4 DESCRIPTION OF THE EXISTING ENVIRONMENT

This section provides a description of the existing environmental conditions for the biophysical and human components that may be influenced by the Project. The information provided in this section is based on field surveys, existing data sources, data bases, and mapping available for the location. Information presented in this section pertains to the Project footprint and the surrounding biophysical environment. The Project footprint includes the five (5) proposed WTG locations, access to WTGs from the existing Crown Land Access road, and access to the site from the existing New Ireland Road.

For the purposes of this report, SOCC are identified as floral or faunal species that are ranked by the ACCDC, protected by the NB SARA, designated by COSEWIC as threatened, endangered, or special concern or protected by the federal SARA. Although many SOCC ranked by the ACCDC are considered rare in NB, those protected or listed by federal and provincial legislation are of particular concern.

4.1 ATMOSPHERIC ENVIRONMENT

4.1.1 CLIMATE

Most of the climate in NB is considered to be continental as a result of westerly air flows passing over the interior of the continent, as opposed to a Maritime Climate that is impacted by flows over a temperature-moderating ocean.

The Project is within in the Caledonia Uplands of the Central Uplands Ecoregion in southeastern NB (Zelzany, 2007). The Caledonia Uplands encompasses a broad plateau adjacent and parallel to the Bay of Fundy and is characterized by a cool and wet climate that is influenced by the uplands high elevation and the influence of the Bay of Fundy. It is characterized by warm summers, however, because of proximity of the Bay of Fundy, the area receives high precipitation.

The closest Canadian Climate Station that meets the United Nations' World Meteorological Organization (WMO) standard is at the Moncton Airport and is approximately 45 km northeast of the Project (46°06'19.10" N, 64°41'01.70" W). The nearest climate station to the Project is Alma (45°36'00.00" N, 64°57'00.00" W), approximately 13 km to the southwest. Although Alma is not a station that meets WMO standard, data from this station is also considered as it is adjacent to the Caledonia Uplands. No stations are within the Project area, therefore no site-specific data are available. Climate data from Moncton and Alma are expected to be representative of the conditions in the Project area. The climate normals are calculated from data between 1981 and 2010.

The climate normals station data at Moncton A is presented in Table 4.1 1. The warmest month is July with an average temperature of 18.8 °C and the coldest is January with an average temperature of -8.9°C (Government of Canada, 2018). The mean annual precipitation is approximately 1,200 mm with approximately 876 mm falling as rain.

The climate normals station data at Alma is presented in Table 4.1-2. The warmest month is August with an average temperature of 17.2 °C and the coldest is January with an average temperature of -7.4°C (Government of Canada 2018). The mean annual precipitation is approximately 1,510 mm with approximately 1,227 mm falling as rain.

Table 4.1-1 1981 to 2010 Canadian Climate Normals Station Data – Moncton A, New Brunswick

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Daily Average (°C)	-8.9	-7.6	-2.9	3.5	10	15.2	18.8	18.2	13.6	7.6	1.9	-4.8	5.4
Rainfall (mm)	28.8	28.4	49.2	62.3	92.5	94.6	92.1	80.8	93.5	112.1	87.3	54.2	875.7
Snowfall (cm)	78.1	64.7	64.5	31.2	3.8	0	0	0	0	1.2	19.4	62.4	325.3
Precipitation (mm)	103.3	90.9	115.6	97.6	96.9	94.6	92.1	80.8	93.5	113.4	107.2	114.4	1200.4

Source: Government of Canada, 2018

Table 4.1-2 1981 to 2010 Canadian Climate Normals Station Data - Alma, New Brunswick

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Daily Average (°C)	-7.4	-6.1	-1.7	4.1	9.5	13.8	17.1	17.2	13.7	8.2	3	-3.3	5.7
Rainfall (mm)	67	47.1	89.6	101.4	124.8	110	99.4	93.9	122.7	132.9	147.4	90.4	1226.6
Snowfall (cm)	79.2	55.1	54	18.2	1.7	0	0	0	0	0	11.7	55.3	275.1
Precipitation (mm)	144.9	107.8	145.8	120.7	126.5	110	99.4	93.9	122.7	132.9	158.9	146.6	1510.1

Source: Government of Canada, 2018

4.1.2 VISIBILITY AND FOG

In general, autumn is the foggiest season in NB with occurrences on four or five days of each month (ECCC, 1990). However, the foggiest times in the Fundy Region of NB is in the spring and summer (Robichaud and Mullock, 2001). This results when moist air from the interior of the Province meets the cold waters of the bay. Fog can occur on more than 185 days of the year with most of the fog occurring in July in Saint John and approximately 50 days in Moncton. Sea fog most commonly occurs at night and the early morning with it burning off by the afternoon (ECCC, 1990).

No specific data are available for the Project area, however it is anticipated that the number of fog days is approximately 50 days because the foothills can act as a barrier preventing fog from moving further inland.

4.1.3 WIND RESOURCE

The nearest weather station with wind data is Moncton A. Wind speed, most frequent direction and maximum hourly speed data are available between 1981 and 2010 (Government of Canada 2018). The average annual wind speed is 16.8 km/h. Average wind speeds drop below average from May through October where the prevailing wind direction is from the southwest. Wind speeds are 17.8 km/hr and higher from November to April, with peak winds occurring in December through March and the prevailing wind direction is from the west. On average, there are 23.6 days per year with wind speeds greater than 52 km/h and the maximum gust recorded was 161 km/h.

SWEB installed a MET tower at the Project site at 45°42'32.15"N, 64°53'3.19"W in October 2016. Wind speed at 60 m, 50 m, and 40 m were collected as part of the data set. Data up to January 2018 was reviewed. The average monthly wind speeds recorded were between 20 kilometres per hour (km/hr) to 29 km/hr and the prevailing wind direction is from the southwest. Wind speeds are typically higher from October through January, with peak winds occurring in October.

The assessment of the wind resource data from the MET and WindCube LiDAR unit at the Project site has illustrated that the wind resource may be classified as an IEC 61400-12-1 Class IIA site. In general, the site wind characteristics give confidence that the Project will be highly productive and consistent.

4.1.4 AMBIENT AIR QUALITY

The Air Quality Regulation in NB's *Clean Air Act*, details the maximum permissible ground level concentrations of several parameters for air quality in NB. The Air Quality Regulation states that a stationary "source" that releases air contaminants to the environment must obtain approvals to release those air contaminants.

The ambient air quality is monitored by the NB Department of Environment and Local Government at established monitoring stations throughout the province. The closest air quality monitoring station to the Project Area is located in Moncton, approximately 40 km north of the Project. The air quality monitoring station in Moncton measures ozone, fine particulate matter, carbon dioxide, and nitrogen dioxide as part of the ambient air monitoring network. The most recent annual report for Moncton is 2015, which provides the current data summarized below (GNB, 2015).

The Project is about 5 km east of Teahans Corner. There are no major industrial facilities in the area. Forestry is a common activity in the area. The Kent Hills wind farm is about 5 km north of the Project. Air emissions would principally be generated from transportation related activities including gravel surfaced roads and emissions from vehicles used for transporting lumber. Given the remote location of the Project, air quality is expected to be better than that recorded in Moncton.

OZONE

In 2015, the ground level ozone concentration measured over an 8-hour averaging time, was 52 parts per billion (ppb), which is below the Canadian Ambient Air Quality Standards (CAAQS) value of 63 ppb.

FINE PARTICULATE MATTER

The daily value for Moncton in 2015 was 14 micrograms per cubic metre ($\mu g/m^3$), which is below the CAAQS of 28 $\mu g/m^3$. The annual average concentration was 5.8 $\mu g/m^3$, which is below the CAAQS of 10 $\mu g/m^3$.

CARBON MONOXIDE

In 2015 there were no exceedances of the 1-hour (30 parts per million [ppm]) NB Air Quality Objectives (NBAQO) standard recorded at the Moncton monitoring station. All recorded values were less than 5 ppm.

NITROGEN DIOXIDE

In 2015 there were no exceedances of the 1-hour (210 ppb) NBAQO standard recorded at the Moncton monitoring station.

AIR QUALITY HEALTH INDEX

The Air Quality Heath Index (AQHI) is provided by Environment and Climate Change Canada (Government of Canada, 2016). This tool is an indexed scale to help Canadians understand how air quality effects health. The AQHI scale is separated into four categories; Low Risk (1-3); Moderate Risk (4-6); High Risk (7-10); and Very High Risk (above 10). Average monthly AQHI for Moncton are summarized in Table 4.1 3 for the period November 2015 to November 2016 (ECCC, 2018a). The yearly average AQHI of 1.71 corresponds to a 'Low Risk' AQHI rating.

Table 4.1-3 Moncton AQHI monthly averages (January 2017 to January 2018)

MONTH	MINIMUM	MAXIMUM	MEAN
Jan 2017	1.4	4.3	2.0
Feb 2017	1.6	4.6	2.4
Mar 2017	1.2	3.3	2.2
Apr 2017	1.1	3.7	2.1
May 2017	1.0	3.6	1.8
Jun 2017	1.0	3.6	1.6
Jul 2017	1.0	2.9	1.4
Aug 2017	1.0	3.9	1.4
Sep 2017	1.0	2.8	1.3
Oct 2017	1.0	3.6	1.4
Nov 2017	1.0	2.8	1.5
Dec 2017	1.0	2.5	1.5
Jan 2018	1.0	3.2	1.7

Source: (ECCC, 2018a)

GREENHOUSE GAS EMISSIONS

Greenhouse gases (GHGs) include CO_2, methane (CH_4), and nitrous oxide (N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF_6), and nitrogen trifluoride (NF_3) and can be emitted from a variety of natural and anthropogenic sources. GHGs emitted from natural sources generally exhibit little variation from one year to the next, and are considered to be nominal when compared to those resulting from the combustion of fossil fuels. Total GHG emissions are normally reported as CO_2-equivalents (CO_2e) which considers the global warming potential of the GHGs.

Emissions vary by province, because of factors such as population, energy sources and economic base. In 2015, NB released its "Guidelines for Greenhouse Gas Management for Industrial Emitters in New Brunswick". NB's goal is to reduce greenhouse gas emissions to 10% below 1990 levels by 2020 and 75% to 85% below 2001 levels by 2050. In 1990, NB's GHG emissions were 16.3 megatonnes of CO_2e. In 2015, NB's GHG emissions were 14.1 megatonnes of CO_2e (ECCC, 2018b). The majority (88%) of NB's GHG emissions are from the energy sector, of which stationary combustion sources (58%) was the main source; transport (29%) and fugitive sources (1%) were also contributors to the energy sector emissions. The remainder of the emission sources are from industrial processes and product use (4%), agriculture (4%) and waste (5%) (ECCC, 2018b).

4.1.5 AMBIENT NOISE LEVELS

Sound is what we hear, while noise is unwanted sound. The difference between the two is dependent on the listener and the circumstance. Outdoor ambient noise is produced and influenced by a variety of natural and anthropogenic factors. The noise can be continuous, variable, intermittent or impulsive. The loudness and type of noise heard can lead to annoyance, stress and interference with speech communication. Some research suggests that the adverse effects described above may also cause sufficient stress on the body to increase the risk of developing stress-related illnesses (Health Canada, 2014).

WSP completed a Noise Impact Assessment (NIA) for the Project. The full report is included in Appendix D. The following is a brief summary of the existing acoustic environment for the Project.

Ambient sound levels were measured at four (4) receptor points, over a 24-hour period. Data was collected on November 1st, 2017, from midnight to midnight the following day. The receptor points were located at the three (3)

noise sensitive receptors located within 1 km of the proposed WTGs and at the proposed substation location as follows:

- Receptor R1: cabin located south of New Ireland Road at 45°43’45’’N, 64°52’47’’W;
- Receptor R2: warming shack located next to Kent Road intersection at 45°43’43’’N, 64°53’16’’W;
- Receptor R3: located by Priest Lake at 45°42’25’’N, 64°53’47’’W;
- Receptor R4: located by New Ireland Road, next to the substation location at 45°43’56’’N, 64°45’30’’W.

The microphones were located away from any large reflecting surfaces and approximately 1.5 m above ground. Sound measurements were performed using Larson Davis sound level meters, models LXT, SN: 2611, 4823, 4824 and 4826 and Larson Davis precision acoustic calibrator, model CAL200. Sound measurements were analyzed and extraordinary events (e.g., people speaking and animal noises close to the microphone or helicopters flying overhead) were excluded from the analysis.

The existing acoustic environment surrounding the Project site is typical of a rural/natural environment due to its remote location, with sounds of nature (e.g., wind and birds) dominating and occasional contributions from local road traffic.

4.2 GEOLOGY, TERRAIN, AND SOILS

Bedrock geology is predominantly of the Broad River Group and Intrusive Rocks of the Middle Neoproterozoic age (GeoNB, 2015). The Broad River Group underlying the Project includes the Teahans Corner formation which is composed of mixed volcanic and sedimentary rocks. The Intrusive Rocks are composed of Forty Five River Grandorite which are intermediate intrusive rocks. Surficial geology in the Project area is predominantly compact till that is sometimes carbonated (Foisy, 1989). There are substantial areas of till veneers overlying bedrock and are interspersed with bedrock outcrops.

The terrain within the Project area is mapped as predominantly level to gently rolling (slope gradients of less than 2% to 8%) (GeoNB, 2015). The soils within the Project area are dominantly within the Lomond Forest Soil Unit (GeoNB, 2015). Lomond soils are predominantly Orthic Humo-Ferric Podzolic soils developed on till materials deposited on felsic volcanic or mixed igneous rocks and/or felsic pebble conglomerates.

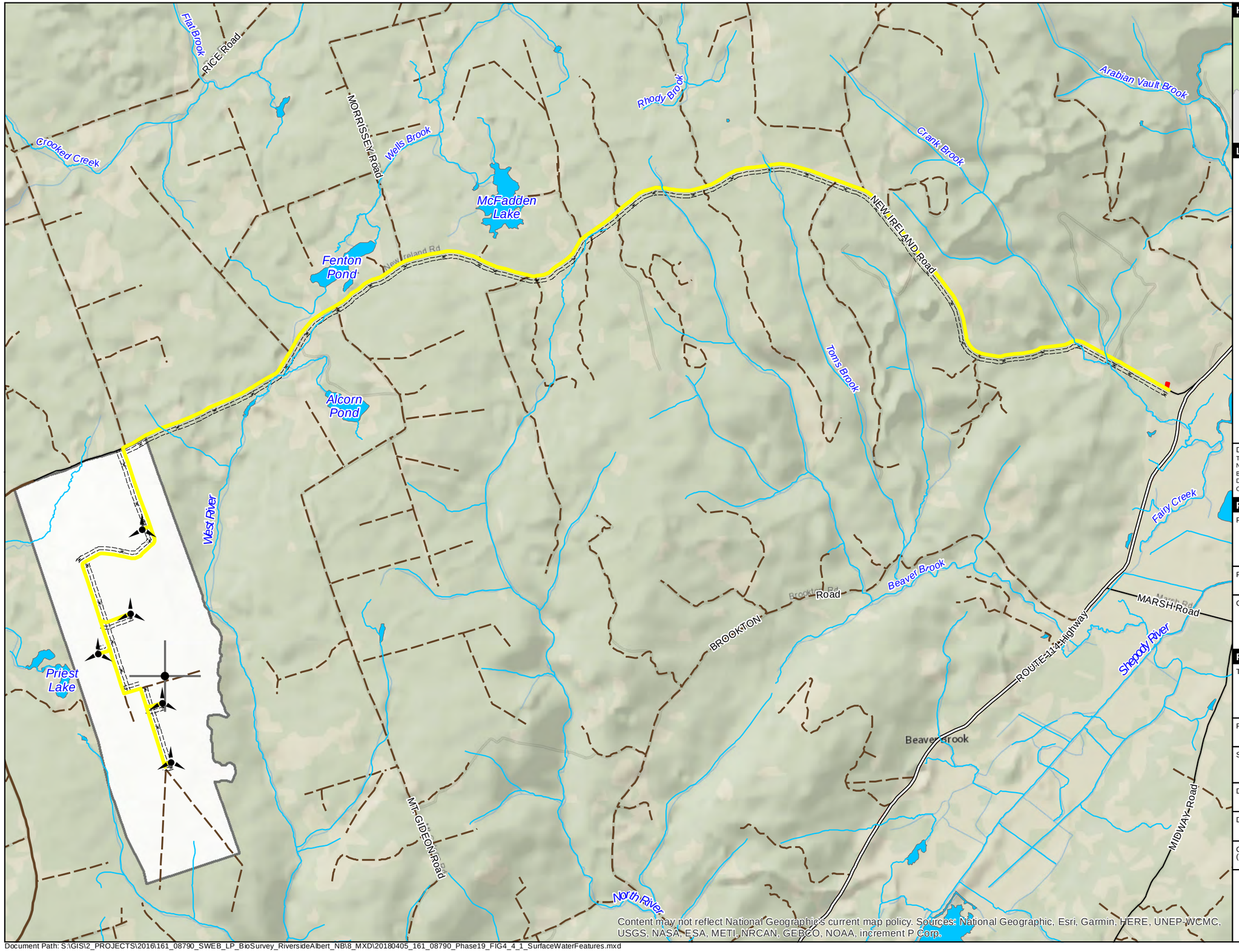
4.3 GROUNDWATER RESOURCES

No municipal potable water well fields are in the Project area. A query of the NB Online Well Log System did not identify any water wells or groundwater chemistry data within 1 km of the Project (NB Department of Environment and Local Government, 2018). There are no protected wellfields within the vicinity of the Project. The Riverside-Albert wellfield is 9 km northeast of the WTG locations, and Approximately 1.7 km north of the existing New Ireland Road. The Riverside-Albert wellfield is protected under the Wellfield Protection Area Designation Order, however, it is outside of the Project footprint and will not be affected by Project construction.

4.4 SURFACE HYDROLOGY

The Project crosses two watersheds; the Chignecto Bay Composite Level 2 watershed in the East Fundy Composite Level 1 watershed to the west and the South Channel Level 2 watershed within the Petitcodiac River Basin Level 1 watershed to the east. The Chignecto Bay Composite watershed has a drainage area of approximately 651 square kilometres (km^2) and the East Fundy Composite watershed has a drainage area of approximately 1,515 km^2. The South Channel watershed has a drainage area of approximately 459.61 km^2 and the Petitcodiac River Basin watershed has a drainage area of approximately 2,832 km^2.

There are numerous small lakes, brooks, creeks, and streams that traverse the area and are shown on Figure 4.4-1. The location of the WTGs and access road does not cross any watercourses or waterbodies. Several watercourses are in close proximity to the existing New Ireland Road. All of the watercourses within 1 km of the Project are first- and second-order streams. Duffy Brook and West River are within 1 km of the proposed WTGs and Crown Access



KEY MAP:

LEGEND:

- WTG
- MET TOWER
- TRANSMISSION LINE
- PROJECT FOOTPRINT
- WATERCOURSE
- PRIMARY HIGHWAY (DTI)
- SECONDARY HIGHWAY (DTI)
- PRIMARY FOREST ROAD (DERD)
- TERTIARY/LIMITED ACCESS FOREST ROAD (DERD)
- SUBSTATION FOOTPRINT
- WATERBODY
- LAND LEASE AREA (1252 ha)

PROJECT:

PROJECT:
WISOKOLAMSON ENERGY PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

PROJECT NO.: **161-08790 PHASE 19**

CLIENT: **WISOKOLAMSON ENERGY LP**

FIGURE:

TITLE:
SURFACE WATER FEATURES

FIGURE NO.:	REVISION NO.:
4.4-1	0

SCALE: 1:35,000
0 500 1,000 2,000 Metres

DATUM:	PROJECTION:
NAD 83 CSRS	NB Stereographic
DRAWN BY:	CHECKED BY:
T. MOREHOUSE	J. FERNET
CREATED DATE: (YYYY-MM-DD) 2018-03-22	REVISION DATE: (YYYY-MM-DD) 2018/04/12

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Document Path: S:\GIS\2_PROJECTS\2016\161_08790_SWEB_LP_BioSurvey_RiversideAlbert_NB\8_MXD\20180405_161_08790_Phase19_FIG4_4_1_SurfaceWaterFeatures.mxd

Road. Beaver brook, Tom's Brook, Crank brook, and Rhody Brook are near New Ireland Road. Four named waterbodies were identified near New Ireland Road and include Alcorn pond, Fenton Pond, Priest Lake, and McFadden Lake. McFadden Lake is the headwater of McFadden brook, which flows to the north away from the Project area. Of all the waterbodies found in the area, Priest Lake is the closest to the Project, and is approximately 280 m west of the proposed WTGs. Powerlines are planned to run parallel along the New Ireland Road and construction of the powerlines is planned to take place be inside the existing ROW.

4.5 FISH AND FISH HABITAT

The Project is within the Inner Bay of Fundy Recreational Fishery Area (ERD, 2017). Recreational fish species that may be present in waterbodies and watercourses in the Fishery Area include brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), arctic char (*Salvelinus alpinus,* found in historically stocked areas of southern NB), rainbow trout (*Oncorhynchus mykiss*), and smallmouth bass (*Micropterus dolomieu*). Non-sport fish species that may be present include burbot (*Lota lota*), chain pickerel (*Esox niger*), American eel (*Anguilla rostrata*), gaspereau (*Alosa pseudoharengus*), rainbow smelt (*Osmerus mordax*), shad (*Alosa* spp.), striped bass (*Morone saxatilis*), sturgeon (*Acipenser* spp.), whitefish (*Coregonus clupeaformis*), white perch (*Morone americana*), and yellow perch (*Perca flavescens*).

There are at least fourteen (14) fish species in the Petitcodiac Watershed (GNB, 2007). These include: gaspereau, American eel, American shad (*Alosa sapidissima*), Atlantic salmon (*Salmo salar*), Atlantic tomcod (*Microgadus tomcod*), blueback herring (*Alosa aestivalis*), brook trout, brown bullhead (*Ameiurus nebulosus*), chain pickerel, rainbow smelt, smallmouth bass, striped bass, white perch and white sucker (*Catostomus commersonii*). There was no information on fish species in the East Fundy Composite watershed.

A search of the ACCDC was completed to compile a list of fish species that have either been previously detected in the Project area or have been observed in the surrounding area. One fish SOCC, Atlantic Salmon – Inner Bay of Fundy population was historically documented in West River and in Beaver Brook; however, the observation locations are greater than 5 km from the Project.

It should be noted that published information on fish occupancy is limited for waterbodies and watercourses in NB. All GeoNB watercourses are assumed fish bearing unless proven otherwise (Lambert, pers. comm., 2017). All unmapped watercourses with channel width greater than 0.5 m with an incised channel and mineral bed are considered fish bearing unless proven otherwise.

4.6 WETLANDS

Wetland ecosystems provide important habitat for a variety of SOCC and important ecological services for the environment and people. Regionally, the Caledonia Uplands contains a number of wetland types including peatlands, streamside alder swamps, marshes, and shallow open water communities. Peatlands are more common in the western portion and marshes are more common along the eastern portion of the region.

There are a number of wetlands within 1 km of the Project and are classified as shrub wetland, fen, and freshwater marsh (GeoNB, 2011; Figure 4.6-1). Shrub wetlands are associated with Duffy Brook, West River, and Beaver Book. The freshwater marsh is near Priest Lake and is approximately 270 m west of a proposed WTG. A fen is located 75 m east of the Project access road (New Ireland Road); this wetland is approximately 625 m from the nearest proposed WTG. A provincially significant wetland is associated with the Shepody River approximately 7 km to the southeast of the Project.

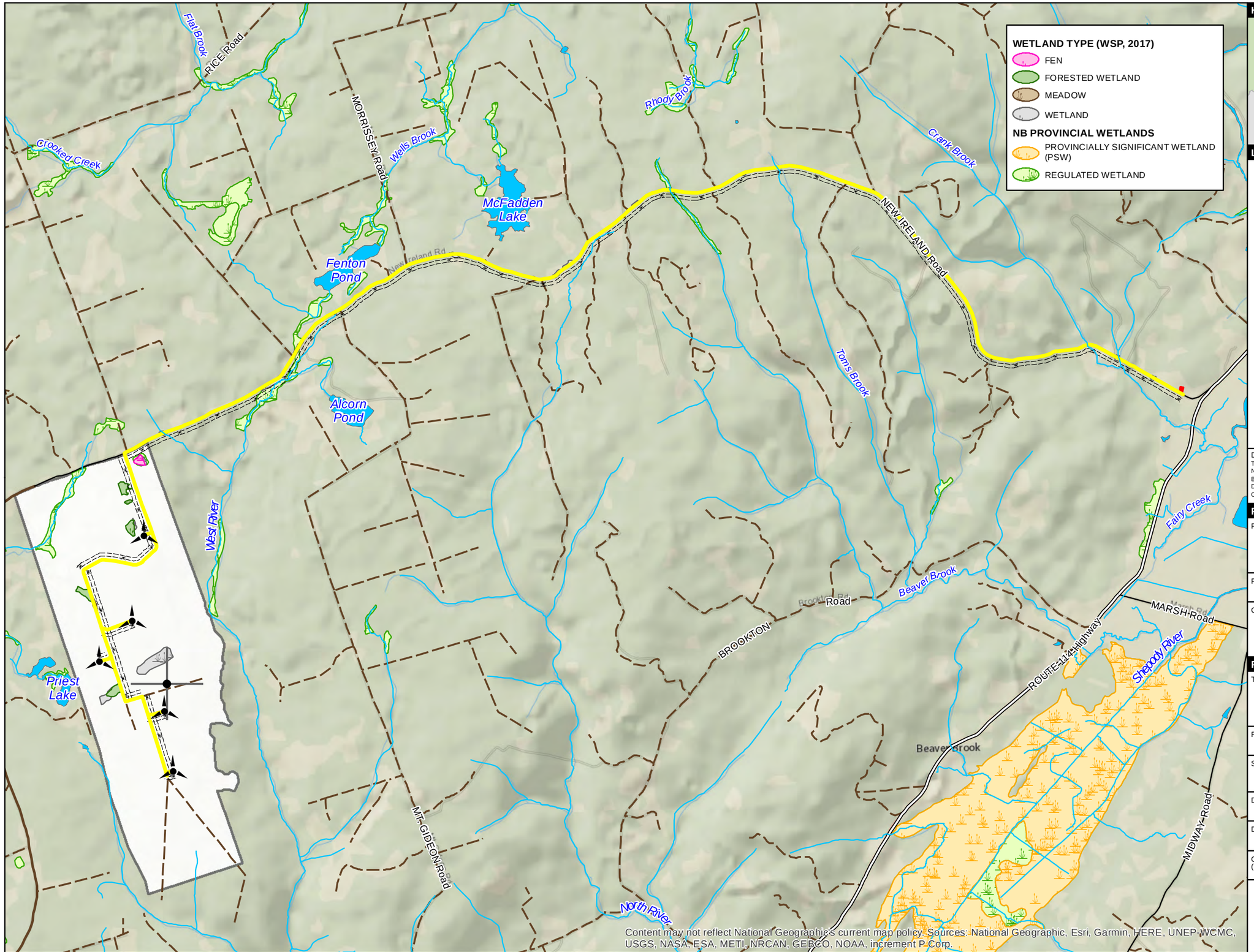
A site visit was completed in July 2016 to ground truth wetlands within a 150 m buffer along the existing Crown Land Access road and around the proposed WTGs locations known at the time of the site visit. The fen was confirmed and a number of areas of forested wetland were also identified that are not on existing provincial mapping (Figure 4.6-1).

4.6.1 FORESTED WETLAND

Forested wetland included area where tree cover amounts to greater than 15% crown closure and drainage was poor to very poor. Tree species observed included black spruce (*Picea mariana*), balsam fir (*Abies balsamea*), and red spruce (*Picea rubens*). The dominant shrub species observed was mountain holly (*Nemopanthus mucronatus*). Dominant forbs observed included dwarf red raspberry (*Rubus pubescens*), cinnamon fern (*Osmunda cinnamomea*), common lady fern (*Athyrium filix-femina*), sensitive fern (*Onoclea sensibilis*), crested wood fern (*Dryopteris cristata*), and white bog orchid (*Platanthera dilatata*). The dominant graminoid was three-seeded sedge (*Carex trisperma*). The bryophyte layer was dominated by Sphagnum moss (*Sphagnum* spp.).

4.6.2 FEN

The graminoid fen was characterized by a dominance of graminoids in the central part of the wetland and shrub cover around the margin of the fen and drainage was poor to very poor. Dominant graminoids observed included boreal bog sedge (*Carex magellanica*), thread rush (*Juncus filiformis*), rough cottongrass (*Eriophorum tenellum*), and three-way sedge (*Dulichium arundinaceum*). The forb observed included harlequin blue flag (*Iris versicolor*). Dominant shrubs observed around the margin of the fen included large cranberry (*Vaccinium macrocarpon*), white meadowsweet (*Spiraea alba*), leatherleaf (*Chamaedaphne calyculata*), and black huckleberry (*Gaylussacia baccata*).



KEY MAP:

LEGEND:

- WTG
- MET TOWER
- TRANSMISSION LINE
- PROJECT FOOTPRINT
- WATERCOURSE
- PRIMARY HIGHWAY (DTI)
- SECONDARY HIGHWAY (DTI)
- PRIMARY FOREST ROAD (DERD)
- TERTIARY/LIMITED ACCESS FOREST ROAD (DERD)
- SUBSTATION FOOTPRINT
- WATERBODY
- LAND LEASE AREA (1252 ha)

PROJECT:

PROJECT:
WISOKOLAMSON ENERGY PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

PROJECT NO.: **161-08790 PHASE 19**

CLIENT: **WISOKOLAMSON ENERGY LP**

FIGURE:

TITLE:
WETLAND DISTRIBUTION

FIGURE NO.:	REVISION NO.:
4.6-1	0

SCALE: 1:35,000
0 500 1,000 2,000 Metres

DATUM:	PROJECTION:
NAD 83 CSRS	NB Stereographic
DRAWN BY: T. MOREHOUSE	CHECKED BY: J. FERNET
CREATED DATE: (YYYY-MM-DD) 2018-03-22	REVISION DATE: (YYYY-MM-DD) 2018/04/12

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4.7 TERRESTRIAL VEGETATION

The Project is within in the Caledonia Uplands of the Central Uplands Ecoregion in southeastern NB (Zelzany, 2007). Regionally, this Upland is characterised by tolerant hardwood forest. Ridges and upper slopes with well-drained soils support forest dominated by sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), beech (*Fagus* spp.), and red spruce. Upland areas with level to gently sloping terrain are typically dominated by mixed forests of red spruce, yellow birch, and red maple (*Acer rubrum*) with some balsam fir. Valley bottoms and flatlands with poor soil drainage often contain forests of spruce (*Picea* spp.) and balsam fir. Pine (*Pinus* spp.) and poplar (*Populus* spp.) are uncommon because of the low fire frequency, a result of the cool, wet climate. In areas that have been harvested, an early successional community of intolerant hardwoods is present and dominated by species such as white birch, yellow birch, and balsam fir.

The forest cover polygon land cover product was obtained from GeoNB as a preliminary data source for vegetation identification (GeoNB, 2016). The land cover classification is interpreted from aerial imagery on a 10 year cycle for the province of NB and describes the stand characteristics for that polygon area. In addition, a search of provincial and federal databases was completed to identify any vascular and non-vascular plant SOCC that are present or have potential to be present in the Project area. The occurrence of SOCC informs on potential avoidance areas, additional mitigation requirements or permitting and additional site management requirements during construction.

The majority of the area is mapped as forest cover or where forestry activities are occurring. The dominant forest cover types mapped are Balsam fir (BFIR), Black spruce (BSPR), Red spruce (RSPR), Spruce (SPRC), Tolerant hardwood and intolerant hardwood (THIH), and Tolerant hardwood (TOHW) forest cover types (GeoNB, 2016). Softwood cover types are dominated by species such as black spruce, red spruce, white spruce (*Picea glauca*), and balsam fir (BFIR, BSPR, RSPR, SPRC). Red spruce and Spruce forest cover types in the area may also contain mature sugar maple and yellow birch. Hardwood cover types are dominated by tree species such as red maple, sugar maple, and yellow birch (THIH, TOHW). There are substantial areas where the forest cover has been harvested, either partially or completely in the early-1990s to mid-2000s. Replanting activities have occurred in some areas during the mid-1970s.

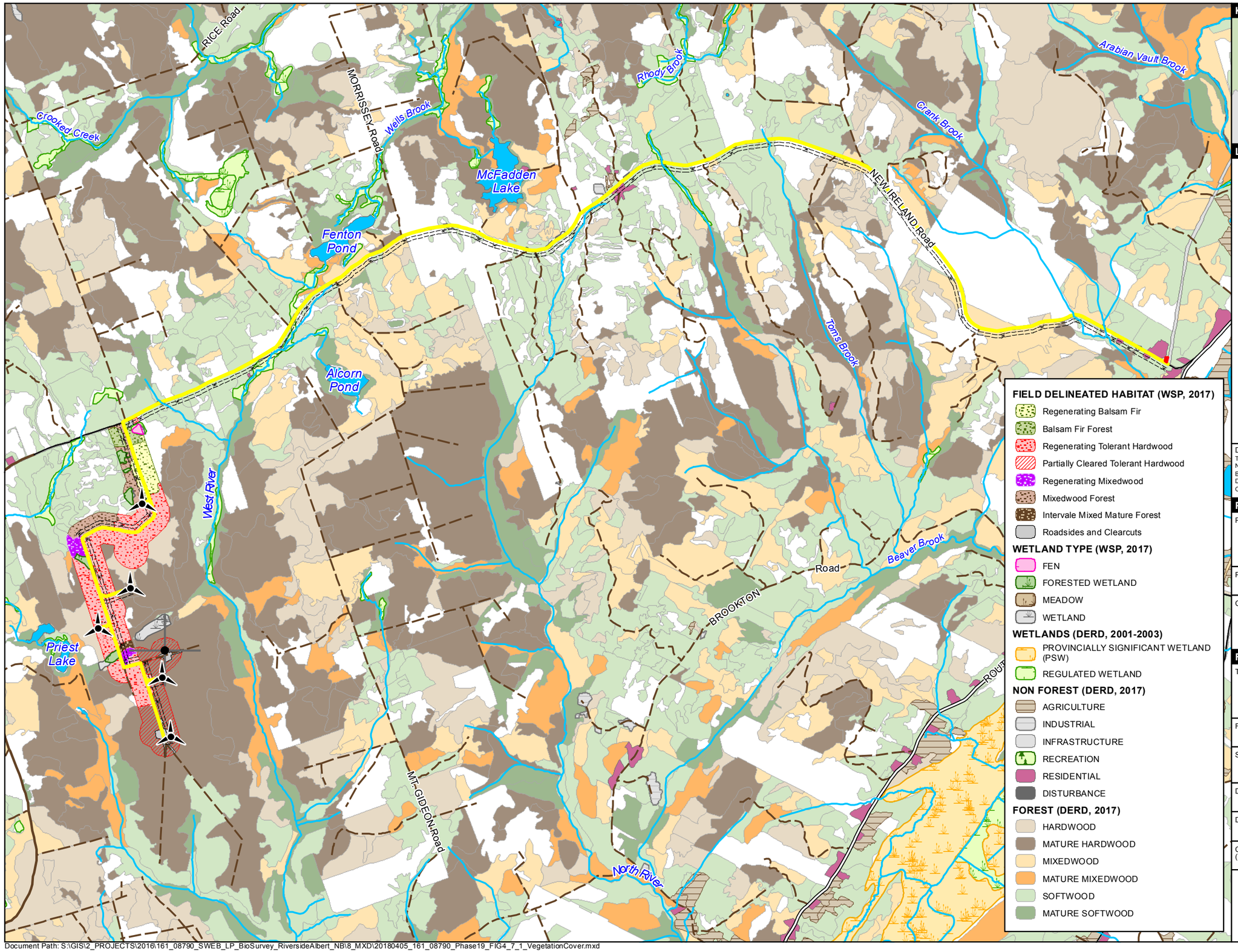
A site visit was completed in July 2016 to ground truth vegetation cover within a 150 m buffer along the existing Crown Land Access road and around the proposed WTGs locations known at the time of the site visit (Figure 4.7-1 and Figure 4.7-2). Vegetation cover identified includes regenerating balsam fir, regenerating TOHW, regenerating mixedwood, partially cleared TOHW, balsam fir forest, mixedwood forest, and intervale mixed mature forest. Roadsides and clear-cuts were also observed. These cover types are described in the following sections.

4.7.1 REGENERATING BALSAM FIR

Regenerating balsam fir is characterized by young forest where no active forestry is taking place. This cover type was dominated by stands of young balsam fir and gray birch (*Betula populifolia*). Other common species observed included sheep laurel (*Kalmia angustifolia*), velvet-leaved blueberry (*Vaccinium myrtilloides*) and Alleghaney blackberry (*Rubus allegheniensis*).

4.7.2 REGENERATING TOLERANT HARDWOOD

Regenerating tolerant hardwood is characterized by young forest where no active forestry was taking place. This cover type was dominated by stands of young yellow birch and American beech (*Fagus grandifolia*). Other common species observed included wild lily-of-the-valley (*Maianthemum canadense*), mountain wood fern (*Dryopteris campyloptera*), and Indian pipe (*Monotropa uniflora*).



KEY MAP:

LEGEND:

- WTG
- MET TOWER
- TRANSMISSION LINE
- PROJECT FOOTPRINT
- SUBSTATION FOOTPRINT
- PRIMARY HIGHWAY (DTI)
- SECONDARY HIGHWAY (DTI)
- PRIMARY FOREST ROAD (DERD)
- TERTIARY/LIMITED ACCESS FOREST ROAD (DERD)
- WATERCOURSE
- WATERBODY

FIELD DELINEATED HABITAT (WSP, 2017)

- Regenerating Balsam Fir
- Balsam Fir Forest
- Regenerating Tolerant Hardwood
- Partially Cleared Tolerant Hardwood
- Regenerating Mixedwood
- Mixedwood Forest
- Intervale Mixed Mature Forest
- Roadsides and Clearcuts

WETLAND TYPE (WSP, 2017)

- FEN
- FORESTED WETLAND
- MEADOW
- WETLAND

WETLANDS (DERD, 2001-2003)

- PROVINCIALLY SIGNIFICANT WETLAND (PSW)
- REGULATED WETLAND

NON FOREST (DERD, 2017)

- AGRICULTURE
- INDUSTRIAL
- INFRASTRUCTURE
- RECREATION
- RESIDENTIAL
- DISTURBANCE

FOREST (DERD, 2017)

- HARDWOOD
- MATURE HARDWOOD
- MIXEDWOOD
- MATURE MIXEDWOOD
- SOFTWOOD
- MATURE SOFTWOOD

PROJECT:

PROJECT:
WISOKOLAMSON ENERGY PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

PROJECT NO.: **161-08790 PHASE 19**

CLIENT: **WISOKOLAMSON ENERGY LP**

FIGURE:

TITLE:
VEGETATION COVER

FIGURE NO.:	REVISION NO.:
4.7-1	0

SCALE: 1:35,000
0 500 1,000 2,000 Metres

DATUM:	PROJECTION:
NAD 83 CSRS	NB Stereographic
DRAWN BY:	CHECKED BY:
T. MOREHOUSE	J. FERNET
CREATED DATE: (YYYY-MM-DD) 2018-03-22	REVISION DATE: (YYYY-MM-DD) 2018/04/12

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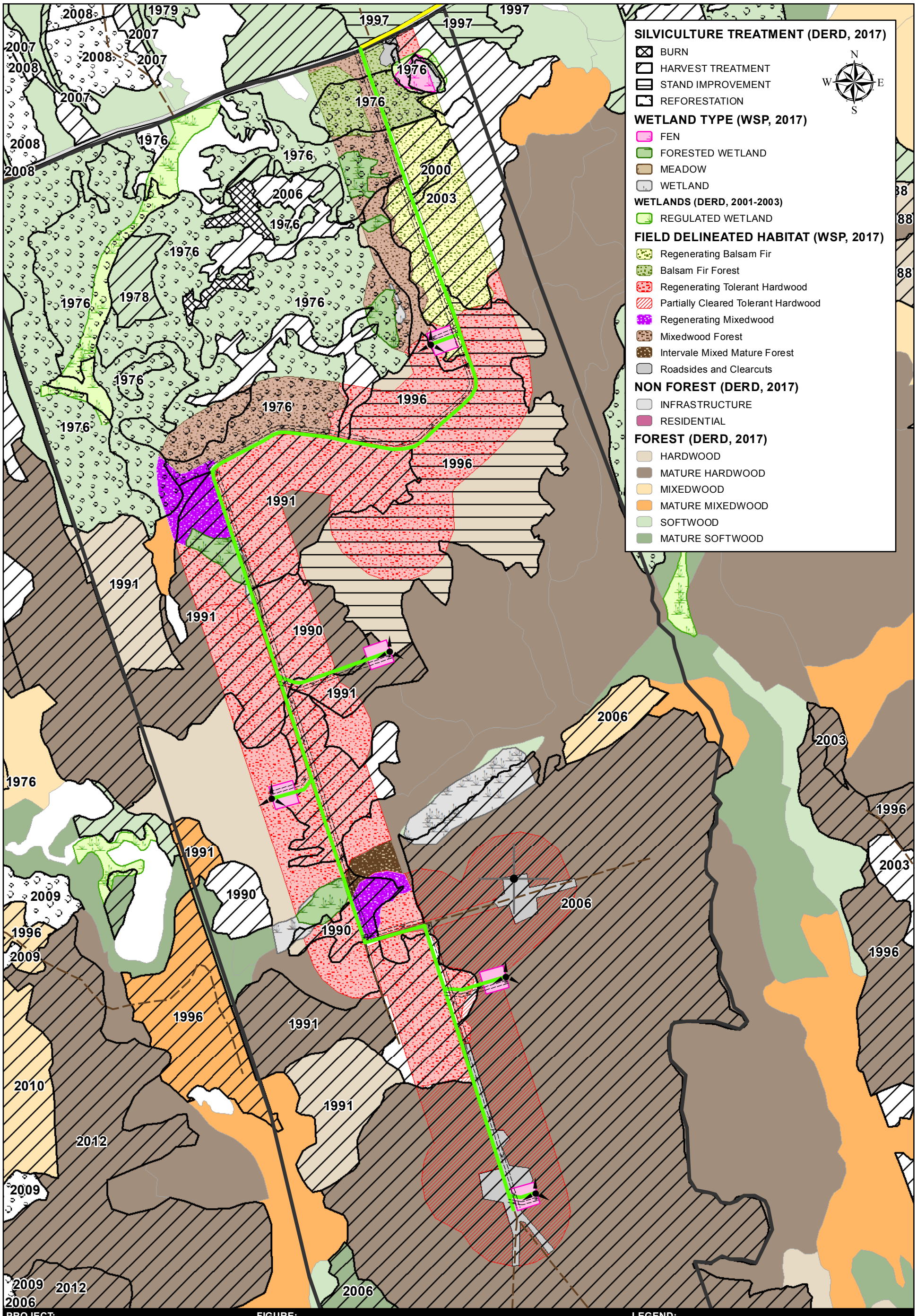

PROJECT:

PROJECT:
WISOKOLAMSON ENERGY PROJECT
ENVIRONMENTAL IMPACT ASSESSMENT

PROJECT NO.: **161-08790 PHASE 19**

CLIENT: **WISOKOLAMSON ENERGY LP**

FIGURE:

TITLE:
VEGETATION COVER AND FORESTRY SILVICULTURE TREATMENTS

FIGURE NO.: **4.7-2**

REVISION NO.: **0**

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DISCLAIMER:

DATUM: NAD 83 CSRS

PROJECTION: NB STEREOGRAPHIC

DRAWN BY: T. MOREHOUSE

CHECKED BY: J. FERNET

CREATED DATE: (YYYY-MM-DD) 2018-04-05

REVISION DATE: (YYYY-MM-DD) 2018-04-12

LEGEND:

- TRANSMISSION LINE
- CROWN LAND ACCESS ROAD (EXISTING)
- NEW IRELAND ROAD (EXISTING)
- WTG ERECTION FOOTPRINT
- LAND LEASE AREA (1252 ha)
- MET TOWER
- WTG

SCALE: 1:9,500

0 50 100 200 300 400 500 Metres

Document Path: S:\GIS\2_PROJECTS\2016\161_08790_SWEB_LP_BioSurvey_RiversideAlbert_NB\8_MXD\20180405_161_08790_Phase19_FIG4_7_2_VegetationCover.mxd

4.7.3 REGENERATING MIXEDWOOD FOREST

This cover type was dominated by stands of young red maple, red spruce, and balsam fir. Other common species observed included Allegheny blackberry, red osier dogwood (*Cornus sericea*), flat top white aster (*Doellingeria umbellatum*), and fireweed (*Chamerion angustifolium*).

4.7.4 PARTIALLY CLEARED TOLERANT HARDWOOD

This cover type was dominated by stands of yellow birch and American beech. Other common species observed included red spruce, sugar maple, yellow bluebead lily (*Clintonia borealis*), and northern starflower (*Trientalis borealis*). This cover type was characterized by large cut areas 30 m or wider. No vegetation remained in the cleared areas.

4.7.5 BALSAM FIR FOREST

This small area of undisturbed forest near New Ireland Road was characterized by an overstory of balsam fir. Very few understory species were observed.

4.7.6 MIXEDWOOD FOREST

Mixedwood forest was observed in several different areas and were characterized by very few understory species. The most common understory species observed was bracken fern (*Pteridium aquilinum*). The overstory included both coniferous and deciduous species, however, this vegetation types was dominated by coniferous species. Dominant overstory species observed included balsam fir, white spruce, red spruce, red maple, yellow birch, and gray birch.

4.7.7 INTERVALE MIXED MATURE FOREST

This vegetation type occurred on a south-facing seepy slope. It was characterized by rich conditions. Dominant overstory species included yellow birch. Common understory species observed included Maryland sanicle (*Sanicula marilandica*), kidney leaved buttercup (*Ranunculus abortivus*), silvery glade fern (*Deparia acrostichoides*), and tall meadow rue (*Thalictrum pubescens*).

4.7.8 ROADSIDES AND CLEAR-CUTS

This is the result of roads and recent clearcuts with little to no vegetation. Non-native species such as mouse-ear hawkweed (*Hieracium pilosella*), coltsfoot (*Tussilago farfara*), and common dandelion (*Taraxacum officinale*) occurred along the entire length of the crown access road. Other common species observed regenerating in these areas included yellow birch, white spruce, pussy willow (*Salix discolor*), fireweed, evergreen wood fern (*Dryopteris intermedia*), grass-leaved goldenrod (*Euthamia graminifolia*), and small-fruited bulrush (*Scirpus microcarpus*).

4.7.9 SPECIES OF CONSERVATION CONCERN

Fifteen (15) vascular plant SOCC have been historically and recently observed within 5 km of the Project; the majority of which have been documented in Shepody National Wildlife Area (ACCDC, 2018; Figure 4.7-3; Table 4.7-1). No records of nonvascular plant SOCC have been documented within 5 km. A total of 180 provincially tracked non-vascular plants have ranges that overlap the Project, and two (2) of these are protected under the federal SARA and three (3) under the provincial SARA. A total of 317 provincially tracked vascular plants have ranges that overlap the Project, three (3) of which are protected under the federal SARA and four (4) under the provincial SARA.

The site visit completed in July 2016 did not document any plant SOCC. Although no plant SOCC were recorded during the site visit, it does not preclude the potential for plant SOCC to be present. Listed plants occurrences can be missed due to timing of surveys because plant SOCC presence can vary annually and locally. Climatic fluctuations (e.g., abnormal temperatures or precipitation) might affect flowering patterns, making plant SOCC more difficult to spot and identify. Available microhabitats can vary over time and space. Therefore, a site visit and database search cannot confirm the absence of plant SOCC; it can only confirm their presence. Because of these limitations, field survey results and habitat preferences of plant SOCC are used to determine potential for occurrence (Table 4.7-1). It was determined that the majority of the habitats immediately around the proposed WTG locations and Crown Access Road were of low potential to support these species. The fen was determined to be of high potential.

FLORA - VASCULAR

- Appalachian Polypody
- Blunt-leaved Pondweed
- Canada Serviceberry
- Creeping Sedge
- Estuary Sedge
- Farwell's Water Milfoil
- Gmelin's Water Buttercup
- Great Duckweed
- Halberd-leaved Tearthumb
- Hyssop-leaved Fleabane
- Maidenhair Spleenwort
- Michaux's Sedge
- Slim-stemmed Reed Grass
- Star Duckweed
- Whorled Water Milfoil

LEGEND:

- WTG
- MET TOWER
- PROJECT FOOTPRINT
- SUBSTATION FOOTPRINT
- 5 km BUFFER
- PRIMARY HIGHWAY (DTI)
- SECONDARY HIGHWAY (DTI)
- PRIMARY FOREST ROAD (DERD)
- TERTIARY/LIMITED ACCESS FOREST ROAD (DERD)
- WATERCOURSE
- WATERBODY
- LAND LEASE AREA (1252 ha)

PROJECT:

PROJECT:
WISOKOLAMSON ENERGY PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

PROJECT NO.: **161-08790 PHASE 19**

CLIENT: **WISOKOLAMSON ENERGY LP**

FIGURE:

TITLE:
VEGETATION SPECIES OF CONSERVATION CONCERN

FIGURE NO.:	REVISION NO.:
4.7-3	0

SCALE: 1:65,000
0 500 1,000 2,000 3,000 Metres

DATUM:	PROJECTION:
NAD 83 CSRS	NB Stereographic
DRAWN BY: T. MOREHOUSE	CHECKED BY: J. FERNET
CREATED DATE: (YYYY-MM-DD) 2018-03-22	REVISION DATE: (YYYY-MM-DD) 2018/04/13

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Table 4.7-1 Vegetation Species of Conservation Concern Previously Documented and Reported within 5 km of the Project

Common Name	Scientific Name	Provincial Rarity Rank	Provincial General Status Rank	Number of Records	Habitat Preference; Location Sighting
Trees and Shrubs					
Canada Serviceberry	*Amelanchier canadensis*	S3	Secure	2	Damp soil of swamps, wet streamheads, bogs, moist to wet thickets, and woods; Observed by Highway, 3 km southwest of Albert
Forbs					
Appalachian Polypody	*Polypodium appalachianum*	S3	Secure	1	Cliffs and rocky slopes; on a variety of substrates; Observed in Caledonia Gorge Protected Natural Area ~1.55 km west-southwest of the mouth of Caledonia Brook in gulley
Blunt-leaved Pondweed	*Potamogeton obtusifolius*	S3	Secure	1	Submersed aquatics in shallow water of protected lake bays, ponds and quiet streams; Observed in Germantown Marsh in Beaver Brook Marsh ~0.9 km southeast of Beaver Brook bridge on Highway 114
Farwell's Water Milfoil	*Myriophyllum farwellii*	S3	Secure	1	Oligotrophic to mesotrophic waters of lakes, ponds, and marshes; Observed in Germantown Marsh along north side of Shepody River 2.5 km upstream from north end of NWA
Gmelin's Water Buttercup	*Ranunculus gmelinii*	S3	Secure	4	Shallow water or drying mud, wet meadows, swamps, marshes, ponds, shores of rivers; Observed near Beaver Brook Marsh ~0.9 km southeast of Beaver Brook bridge on Highway 114, along stream near east edge of Germantown Marsh ~2.2 km southwest of Marsh Road bridge, and near east edge of Germantown Marsh ~1.75 km southwest of Marsh Road bridge
Great Duckweed	*Spirodela polyrrhiza*	S3S4	Secure	3	Eutrophic, quiet waters; Observed in Germantown Marsh in Shepody River 0.2 km upstream from bridge at north end of NWA, north of Shepody River 1.0 km upstream from bridge at north end of NWA, and at Marsh Road bridge over dyked stream.
Halberd-leaved Tearthumb	*Polygonum arifolium*	S3	Secure	1	Shaded swamps, ponds, tidal marshes along rivers, wet ravines in forests; Observed near east edge of Germantown Marsh ~1.8km southwest of Marsh Road bridge
Hyssop-leaved Fleabane	*Erigeron hyssopifolius*	S3	Secure	1	Bogs, muskegs and fens; Observed at falls at Crooked Creek below lookout at Albert
Maidenhair Spleenwort	*Asplenium trichomanes*	S2	Sensitive	1	Sandstone, basalt, and granite; Observed in Germantown Marsh along Beaver Brook ~130 m south of Highway 114 at bridge over brook
Star Duckweed	*Lemna trisulca*	S3	Secure	2	Mesotrophic, quiet waters rich in calcium; Observed in Germantown Marsh in Beaver Brook Marsh ~0.9 km south-southeast of Beaver Brook bridge on Highway 114, and north side of Shepody Road 2.3 km upstream from north end of NWA
Whorled Water Milfoil	*Myriophyllum verticillatum*	S3	Secure	2	Streams, rivers, ponds, lakes, and sloughs; Observed in Germantown Marsh in Beaver Brook Marsh ~0.9 km southeast and ~0.9 km south-southeast of Beaver Brook bridge on Highway 114

Common Name	Scientific Name	Provincial Rarity Rank	Provincial General Status Rank	Number of Records	Habitat Preference; Location Sighting
Graminoids					
Creeping Sedge	*Carex chordorrhiza*	S3	Secure	1	Fens, bogs, floating mats on lakeshores, emergent sedge marshes, usually in very wet sites, often in shallow water; Observed in Germantown Marsh at Beaver Brook Marsh ~1.2 km southeast of Beaver Brook bridge on Highway 115
Estuary Sedge	*Carex recta*	S3	Secure	2	Saline, brackish shores, swales, intertidal marshes, river estuaries; Observed in Germantown Marsh north of Shepody Road 1.0 km upstream from bridge at north end of NWA
Michaux's Sedge	*Carex michauxiana*	S3	Secure	1	Wet sedge fens, open and treed bogs; Observed in Germantown Marsh at Beaver Brook Marsh ~0.9 km south-southeast of Beaver Brook bridge on Highway 114
Slim-stemmed Reed Grass	*Calamagrostis stricta*	S3S4	Secure	1	Mesic to wet meadows, gravel bars, fens, marshes, lakeshores and open forests; Observed in Germantown Marsh north of Shepody River 1.0 km upstream from bridge at north end of NWA

Notes:
Data retrieved from ACCDC Report 6038: Riverside Albert, NB
Data is accurate as of 23 February, 2018.
None of these species are designated under COSEWIC, listed under SARA, or are protected under the NB SARA.

4.8 TERRESTRIAL WILDLIFE

Fifty seven (57) native species of mammals (Dilworth, 1984), over three hundred and fifty (350) resident and migratory bird species (Squires, 1976), and approximately twenty five (25) species of reptiles and amphibians (herptiles) (Gorham, 1970) are known to inhabit NB. A variety of these species frequent the Shediac Bay watershed, including several species of mammals, birds, herptiles and invertebrates (Leblanc, 2009).

The forests of NB provides habitat for moose (*Alces alces*), black bear (*Ursus americanus*), red fox (*Vulpes vulpes*), porcupine (*Erthizon dorsatum*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*) and beaver (*Castor canadensis*) (Leblanc, 2009). The habitat located in the Project area provides suitable habitat for many common mammal species.

Several common varieties of reptiles and amphibians, such as the maritime garter snake (*Thamnophis sirtalis pallidulus*), wood frog (*Lithobates sylvaticus*), and American toad (*Anaxyrus americanus*), may frequent the area. Salamander species could potentially also be present in the damper areas, such as wetlands and other low lying areas.

4.8.1 BIRDS

Timing and patterns of migration will typically vary on an annual basis and be species-specific, but generally peak migration for birds would likely be expected during May and September. Many individuals of certain species will also remain in the Project area to breed during the summer, including numerous songbird species such as those identified in Section 4.8.3. Although there are no IBA or RAMSAR sites (wetlands of international importance) within the Project area, there is an IBA located within 5 km of the Project (Shepody Bay West NB009). There are a number further east along the Bay of Fundy (Dorchester Cape and Grand Anse NB038 and Upper Cumberland Basin NS002) and one located approximately 86 km to the west (Lower St. John River NB010). The Shepody National Wildlife Area is also designated as part of a RAMSAR site (Section 4.9). Identifying these areas are important when considering flight paths of birds that may be moving to and from these sites during migration as they will have potential to interact with the Project.

WSP completed a Bird Inventory for the Project. The full report is included in Appendix E. The following is a brief summary of the report.

A field program was initiated in 2016 to collect data on birds in the Project area, with emphasis on migrating, wintering and breeding birds. Migration surveys were conducted within the area in the fall of 2016, breeding bird surveys were performed in 2016 and 2017, and wintering bird surveys were conducted in 2017

A fall migratory bird survey was conducted between September 13 and October 20, 2016. Seven (7) transects and two (2) observation stations were selected to reflect habitat availability in the study area (Appendix E). Transects were 325 m to 580 m in length and each transect was surveyed ten times. Bird data collected included distance and direction from the observer, bird behaviour, flight height, and direction. The duration of each transect survey was of 10 minutes on average, and the observation stations surveys were of a duration a 1 hour per visit. A total of 29 species, comprising 214 individual birds, were recorded during the field survey at heights generally less than 100 m (Appendix E). Dark-eyed junco (*Junco hyemalis*) and black-capped chickadee (*Poecile atricapillus*) were the most common species detected.

Breeding bird surveys were conducted on June 24 and July 6 2016 and May 5 to July 3 2017. The bird surveys included ten minute point counts from eleven (11) point count survey stations in 2016 and the seven (7) transect locations in 2017. A nocturnal nighthawk survey was also conducted during the night of July 2/3, 2017. A total of 55 bird species, comprising 227 individual birds, were observed during the 2016 and 2017 field surveys (Appendix E). American robin (*Turdus migratorius*), white-throated sparrow (*Zonotrichia albicollis*), and dark-eyed junco were the most common species observed.

Winter bird surveys were conducted on January 10, February 21, and March 30, 2017 along the seven (7) transects established for the fall migratory bird survey. According to the Christmas Bird Count data, from the Village of Riverside-Albert in Albert County for the 2010 to 2015 period, more than 80 species occur in the Project area during

winter. Only ten (10) bird species were observed during the 2017 winter surveys (Appendix E). American crow (*Corvus brachyrhynchos*), white-throated sparrow, black-capped chickadee, and red-breasted nuthatch (*Sitta canadensis*) were the most common species observed.

Five (5) bird SOCC were observed during the field surveys (Appendix E; Section 4.8.3). These included pine siskin (*Carduelis pinus*), turkey vulture (*Cathartes aura*), common nighthawk (*Chordeiles minor*), eastern wood-pewee (*Contopus virens*), and evening grosbeak (*Coccothraustes vespertinus*).

4.8.2 BATS

In NB, seven (7) bat species have been documented and have ranges that overlap the Project area. These include big brown bat (*Eptesicus fuscus*), eastern pipistrelle or tri-colored bat (*Perimyotis subflavus*), hoary bat (*Lasiurus cinereus*), little brown myotis or little brown bat (*Myotis lucifugus*), northern myotis or northern long-eared bat (*Myotis septentrionalis*), eastern red bat (*Lasiurus borealis*), and silver-haired bat (*Lasionycteris noctivagans*) (GNB, n.d.). The hoary bat, eastern red bat, silver-haired bat are considered migratory species because they migrate north in the spring to breed and return to the south for the winter months. The little brown bat, northern long-eared bat, tri-colored bat, and big brown bat are primarily non-migratory, resident species that shift habitat seasonally moving between summer nursery areas and winter hibernation/mating sites.

The little brown bat, northern long-eared bat, tri-colored bat, and big brown bat have been documented within 20 km of the Project (ACCDC, 2018) and a known bat hibernaculum (overwintering site) is approximately 18 km north of the Project (Vanderwolf et al., 2012). Other critical habitats for little brown bat, northern long-eared bat, and tri-colored bat exist within 50 km of the Project Area according to the Recovery Strategy for these species (ECCC, 2015).

WSP completed a Bat Inventory for the Project. The full report is included in Appendix F. The following is a brief summary of the report.

The bat inventory was conducted during the reproduction and the fall bat migration periods (late summer/early fall) 2016, and during the reproduction period (spring) 2017 using a stationary acoustic inventory technique. Acoustic survey stations (AnaBat® II Bat Detector) were installed in representative habitats (Appendix F). Stations were equipped with an automated system and were set to record between 8:00 p.m. and 6:00 a.m. All the stations were installed in trees approximately 4 m to 6 m above ground, except for one station that was installed on the MET tower at approximately 30 m.

Three bat species and one genus of bats were identified during this survey among the 20 bat sonograms recorded, including:

- Hoary Bat
- Species in the genus Myotis (*Myotis* spp.)
- Big Brown Bat
- Tri-colored Bat

The hoary bat represented approximately 45% of the sonograms, and had the highest percent of sonograms out of all the species identified. The tri-colored bat represents approximately 20% of the sonograms. *Myotis* spp. represent approximately 20% of the sonograms but, due to limitations of survey methods, the relative proportion of the sonograms belonging to each species of *Myotis* cannot be determined. Only one sonogram of the big brown bat was collected, representing approximately 5% of the recordings. Unidentified bat species were documented for 10% of the recorded sonograms that could not be identified to genus or species because the recordings were too short to recognize key characteristics.

Both resident and migratory species were encountered during this survey, with most of the sonograms collected during early migration (August 9 to 14 2016) and migration (September 17 to 21 2016). Early migration bat activity in August was mostly due to hoary bat. September bat activity was mostly due to *Myotis* sp. and tri-colored bat. The only sonogram of big brown bat was collected in September 2016. Only one sonogram from hoary bat was collected during the 2017 survey period.

During this survey, all the recordings for hoary bat were collected between 11:30 p.m. and 02:40 a.m., recordings from *Myotis* spp. between 08:00 p.m. and 00:30 a.m., and recordings for tri-colored bat between 09:30 pm and 05:30 am. The recording from big brown bat was collected around 01 00 p.m. Bats typically forage in several different locations each night and display dynamic movements across the landscape (Kunz et al. 2007). However, the method does not control the action of whether several calls of a given species recorded during a single night or even different nights came from one or several individuals. Therefore, some of the recorded calls could originate from a single bat repeatedly calling near the same station during the night, or even for several nights.

Overall, the average bat passes recorded is approximately 0.15 calls per night. When comparing this result to the bat acoustic survey of the Richibucto Wind Project approximately 100 km north of the Project that had an average bat passes of 1.4 calls per night (Natural Forces, 2017), the bat activity within the Project area appears to be low. Similar observations of low bat activity were recorded at the Kent Hills wind farm about 5 km north of the Project (Stantec, 2017).

All the habitats selected for survey stations were suitable for bats, including forest patches with some mature trees alternating with clearings, and sometimes wetlands. These habitats can provide both resting and foraging sites for bats. The valley of the West River east of the project footprint, is likely the most suitable moving/migrating corridor for bats near the Project. No potential hibernaculum or other critical habitat (maternal sites) for bats was identified during field surveys.

4.8.3 SPECIES OF CONSERVATION CONCERN

A comprehensive search of the ACCDC was completed to compile a list of wildlife species that have either been previously detected in the Project area or have been observed in the surrounding area and thus have the potential to occur in the Project area (ACCDC, 2018). Of particular concern, are sensitive, rare, at-risk, and legally listed species, in addition to special areas such as managed areas and environmentally significant areas (discussed in Section 4.9). Records found within 5 km of the Project were identified as in the Project area and a standardized 100 km search radius from the centre of the Project site was used to compile and summarize data for the surrounding area.

Based on the screening for wildlife in a 100 km radius around the Project site, numerous records were found totalling 28,553 records of 138 vertebrate species and 702 records of 64 invertebrate species. However, a number of the species were not applicable to the Project area given they were marine or coastal species. A number of these species have potential to occur in the Project area, and include species upland birds, waterbirds, raptors, amphibians, reptiles, small mammals, furbearers, carnivores, and ungulates. A number of the species in these wildlife groups are provincially and/or federally listed while others are sensitive or of conservation concern.

Within the Project area, 60 SOCC were found that have been previously detected and reported to the ACCDC (Table 4.8-1; Figure 4.8-1). Of these, four (4) are mammals, fifty (50) are birds, and five (5) are invertebrates. Although many SOCC ranked by the ACCDC are considered rare in NB, those protected or designated by federal and provincial legislation are of particular concern and are discussed in further detail below. In addition to those identified by the ACCDC, a number of bat species were detected during field surveys in 2016.

Table 4.8-1 Wildlife Species of Conservation Concern Previously Documented and Reported within 5 km of the Project

Common Name	Scientific Name	Provincial General Status Rank	Provincial Rarity Rank	NB SARA Status	COSEWIC Designation	SARA Status	Number of Records
Mammals							
Canadian Lynx	*Lynx canadensis*	At Risk	S3	Endangered	Not At Risk	-	1
Eastern Cougar[(a)]	*Puma concolor*	Undetermined	SU	Endangered	Data Deficient	-	8
Long-tailed Shrew	*Sorex dispar*	Sensitive	S2	-	Not At Risk	Special Concern, Schedule 3	2
Southern Bog Lemming	*Synaptomys cooperi*	Secure	S3S4	-	-	-	14
Birds							
American Coot	*Fulica americana*	Sensitive	S1S2B,S1S2M	-	Not At Risk	-	4
Bald Eagle**	*Haliaeetus leucocephalus*	At Risk	S4	Endangered	Not At Risk	-	n/a
Bank Swallow	*Riparia riparia*	Sensitive	S2S3B,S2S3M	-	Threatened	Threatened, Schedule 1	7
Barn Swallow	*Hirundo rustica*	Sensitive	S2B, S2M	Threatened	Threatened	Threatened, Schedule 1	16
Black-bellied Plover	*Pluvialis squatarola*	Secure	S3S4M	-	-	-	1
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Secure	S3B,S3M	-	-	-	1
Black Guillemot	*Cepphus grylle*	Secure	S3	-	-	-	1
Black Scoter	*Melanitta nigra*	Sensitive	S3M,S1S2N	-	-	-	5
Black Tern	*Chlidonias niger*	Sensitive	S2B,S2M		Not At Risk	-	2
Bobolink	*Dolichonyx oryzivorus*	Sensitive	S3B,S3M	Threatened	Threatened	Threatened, Schedule 1	17
Brown-headed Cowbird	*Molothrus ater*	May Be At Risk	S3B,S3M	-	-	-	3
Brown Thrasher	*Toxostoma rufum*	Sensitive	S2B,S2M	-	-	-	1
Bufflehead	*Bucephala albeola*	Sensitive	S3M,S2N	-	-	-	7
Canada Warbler	*Wilsonia canadensis*	At Risk	S3B, S3M	Threatened	Threatened	Threatened, Schedule 1	
Cape May Warbler	*Dendroica tigrina*	Secure	S3B, S4S5M	-	-	-	10
Chimney Swift	*Chaetura pelagica*	At Risk	S2S3B,S2M	Threatened	Threatened	Threatened, Schedule 1	13
Cliff Swallow	*Petrochelidon pyrrhonota*	Sensitive	S2S3B,S2S3M	-	-	-	16

Common Name	Scientific Name	Provincial General Status Rank	Provincial Rarity Rank	NB SARA Status	COSEWIC Designation	SARA Status	Number of Records
Common Eider	*Somateria mollissima*	Secure	S3B,S4M,S3N	-	-	-	1
Common Moorhen	*Gallinula chloropus*	Secure	S1B,S2S3M	-	-	-	4
Common Nighthawk	*Chordeiles minor*	At Risk	S3B, S4M	Threatened	Threatened	Threatened, Schedule 1	5
Eastern Kingbird	*Tyrannus tyrannus*	Sensitive	S3S4B, S3S4M	-	-	-	8
Eastern Wood-Pewee	*Contopus virens*	Secure	S4B, S4M	Special Concern	Special Concern	Special Concern, Schedule 1	2
Evening Grosbeak	*Coccothraustes vespertinus*	Sensitive	S3B,S3S4N,SUM	-	Special Concern	-	3
Gadwall	*Anas strepera*	Secure	S2B,S3M	-	-	-	2
Great Cormorant	*Phalacrocorax carbo*	Secure	S2N,S2M	-	-	-	1
Greater Scaup	*Aythya marila*	Secure	S1B,S4M,S2N	-	-	-	1
Horned Lark	*Eremophila alpestris*	May Be At Risk	S1B,S4N,S5M	-	-	-	1
Killdeer	*Charadrius vociferus*	Sensitive	S3B,S3M	-	-	-	6
Least Bittern	*Ixobrychus exilis*	At Risk	S1S2B,S1S2M	Threatened	Threatened	Threatened, Schedule 1	5
Lesser Scaup	*Aythya affinis*	Secure	S1B,S4M	-	-	-	6
Marsh Wren	*Cistothorus palustris*	Sensitive	S2B,S2M	-	-	-	10
Northern Mockingbird	*Mimus polyglottos*	Sensitive	S2B,S2M	-	-	-	8
Northern pintail	*Anas acuta*	Sensitive	S3B,S5M	-	-	-	6
Northern Shoveler	*Anas clypeata*	Secure	S2S3B,S2S3M	-	-	-	13
Olive-sided Flycatcher	*Contopus cooperi*	At Risk	S3B, S3M	Threatened	Threatened	Threatened, Schedule 1	9
Pectoral Sandpiper	*Calidris melanotos*	Secure	S3S4M	-	-	-	1
Peregrine Falcon anatum/tundrius pop.[(b)]	*Falco peregrinus*	At Risk	S1B, S3M	Endangered	Special Concern	Special Concern, Schedule 1	n/a
Pine Grosbeak	*Pinicola enucleator*	Sensitive	S2B,S4S5N,S4S5M	-	-	-	1
Pine Siskin	*Carduelis pinus*	Secure	S3	-	-	-	11
Red Crossbill	*Loxia curvirostra*	Secure	S3	-	-	-	1

Common Name	Scientific Name	Provincial General Status Rank	Provincial Rarity Rank	NB SARA Status	COSEWIC Designation	SARA Status	Number of Records
Red-breasted Merganser	*Mergus serrator*	Secure	S3B,S5M,S4S5 N	-	-	-	1
Red-headed Woodpecker[(c)]	*Melanerpes erythrocephalus*	Accidental	SNA	-	Threatened	Threatened, Schedule 1	3
Ruddy Duck	*Oxyura jamaicensis*	Secure	S1B,S4M	-	-	-	6
Ruddy Turnstone	*Arenaria interpres*	Secure	S3M	-	-	-	1
Rusty Blackbird	*Euphagus carolinus*	May Be At Risk	S3B, S3M	Special Concern	Special Concern	Special Concern, Schedule 1	2
Sanderling	*Calidris alba*	Sensitive	S3S4M,S1N	-	-	-	2
Semipalmated Sandpiper	*Calidris pusilla*	Secure	S3S4M	-	-	-	3
Short-eared Owl	*Asio flammeus*	Sensitive	S2B,S2M	Special Concern	Special Concern	Special Concern, Schedule 1	4
Spotted Sandpiper	*Actitis macularius*	Secure	S3S4B,S5M	-	-	-	4
Turkey Vulture	*Cathartes aura*	Secure	S3B,S3M	-	-	-	11
Virginia Rail	*Rallus limicola*	Sensitive	S3B,S3M	-	-	-	10
Wilson's Snipe	*Gallinago delicata*	Secure	S3S4B, S5M	-	-	-	14
Invertebrates							
a Ground Beetle	*Elaphrus americanus*	Secure	S3	-	-	-	1
a Ground Beetle	*Harpalus fulvilabris*	Secure	S3	-	-	-	1
Bronze Copper	*Lycaena hyllus*	Sensitive	S3	-	-	-	3
Eastern Tailed Blue	*Cupido comyntas*	Secure	S3S4	-	-	-	1
Yellow-banded Bumblebee	*Bombus terricola*	Sensitive	S3?	-	Special Concern	-	1

Notes: Data retrieved from ACCDC Report 6038: Riverside Albert, NB
Data is accurate as of 23 February, 2018, All species listed were sighted within 5 km of Project area
(a) = The last confirmed Eastern Cougar sighting in NB was in the winter of 1932, Kent County NB. All recent sightings are unsubstantiated. Hairs from two individuals were found at Fundy National Park in 2003, however one sample was determined to be a South American Cougar (*Puma concolor concolor*).
(b) = This species is location sensitive and because of concern about exploitation of location sensitive species, the precise location of this observation is not known; however, the range for this species overlaps the Project area.
(c) = This species occurs only as a vagrant in the Maritimes and was observed at one location in the Province.

FAUNA

- VERTEBRATE
- INVERTEBRATE

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KEY MAP:

LEGEND:

- WTG
- MET TOWER
- PROJECT FOOTPRINT
- SUBSTATION FOOTPRINT
- 5 km BUFFER
- PRIMARY HIGHWAY (DTI)
- SECONDARY HIGHWAY (DTI)
- PRIMARY FOREST ROAD (DERD)
- TERTIARY/LIMITED ACCESS FOREST ROAD (DERD)
- WATERCOURSE
- WATERBODY
- LAND LEASE AREA (1252 ha)

PROJECT:

PROJECT:
WISOKOLAMSON ENERGY PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

PROJECT NO.: **161-08790 PHASE 19**

CLIENT: **WISOKOLAMSON ENERGY LP**

FIGURE:

TITLE:
WILDLIFE SPECIES OF CONSERVATION CONCERN

FIGURE NO.:	REVISION NO.:
4.8-1	0

SCALE: 1:65,000
0 500 1,000 2,000 3,000 Metres

DATUM:	PROJECTION:
NAD 83 CSRS	NB Stereographic
DRAWN BY: T. MOREHOUSE	CHECKED BY: J. FERNET
CREATED DATE: (YYYY-MM-DD) 2018-03-22	REVISION DATE: (YYYY-MM-DD) 2018/04/13

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MAMMALS

CANADIAN LYNX

Canada lynx (*Lynx canadensis*) is listed as Endangered under the NB SARA and is ranked as S3, Sensitive by the ACCDC. Canada lynx has a range that extends from Alaska to Nova Scotia, and possibly as far south as New Mexico (Vashon, 2016). Preferred habitat for this species includes multi-layered forest stands and younger regenerating stands. These habitat types are also preferred by snowshoe hare, which is the main prey species for the lynx. Canada lynx gives birth once per year with an average litter size of one to five kittens and uses available existing features such as downed logs, root masses, or ground depressions to hide their young as opposed to building dens (Fox and Murphy, 2002). Litter size is thought to be dependent on snowshoe hare populations in the area. Areas of uneven aged and regenerating forest habitat are found within the Project area, and as so, the Canada lynx potential to be present. Sightings of the Canada lynx have been documented within 5.7 km of the Project (ACCDC 2018), which may further indicate the possibility of this species occurring in the Project area.

EASTERN COUGAR

The Eastern cougar (*Puma concolor*) is listed as Endangered by NB SARA and ranked as SU, Undetermined by the ACCDC. Little is known about the eastern cougar, and consensus has not been met regarding their inhabitation of the eastern provinces of Canada (Nature Canada, 2018). This species native habitat is thought to be dense hardwood forests associated with hills or mountains, and swampy areas surrounding this type of habitat. Eastern cougars are assumed to be top predators in the areas they may inhabit, second only to the Black Bear in size on the east coast. Prey includes most animals including moose. While some evidence in the form of unsubstantiated sightings and inconclusive DNA material is available, the last confirmed eastern cougar sighting in NB was in the winter of 1932, Kent County. Hairs from two individuals were found at Fundy National Park in 2003, however one sample was determined to be a South American Cougar (*Puma concolor concolor*). It is highly unlikely this species would be present in the Project area.

LONG-TAILED SHREW

Long-tailed shrew (*Sorex dispar*) is listed as Special Concern under Schedule 3 of SARA and ranked as S3, Sensitive by the ACCDC. Long-tailed shrew appear to prefer mountainous forested areas with an abundance of loose rock and damp areas (Whittaker et. al, 2016). It is believed that this species spends much of its time navigating between rocks and crevices roughly 30 centimetre (cm) below the surface. The diet of the long-tailed shrew consists of terrestrial invertebrates, and lifespan for this species is thought to be 2 years or less (Burian, 2002). Mating season for this species is April through August, and several litters of between four to seven individuals are realized per year (Burian, 2002). This species was documented in the Caledonia Gorge Protected Natural Area in 1979 (ACCDC, 2018) and their preferred habitat is not likely abundant within the Project area.

BATS

Little brown bat, northern long-eared bat, and tri-colored bat are all listed as Endangered under Schedule 1 of SARA and listed as Endangered under NB SARA. The listing of these species under Schedule 1 of SARA in 2014 was in response to sudden and dramatic declines of little brown bat and northern long-eared bat across the eastern portions of their range, and declines of tri-colored bat across their entire range in Canada. These declines are the result of white-nose syndrome, which is responsible for large numbers of mortality in hibernating bats through much of eastern North America (Blehert et al., 2009; CBC News, 2014; Burns and Broders, 2013, ECCC, 2015). In Quebec, NB, and NS, some hibernacula no longer have these bat species present (ECCC, 2015). In March of 2011, white-nose-syndrome was detected in a cave, one of NB's most important bat hibernaculum, in Albert County (GNB, 2018).

All three species overwinter in caves. Northern long-eared bat may hibernate in cooler sections of a cave, compared to little brown bat whereas tri-colored bat often roost in the deepest and warmest part of caves (COSEWIC, 2013a). In spring, females of each species leave winter hibernacula and give birth and raise pups in maternity colonies. For example, little brown bat maternity colonies often exist in warm sites that facilitate pup growth rates, such as attics of buildings and under bridges, in rock crevices, or in cavities of canopy trees in forests. Little brown bat, northern long-eared bat, and tri-colored bat were all detected in during field surveys (Section 4.8.2; Appendix F).

LITTLE BROWN BAT AND NORTHERN LONG-EARED BAT

Until the onset of white-nose syndrome, *Myotis* was the most common genus in eastern Canada (Broders et al., 2003; Jutras et al., 2012). In NB, *Myotis* includes the species little brown bat and northern long-eared bat both of which are resident bat species. They remain in their feeding and breeding areas until the fall (Brunet et al., 1998; ECCC, 2015) before joining their hibernacula, usually located in caves or old mine openings (Banfield, 1977; McDuff et al., 2001; ECCC, 2015). In the eastern part of their range, bat populations of the genus *Myotis* have been devastated by white-nose syndrome. To date, this syndrome has caused a 94% overall decline in known numbers of hibernating *Myotis* bats in NS, NB, Ontario, and Québec (ECCC, 2015).

Both species feed nocturnally on insects and spiders (Thomas et al., 2012). The northern long-eared bat is generally closely associated with the boreal forest (Broders et al., 2003; Owen et al., 2003), while the little brown bat frequents a wider variety of habitats, including riparian, forest, or anthropogenic areas (Broders et al., 2003; ECCC, 2015). During the summer, both the little brown bat and northern long-eared bat may use tree structures (e.g., natural cavities or cracks under the bark), building structure, or rock structures as resting or maternity roosting habitats (Moseley, 2007; Tremblay and Jutras, 2010; ECCC, 2015).

TRI-COLORED BAT

Tri-colored bat is considered to have the most specific overwintering habitat requirements than *Myotis* spp. (COSEWIC 2013a; ECCC, 2015). They often roost in the deepest part of caves or mines where temperature is the least variable, have strong humidity level preferences, and use warmer walls than other species (Briggler and Prather, 2003; COSEWIC 2013a; Kurta and Smith, 2014). A study of hibernacula in NB noted tri-colored bats hibernating low on cave walls (Vanderwolf et al., 2012). Although tri-colored bats tend to use the same hibernacula as little brown bat and northern long-eared bat, relatively few tri-colored bats have been recorded within any one hibernacula in Canada, possibly because they tend to hibernate solitarily (i.e., not in clusters) in the deepest sections of the caves/mines (ECCC, 2015). The tri-colored bat population declines in areas affected by white-nose syndrome in Canada are likely similar to that observed in little brown bat and northern long-eared bat, though the declines observed in this species are less straightforward (ECCC, 2015). In NB, declines at individual hibernacula have ranged from 30% to more than 75% (ECCC, 2015).

Tri-colored bats feed on insects after dusk and before dawn using echolocation (Naughton, 2012), predominately in forested riparian areas, over water (e.g., ponds and rivers), and in relatively open areas (Ethier and Fahrig, 2011). Little is known about roosts of tri-colored bats. Most known roost sites are found within forested habitats, where this species also forages. Tri-colored bats may roost in clumps of dead foliage and lichens (Veilleux et al., 2003; Perry and Thill, 2007; Poissant et al., 2010). In Nova Scotia, 30 radio-tagged bats had roosts in large clumps of arboreal lichens that grew on coniferous or deciduous trees relatively close to water features (Poissant et al., 2010).

BIRDS

BALD EAGLE

Bald eagle (*Haliaeetus leucocephalus*) is listed as Endangered by NB SARA and ranked as S4, At Risk by the ACCDC. The bald eagle is a diurnal raptor, typically found in forested areas near large fish-bearing water bodies (Cornell University, 2017a). In the Maritimes, it is most strongly associated with open water habitats, including freshwater rivers, lakes, and ponds, and saltwater estuaries and bays (Bird Studies Canada, 2018). This species is tolerant of human activity when feeding, and may be sighted near fish processing plants, landfills, and aqua-cultural operations. Bald eagle prefers to perch in tall trees with clear visibility of its surrounding area and typically nest in trees that protrude above the forest canopy; however, they will also nest on cliffs, telephone poles, or on the ground in areas where no trees are available. This species may also use abandoned osprey nests, as the bald eagle nests earlier in the year than the Osprey (Pepper, pers. comm., 2018). While some ponded waterbodies were found within the Project area, nesting habitat for bald eagle more closely associated with sizeable lakes, harbours, or bays, all of which are not found within 5 km of the Project. Bald eagle was recorded during spring migration field surveys near the Kent Hills wind farm in 2017 (Stantec, 2017), however bald eagle was not recorded during field surveys completed in 2016 and 2017.

BANK SWALLOW

Bank swallow (*Riparia riparia*) is listed as Threatened under Schedule 1 of SARA, designated as Threatened by COSEWIC and S2S3B, S2S3M, Sensitive by the ACCDC. This species has been documented in every province and territory except Nunavut (COSEWIC, 2013b). Like their name suggests, the bank swallow nests in sandy banks and cliffs along watercourses and coastlines but it will also take advantage of man-made habitats, such as sand and gravel pits, roadcuts, or sand piles, sawdust, coal ash, and other materials (COSEWIC, 2013b; Bird Studies Canada, 2018). Nesting occurs between mid-April and August, and vertical banks are required for nest burrows and nesting areas are always close to open habitats where the birds can forage such as grasslands, meadows, and pastures (COSEWIC, 2013b; BirdLife International, 2016). In the Maritimes, the species is strongly associated with coastal habitats such as beaches and dunes and with other open foraging areas, such as agricultural areas, grasslands, barelands, and bogs (Bird Studies Canada, 2018). Nesting habitat is not likely present in the Project area, however, they may forage in some open areas present in the area.

BARN SWALLOW

Barn swallow (*Hirundo rustica*) is listed as Threatened under Schedule 1 of SARA, listed as Threatened under NB SARA, designated as Threatened by COSEWIC, and ranked as S2B, S2M, Sensitive by the ACCDC. Barn swallows are found throughout Canada during the breeding season (Cornell University, 2017b). In the Maritimes, the barn swallow occurs mostly in agricultural areas close to aquatic habitats and is a possible breeder in the Project area (Bird Studies Canada, 2018). Barn swallows typically select nesting and foraging sites close to open habitats including parks, sports fields, agricultural areas, wetlands, large forest clearings, road ROW, and beaches (Cornell University, 2017; COSEWIC, 2011). Nesting sites typically include human-made structures; however, they will nest on natural areas with a vertical substrate (Cornell University, 2017; Bird Studies Canada, 2018). Foraging habitat for this species is within the Project area. There are 3 human-made structures within 2 km of the Project, which could provide nesting habitat for barn swallow. Barn swallow was not recorded during field surveys completed in 2016 and 2017.

BOBOLINK

Bobolink (*Dolichonyx oryzivorus*) is listed as Threatened under Schedule 1 of SARA, listed as Threatened under NB SARA, designated as Threatened by COSEWIC, and ranked as S3B, S3M, Sensitive by the ACCDC. Bobolink may be one of the most agriculture-dependent species in the Maritimes; it has a strong preference for forage crops (COSEWIC, 2010; Bird Studies Canada, 2018). Nesting begins in mid-May and nests are built on the ground (COSEWIC, 2010).The bobolink also occurs in wet prairie, graminoid peatlands and abandoned fields dominated by tall grasses, remnants of uncultivated virgin prairie (tall-grass prairie), no-till cropland, small-grain fields, reed beds and irrigated fields in arid regions (COSEWIC, 2010). Its abundance is lowest within heavily forested areas is not recorded as having breeding evidence in the Project area (Bird Studies Canada, 2018).

CANADA WARBLER

Canada warbler (*Wilsonia canadensis*) is listed as Threatened under Schedule 1 of SARA, listed as Threatened under NB SARA, designated as Threatened by COSEWIC, and ranked as S3B, S3M, At Risk by the ACCDC. Canada warblers are found in lower central and eastern Canada, and across the northern forests during the breeding season (Cornell University, 2017c; Bird Studies Canada, 2018). In the Maritimes, the Canada warbler is associated with mature cedar swamps, forested wetlands, and with complex, mature or regenerating mixed forests, partial cuts, and shrublands; however this species is not recorded as having breeding evidence in the Project area (Bird Studies Canada, 2018). Nests are often built in treed swamps or the fringes of other types of wetland habitat on or very close to the ground, often in dense ferns or fallen logs (COSEWIC, 2008a; Cornell University, 2017c). The Canada warbler prefers to forage in areas where vegetation is at a low height, such as shrubby forest edge, regenerating woodland areas that have been previously harvested, and shrubby wetlands. Canada warbler nesting habitat and foraging habitat are found within the Project area. This species was incidentally documented near the Kent Hills wind farm in 2017 (Stantec, 2017), however Canada warbler was not recorded during field surveys completed in 2016 and 2017.

CHIMNEY SWIFT

Chimney swift (*Chaetura pelagica*) is listed as Threatened under Schedule 1 of SARA, listed as Threatened under NB SARA, designated by COSEWIC as Threatened, and ranked S2S3B, S2M, At Risk by the ACCDC. During the breeding season, chimney swifts can be found throughout southern parts of eastern and central Canada, as well as much of the United States. Before European settlement, this was associated with old growth forests where their nesting and roosting sites were primarily large hollow trees, however in present times, the chimney swift uses man-made structures including open chimneys air shafts, silos, wells, inside barns, and abandoned buildings; chimneys are most frequently used (COSEWIC, 2007a; Bird Studies Canada, 2018). The chimney swift is now highly dependent upon humans for nesting sites. The chimney swift preys upon flying insects, and hunts mostly in daylight near bodies of water because of the abundance of insects (COSEWIC, 2007a; Cornell University 2017d). Buildings are scarce within the Project area; there are three (3) human-made structures within 2 km of the Project; however, there is low potential for this species to be present within the area.

COMMON NIGHTHAWK

Common nighthawk (*Chordeiles minor*) is listed as Threatened under Schedule 1 of SARA, listed as Threatened under the NB SARA, designated by COSEWIC as threatened, and ranked as S3B, S4M, At Risk by the ACCDC. This species is found in all of the Canadian provinces and territories with the exception of Nunavut (COSEWIC, 2007b). The breeding habitat of the common nighthawk includes open habitats, such as sand dunes, beaches, recently logged areas, recently burned-over areas, forest clearings, short-grass prairies, pastures, open forests, peatbogs, marshes, lakeshores, gravel roads, river banks, rocky outcrops, rock barrens, railways, mine tailings, quarries, urban parks, military bases, airports, mines and commercial blueberry fields (COSEWIC, 2007b). In the Maritimes, its habitat associations include open areas such as regenerating forests and some types of wetlands (Bird Studies Canada, 2018). The common nighthawk nests on the ground in a variety of unsheltered habitat conditions, such as rocky outcrops, gravel beaches, and forest floor, as long as there are gravel or littered substrates for nesting and open areas for foraging (Bird Studies Canada, 2018; Cornell University, 2017e). When found in urban areas, the common nighthawk is known to nest on flat roofs of buildings which have gravel on them. This species was documented at two locations during nightjar and breeding bird surveys near the Kent Hills wind farm in 2017 (Stantec, 2017). Two (2) common nighthawks were observed during the field surveys. These birds were observed during the breeding season, indicating that they are “probable” breeders in the Project area. It is likely that this species is using exposed forest floors in clear cut areas or the logging roads as roost or nest locations.

EASTERN WOOD-PEWEE

The eastern wood-pewee (*Contopus virens*) is listed as Special Concern under Schedule 1 of SARA, listed as Special Concern under NB SARA, designated as Special Concern by COSEWIC and ranked as S4B, S4M, At Risk by the ACCDC. This species is found in eastern Canada during the breeding season usually from May to August (Cornell University, 2017f). Eastern wood-pewee is mostly associated with the mid-canopy layer of forest clearings and edges of deciduous and mixed forests (COSEWIC, 2012). It is most abundant in forest stands of intermediate age and in mature stands with little understory vegetation. In the Maritimes it is found in older, predominantly deciduous forests, often mixed with mature hemlock or pine (Bird Studies Canada, 2018). This species preys upon flying insects, and may also eat small amounts of vegetation such as berries and seeds from dogwood trees, blueberries, raspberries, and even poison ivy (Cornell University, 2017f). Foraging and nesting habitat are present in the Project area and eastern wood-pewee was documented once during the field surveys. Given that the species was detected during the breeding season, eastern wood-pewee should be considered a “possible” breeder within the Project area.

EVENING GROSBEAK

The evening grosbeak (*Coccothraustes vespertinus*) is designated by COEWIC as Special Concern and ranked as S3B, S3S4N, SUM, Sensitive by the ACCDC. The evening grosbeak can be found in every province and territory of Canada except Nunavut during their breeding season (COSEWIC, 2016). Nesting occurs between mid-May and early September and nesting habitat for this species consists of open, old mixed-wood forests where Fir species and White Spruce are abundant or dominant (COSEWIC, 2016). In the Maritimes, the evening grosbeak is generally associated with older coniferous and mixed forests, but it may take advantage of other habitats, especially if insects such as beetles and moth larvae are abundant (Bird Studies Canada, 2018). Nest sites are often located high in trees and a complete nests are roughly 10 cm to 15 cm in diameter (Cornell University, 2017g). The abundance of

softwood forest stands in and near the Project area increase potential for this species to be present. Evening grosbeak was observed once during the field surveys. The evening grosbeak's spatial distribution varies considerably from one year to the next, therefore may not be a regular breeder within the Project area.

LEAST BITTERN

The least bittern (*Ixobrychus exilis*) is listed as Threatened under Schedule 1 of SARA, listed as Threatened under NB SARA, designated as Threatened by COSEWIC, and ranked as S1S2B, S1S2M, At Risk by the ACCDC. This species is the smallest of the herons found in North America (Cornell University, 2017h; Bird Studies Canada, 2018). Least bittern can be found in Lower Canada during its breeding season, which begins in late April, with nesting occurring in mid-May (COSEWIC, 2009). Least bitterns preferentially breed in marshes with tall robust emergent vegetation (usually cattails), relatively stable water levels, and about 50% open water interspersed in small pockets throughout the vegetated areas. The least bittern also uses emergent vegetation for foraging purposes, by latching on to the plants and waiting for prey (Kaufmann, 2018). Least bitterns are thought to prey mainly on small vertebrates including fish, snakes, frogs, tadpoles, salamanders, and occasionally small mammals and songbird eggs or nestlings (COSEWIC, 2009). They may also prey on large insects, leeches, slugs, crayfish, and some vegetation. While some wetland areas are present within the Project area, only one freshwater marsh is near Priest Lake, approximately 270 m west of the proposed WTGs. It is not known if this marsh is preferential breeding habitat for least bittern because it was not surveyed during the baseline surveys. However based on aerial imagery of the marsh, it does not appear to be characteristic preferential breeding habitat because there is not emergent vegetation apparent throughout the center of the wetland basin with open water interspersed throughout the vegetated areas.

OLIVE-SIDED FLYCATCHER

The olive-sided flycatcher (*Contopus cooperi*) is listed as Threatened under Schedule 1 of SARA, listed as Threatened under the NB SARA, designated as Threatened by COSEWIC, and ranked as S3B, S3M, At Risk by the ACCDC. In the Maritimes, olive-sided flycatcher is typically found in open woodland and other forested areas with both mature and regenerating components, adjacent to shrubby forested wetlands, bogs, fens, beaver ponds, or clear-cuts where scattered trees remain and is a possible breeder in the Project area (COSEWIC, 2008b; Cornell University, 2017i; Bird Studies Canada, 2018). The species will use early successional forest, although the presence of tall snags and residual live trees for foraging and nesting is essential (COSEWIC, 2008b). Foraging and nesting habitat are present in the Project area and was observed during field surveys at the Kent Hills wind farm in 2017 (Stantec, 2017), however olive-sided flycatcher was not recorded during field surveys completed in 2016/2017.

PEREGRINE FALCON

Peregrine falcon anatum/tundrius population (*Falco peregrinus*) is listed as Special Concern under Schedule 1 of SARA, listed as Endangered under the NB SARA, designated as Special Concern by COSEWIC and ranked as S1B, S3M, At Risk by the ACCDC. The peregrine falcon is found year-round in various areas of Canada with preference given to open areas, barrier islands, mudflats, cliffs, riparian areas, or coastlines (Cornell University, 2017j). In NB, the peregrine falcon is found primarily along the Fundy Coast, which provides appropriate nesting habitat on shoreline cliff faces and an abundance of migrating shorebirds as a prey source during brooding and fledging (Bird Studies Canada, 2018). Most peregrine falcons nest on cliff ledges or crevices near good foraging areas and cliff elevations of 50 m to 200 m high are preferred (COSEWIC, 2007c). Although cliffs are preferred, this species will also nest on sky-scrapers, electrical towers, silos, and bridges (Cornell University, 2017j). Suitable nesting habitat is not found within the Project area.

RUSTY BLACKBIRD

Rusty blackbird (*Euphagus carolinus*) is listed as Special Concern under Schedule 1 of SARA, listed as Special Concern under NB SARA, designated as Special Concern by COSEWIC and ranked as S3B, S3M, May Be at Risk by the ACCDC. Rusty blackbird uses several different types of wet-areas for breeding and foraging habitat, including swamps, bogs, fens, beaver ponds, and other wet woodlands (Cornell University, 2017k). In the Maritimes, rusty blackbird is associated with forested wetlands and beaver ponds that are surrounded by regenerating coniferous and mixed forest (Bird Studies Canada, 2018). Regenerating clear-cuts and plantations are also used. This species forages in shallow water where they obtain aquatic prey in leaf litter (COSEWIC, 2017). In nesting and breeding areas, rusty blackbird feed mostly on invertebrates, with a preference for dragonfly nymphs. They also eat salamanders, water beetles, spiders, small fish, crustaceans, snails, and mosquitoes. Rusty Blackbirds

nest in trees near or in wetland areas sometimes on trees overhanging a waterbody (Cornell University, 2017k). Habitat for the rusty blackbird is present within the Project area, however rusty blackbird was not recorded during field surveys completed in 2016/2017.

SHORT-EARED OWL

The short-eared owl (*Asio flammeus*) is listed as Special Concern under Schedule 1 of SARA, listed as Special Concern under NB SARA, designated as Special Concern by COSEWIC, and ranked as S2B, S2M, Sensitive by the ACCDC. Short-eared owl is found throughout Canada, with records of the species in every province and territory (COSEWIC, 2008c). This species prefers to nest in open areas, including grasslands, arctic tundra, peat bogs, old pastures, and marshland (Cornell University, 2017l). These areas also coincide with preferred prey of the short-eared owl, such as voles and other small rodents. In the Maritimes, the short-eared owl is strongly associated with shrublands, which include open, tundra-like barrens, and uncultivated grasslands (Bird Studies Canada, 2018). They have also been documented in grassy fields associated with marshlands or other wet areas, often adjacent to woodlands (Bird Studies Canada, 2018l). Short-eared owls breed primarily in well-drained grasslands near coastal wetlands (COSEWIC, 2008c). Suitable nesting habitat is not found within the Project area.

INVERTEBRATES

YELLOW-BANDED BUMBLEBEE

The yellow-banded bumblebee (*Bombus terricola*) is listed as Special Concern by COSEWIC and ranked as S3, Sensitive by the ACCDC. Yellow-banded bumblebees live in annual colonies, and only the new mated queens overwinter (Hatfield et al., 2015). After hibernation the queen begin to search a new nest site and foraging for nectar until the first worker bees emerge and are available to aid in these tasks. Yellow-banded bumble bees typically nest underground often in abandoned rodent burrows (COSEWIC, 2015). This species is a habitat generalist and are found in a variety of habitats such as open coniferous, deciduous and mixed-wood forests, agricultural areas, urban areas, along roadsides, meadows, grasslands, and wetlands (Hatfield et al., 2015; COSEWIC, 2015). Like other bumble bees, the yellow-banded bumblebees are a generalist pollen forager and collect pollen and nectar from a variety of plant species. They are pollinators of the plants they forage on. Several areas of suitable habitat are found within the Project area, and therefore there is potential for yellow-banded bumblebee to be present.

4.9 ENVIRONMENTALLY SENSITIVE AND PROTECTED AREAS

The ACCDC identified three (3) managed areas within 5 km of the Project. These include the Caledonia Gorge Protected Natural Area, Shepody National Wildlife Area, and Fundy National Park. The ACCDC also identified a biologically significant site within 5 km of the Project, Shepody Bay West IBA (Figure 4.9-1). Caledonia Gorge Protected Natural Area is an approximate 2,900 ha Class II Protected Natural Area. Class II areas are permanently set aside for the conservation of biological diversity, where certain recreational activities having minimal impact will be allowed.

Shepody National Wildlife Area was established in 1980 and is comprised of the Germantown Marsh, Mary's Point and New Horton sections that are situated on and adjacent to Chignecto and Shepody Bays. The Shepody National Wildlife Area is also designated as part of a RAMSAR site (wetland of international importance under the Ramsar Convention) because it supports large numbers of mud shrimp, the principle food source for millions of fall migrating shorebirds.

Shepody Bay West IBA is globally significant for congregatory species and shorebird concentrations (IBA Canada, 2018). The mudflats and tidal marshes at the head of the Bay of Fundy are considered one of the most important stopover sites for shorebirds in eastern North America.

There is a Deer Wintering Area 3.8 km of the southern-most WTG. There are no Provincial Parks, operational quarries and mine sites, economically viable peatlands, Old Forest Communities and Habitats, Eastern Habitat Joint Venture sites, International Shorebird Reserves, or conservation areas managed by Ducks Unlimited within the Project area.

SPECIAL MANAGEMENT AREAS

- Wildlife Management Area
- Ducks Unlimited Management Area
- Eastern Habitat Joint Venture Sites
- Deer Wintering Area
- Atlantic Salmon (Inner Bay of Fundy population)
- Caledonia Gorge Protected Area
- Fundy National Park
- Shepody Natural Wildlife Area (Germantown Marsh Unit)
- Shepody Bay West Important Bird Area

LEGEND:

- WTG
- MET TOWER
- SUBSTATION FOOTPRINT
- PROJECT FOOTPRINT
- 5 km BUFFER
- PRIMARY HIGHWAY (DTI)
- SECONDARY HIGHWAY (DTI)
- PRIMARY FOREST ROAD (DERD)
- TERTIARY/LIMITED ACCESS FOREST ROAD (DERD)
- WATERCOURSE
- WATERBODY
- LAND LEASE AREA (1252 ha)

PROJECT:

PROJECT:
WISOKOLAMSON ENERGY PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

PROJECT NO.: **161-08790 PHASE 19**

CLIENT: **WISOKOLAMSON ENERGY LP**

FIGURE:

TITLE:
PROVINCIALLY SIGNIFICANT AREAS

FIGURE NO.:	REVISION NO.:
4.9-1	0

SCALE: 1:65,000
0 500 1,000 2,000 3,000 Metres

DATUM:	PROJECTION:
NAD 83 CSRS	NB Stereographic
DRAWN BY: T. MOREHOUSE	CHECKED BY: J. FERNET
CREATED DATE: (YYYY-MM-DD) 2018-03-22	REVISION DATE: (YYYY-MM-DD) 2018/04/13

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4.10 SOCIAL AND CULTURAL ENVIRONMENT

4.10.1 EXISTING LAND USE

The Project is located on Crown land south of New Ireland Road, entirely within Albert County, NB (Figure 4.10-1). Albert County is divided into six parishes and include Coverdale, Hillsborough, Elgin, Hopewell, Harvey, and Alma. The County has numerous communities. The largest community in the county is Riverview. The closest community to the Project is the village of Riverside-Albert. There are four (4) residences located approximately 2.5 km southwest of Riverside-Albert. A NAVCanada Radar is about 14 km northeast of the Project and the nearest aerodrome is in Moncton International Airport about 45 km northeast of the Project. The primary land use in the area is forestry. The Project is within Wildlife Management Zone 24.

4.10.2 RECREATION AND TOURISM

Recreational activities in-and-around the Project primarily include snow mobile trails, all-terrain vehicle (ATV) trails, and all-season trails for hiking, cross-country skiing and snowshoeing.

The NB Federation of Snow Mobile Clubs is a non-profit, volunteer organization whose goal is to organize snowmobile clubs and create and maintain snowmobile trails (NBFSC, 2017-2018). The Project is in Zone 8 where there are a number of local and provincial trails that traverse the area, including one local trail that uses a portion of the Crown Access Road through the Project area. There is a local/provincial trail that is associated with New Ireland Road. The warming shack located on the corner of New Ireland Road and the Crown Access Road is the Kent Road Shelter associated with this trail network.

The NB All-Terrain Vehicle Federation runs a province-wide trail network that is linked to local member trails and promotes safe ATV Trails for all (NBATVF, 2018). The Project is within Region 8. A network of non-managed trails traverse the Project area. These are associated with New Ireland and Barrett roads.

There is an all-season trail, the Dobson Trail, which runs from Riverview to Fundy National Park (FHTA, 2018). The Dobson Trail is a 57.75 km hiking trail that traverses a variety of woodland terrain. The closest point of the trail is about 5 km northwest of the Project.

4.10.3 ECONOMY

According to the 2016 census, there were 29,158 people living in Albert County with a population density of 16.1 persons per square kilometre (Statistics Canada, 2016). The majority of the population is within Riverview (19,667 people). The population of Riverside-Albert is 350 people.

In 2016 Statistics Canada reported the median total income for households in Albert County to be approximately $66,500 compared to the provincial average of approximately $59,350. The current unemployment rate is approximately 9.8% compared to that of NB of approximately 10.9% (Statistics Canada, 2017). The main sources of income include sales and service occupations; business, finance and administration occupations; and trades, transport and equipment operators and related occupations. The major industries for Albert County include retail trade, health care and social services, administrative and support, waste management and remediation services, transportation and warehousing, accommodation and food services, and construction (Statistics Canada, 2017).

Transformer Substation
Historic Point of Interest
Cemetery
Building
Hospital
Fire Station
Fundy National Park
MunicipalBoundaries
Protected Wellfield
Pit

Points of Interest (within 2km)

Chalet/Cabin
Lake Shore Access
Warming Shack

RIVERSIDE-ALBERT
VILLAGE OF ALMA
Beaver Brook
Midway
New Horton
Germantown
Harvey Parish
NB 114

Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

KEY MAP:

LEGEND:

WTG
MET TOWER
PROJECT FOOTPRINT
5 km BUFFER
PRIMARY HIGHWAY (DTI)
SECONDARY HIGHWAY (DTI)
PRIMARY FOREST ROAD (DERD)
TERTIARY/LIMITED ACCESS FOREST ROAD (DERD)
WATERCOURSE
WATERBODY
SNB PROPERTY BOUNDARY (ALBERT COUNTY)
LAND LEASE AREA (1252 ha)

PROJECT:

PROJECT:
WISOKOLAMSON ENERGY PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

PROJECT NO.: **161-08790 PHASE 19**

CLIENT: **WISOKOLAMSON ENERGY LP**

FIGURE:

TITLE:
LAND USE

FIGURE NO.:	REVISION NO.:
4.10-1	0

SCALE: 1:65,000
0 500 1,000 2,000 3,000 Metres

DATUM:	PROJECTION:
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4.10.4 HERITAGE AND ARCHEOLOGICAL RESOURCES

WSP contracted Stratis Consulting Inc. (Stratis) to complete a Heritage Resource Impact Assessment (HRIA) for the Project. The full report is included in Appendix G. The following is a brief summary of the report.

Stratis completed a background research for the Project footprint which includes the WTG locations, Crown Access Roads, and the New Ireland Road ROW. This background research included aerial photographs; research of documents found at Archaeological Services in Fredericton; published materials such as topographic and surficial geology maps and reports; and the NB Register of Historic Places. A field visit and preliminary field examination took place on November 13 and November 17, 2017 under Archaeological Field Research Permit 2017 NB 145, issued to Dr. Grant Aylesworth, RPA No. 15583. The preliminary field examination included a visual survey of the Project footprint, including walking and visually surveying WTG locations and the existing ROW along New Ireland Road where utility poles will be installed. Focus was placed on watercourse crossing locations.

The document review indicated no areas of high archaeological potential near the WTG locations or south of New Ireland Road. There was one known archaeological site, cataloged as BkDf-2 that represents the location of a 19th century Anglican Church and cemetery. Another site, BkDf-1, is located to the west along New Ireland Road.

No new heritage resources were found within the Project area during the preliminary field examination. Some historic period resources, such as BkDf-2, and other features such as rock walls and building foundations, are likely in the area; however the Project is unlikely to encounter these features if construction of the powerlines remains within the existing New Ireland Road ROW and existing Crown Land Access roads.

Based on the results of the assessment, none of the areas near the WTGs and the substation location are of high archaeological potential and archaeological monitoring during construction for these areas is not recommended. New Ireland Road, however, crosses a number of high potential archaeological areas, therefore it is recommended that archaeological monitoring of ground disturbing activities within 80 m of a current or former watercourse location and archaeological monitoring for utility pole installation within 200 m of the location of the Anglican Church and cemetery (BkDf-2) should be undertaken. Accidental discovery of heritage resources remains possible whenever any ground disturbing activities take place. If archaeological materials are encountered, Archeological Services New Brunswick (ASNB) must be notified and any ASNB protocols related to accidental discovery of heritage resources must be followed.

If any change to the proposed footprint is anticipated, consultation with a permitted archaeologist should be completed to ensure minimal damage to possible buried heritage resources.

4.10.5 VISUAL LANDSCAPE

WSP completed a Visual Impact Assessment for the Project. The full report is included in Appendix H. The following is a brief summary of the existing conditions in the Project area.

The landscape surrounding the Project is remote and consists of forested areas that are currently used for logging operations. There are no major industrial facilities in the area. The Kent Hills Wind Farm is about 5 km north of the Project. The representative photographs of the current visual landscape can be viewed in Photos 4.10-1 and 4.10-2.

Photo 4.10-1 Pre-Project Landscape View from the Warming Shack (45°43'43.03"N, 64°53'16.22"W), Facing South at the Project Location

Photo 4.10-2 Pre-Project Landscape View from Midway Road (45°40'24.08"N, 64°46'42.18"W), Facing Northwest at the Project Location