# 3 PROJECT DESCRIPTION

## 3.1 PROJECT NAME

The name of the Project is the Wisokolamson Energy Project (Project).

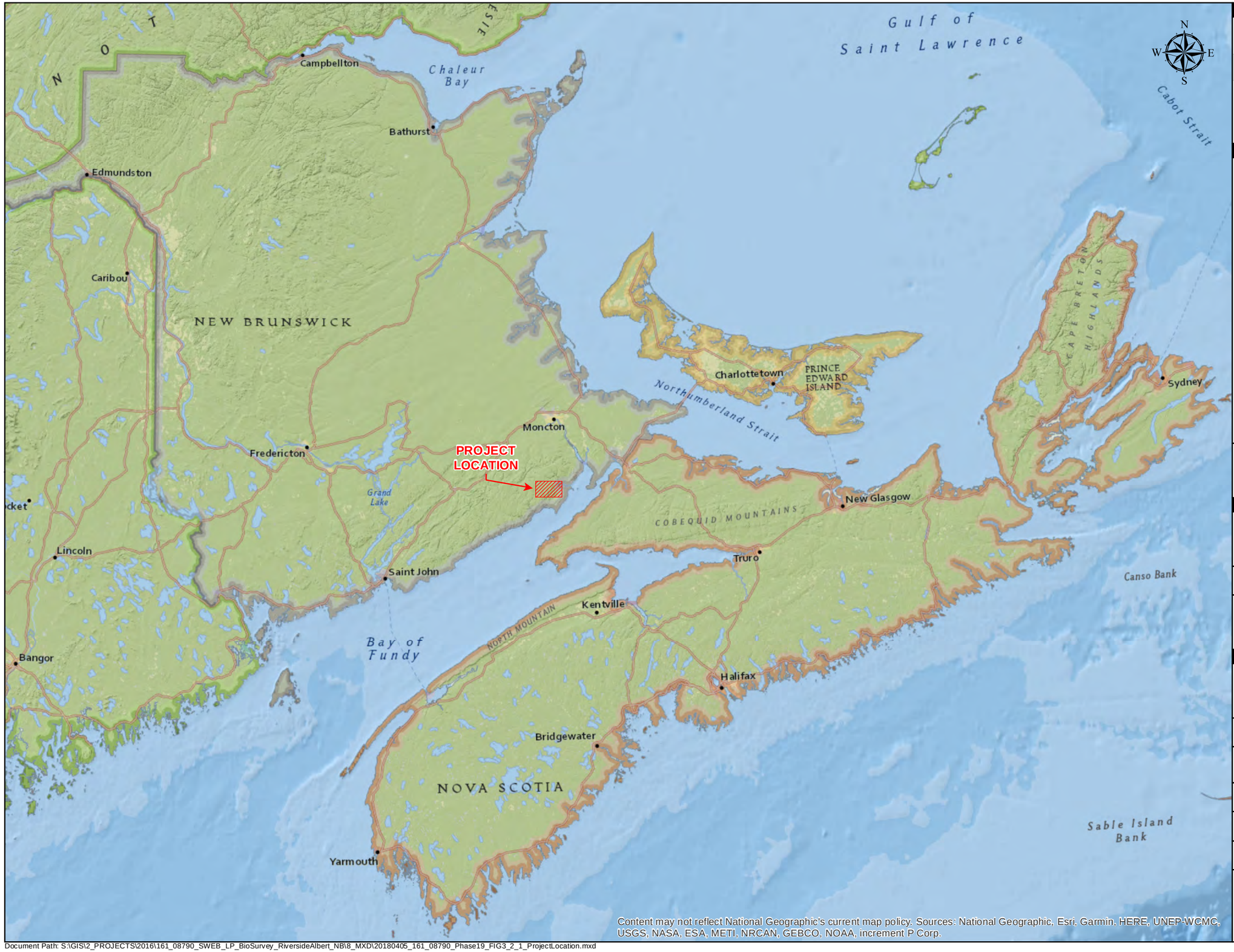
## 3.2 PROJECT OVERVIEW

The Project is located on Crown land south of New Ireland Road, in Albert County, New Brunswick, and will have an aggregate electrical capacity of 18 MW (Figure 3.2-1). In addition, the Project's electrical substation will be located on a private parcel adjacent to a section of NB Power's 69 kilovolt (kV) circuit which ends at the Albert substation, south of Riverside-Albert, NB. The Project will consist of five (5) WTG, access roads, collector system, substation, and associated temporary laydown areas required for construction (Figure 3.2 2 and Figure 3.2 3). Construction of the Project is scheduled to begin in late summer/early fall 2018, with WTG delivery and commissioning commencing in June 2019.

The Project is expected to consist of Vestas V126 WTGs with a nominal power of 3.6 MW. Each assembly will consist of the tower, hub, nacelle, rotor blades, and controller, with a total height of 180 m. The total WTG rotor diameter will be 126 m. It is anticipated that each WTG will be erected on a concrete foundation. The dimensions, depth, and type of foundation will depend on an evaluation of the local soil, surficial geology characteristics, wind forces at the location, and site-specific details of each location. The proposed substation location is near New Ireland Road and Highway 114. The substation area will be approximately 40 m by 40 m.

The Vestas V126 will be equipped with Vestas' de-icing system, can be used on low- medium- and high-wind sites, and are capable of low temperature operation (-30ºC). The can also be fitted with aviation lights and markings on the blades with an Obstacle Collision Avoidance System which is a low-energy radar system that detects aircraft to switch the aviation lights on and off as needed.

The proposed schedule for the Project is dependent on receiving all necessary approvals. It is expected that site preparation and construction will begin in late summer/early fall of 2018, and take approximately 14 to 16 months to complete. Construction will be scheduled to occur during daytime hours. It is expected the Project will be in operation by late 2019. The anticipated life of the Project is estimated to be 25 years, which is consistent with the WTG life expectancy.




**KEY MAP:**


**LEGEND:**

PROJECT LOCATION



**PROJECT:**

PROJECT:
**WISOKOLAMSON ENERGY PROJECT ENVIRONMENTAL IMPACT ASSESSMENT**

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

CLIENT:
**WISOKOLAMSON ENERGY LP**

**FIGURE:**

TITLE:
**PROJECT LOCATION**

| FIGURE NO.: | REVISION NO.: |
|---|---|
| **3.2-1** | **0** |

SCALE: 1:2,100,000
0 25 50 100 Kilometres

| 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) 2018/04/05 |

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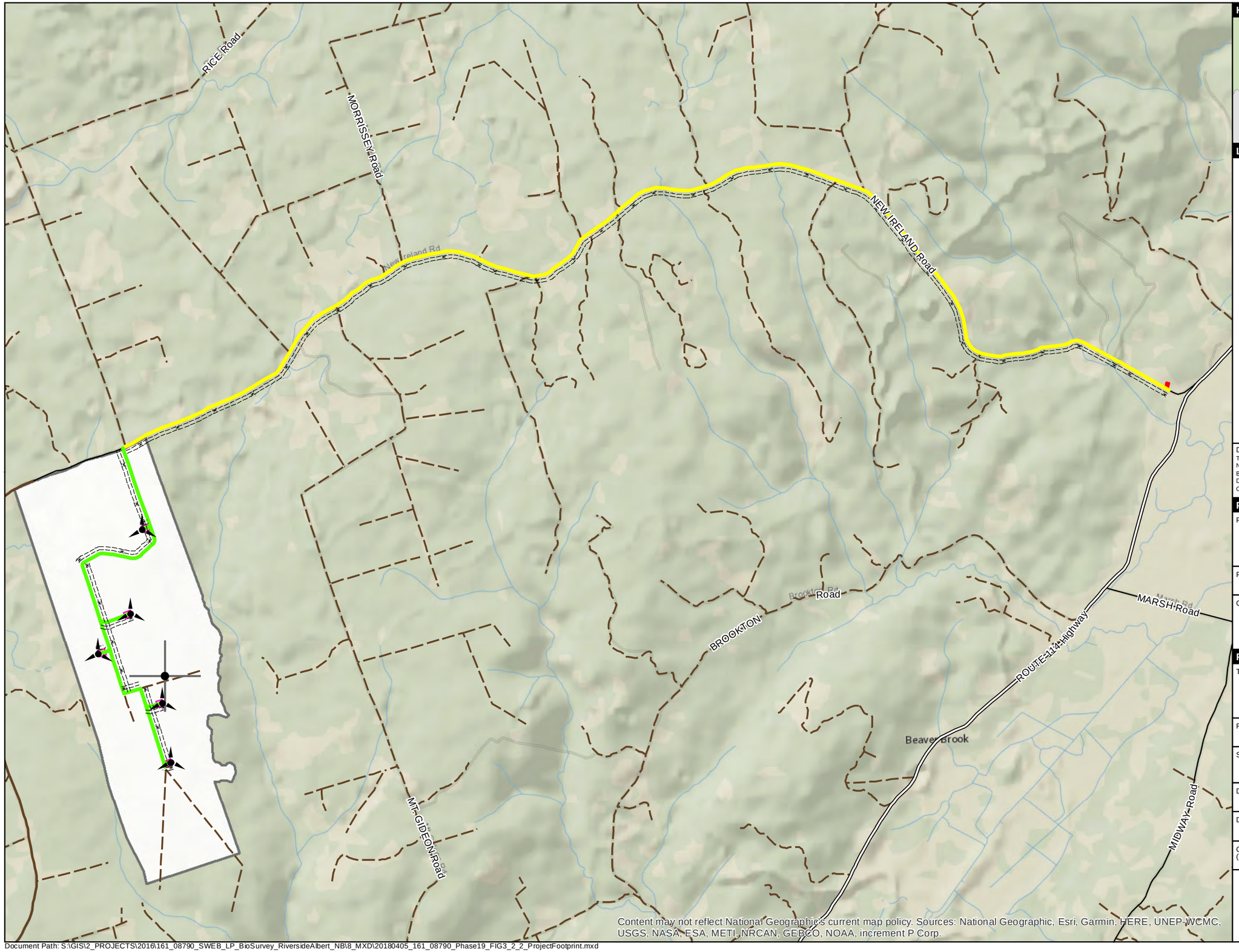
Document Path: S:\GIS\2_PROJECTS\2016\161_08790_SWEB_LP_BioSurvey_RiversideAlbert_NB\8_MXD\20180405_161_08790_Phase19_FIG3_2_1_ProjectLocation.mxd




**KEY MAP:**


**LEGEND:**

- TRANSMISSION LINE
- NEW IRELAND ROAD (EXISTING)
- CROWN LAND ACCESS ROAD (EXISTING)
- PRIMARY HIGHWAY (DTI)
- SECONDARY HIGHWAY (DTI)
- PRIMARY FOREST ROAD (DERD)
- TERTIARY/LIMITED ACCESS FOREST ROAD (DERD)
- SUBSTATION FOOTPRINT
- WTG ERECTION FOOTPRINT
- LAND LEASE AREA (1252 ha)
- MET TOWER
- WTG



**PROJECT:**

PROJECT:
**WISOKOLAMSON ENERGY PROJECT ENVIRONMENTAL IMPACT ASSESSMENT**

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

CLIENT: **WISOKOLAMSON ENERGY LP**

**FIGURE:**

TITLE: **PROJECT FOOTPRINT**

| FIGURE NO.: | REVISION NO.: |
|---|---|
| 3.2-2 | 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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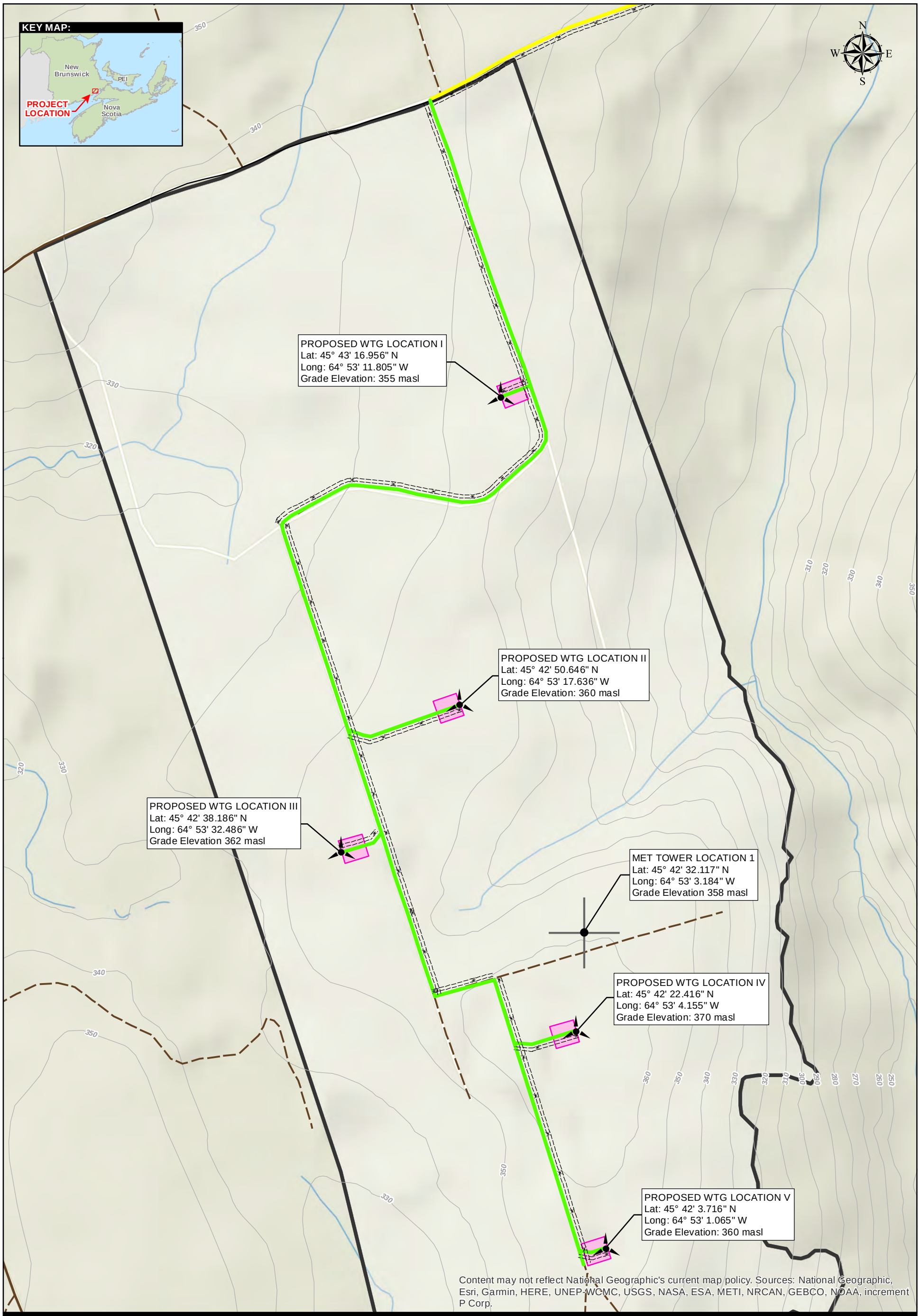


**PROJECT:**

PROJECT:
**WISOKOLAMSON ENERGY PROJECT ENVIRONMENTAL IMPACT ASSESSMENT**

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

CLIENT: **WISOKOLAMSON ENERGY LP**

**FIGURE:**

TITLE:
**WIND TURBINE GENERATORS SITE PLAN**

FIGURE NO.: **3.2-3**

REVISION NO.: **0**

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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)
- ELEVATION CONTOUR (10 metre Interval)
- 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_FIG3_2_3_WTG_SitePlan.mxd

# 3.3 PURPOSE, RATIONALE, AND NEED FOR THE UNDERTAKING

## *3.3.1 NEED FOR THE PROJECT*

In 2016, NB Power released a solicitation for 40 MW of transmission-connected renewable energy projects to be majority owned by Aboriginal businesses. The solicitation, otherwise known as the Locally Owned Renewable Energy Projects that are Small Scale (LORESS) program, was developed with the intent of contributing to NB Power's obligation to produce 40% of its electricity with renewable energy sources by the year 2020. As such, a project submission detailing the Project was submitted to NB Power in response the LORESS solicitation.

## *3.3.2 SOCIAL AND ECONOMIC BENEFIT PLAN*

The WISK team intends to implement a similar approach to what has been employed in previous projects developed by SWEB to ensure that social license is gained from the local community and that First Nations communities and companies are well represented and involved in the execution of the Project. Provided that adequate attention is paid to this goal, New Brunswick's local communities will benefit greatly from the development, construction, and operation of the Project.

### COMMUNITY INVOLVEMENT

#### DEVELOPMENT OF A LOCAL COMMUNITY LIAISON COMMITTEE

A portion of the Project revenue will be allocated to the hosting community to ensure that the Project's benefits contribute to local community planning initiatives. To assist with the allocation of these community-specific funds, WISK will support the community with organizing a local community liaison committee that is comprised of community members interested in participating in organizing local capital projects or community-specific programming that contributes to the wellbeing of Riverside-Albert's residents. The committee will serve to identify and prioritize spending on projects and/or community programming that requires funding. This will ensure that the Project benefit is shared with all community stakeholders.

#### MAXIMIZING FIRST NATION AND LOCAL PARTICIPATION

Although gaining Project acceptance from all stakeholders will be essential throughout the Project's lifecycle, the WISK team is also driven to maximize Aboriginal and local participation throughout the Project. This guiding principle is reflected throughout Section 2, and the approach to maximizing participation is described below.

#### ASSESSING LOCAL BUSINESS CAPABILITIES

The WISK team will engage other Aboriginal businesses, as well as local stakeholders to assess their capacity to participate in the Project (e.g., local contractors, other Aboriginal businesses, hiring/training agencies). This consultation process will increase the understanding of the available labour force and support in the surrounding area.

#### EARLY ADVERTISING

The WISK team will ensure that contracting opportunities are shared throughout the Project region to ensure local contractors are kept apprised of these opportunities early in the development and construction phases.

#### PRIORITIZING LOCAL HIRING AND SKILLS DEVELOPMENT

The WISK team will work with major project contractors to ensure that local expertise is prioritized before extending any Project-specific tendering beyond the province. For long-term jobs (e.g., operations staff, maintenance technicians) which require specialized training, a similar approach will be implemented whereby local

citizens are trained to fill these positions when possible; in some instances, WISK may engage specialists to train local people to take over these positions throughout the operation of the Project.

# EMPLOYMENT

## ESTIMATED NUMBER OF NEW JOBS

New jobs will be created during both the construction and commercial operation phases of the Project. To estimate the number of new jobs during the construction phase, the WISK team used the Jobs and Economic Development Impact (JEDI) Land Based Wind Model provided by the National Renewable Energy Laboratory. This model allows for various Project-related data to be inputted, and the output produces employment and economic-related information specific to a project in a given region. Based upon the JEDI model, up to 25 full-time equivalent jobs will be created during construction from civil contracts, telecommunications installation, WTG foundation construction, and electrical infrastructure design and construction (Table 3.3-1). Once construction is complete, an additional 3 full-time equivalent jobs are expected to be created from onsite labour, site security, and WTG service technicians.

**Table 3.3-1 Estimated Number of Full-Time Equivalent Jobs Created**

| PROJECT PHASE | NUMBER OF ESTIMATED JOBS CREATED (FULL-TIME EQUIVALENT)[(a)] |
|---|---|
| Construction | 25 |
| Operation | 3 |

(a) The actual number of jobs created may fluctuate slightly above or below the estimated values above, based upon project-specific requirements at the time of staffing these positions.

## OPPORTUNITIES FOR LOCAL EMPLOYMENT

WISK's goal is to maximize local contracting and other employment opportunities for those jobs that can reasonably be filled locally, generating sustainable business development opportunities for NB. When possible, WISK will prioritize hiring Aboriginal labour and local expertise during the construction and operation of the project. Often these are common trades such as:

- Logging and brush clearing
- Road construction
- Blasting
- Security
- Equipment operators
- General laborers
- Gravel supply and installation
- Fencing
- Electrical installation
- Transmission line installation
- Fiber cable installation
- Transport and logistics
- Foundation rebar installation
- Building trades (carpentry & plumbing)
- First aid
- Hospitality

# ECONOMIC IMPACTS

## COST ESTIMATES FOR SERVICES AND EQUIPMENT

The Project will have a significant amount of spending on services and equipment that are sourced throughout NB, and local contractors will be contacted early to determine their capacity to provide the materials and services required to complete the Project.

#### INDIRECT BENEFITS

There are several ways that this Project will provide indirect benefits to communities in NB. The WISK team will ensure that local community centers are used for Public Community Meetings regarding Project-specific details and that meeting materials, food & beverages, and other related items are sourced from local service providers. Other indirect benefits will result from the use of establishments such as hotels, restaurants, gasoline stations, and other businesses in the area. Further, during construction, building materials will be sourced locally where possible. The total amount of indirect benefits will range significantly depending on the availability of these services in the vicinity of the Project area.

#### PRODUCT AND SERVICE PROCUREMENT

WISK is committed to procuring products and services from within the Fundy region, directly from WFN, and from NB's workforce. If pertinent products and services cannot be sourced within the province of NB, they will be procured from the appropriate purveyors throughout the Project's development, construction, and operation. Examples of out-of-province materials typically include WTG-specific components such as: blades, nacelles, towers, and cranes.

To ensure employment and revenue benefits are maximized for the province of NB and its communities, WISK has contacted construction, concrete, and equipment companies to secure local service options for the development, construction, and operation of the Project.

### EDUCATIONAL OUTREACH PROGRAM

SWEB has experience with educating youth on wind energy through interactive in-class sessions and field trips to projects that it operates throughout the province of Nova Scotia. Once the Project begins operation, the Partners will design and deliver a region-specific education and outreach program that will include:

- field trips to the Wisokolamson Wind Energy Project site
- an in-class, interactive learning workshop that is tailored to levels that are appropriate to the education level
- community-specific Project site tours

This program will be designed to introduce concepts of electricity and renewable energy to youth, local community members, and local First Nations communities. The education sessions will be designed to foster interest in renewable energy, and to teach stakeholders about the benefits that renewable energy has in their community its impact on climate change initiatives. The youth component of the program will be delivered to different age levels depending on which institutions express interest in the programming.

### *3.3.3 ENVIRONMENTAL BENEFITS*

From an environmental perspective, the Project will serve as a partial replacement of other NB Power energy resources. In cases where the Project offsets energy generation from NB Power's thermal and combustion energy fleet (i.e. coal-fired, natural gas, and heavy fuel oil plants), it can offset up to 55,000 to 65,000 metric tons of carbon dioxiode ($CO_2$) emissions. The Project will also further diversify NB Power's electrical generation base and contribute to the local grid system in Albert County.

## 3.4 PROJECT LOCATION

The Project is located on Crown land south of New Ireland Road, in Albert County, NB, approximately 5 kilometres (km) east of Teahans Corner (Figure 3.2-1). In addition, the Project's electrical substation will be located on a private parcel adjacent to a section of NB Power's 69 kilovolt (kV) circuit which ends at the Albert substation, south of Riverside-Albert, NB. The WTG locations are summarized in Table 3.4-1 and presented on Figure 3.2-2.

**Table 3.4-1 Wind Turbine Generator Locations (dd° mm' ss") (NAD 83 CSRS)**

| WIND TURBINE GENERATOR NUMBER | LATITUDE | LONGITUDE |
|---|---|---|
| 1 | 45° 43' 16.956" N | 64° 53' 11.805" W |
| 2 | 45° 42' 50.646" N | 64° 53' 17.636" W |
| 3 | 45° 42' 38.186" N | 64° 53' 32.486" W |
| 4 | 45° 42' 22.416" N | 64° 53' 4.155" W |
| 5 | 45° 42' 3.716" N | 64° 53' 1.065" W |

# 3.5 SITING CONSIDERATIONS

## *3.5.1 ENVIRONMENTAL AND LAND USE CONSIDERATIONS*

Many environmental impacts associated with wind projects can be avoided or reduced through proper planning. As such, SWEB completed a preliminary evaluation as part of the initial screening when siting the WTGs for the Project. The minimum setback distances from Section 8 of the *Allocation of Crown Lands for Wind Power Projects Policy* applies to the Project (Table 3.5-1; NBDNR, 2012). Wind power development is not allowed in National or Provincial Parks, operational quarries and mine sites, economically viable peatlands, Deer Wintering Areas, Old Forest Communities and Habitats, Eastern Habitat Joint Venture sites, RAMSAR sites and International Shorebird Reserves and any other site-specific fish, wildlife and environmental areas identified during the review process or during the EIA. It is important to note that where wildlife or other concerns are identified, a site-specific setback buffer may be applied.

**Table 3.5-1 Setbacks for Wind Turbines on Crown Lands**

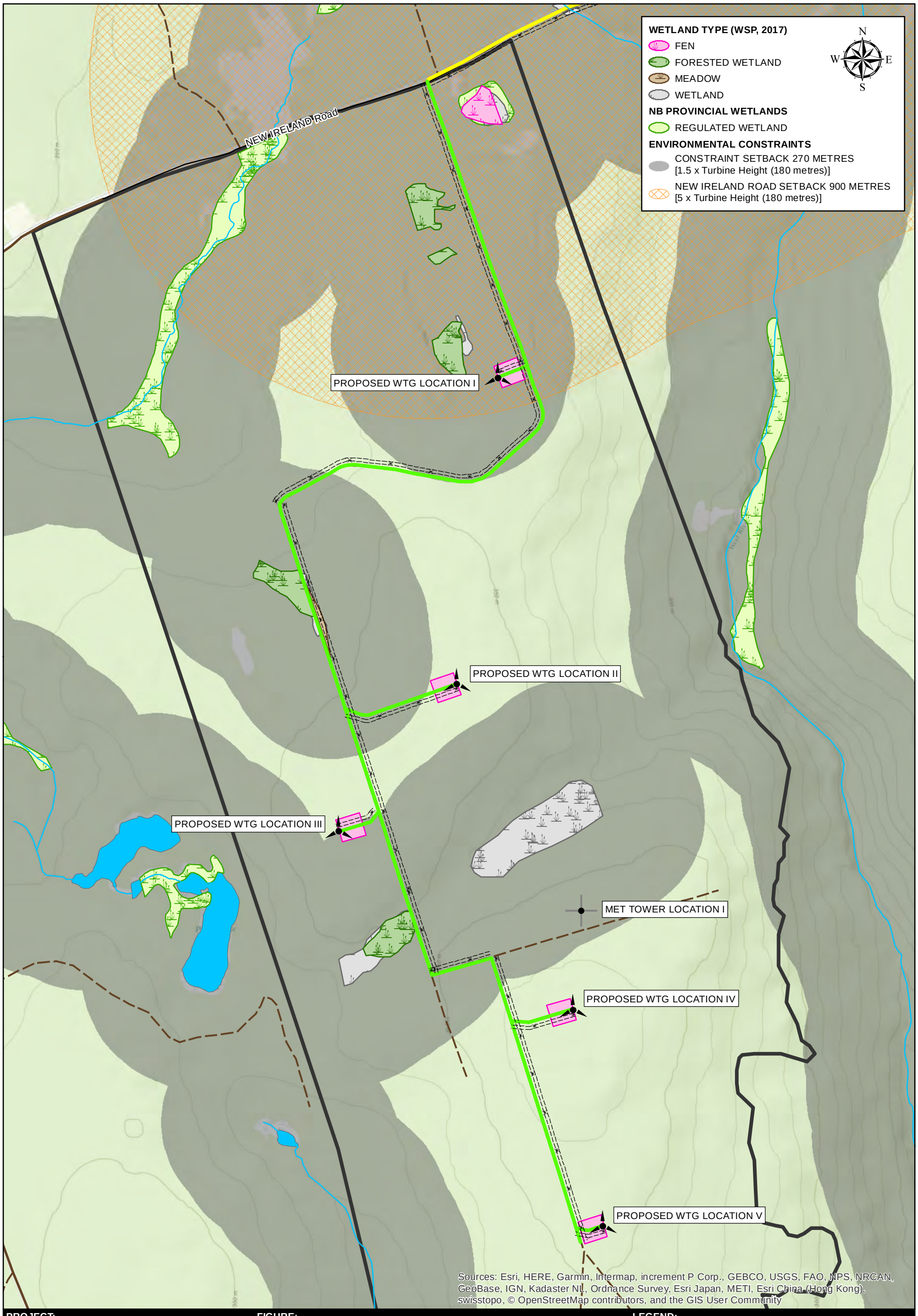
| LAND USE/COVER | SETBACK |
|---|---|
| – Crown lands boundaries, lakes, watercourses, and wetlands<br>– Protected Natural Areas and candidate Protected Natural Areas | A minimum of 150 m, or 1.5 x height of turbine, **whichever is greatest** |
| – Industrial areas (e.g., industrial parks, mines, quarries, etc.)<br>– Crown woods access roads | Assessed on a case-by-case basis, typically 150 m, or 1.5 x height of turbine, **whichever is greatest** |
| – Public highways, roads and streets (including roads and streets within the boundaries of a city, town, or village), designated as highways under the Highways Act; and areas designated for those purposes in a plan adopted under the *Community Planning Act*<br>– Telecommunication, fire, airport and other tower structures,<br>– Archaeological and Historical Sites listed by the Department of Wellness, Culture and Sport<br>– Other wind exploration area boundaries, meteorological test towers, wind turbines and associated infrastructure either existing or under application review | 500 m, or 5 x height of turbine, **whichever is greatest** |
| Existing recreational, institutional and residential areas, and areas designated for those purposes in a plan adopted under the *Community Planning Act* | A minimum of 500 m |

| LAND USE/COVER | SETBACK |
|---|---|
| Coastal features (e.g., coastal wetlands, estuaries, beaches and dunes)<br>Endangered species habitat (*Endangered Species Act*)<br>National Wildlife Areas and Migratory Bird Sanctuaries | 500 m |
| Important migratory bird nesting sites and migration routes (*Migratory Birds Convention Act*)<br>Important water-bird breeding colonies (*Fish and Wildlife Act*) | 1,000 m |
| Known bat migration routes and hibernacula | 5 km |

The Environmental Constraint Setback Areas (Figure 3.5-1) shows the setback distances as recommended in the Allocation of Crown Lands for Wind Power Projects Policy (NBDNR, 2012) in relation to the proposed WTG locations. All the proposed WTG locations fall outside the recommended setback distances, with the exception of WTG I. WTG I is located 800 m from the New Ireland Road, which is classified as a secondary public road. The recommended setback distance from public roads is 900 m (i.e., 5 x 180 m turbine height). WSP believes the proposed placement of WTG I is of sufficient distance to ensure public safety. A de-icing system will be used for each of the five (5) WTGs to minimize the potential and distance of ice throw. In addition it should be noted that New Ireland Road is not frequently used and serves mostly as a resource/recreation road. WTG I is also located 100 m from an unmapped forested wetland. The recommended setback distance from wetlands is 270 m (i.e., 1.5 x 180 m turbine height). WSP believes the proposed placement of the WTG I is of sufficient distance from the wetland as to not impact wetland function. Forested wetlands do not provide adequate habitat to allow for staging of large flocks of waterfowl or shorebirds during migration which would be the main reason for requiring a 270 m setback distance.

Fifteen (15) vascular plant Species of Conservation Concern (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 (Section 4.7.9). No records of nonvascular plant SOCC have been documented within 5 km. 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. 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.

Within the Project area, 60 wildlife SOCC have been previously detected within 5 km of the Project (Section 4.8.3). Of these, 4 are mammals, 50 are birds, and 5 are invertebrates. Although many SOCC ranked by the Atlantic Canada Conservation Data Centre (ACCDC) are considered rare in NB, those protected or designated by federal and provincial legislation are of particular concern. These included six (6) mammals (which include three (3) bat species), fourteen (14) bird species, and one (1) invertebrate. Of these, fourteen (14) are listed under the federal SARA, fourteen (14) are listed under *New Brunswick Species at Risk Act* (NB SARA), and fifteen (15) designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and are described in Section 4.8.3. Five (5) bird SOCC were observed during the field surveys (Section 4.8.1). These included pine siskin (*Carduelis pinus*), turkey vulture (*Cathartes aura*), common nighthawk (*Chordeiles minor*), eastern wood-pewee (*Contopus virens*), and evening grosbeak (*Coccothraustes vespertinus*). Pine siskin and turkey vulture are ranked by the ACCDC as S3 and S3B,S3M respectively; however, both are listed as Secure by the ACCDC, and not listed under the NB SARA, designated by COSEWIC, or listed under SARA. Common nighthawk and eastern wood-pewee are protected under Schedule 1 of SARA. Evening Grosbeak is designated by COSEWIC as Special Concern, but is not listed under the NB SARA or listed under SARA.




**PROJECT:**

PROJECT:
**WISOKOLAMSON ENERGY PROJECT**
**ENVIRONMENTAL IMPACT ASSESSMENT**

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

CLIENT: **WISOKOLAMSON ENERGY LP**

**FIGURE:**

TITLE:
**ENVIRONMENTAL CONSTRAINT SETBACK AREAS**

FIGURE NO.: **3.5-1**

REVISION NO.: **0**

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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) 2018-04-16

**LEGEND:**

- WATERCOURSE
- TRANSMISSION LINE
- CROWN LAND ACCESS ROAD (EXISTING)
- NEW IRELAND ROAD (EXISTING)
- WATERBODY
- 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\20180412_161_08790_Phase19_FIG3_5_1_EnviroConstraints.mxd

There are three (3) managed areas within 5 km of the Project and include the Caledonia Gorge Protected Natural Area, Shepody National Wildlife Area, and Fundy National Park. A biologically significant site area is within 5 km of the Project, Shepody Bay West Important Birding Areas (IBA). Although there are no IBA or RAMSAR sites (wetlands of international importance) within the Project footprint, there are IBAs and RAMSAR sites along the Bay of Fundy, the nearest, Shepody Bay West NB009, is located southeast of the Project. Identifying these areas is 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. 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 5 km of the Project.

The majority of the Project footprint was determined to have low archaeological potential. New Ireland Road, however, crosses a number of high potential archaeological areas that are associated with watercourses, 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.

The Project will be located on Crown Land and the predominant land use is forestry. Existing forestry road corridors will be used for the Project. It is anticipated that the existing land use in the area would be continued. The Kent Hills wind farm is approximately 5 km to the north of the Project.

### *3.5.2 ALTERNATIVE LOCATIONS*

The Project location was selected based on a number of factors including but not limited to:

- Proximity to the NB Power transmission grid and available capacity on the electrical circuit
- Indicative wind speeds within the region based on atmospheric model data
- Mapped environmental features procured from Geo NB's GIS data repository
- Available Crown land for wind energy development, and
- Existing forestry roads to serve as project access roads
- Potential archeological areas
- Potential important bat habitat
- Important bird areas

In general, the Project was designed to use existing forestry roads as access roads to minimize the need for additional clearing and road construction. Other potential locations were considered for this project; however, the proposed site represented an optimal balance between project economics and potential impacts on the environment, thus resulting in a net benefit from the commissioning of the Project.

Throughout the Project site, additional WTG locations were considered throughout the development process. However, based on mapped and site-verified environmental features, the locations presented in Figure 3.2 2 proved to be the most suitable.

## 3.6 PHYSICAL COMPONENTS AND DIMENSIONS OF THE PROJECT

### *3.6.1 PROJECT INFRASTRUCTURE*

The various Project features required to support the Project is summarized in Table 3.6-1. The area of clearing required for Project features is summarized in Table 3.6 2 and presented on Figure 3.2 2 and Figure 3.2 3.

**Table 3.6-1 Length of Project Roads and Proposed Powerline**

| PROJECT FEATURE | LENGTH | ADDITIONAL INFORMATION |
|---|---|---|
| Existing New Ireland Road from location of substation to Project area | 12 km | Minor filling where slope of road exceeds allowable level for WTG delivery |
| Access Roads (existing Crown Land Access road) | 4.26 km | Minor upgrades and widening of road top (up to 6 m wide) |
| Access Roads (new construction from existing Crown Land Access roads) | 1 km | Tree clearing required in some instances. 6 m roadway to WTG crane pad |
| Overhead powerline | 17.26 km | May vary based on final pole line design |
| Overhead powerline from substation to interconnection point | 40 m | May vary based on substation design |

**Table 3.6-2 Area of Clearing Required for Project Features**

| PROJECT FEATURE | AREA OF CLEARING | ADDITIONAL INFORMATION |
|---|---|---|
| Crane Pads/ Erection Footprints | 1.44 hectares (ha)<br>(0.288 ha per WTG) | In some instances, crane pad areas and/or road construction areas have previously been harvested through forestry activity |
| New Road Construction | 0.8 ha | In some instances, road construction areas and/or improvement areas have previously been harvested through forestry activity |
| Upgrades to existing Crown Land Access roads | 2.13 ha | In some instances, road construction areas and/or improvement areas have previously been harvested through forestry activity |

### *3.6.2 BLASTING*

It is likely that very little or no blasting will be required. However, blasting may be required for both the WTG foundations and the overhead powerline in order to complete construction in a cost and time efficient manner. If blasting is required, it would be performed in very small amounts as the depths of the WTG foundations would not require mass quantity removals as with a gravel pit/processing scenario.

### *3.6.3 WATER SUPPLY*

It is anticipated that most of the water will come from water trucks, however if required, an on-site water supply may be used. There is no current plan for an on-site concrete batch plant so the use of on-site water for that process will not be needed. The daily estimated amount would be around 7,500 to 11,500 liters (L).

### *3.6.4 ELECTRICAL WORKS AND INTERCONNECTION TO GRID*

All electrical power lines will be overhead from the proposed substation location (near New Ireland Road and Highway 114) to the WTGs at which point the last 70 to 90 m between the riser poles to each WTG will switch to underground buried cable for safety and clearance reasons.

Approximately 5.26 km of overhead 34.5 kV electrical lines will be located within the Project footprint with an additional 12 km running eastward in the right-of-way (ROW) along the existing New Ireland Road to the proposed substation. The overhead line will then be connected to a main power step-up transformer (20 MVA) at the substation to raise the voltage to the 69 kV transmission line voltage. Finally, a 69 kV line will extend 40 to 50 m from the substation to the tap point on NB Power's Line 0067.

### *3.6.5 WIND TURBINE GENERATORS AND METEOROLOGICAL TOWER*

The WTG specifications are summarised in Table 3.6-3 and details about the meteorological tower is summarized in Table 3.6 4.

**Table 3.6-3 Proposed Wind Turbine Generator Specifications**

| WIND TURBINE GENERATOR INFORMATION | MEASUREMENT |
|---|---|
| Rotor Diameter | 126 m |
| Hub Height | 117 m |
| Tip Height (ground level to maximum height at blade tip) | 180 m |
| Sound Power Level at Hub Height at Maximum Output | 107.4 A-weighted decibels (dBA) |

**Table 3.6-4 Project Meteorological Tower Summary**

| DESCRIPTION | CONFIGURATION |
|---|---|
| Commissioned | May 11, 2017 |
| Meteorological Tower Height | 60 m |
| Elevation (ground level) | 360 m |
| Location (Latitude, Longitude) | 45° 42' 32.117" N, 64° 53' 3.184" W |
| Guy Wire Placement | Approximately 35 m from the tower base, secured to ground with anchors at the following positions from the tower base: NW, NE, SE, SW |
| Sound | Not Applicable |

To ensure the Project is operated in a safe manner, WISK has procured a Vestas de-icing system for each of the five (5) WTGs which will detect whether the blades are collecting ice. In the event that icing is detected, the WTG rotor is halted at a point where one of the three blades is pointing downward, perpendicular to the ground; the blade is then heated until the icing no longer remains. The rotor is then rotated until the next blade is in this downward position and the process is repeated until all icing has been removed.

In extreme wind conditions, the Project's WTG monitoring system will automatically ensure the WTG blades are feathered (i.e., pitched) such that the blade surface is no longer positioned to capture incoming wind. This change of pitch ensures the extreme winds cannot cause the rotor to rotate.

Based on Transport Canada's Standard 621, WTG's that have an overall height of more than 150 m must have two (2) CL-864 lights mounted to the top of the nacelle, in addition to at least three (3) CL-810 lights mounted at half of the nacelle height up the WTG tower. Only one of the nacelle-mounted lights is to be operating for a single period while the second light remains on standby. All lights mounted on the WTG must flash at the same rate.

# 3.7 CONSTRUCTION ACTIVITIES

## *3.7.1 SITE CLEARING AND CONSTRUCTION OF ACCESS ROADS*

Clearing includes the removal of all trees, brush, stumps, or other obstacles lying within the construction area that may potentially impair construction activities, vehicle movement, and/or threaten the safety of construction personnel.

The resulting material will be salvaged and stored in piles or windrows. No material will be pushed into or against standing live trees adjacent to construction areas. Likewise, no material will be placed or stored in any wetland or watercourse.

Where safe to do so, low shrub stands and small or regenerating trees will not be cleared. Rather, heavy equipment and trucks will simply drive over or "walk down" this woody growth to limit disturbance to the roots, sod layer, and associated grass/forb cover. Any trees that are cleared will be removed following standard forestry practices using equipment such as fellers. Bulldozers and excavators will be used for grubbing and to clear smaller vegetation.

Existing roads will be upgraded and new access roads will be constructed to transport equipment to the construction sites. There will be a 45 m wide area for construction of the site-specific access roads. The access road will be sited within this area of disturbance in consultation with landowners and taking into consideration potential environmental effects. Typically the access roads will be 4 m wide during the construction phase to accommodate the large cranes (with an additional 1 m clearance on each side for ROW and clearance). The road length will be different for each WTG according to its location.

The construction of the access road will typically require clearing and grubbing of any vegetation, excavation of the topsoil layer and adding a layer of compacted material to a typical thickness of 300 to 600 millimetres (mm), depending upon site specific geotechnical conditions. Clean granular material (typically "A" or "B" gravel) will be brought to the site as needed and will not be stockpiled onsite. The topsoil will be kept and re-used on site and appropriate mitigations will be applied as per the Erosion and Sedimentation Control Plan that will be implemented for the Project. The access road to each WTG will typically require one to three days of construction time. Depending on the length of the access roads, construction may require approximately 50 truckloads of gravel for each location.

New culverts may be required to maintain drainage in ditches at junctions with roadways and these will be constructed to support the construction equipment and delivery trucks. The exact details of culverts and their installation in addition to erosion control measures will be determined in conjunction with the appropriate regulatory authorities as part of their permitting process.

Equipment will include, at a minimum, trucks, graders, and bulldozers. Municipal and provincial roads will also be used for transporting equipment, and minor modifications may be required to some of the existing roads (e.g., widening the turning radius) to handle the oversized loads. Any road damages will be repaired prior to the completion of the construction phase. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers. The chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment. Fuel-handling will be conducted in compliance with the mitigation measures outlined in Section 3.7.14.

## *3.7.2 GRADING*

In general terms, grading includes topsoil removal, installation of ramps, two-toning, and other work required to facilitate the movement of equipment onto and within construction areas.

Topsoil stripping is the most important step in maintaining the growth medium for successful reclamation and post disturbance land use. Topsoil will be stripped to a predetermined depth and stored for use during clean-up and reclamation. Where the Project crosses sensitive habitats, only the areas required for the Project width will be

stripped to minimize disturbance to the plant communities and limit the creation of suitable growing sites for non-endemic, weedy species.

Grading of subsoil may be required to establish a level and safe working surface for equipment operation and travel. It is anticipated that localized grading will be required where site-specific micro-relief variations (e.g., side slopes or low knolls) are traversed by the Project.

### *3.7.3 INSTALLATION OF TEMPORARY FACILITIES*

A construction laydown area will be constructed for the temporary storage of construction material. The construction laydown area will include staging areas for construction materials, construction trailers and associated facilities and a temporary electrical service line to provide power to the construction trailers. Following clearing and grubbing of any vegetation, the topsoil at the construction laydown area will be removed and approximately 600 mm of clean compacted crushed gravel will be imported as needed. The excavated topsoil will be re-used on site as feasible. Following the construction phase, the gravel will be removed from the site or re-used, to be determined in consultation with the landowner. The stockpiled topsoil will then be redistributed throughout the Temporary Laydown Area.

Equipment will include, at a minimum, trucks, graders, and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment. Fuel-handling will be conducted in compliance with the mitigation measures outlined in Section 3.7.14.

### *3.7.4 CONSTRUCTION OF TURBINE SITES AND CRANE PADS*

Prior to construction, the construction area will be cleared and grubbed. In order to provide sufficient space for the laydown of the WTG components and its assembly, a 122 m by 122 m area must be cleared, levelled, and be accessible during the construction phase. The topsoil is generally removed with some soil stabilizing material (i.e., crushed gravel or clean back fill) added depending upon site specific geotechnical conditions. Where the site laydown areas are close to watercourses, erosion control measures will be implemented, as described in the Erosion and Sedimentation Control Plan.

Crane pads will be constructed at the same time as the road, and will be located adjacent to WTG locations. The crane pads will typically 15 m by 35 m in area. The topsoil at the crane pad will be removed and approximately 600 mm of clean compacted crushed gravel will be imported as needed. The excavated topsoil will be re-used on site as feasible. Once the WTG erection is complete, the crane pad will be removed and will be restored to prior use.

Equipment will include, at a minimum, trucks, graders, and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment. Fuel-handling will be conducted in compliance with the mitigation measures outlined in Section 3.7.14.

### *3.7.5 DELIVERY OF EQUIPMENT*

Equipment will be delivered by truck and trailer throughout the construction phase and stored at the temporary lay-down sites surrounding each WTG. A Traffic Management Plan will be developed and discussed with NBDERD and NB Department of Transportation and Infrastructure (NBDTI). Alternative traffic routes will be prepared to address traffic congestion, as needed. NBDTI has already been engaged and has provided a list of reuqiments that will be fulfilled.

### *3.7.6 CONSTRUCTION OF TURBINE FOUNDATIONS*

Excavators will be used to excavate an area approximately 3 m deep by 20 m by 20 m (the precise size of excavation area to be determined by geotechnical analysis of the soil) with the material being stockpiled for future backfilling. Stockpiled material will have topsoil and subsoil separated out and surplus excavated material will be used on site as

aggregate to further reinforce and bury WTG foundations once they have been completed. The foundation, with an approximate footprint of 400 square metres ($m^2$), will be constructed of poured concrete and reinforced with steel rebar to provide strength. After construction the foundation will be backfilled and the surface will be landscaped for drainage. Any wood-waste generated will be removed from the site and recycled. Spent welding rods will be disposed of as hazardous waste by a licensed contractor.

Typical construction equipment, on a per turbine basis, will include:

- Excavator for removing material
- Flatbed trucks (four to six) for delivery of rebar, turbine mounting assembly and forms
- Truck mounted crane or rough terrain forklift for unloading and placement of rebar and forms
- Concrete trucks for delivery of concrete (30 to 40 loads)
- Construction trucks (three to four vehicles with multiple visits), and
- Dozer, loader and trucks to backfill and compact foundation and remove surplus excavated materials

The trucks and graders will be driven to the site and the bulldozers will be transported via trailers. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment. Fuel-handling will be conducted in compliance with the mitigation measures outlined in Section 3.7.14.

### *3.7.7 WIND TURBINE ASSEMBLY AND INSTALLATION*

Turbine components will arrive on-site using flat bed and other trucks and will be temporarily stored on-site in the immediate vicinity of the base prior to assembly. Typically, two cranes will be used to install the WTGs. The larger crane is usually a crawler type with a capacity of 400 tonnes or larger, and is used for the higher lifts.

Clearing and grubbing will be required for the erection area. The erection cranes and crew will follow the foundation crew and erect the WTGs once the foundations are completed and the concrete has set. This will typically be in five lifts (three for the towers, one for the nacelle and one for the rotor) over a period of two to three days. The lower tower sections may be installed several days before the upper tower sections and the turbine to optimize installation sequence. The lower tower section will also include electrical and communications equipment. Total WTG assembly and installation will typically require four to five days for each WTG.

Packing frames for the WTG components are returned to the turbine vendor. Following commissioning, the surrounding area will be returned to its original use.

Equipment will include, at a minimum, trucks, two cranes, graders, and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers. The larger track mounted crane can move from WTG site to WTG site; however, it will need to be disassembled to move it along roadways and from the Project site. Alternatively, cranes may be moved between WTG sites without disassembly along crane paths. The only chemicals required for this phase are oils, gasoline, hydraulic fluid, and grease used to operate construction equipment. Fuel-handling will be conducted in compliance with the mitigation measures outlined in Section 3.7.14.

### *3.7.8 CONSTRUCTION OF THE ELECTRICAL COLLECTOR SYSTEM*

The electrical collector system will consist of underground cabling and a buried collection system running along WTG access roads and ROW. Cables and communication lines from each WTG to the transformer substation will be buried and will be located adjacent to the WTG access roads, where feasible and in the municipal road ROW when necessary. Above ground electrical junction boxes will be installed where necessary to connect sections of the underground cabling. The excavated soil will be stored temporarily and then reused as backfill. Power conductors will be approximately 0.9 m below grade and the location will be marked. Equipment will include trenchers or diggers (depending on soil type) and construction will require a crew of six people. The construction timeframe is dependent upon the required length of the lines.

The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment, and the polymer used for directional drilling. Fuel-handling will be conducted in compliance with the mitigation measures outlined in Section 3.7.14.

### 3.7.9 CONSTRUCTION OF THE ELECTRICAL INTERCONNECTION

Three overhead electrical lines of approximately 40 m to 50 m will connect the transformer substation to the existing 69 kV transmission line. An overhead 3-phase 34.5 kV circuit will extend south of the substation, crossing New Ireland Road and continuing westward approximately 12 km to the Project area along the south side of the existing New Ireland Road ROW. This electrical line will include the installation of a number of poles to support the circuit within the New Ireland Road ROW. The poles are proposed to be constructed of wood, concrete or steel and will be typically be between 18 m and 30 m tall.

Holes for new hydro poles are typically augured into the ground using a truck mounted auger device. The poles will then be inserted using cranes to a typical depth of 2 m to 3 m below grade. The poles are typically "dressed" (made ready to accept conductors) on the ground prior to installation. Typically, one crew will install the poles dress them in one day. Once the poles are in place and dressed, cables will be strung in place using boom trucks and special cable reel trucks. Some packing-material waste may be generated. All recyclable materials will be separated from non-recyclable materials and both streams will be removed from the site and disposed of at an approved and licensed facility.

Equipment will include, at a minimum, a truck mounted crane, flatbed trailers and a truck mounted auger. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment. A lubricant is likely to be used when the cables are pulled in through the conduit. Fuel-handling will be conducted in compliance with the mitigation measures outlined in Section 3.7.14.

### 3.7.10 CONSTRUCTION OF THE TRANSFORMER SUBSTATION

Generally, less than 0.05 ha, the transformer substation will include equipment such as an isolation switch, a circuit breaker, a step-up power transformer, transmission switch gear, instrument transformers, grounding and metering equipment as well as a control housing ("E-House") which will be supplied with power from the local distribution line. Substation grounding will meet the local electrical codes. The substation area will be gravelled with clean material imported to the site on an as needed basis and sloped to facilitate drainage. A secondary containment system will be installed around the transformer in the event of an oil leak to prevent any soil, groundwater, or surface water contamination.

During construction of the substation, topsoil and subsoils will be stripped and stockpiled separately. Stripped topsoil and subsoil will be placed in a temporary storage facility area and topsoil stripped from the substation area will be distributed on other Project properties. An electrical service line and associated poles will likely be connected to the existing distribution line adjacent to the substation for the purpose of providing house service power to the substation control building. Some packing-material waste may be generated. All recyclable materials will be separated from non-recyclable materials and both streams will be removed from the site and disposed of at an approved and licensed facility.

Construction equipment will include small trenchers, a small crane, forklifts, concrete trucks and a bulldozer. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment and transformer oil. Fuel-handling will be conducted in compliance with the mitigation measures outlined in Section 3.7.14.

### 3.7.11 METEOROLOGICAL TOWERS

SWEB installed a 60 m NRG HXD meteorological tower (MET tower) at the Project site at 45°42'32.15"N, 64°53'3.19"W to collect raw meteorological data (Section 4.1.3). The tower included six anemometers at three different vertical heights, as well as two wind veins, a thermometer, and a communications device. Four tubular anchors (0.5 m in length) were screwed into the ground approximately 30 m from the base of the tower in the northwest, northeast, southeast, and southwest directions and are used to anchor the tower via four sets of guy-wires. The base of the tower is fastened to a 0.75 m by 0.75 m steel plate that rests on the ground surface and fastened with two rebar pins. The installation of the tower did not require tree clearing or the placement of a foundation.

### 3.7.12 CLEAN-UP AND RECLAMATION

Site clean-up will occur throughout the construction phase and site reclamation will occur after construction has been completed. Waste and debris generated during the construction activities will be collected by a licensed operator and disposed of at an approved facility. Reasonable efforts will be made to minimize waste generated and to recycle materials including returning packaging material to suppliers for reuse/recycling.

Stripped soil will be replaced and re-contoured in the construction areas and disturbed areas will be re-seeded, as appropriate. Erosion control equipment will be removed once inspections have determined that the threat of erosion has diminished to the original land use level or lower. High voltage warning signs will be installed at the transformer substation and elsewhere, as appropriate. At the conclusion of construction, vehicles and construction equipment will be removed from the site.

### 3.7.13 TURBINE COMMISSIONING

Turbine commissioning will occur once the WTGs and substation are fully installed and regulatory authorities are ready to accept grid interconnection. The commissioning activities will consist of testing and inspection of electrical, mechanical and communications systems. Some packing-material waste may be generated. All recyclable materials will be separated from non-recyclable materials and both streams will be removed from the site and disposed of at an approved and licensed facility.

Temporary portable generator sets may be used to electrically commission the WTGs prior to connection to the grid. The generators are required for approximately one day per WTG. The generators are supplied with a Certificate of Approval to the owners. Following the commissioning phase, the portable generators will be removed from the site and returned to the owners.

Equipment will include support trucks which will be driven to the construction site. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment and portable generators, gearbox oil, and lubricants. Fuel-handling will be conducted in compliance with the mitigation measures outlined in Section 3.7.14.

### 3.7.14 FUEL HANDLING

Should it be necessary to do so, the contractor will set-up temporary fuel storage tanks at designated staging areas or their temporary office/storage yards. The storage facilities will be subject to provincial environmental and health and safety regulations. Fuel would be transported to machinery using a standard tank truck. Spill response plans will be filed with local authorities, as required.

Alternatively, local bulk dealers would be employed to transport fuel to Project equipment. These persons and/or firms are subject to provincial legislation respecting these activities. The majority of the equipment is refuelled at the Project site, with light vehicles typically obtaining fuel in nearby cities and towns.

All fuelling, particularly at watercourse/wetland crossings, will take place a minimum of 50 m from the edge of the delineated feature, with particular attention being paid to avoiding the inadvertent release of fluids.

### 3.7.15 WASTE MANAGEMENT

Contractors are required to comply with all applicable legislation in the handling, storage, transport, and disposal of wastes. Construction is expected to result in relatively little waste material. Typically, refuse and other non-hazardous waste (e.g., packaging) is collected and disposed of in local landfills. All wastes (i.e., engine gas, waste gas, grease, etc.) will be collected in containers and transported to an approved disposal sites. Fuel barrels or other liquid containers will be stored on level sites (expected to be located in the lay-down area) and all drilling chemicals will be clearly marked as per Workplace Hazardous Materials Information Systems requirements, and stored in a dry, secure place prior to use.

Waste requiring greater attention would include used or surplus primer, epoxy coating, oil and lubricants, and associated empty product containers. All such waste would be collected and disposed of in accordance with applicable legislation. Generally, these functions would be subcontracted to waste management firms.

Good housekeeping practices will be maintained during all phases of the construction program. The construction areas will be kept free of trash and litter, and all Project related garbage will be collected in secure containers for eventual transfer to the nearest landfill or other approved disposal facility.

## 3.8 OPERATION AND MAINTENANCE

The following section describes the Facility Operations Plan; including daily operations activities and routine/ unplanned maintenance activities.

### *3.8.1 WIND TURBINE OPERATION*

The wind energy centre will require full time technical and administrative staff to maintain and operate the facility. The primary workers will be wind technicians (i.e., technicians who carry out maintenance on the WTGs) along with a site supervisor. The Project will be operated by a staff of two to three people who will work out of the offsite Operations and Maintenance Building.

The WTGs will be operating (i.e., in "Run" mode and generating electricity) when the wind speed is within the operating range for the WTG and there are no component malfunctions. Each WTG has a comprehensive control system that monitors the subsystems within the WTG and the local wind conditions to determine whether the conditions are suitable for operation. If an event occurs which is considered to be outside the normal operating range of the WTG (such as low hydraulic pressures, unusual vibrations or high generator temperatures), the WTG will immediately take itself out of service and report the condition to the Operations Centre, located in the off-site Operations and Maintenance Building. A communication line connects each WTG to the Operations Centre, which closely monitors and, as required, controls the operation of each WTG. The WTG system will be integrated with the electric interconnection Supervisory Control and Data Acquisition to ensure that critical controls, alarms and functions are properly co-ordinated for safe, secure and reliable operation. The WTG will also report to SWEB's Operations Facility during non-working hours.

### *3.8.2 ROUTINE TURBINE MAINTENANCE*

Routine preventative maintenance activities will be scheduled at six-month intervals with specific maintenance tasks scheduled for each interval. Maintenance involves removing the WTG from service and having two to three wind technicians climb the tower to spend a full day carrying out maintenance activities.

Consumables such as the various greases used to keep the mechanical components operating and oil filters for gearboxes and hydraulic systems will be used for routine maintenance tasks. Following all maintenance work on the WTG, the area is cleaned up. All surplus lubricants and grease-soaked rags are removed and disposed of as required by applicable regulations. All maintenance activities will adhere to the same spill prevention protocols undertaken during the construction phase.

### *3.8.3 UNPLANNED TURBINE MAINTENANCE*

Modern WTGs are very reliable and the major components are designed to operate for approximately 25 years. However, there is a possibility that certain component failures may occur despite the high reliability of the WTG fleet-wide. Most commonly, the failure of small components such as switches, fans, or sensors will take the WTG out of service until the faulty component is replaced. These repairs can usually be carried out by a single crew visiting the WTG for several hours.

Events involving the replacement of a major component such as a gearbox or rotor are rare. If they do occur, the use of large equipment, sometimes as large as that used to install the WTGs, may be required.

It is possible that an access road, built for construction and returned to previous existing conditions when the construction phase is completed, will need to be rebuilt to carry out repairs to a damaged WTG. Typically only a small percentage of WTGs will need to be accessed with large equipment during their operating life.

### *3.8.4 ELECTRICAL SYSTEM MAINTENANCE*

The collector lines and substation will require periodic preventative maintenance activities. Routine maintenance will include condition assessment for above-ground infrastructure and protective relay maintenance of the substation, in addition to monitoring of the secondary containment system for traces of oil. Finally, vegetation control will be required around the transmission line to prevent any damage to the line and ensure safe operation.

### *3.8.5 WASTE MANAGEMENT*

Waste generated during the operations phase will be removed by a licensed operator and disposed of at an approved facility. Any lubricants or oils resulting from WTG maintenance will be drummed on site and disposed of in accordance with applicable Provincial regulations. All reasonable efforts will be made to minimize waste generated and to recycle materials including returning packaging material to suppliers for reuse/recycling. The spill prevention protocols followed during construction will continue to be observed throughout the facility's operations and maintenance activities.

### *3.8.6 ENVIRONMENTAL MONITORING*

Monitoring activities including post-construction bird and bat mortality monitoring will be carried out at the wind project during its operation. The specific monitoring activities will be developed with NBDERD as part of the overall permitting and approvals phase of the project.

## 3.9 DECOMMISSIONING

The anticipated life of the Project is estimated to be 25 years. The following describes how the Project will be decommissioned. The decommissioning process will involve removing the WTG, including the tower, generator, auxiliary equipment, above ground cables/poles, fixtures, all other personal property and otherwise restoring the premises to its original condition. If it is agreed upon with NBDERD, access roads and underground cables may be left in place. Foundations shall be removed to original soil depth or 1.2 m below grade, whichever is the lesser, and replaced with topsoil. Within 12 months of initiating the decommissioning process, the Project owner will have removed the relevant components from the leased land.

The decommissioning of the Project will be undertaken in compliance with the appropriate Health and Safety regulation. As with construction, a manager responsible for safety will be present on site for the duration of the work.

### *3.9.1 DECOMMISSIONING AFTER CEASING OPERATIONS*

Properly maintained WTGs have an expected life of at least 25 years. At the end of the project life, depending on market conditions and project viability, the WTGs may be 're-powered' with new nacelles, towers, and/or blades, thus extending the useful life of the project and delaying any decommissioning activities. Alternatively, the WTGs may be decommissioned.

The following activities for the removal of the components will be undertaken once decommissioning is initiated:

- Remove above-ground collection system including substation and point of connection
- Remove WTGs
- Partial removal of WTG foundations, and
- Remove WTG access roads, if required by landowners

The following anticipated decommissioning plan is based on current procedures and experience. The specifics of these procedures may be adjusted to reflect additional decommissioning experience in the future.

## WIND TURBINES

The first stage of the disassembly will be to have wiring crews disconnect the tower from the collection system and disconnect the wiring between WTG sections. A disassembly crew will then use a crane to remove the blades, the rotor, nacelle and then the towers section by section. The lubricating oil will be drained from the gearbox once it has been placed on the ground, and the oil will be disposed of in accordance with applicable regulations. As the WTG is being disassembled, the various components will be transported off-site.

## WIND TURBINE FOUNDATIONS

Once all the WTG components have been cleared from a site, the top metre of overburden around the foundation will be excavated and stockpiled. Once cleared, the top 1.2 m of the foundation (or to bedrock) will be demolished. The resulting concrete and rebar will be hauled off-site and disposed of at a licensed facility. Afterwards, the stockpiled soil will be used to replace the now cleared area. The disturbed area will be feathered out and graded. No off-site soil is predicted to be needed.

## ACCESS ROAD REMOVAL

New access roads will be left at NBDERD's request or graded to restore terrain profiles (as much as possible), and re-vegetated. Upgraded access roads will not be removed.

## CABLE WIRE DECOMMISSIONING

At the time of decommissioning, if appropriate, the underground cables will be left in place. The lines will be cut and the ends buried to 1.2 m below grade. Above ground junction boxes will be removed.

## ELECTRICAL SUBSTATION DECOMMISSIONING

The substation electrical components will be either removed as a whole or disassembled, pending reuse or recycling. Once cleared, the gravel around the yard will be reclaimed (unless the landowner wishes to keep the area as is) and the fence removed. As with the WTG foundation, the substation foundation will be excavated and the top 1.2 m of concrete (or to bedrock) will be demolished and hauled off-site to be disposed of at a licensed facility. The excavated area will then be filled in with native soil and re-graded. Any material that has been used as a sound attenuating berm will be levelled and replanted to the requirements of the landowner.

## CRANE PAD DECOMMISSIONING

The crane pad aggregate will be removed and areas will be filled unless the landowner requests it to remain.

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### *3.9.2 PROCEDURES FOR DECOMMISSIONING*

Decommissioning procedures will be similar to the construction phase and will include:

- The creation of temporary work areas. In order to provide sufficient area for the lay-down of the disassembled WTG components and loading onto trucks, an area must be cleared, levelled and made accessible. The topsoil will be removed and some material may need to be added.
- The creation of crane pads. The crane pads will typically be 15 m by 35 m in size and will be located within the temporary work area around each WTG. The topsoil at the crane pad will be removed and approximately 600 mm of compacted crushed gravel will be added. Once the WTG disassembly is complete, the gravel area around each WTG will be removed and the area will be restored to prior use using stockpiled topsoil.
- The use of cranes to remove the blades, hub and tower segments.
- The use of trucks for the removal of WTGs, towers and associated equipment.

- The removal of the top 1.2 m of the WTG foundations and replacement with clean fill and stockpiled topsoil. The fill and topsoil will be contoured to allow cultivation in the case of agricultural lands.
- Road bedding material will be removed and replaced with clean subsoil and topsoil for reuse by the landowner for agricultural purposes. It is proposed to leave culverts in place following the operations phase.
- Cutting underground electrical lines, burying the ends to 1.2 m below grade, and leaving the lines in place. Above-ground lines and poles will be removed and the holes will be filled with clean fill.
- The substation will be demolished. This will be decommissioned in a manner appropriate to and in accordance with the standards of the day. All materials will be recycled, where possible, or disposed off-site at an approved and appropriate facility.

### *3.9.3 RESTORATION OF LAND AND WATER NEGATIVELY AFFECTED BY THE FACILITY*

Once all of the WTGs and ancillary facilities are removed, the remaining decommissioning work will consist of shaping and grading the areas to, as near as practicable, the original contour prior to construction of the WTGs and access roads. All areas, including the access roads, transformer pads and crane pads will be restored to, as near as practical, their original condition with native soils and seeding. If there is insufficient material onsite, topsoil and/or subsoil will be imported from a source acceptable to the landowner.

## 3.10 FUTURE MODIFICATIONS, EXTENSIONS, OR ABANDONMENT

There are no future phases planned for the Project. The Project will be in operation for 25 years, which is consistent with the WTG life expectancy. Prior to the end of the Wind Farm Lease and Licence of Occupation for Access and Distribution, decommissioning and site reclamation plans will begin or a new registration may be obtained to extend the life of the Project.

## 3.11 DOCUMENTS RELATED TO THE UNDERTAKING

All Project related documents are included in the Appendices of this report as follows:

- Appendix A – Clearances And Approvals
- Appendix B – Preliminary Indigenous Knowledge Study
- Appendix C – Letter of Support
- Appendix D – Noise Impact Assessment
- Appendix E – Bird Inventory Report
- Appendix F – Bat Inventory Report
- Appendix G – Archaeology Report
- Appendix H – Visual Impact Assessment
- Appendix I – Shadow Flicker Assessment
- Appendix J – Electromagnetic Interference Study

The following list of applications have been submitted to any municipal, provincial or federal agency concurrently with the EIA registration and are included in Appendix A. Upon completion of the final Project design, WISK will resubmit all Federal-specific WTG permit applications as required.

- Harvesting Permit for Crown Land P70034280 to SWEB Development by the Minister of Natural Resources, with the effective date 2018-01-11 for tree clearing to conduct borehole sampling.
- Harvesting Permit for Crown Land P70029174 to SWEB Development by the Minister of Natural Resources, with the effective date 2016-08-19 for tree clearing to install a 60 m meteorological tower.

- NBDERD – Licence of Occupation for Wind Exploration with Option Agreement, dated June 30, 2016 for SWEB Development.
- NAV Canada – Clearance for Meteorological Tower, dated June 17, 2016 for SWEB Development.
- NAV Canada – Clearance for 5 Wind Turbines, dated December 2, 2017 for SWEB Development.
- Environment Canada Weather Radar - Clearance for Albert Wind Project received October 18, 2016 for SWEB Development.
- CCG - Clearance received for Wind Farm – Riverside-Albert, NB, dated October 13, 2016 for SWEB Development.
- RCMP - Clearance received regarding Riverside-Albert Wind Project, dated October 31, 2016 for SWEB Development, GV 1620-7-3.
- Transport Canada – Aeronautical Assessment Form for Obstruction Evaluation for five wind turbines, dated 2017-10-25, TC # 2017-265 for SWEB Development.
- Transport Canada – Aeronautical Assessment Form for Obstruction Evaluation for meteorological test tower, dated 2016-04-12, TC # 2016-047 for SWEB Development.

It is not anticipated at this time that any work within 30 m of a watercourse or wetlands is required for the Project. However, if alteration is required for the wetland that runs along the existing Crown Land Access road near WTGs 3 and 4, then a WAWA Permit application will be submitted as it will be required for the Project. It is anticipated that most of the water will come from water trucks, however if required, an on-site water supply may be used. If an on-site water supply is determined to be required for the Project, a WAWA will be obtained prior to withdrawing any water on-site during Project construction.