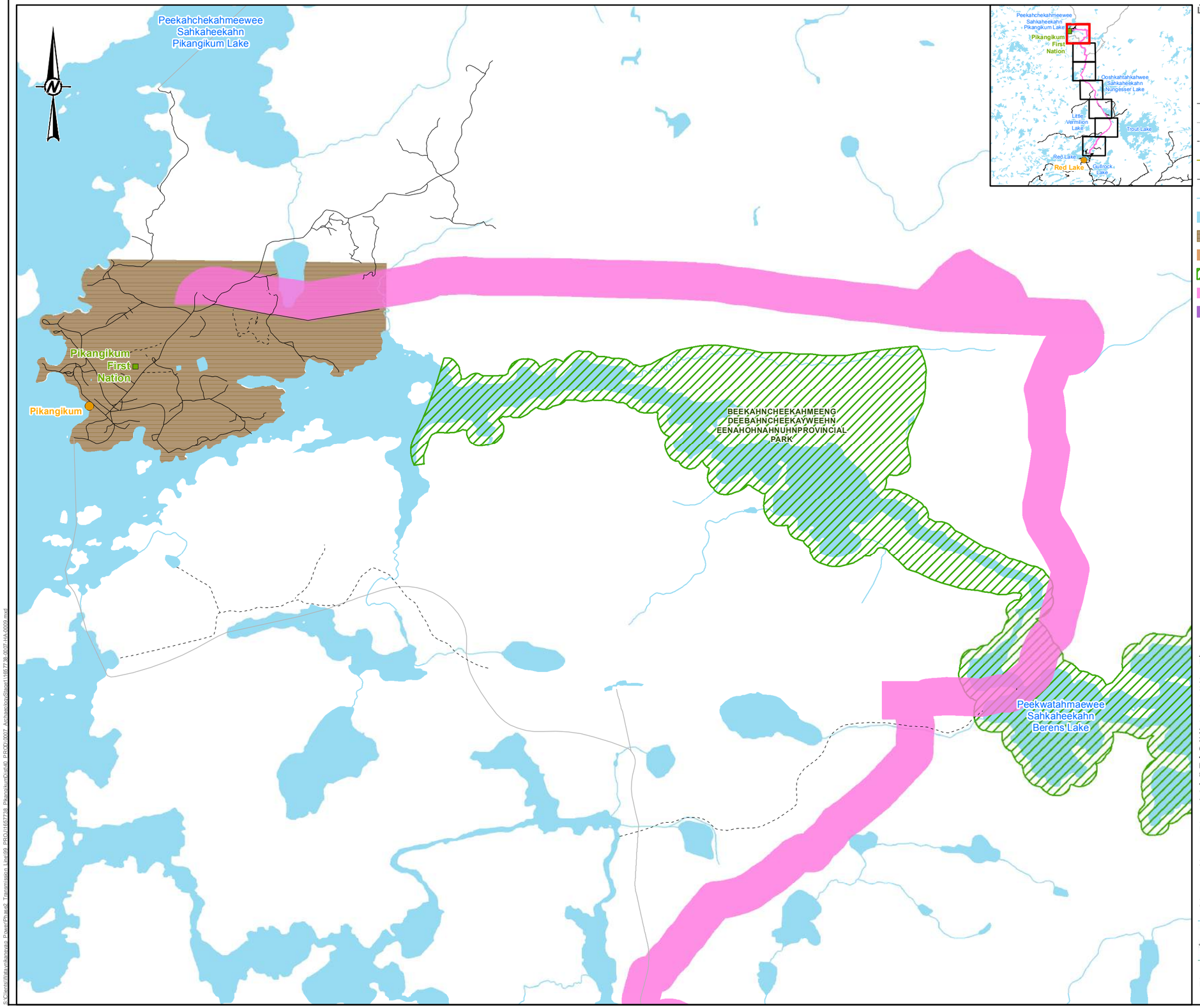
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1657738	-	-	**9-6**

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LEGEND

- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
- Railway
- Watercourse
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CLIENT
WATAYNIKANEYAP POWER L.P.

PROJECT
PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE
MNRF ARCHAEOLOGICAL POTENTIAL

CONSULTANT

Wataynikaneyap Power

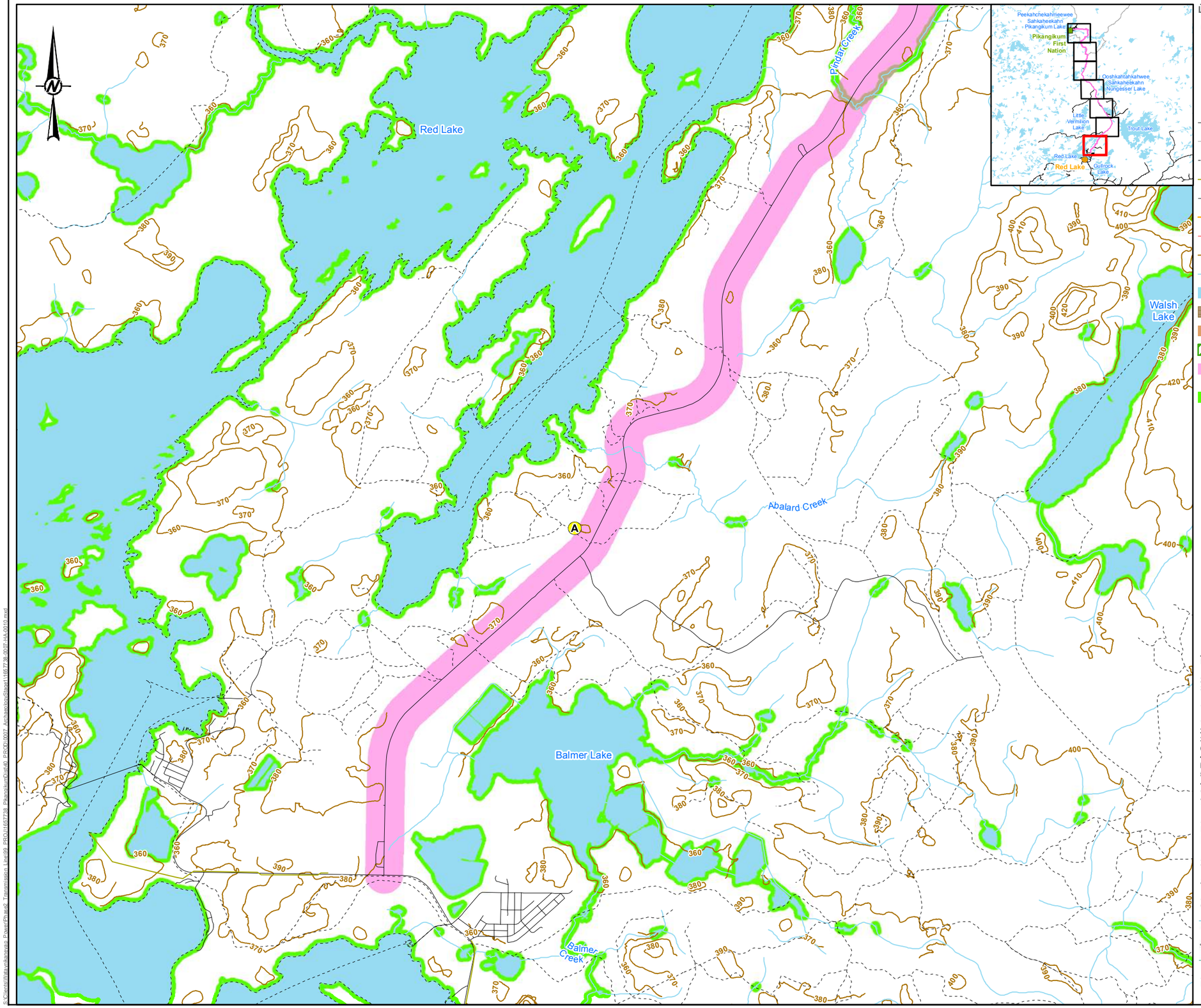
Golder Associates

YYYY-MM-DD	2017-04-17
DESIGNED	PR
PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

PROJECT NO.	CONTROL	REV.	MAP
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LEGEND

- Areas of Removed Archaeological Potential
- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Existing Electrical Transmission Line
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- Area of DeGeer or minor moraine forms
- Elevation (10 m)
- Watercourse
- Waterbody
- First Nation Reserve Land
- Conservation Reserve
- Provincial Parks
- Project Limits of Work
- Areas recommended for Stage 2 Archaeological Assessment

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NOTE(S)

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CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

AREAS REQUIRING STAGE 2 ARCHAEOLOGICAL ASSESSMENT

CONSULTANT

Wataynikaneyap Power

Golder Associates

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PREPARED	PR/JMC
REVIEWED	AM/BD
APPROVED	BT

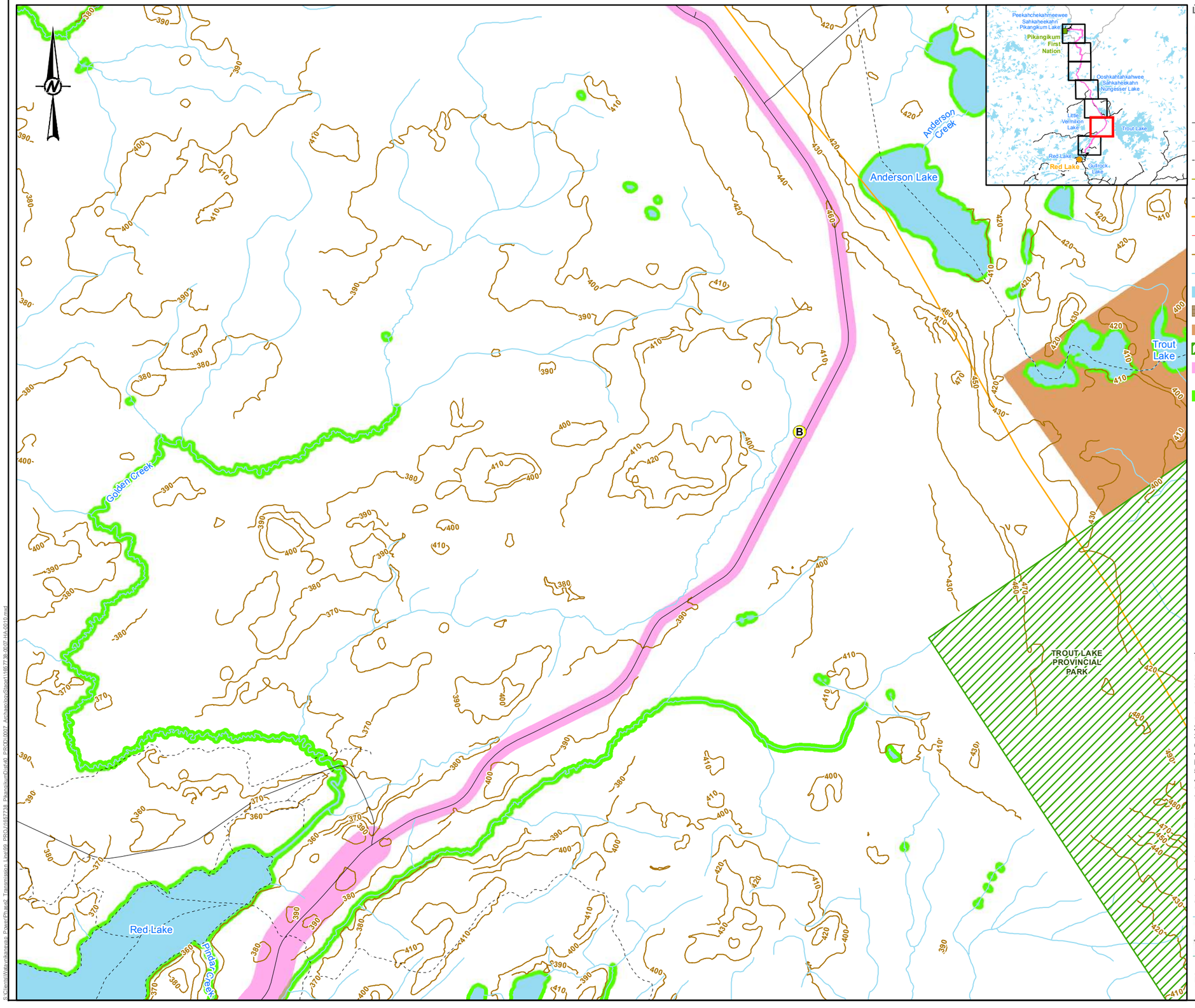
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LEGEND

- Areas of Removed Archaeological Potential
- City
- Town
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CLIENT

WATAYNIKANEYAP POWER L.P.

PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

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CONSULTANT

Wataynikaneyap Power

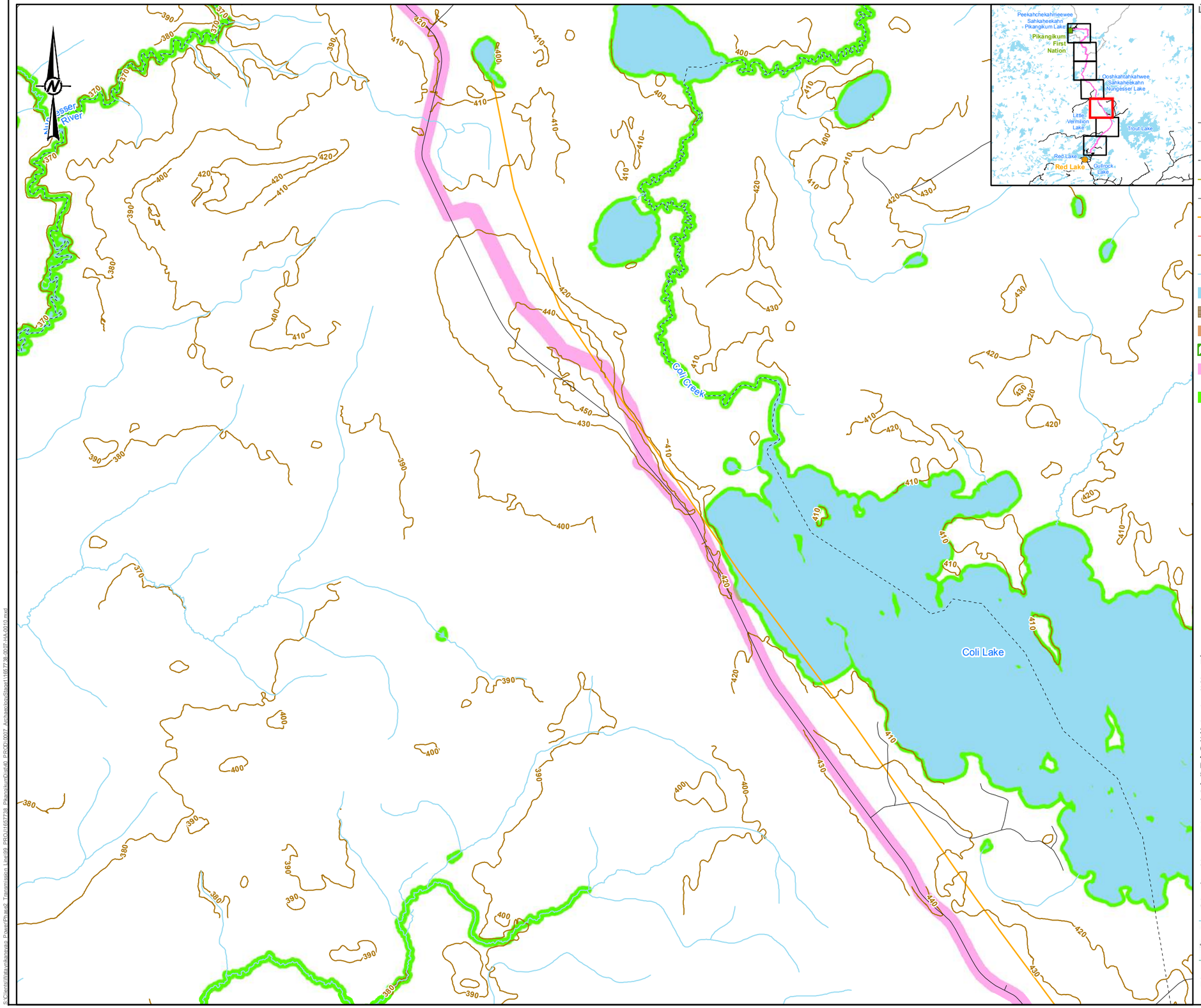
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LEGEND

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- City
- Town
- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
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TITLE

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CONSULTANT

Wataynikaneyap Power

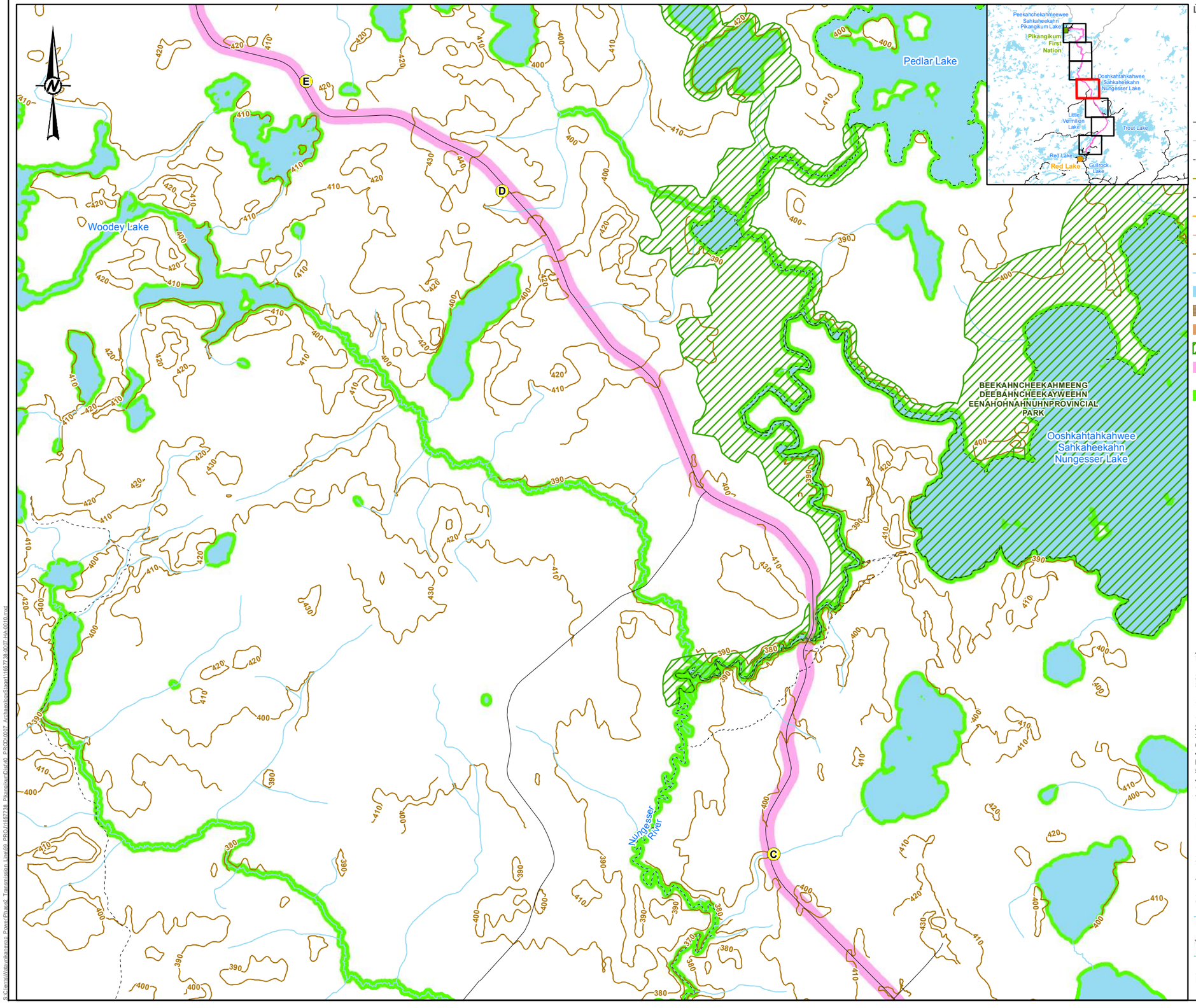
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- Town
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CONSULTANT

Wataynikaneyap Power

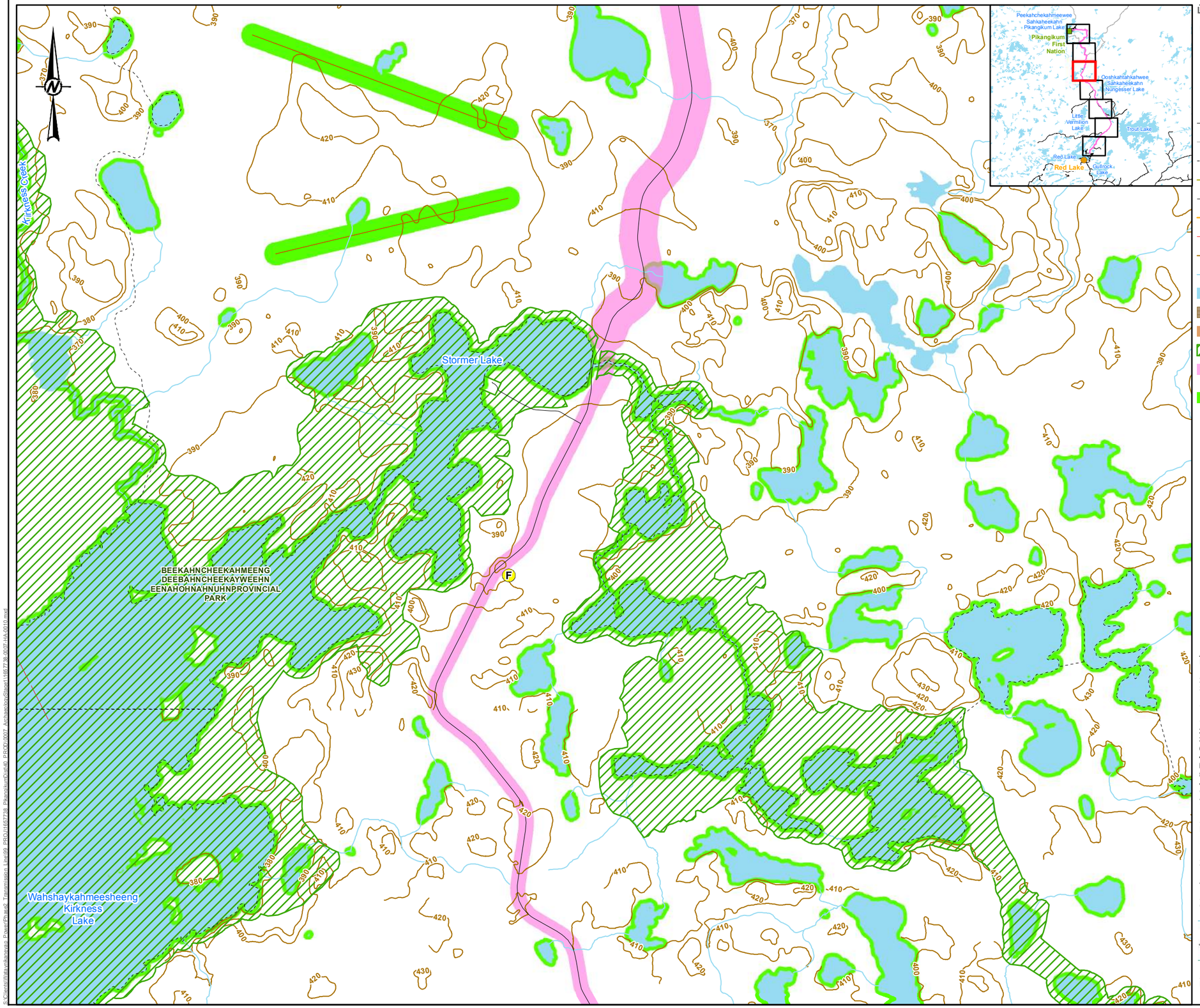
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PROJECT

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TITLE

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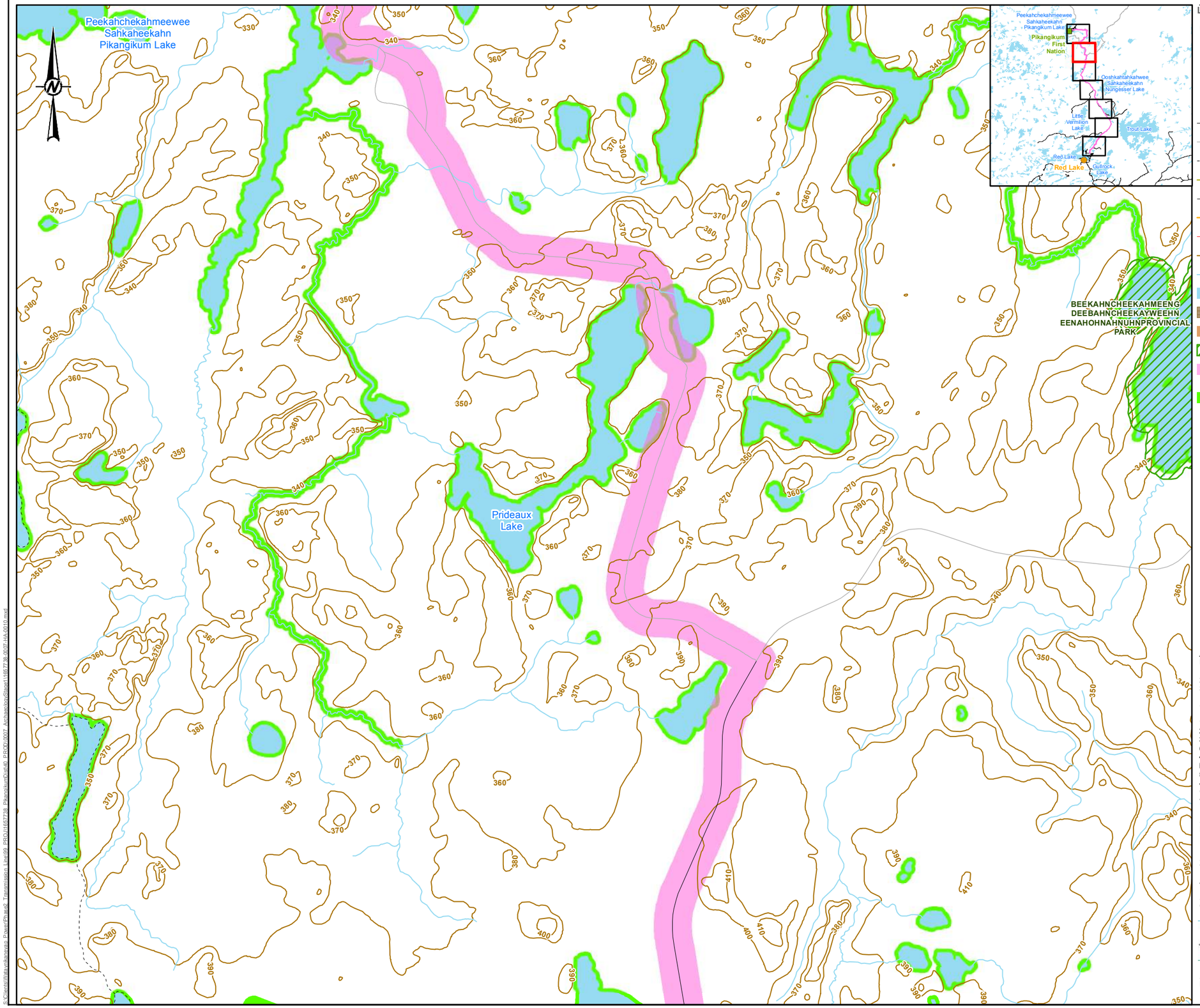
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CLIENT

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PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

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CONSULTANT

Wataynikaneyap Power

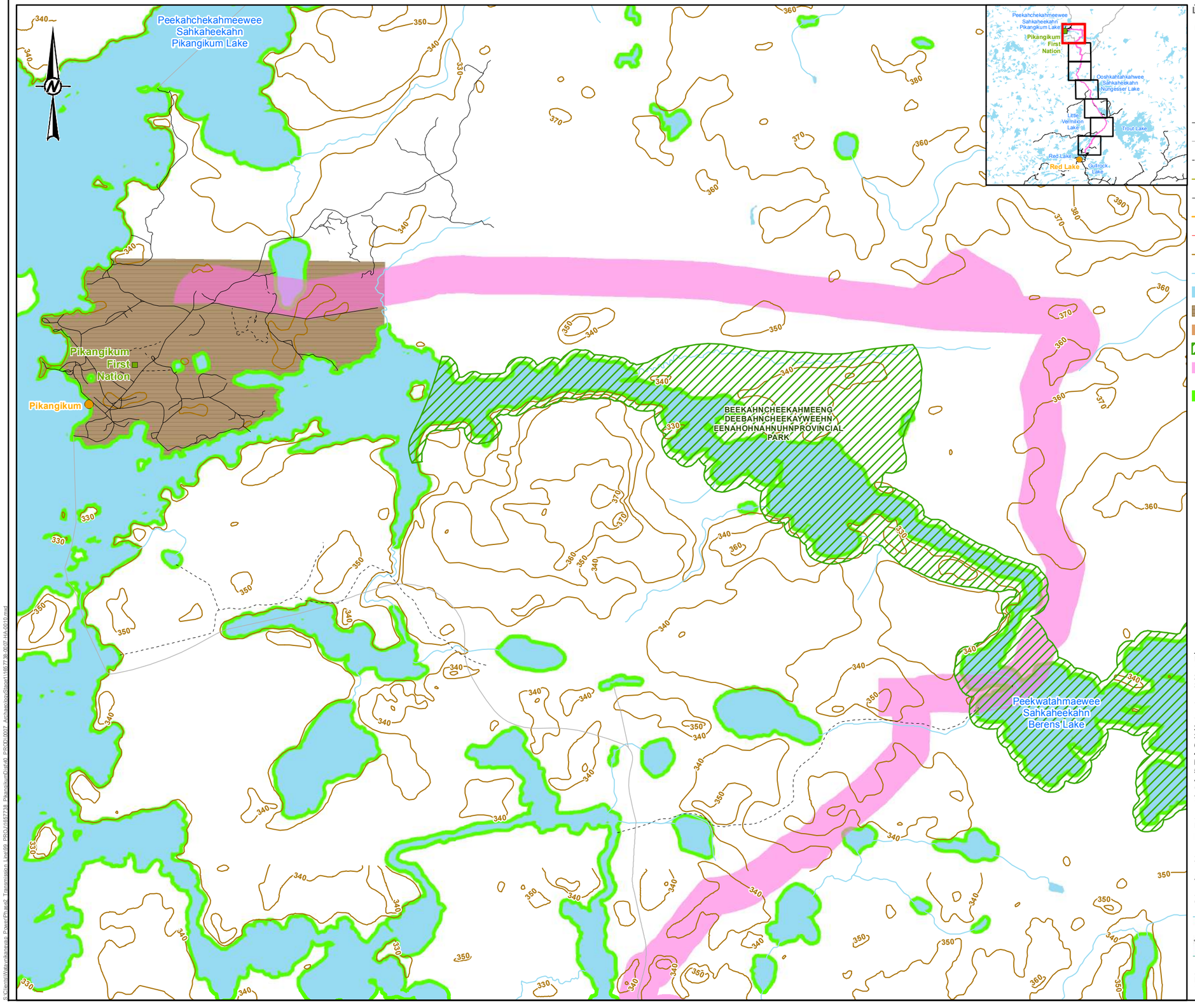
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LEGEND

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TITLE

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CONSULTANT

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This report has been prepared for the specific site, design objective, developments and purpose described to Golder by Wataynikaneyap Power L.P. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project.

Special risks occur whenever archaeological investigations are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain archaeological resources. The assessment strategies incorporated in this study comply with those identified in the Ministry of Tourism Culture, and Sport's *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011).

Report Signature Page

GOLDER ASSOCIATES LTD.

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Staff Archaeologist

Aaron Mior, M.A.
Archaeologist

Carla Parslow, PhD
Associate and Senior Archaeologist

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Golder Associates

SUPPLEMENTARY DOCUMENTATION

June 2017

STAGE 1 ARCHAEOLOGICAL ASSESSMENT

Wataynikaneyap Power L.P. Pikangikum Distribution Line Project, District of Kenora, Ontario

Submitted to:
Juan Anderson
Wataynikaneyap Power L.P.

Licensees: Bradley Drouin, M.A.., Golder Associates Ltd.

Licence Number: P311

PIF Number: P311-0311-2017

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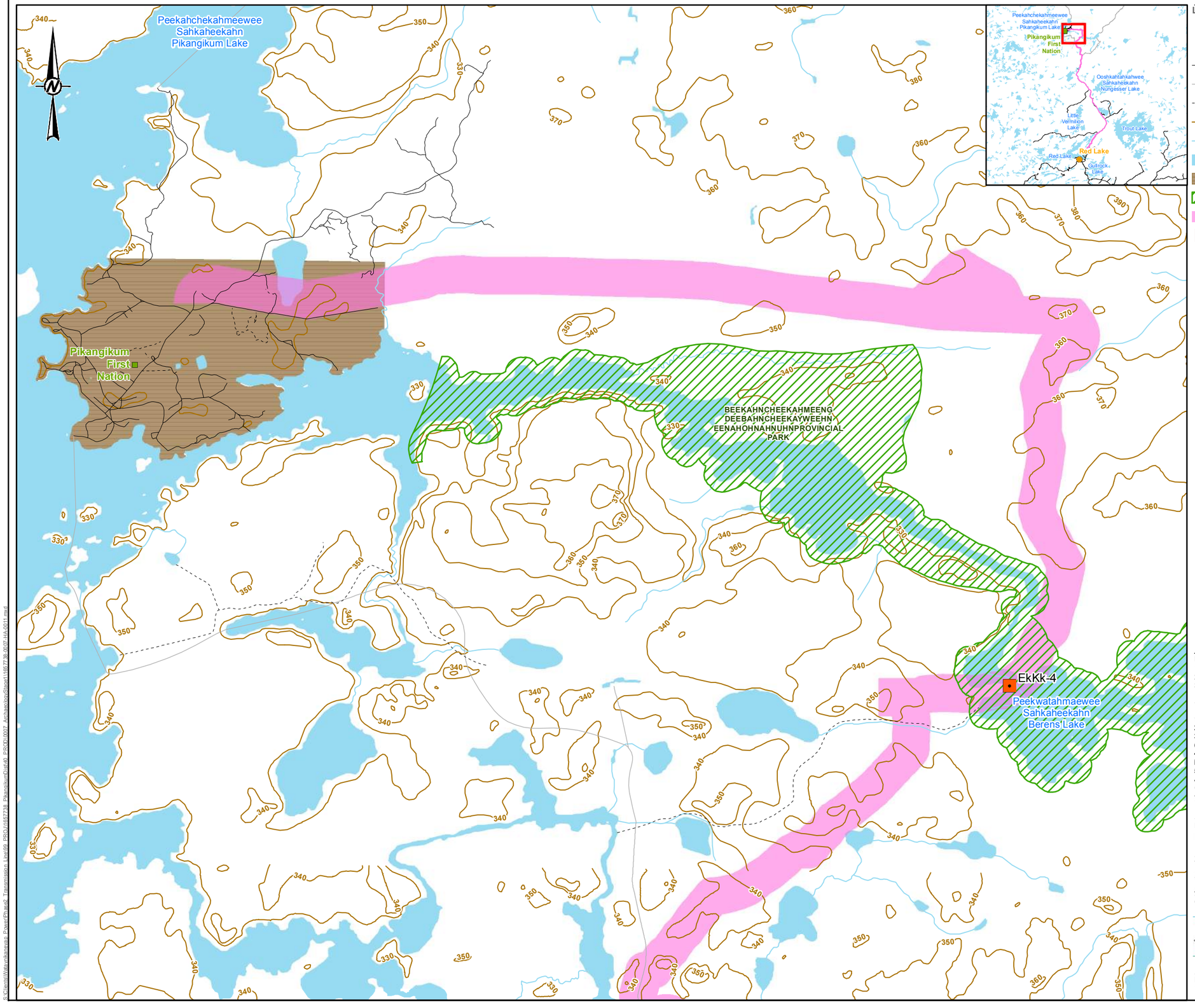
1.0 SUPPLEMENTARY DOCUMENTATION – REGISTERED ARCHAEOLOGICAL SITES WITHIN 1 KM OF THE LSA – PIKANGIKUM DISTRIBUTION LINE PROJECT 1

FIGURES

Supplement A: Registered Archaeological Sites within 1 km of the LSA 2

1.0 SUPPLEMENTARY DOCUMENTATION – REGISTERED ARCHAEOLOGICAL SITES WITHIN 1 KM OF THE LSA – PIKANGIKUM DISTRIBUTION LINE PROJECT

The figure follows on the succeeding page.



LEGEND

- First Nation Community
- Wataynikaneyap Power Community
- Major Roads and Highways
- Winter Road
- Trail
- Elevation (10 m)
- Watercourse
- Waterbody
- First Nation Reserve Land
- Provincial Parks
- Project Limits of Work
- Known Archaeological Site

0 0.5 1 2 3

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PROJECT

PIKANGIKUM DISTRIBUTION LINE PROJECT

TITLE

SUPPLEMENTARY DOCUMENTATION: KNOWN ARCHAEOLOGICAL SITES WITHIN 1 km OF THE PROJECT LSA

CONSULTANT

Wataynikaneyap Power

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Bradley Drouin, M.A.
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Carla Parslow, PhD
Associate/Senior Archaeologist

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