Appendix E

Bat Survey Methodology

DILLON CONSULTING

WOCAWSON ENERGY LIMITED PARTNERSHIP

Preliminary Acoustic Bat Survey Report (Draft)

July 2018 – 18-6975

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1.0 Introduction

Dillon Consulting Limited (Dillon) was retained by the Wocawson Energy Limited Partnership (WLP) to complete natural environment surveys in support of a future provincial registration for an Environmental Impact Assessment (EIA) of the Wocawson Energy Project ("the proposed project"). WLP is a partnership between Tobique First Nation (51%) and Natural Forces NB Inc. (49%).

The proposed project is located in a generally undeveloped area although regular tree harvesting has occurred. It is anticipated that the area would provide suitable bat habitat for many species, resulting in bats and bat habitat being considered an important feature and a valued component (VC) related to the proposed project. Natural environment surveys for the proposed project were conducted for VCs of the environment based on an understanding of the environmental features of the proposed project area, feedback from New Brunswick Department of Energy and Natural Resources (NBDERD) biologists, the nature of the proposed project, and the potential interactions that may occur between the proposed project and the environment/VCs.

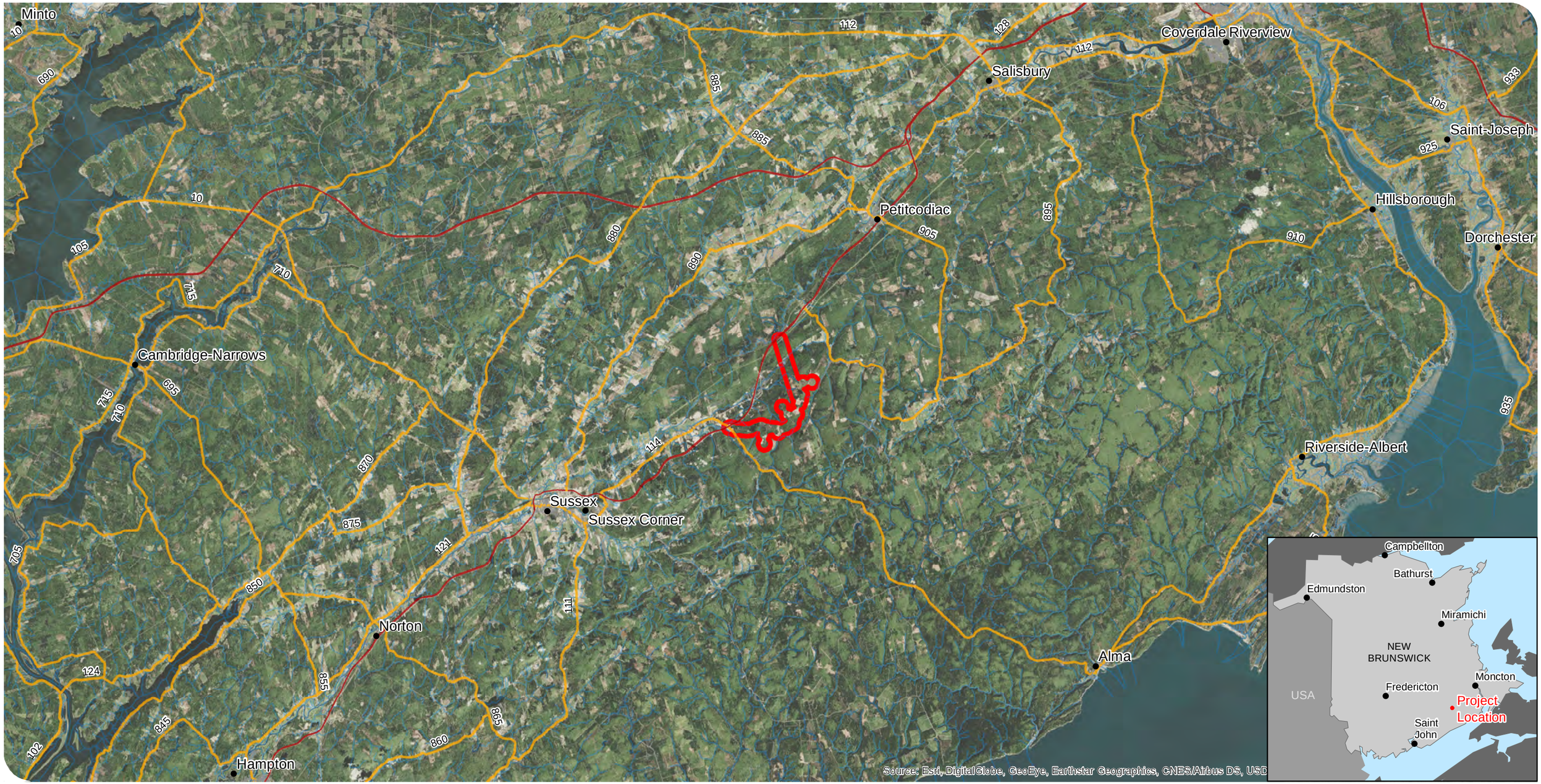
This report provides a summary of the acoustic bat surveys that were conducted and are ongoing in support of the Wocawson Energy Project EIA registration, and includes: a brief description of the proposed project; a description of the scope and methodology used for the survey; a summary of the proposed approach used to evaluate the data; and, proposed mitigation based on industry experience and standard mitigation.

Though the bat surveys were completed over similar time frames as other focused environmental surveys (i.e. birds and bird habitat, vegetation, wetlands, wildlife, and wildlife habitat,), the focus of this report is on bats and bat habitat. Separate reports will be provided for other components of the environment, specifically for birds and bird habitat, wildlife and wildlife habitat, vegetation, and wetlands and watercourses.

It is important to note that bat data collection is ongoing at this time and will continue until October 31, 2018. As such, this report should be considered as a preliminary summary of the approach and data collected to date. Once data collection is complete, this report will be amended to include a summary of all data collected in support of the proposed project.

1.1 Project Description

The proposed 20-40 megawatt (MW) Wocawson Energy Project is expected to provide electricity to approximately 3,600 – 7,200 New Brunswick homes. The turbines for the proposed project are sited on approximately 1,150 hectares (ha) of Crown land located approximately 20 km east of the Town of Sussex, in Kings County, New Brunswick (refer to **Figure 1**). The transmission line associated with the Project will extend across Crown land as well as private land to connect to the existing power grid.



NATURAL FORCES TECHNOLOGIES
Wocawson Energy Project

Wocawson Energy Project Location
FIGURE 1

Project Location
Watercourses

Road Network
Expressway / Highway
Freeway
Local / Street

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY NBDERD

MAP CREATED BY: JNH
MAP CHECKED BY: AS
MAP PROJECTION: NAD 1983 CSRS New Brunswick Stereographic

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FILE LOCATION: G:\CAD\GIS\186975_SUSSEX EAST\SUSSEX EAST WIND PROJECT\MAPS FOR REPORT\PROJECT LOCATION JULY 4 2018_JNH

PROJECT: 18-6975 STATUS: DRAFT DATE: 2018-07-18

The project area includes 12 proposed turbine locations (with 6-12 turbines installed), connector lines, a substation and transmission line, as well as pre-existing road infrastructure (Mitton Road) to be upgraded for the proposed project (refer to **Figure 2**). Mitton Road (located off NB Route 114) is the main access to the proposed project area.

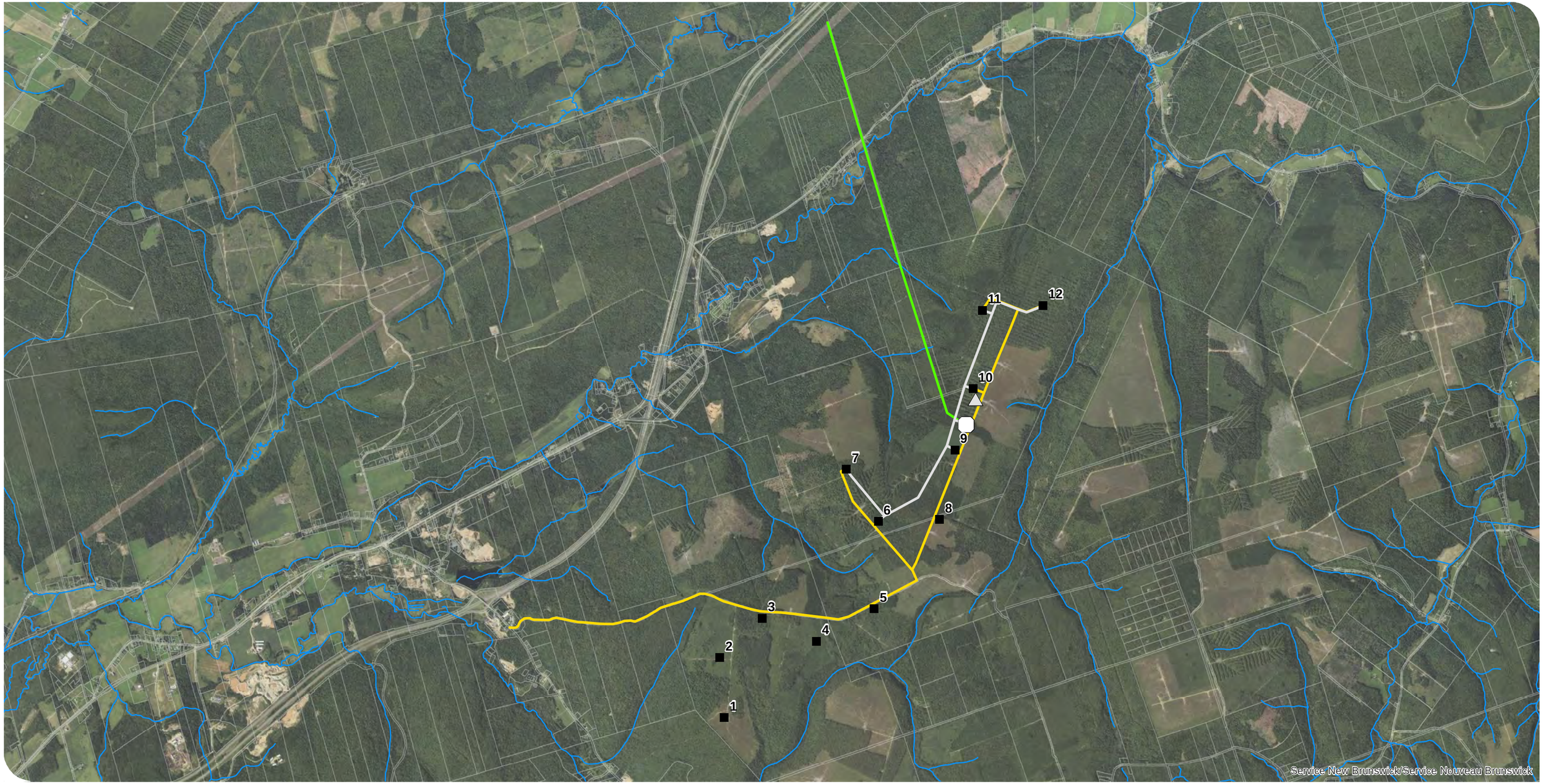
Although the developed project is anticipated to only include 6 turbines at this time, locations for 12 turbines were assessed to allow WLP the opportunity to refine the project footprint based on environmental constraints and to plan for potential future growth.

The proposed turbine layout includes the sites for up to 12 turbines located along a ridge running approximately northeast-southwest between elevations 225 m and 275 m above mean sea level (amsl). The general project area is recognized to have an energetic wind regime due to its high elevation (Natural Forces, 2018). Local topography is undulating, with several low ridges also following a northeast-southwest orientation.

The majority of the proposed project site is characterized as being predominantly in an early stage of forest regeneration or plantation due to historic and recent commercial forestry operations. Many of the turbine locations have been selected in areas of recent cut over (i.e., clear-cut and select-cut areas) to minimize the destruction of potentially undisturbed or more mature habitat. No mapped watercourses or wetlands were observed within the footprint of proposed turbine locations. One small unmapped ephemeral drainage channel was observed along Mitton Road (proposed road upgrade).

The proposed transmission line runs approximately north-south and crosses a variety of land uses such as, rural residential property, recent clear cuts, and areas of immature to mature coniferous and deciduous forests in various stages of regeneration. The northern portion of the proposed transmission line crosses three mapped and one unmapped watercourse. The proposed transmission line does not cross any mapped (regulated) wetlands, however; the proposed transmission line crosses three unregulated wetlands, one of which is located in low lying floodplain (riparian) habitat associated with the Kennebecasis River and has been identified on the Service New Brunswick [SNB] draft beta wetland mapping currently being proposed by the New Brunswick Department of Environment and Local Government (NBDELG).

To facilitate the existing forestry operations, several logging roads have been constructed and maintained across the area. WLP has selected the proposed project site to use existing roads reducing the need for new road construction. Additionally, several groomed snowmobile trails that pass through the proposed project area are frequently used during the winter months. WLP recognizes that the local snowmobile club is a concerned stakeholder and thus WLP has selected the proposed locations for site infrastructure to minimize the possibility that snowmobile trails would be affected, or that construction of new trails would be required as a result of the project.



NATURAL FORCES TECHNOLOGIES
Wocawson Energy Project

Wocawson Energy Project Site Plan
FIGURE 2

Proposed Turbine Locations
Substation
Met Tower
Road Upgrade
Proposed Transmission Line
Watercourses
Collector
PID

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY NBDERD

MAP CREATED BY: JNH
MAP CHECKED BY: ACS
MAP PROJECTION: NAD 1983 CSRS New Brunswick Stereographic

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SCALE 1:45,000

FILE LOCATION: G:\CAD\GIS\186975_SUSSEX EAST\SUSSEX EAST WIND PROJECT\MAPS FOR REPORT\SITE PLAN JULY 9 2018_JNH

PROJECT: 18-6975 STATUS: DRAFT DATE: 2018-07-18

1.1.1 Siting Considerations

WLP has extensive knowledge with respect to the development of wind farms on lands with favourable characteristics to provide efficient renewable energy. Many considerations are taken into account during site selection that focus on efficiently delivering renewable energy to the local community in a way that minimizes the effects on the community and the environment (Natural Forces, 2018).

Specifically, the proposed project area is favourable due to the following characteristics (in no particular order): the available wind resource, the project distance from residential dwellings and environmentally sensitive features, proximity to the New Brunswick Power (NB Power) transmission system, and the existing land use and disturbed nature of the area due to extensive forestry activities (Natural Forces, 2018). The following is a list of factors that have been considered during the site selection and design process:

Technical Considerations:

- Sufficient wind resource;
- Regional topography;
- Proximity to transmission system; and,
- Turbine technology.

Environmental Considerations:

- Proximity to provincially regulated wetlands;
- Proximity to residential dwellings or other sensitive buildings;
- Sensitivity of flora and fauna;
- Proximity to provincial or national parks and nature reserves; and,
- Risk of archaeological resource disturbance.

Land use considerations:

- Known culturally significant areas;
- Current land use;
- Historical land use;
- Future land use;
- Available access to the land; and,
- Proximity to residential properties, communities and towns.

1.1.2 Physical Components of the Project

The proposed project will be comprised of 6-12 Enercon wind energy generators, and turbine size is not expected to exceed approximately 135 m in total hub height with a blade length of 72 m (exact model not yet determined). Refer to **Figure 3** for a conceptual rendering of the proposed turbine design.

The transmission line will extend approximately 5.6 km across privately owned lands, within a cleared corridor approximately 75 m wide, and will connect with existing New Brunswick Power infrastructure along the New Brunswick Department of Transportation and Infrastructure (NBDTI) right-of-way for

Route 1. The proposed project's output at the point of interconnection to the electrical grid will be 20 - 40 MW.

The project's lifespan ('design life') is expected to be 30-years (which is unique to Enercon wind turbines) (Natural Forces, 2018). The 30-year design life allows the Project to align itself with a 30-year Power Purchase Agreement (PPA) with NB Power, and allow a longer, stable energy production. Natural Forces has used Enercon machines exclusively for all its community wind projects currently under operation and has a long-standing relationship with the company.

Figure 3: Anticipated Turbine Hub and Blade Lengths

Base photo reference: Enercon https://www.enercon.de/en/products/ep-4/e-141-ep4/

1.1.3 Project Schedule

The proposed project schedule and activities are currently arranged as four distinct phases, as described in **Table 1**, below:

Table 1: Anticipated Project Schedule

Phase	Phase Details	Anticipated Schedule
1. Development Phase	This phase includes the post power purchase agreement development activities (including the EIA and related work).	Q4 2017 to Q1 2019
2. Pre-Construction Phase	This phase includes pre-construction activities, including: financing arrangement for debt and equity, wind turbine supply negotiation, site design, execution of the Facilities Study Agreement, tendering for all construction contracts, and final construction-related permitting.	Q4 2018 to Q2 2019
3. Construction Phase	This phase includes construction and commissioning related activities, including: tree clearing and grubbing, road building, electrical works, foundation pour, turbine delivery, turbine assembly, and final Project commissioning.	Q1 2019 to Q4 2019 Commercial Operation anticipated to begin Q4 2019
4. Operation Phase	This phase includes activities that occur during the operation of the wind project, including: post-construction monitoring, annual monitoring reports, remote monitoring of turbine performance, and maintenance.	Q4 2019 to decommissioning of the turbines (30 year lifespan)

The decommissioning phase of the project will include activities required to decommission the project at the end of its service life, including: the removal of the turbine materials and associated infrastructure to an appropriate underground depth and restoration of the site. The precise timing of the decommissioning of the proposed project is currently unknown. If possible, the wind turbines' lifespan may be extended by replacing parts or otherwise refurbishing them to produce additional energy after their original 30-year lifespan. Therefore, the decommissioning phase of the project is not considered within the scope of this assessment. Once the proposed project is approaching the end of its useful life, a decommissioning plan will be submitted to the NBDELG prior to undertaking decommissioning activities, which reflects the guidance and regulations in place at that time.

2.0 Bat Acoustic Survey Scope and Methodology

This section details the scope of the bat acoustic bat monitoring surveys conducted for the proposed project, and the methods that were used to conduct the desktop and field assessments.

2.1 Recommended Protocols and Scope of Work

2.1.1 Surveys Protocols and Guidance

The 2009 Pre-Construction Bat Survey Guidelines for Wind Farm Development in New Brunswick (NBDNRE. 2009) require, acoustic bat surveys for a minimum of one year prior to construction during both the breeding season (June 1 to June 30) and the late summer – early fall migratory period (August 15 to September 15).

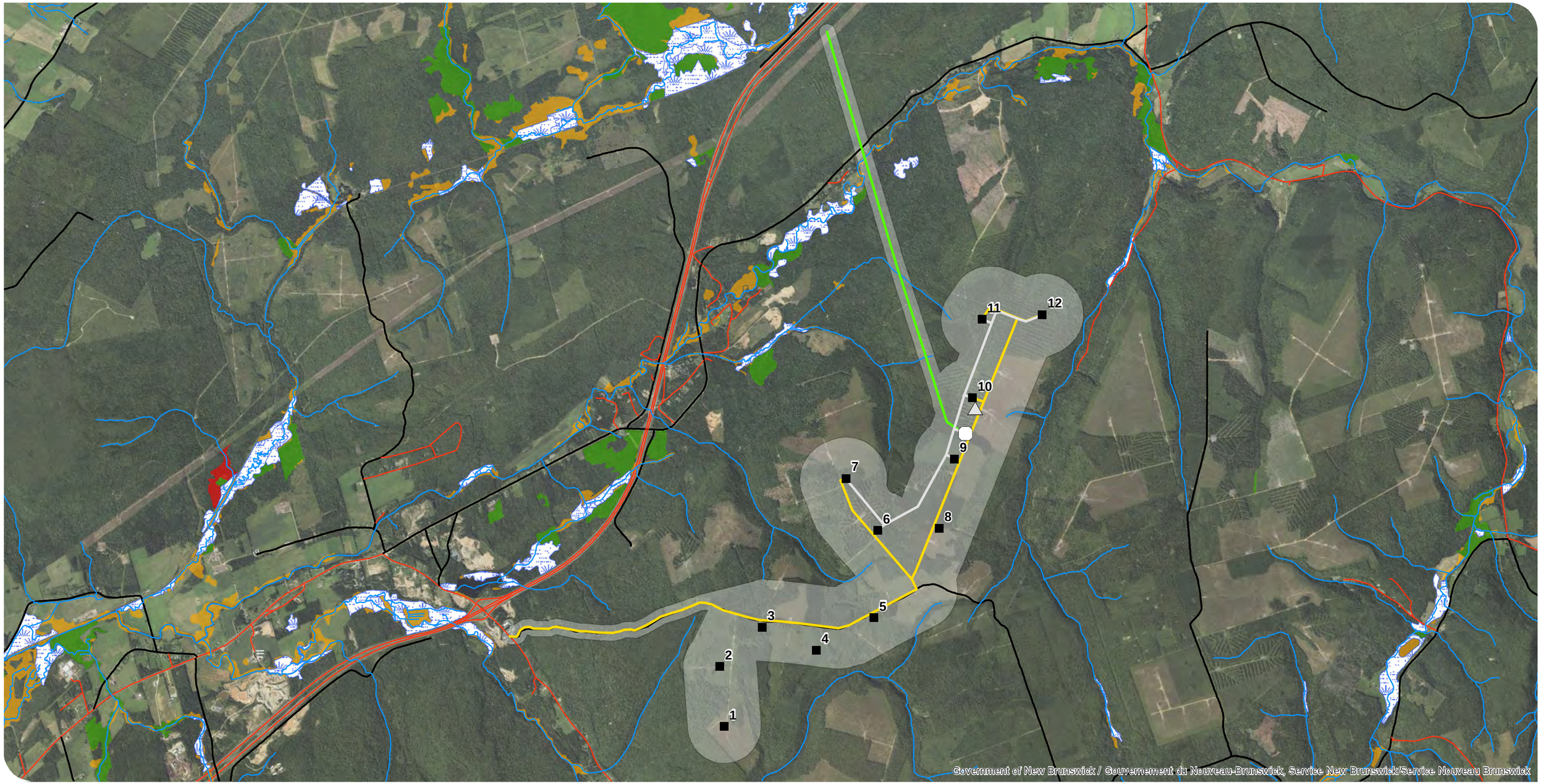
The guidelines require additional pre-construction bat acoustic survey effort if the proposed wind facility and surrounding areas contain high risk habitat features (i.e., within 5 km of a known hibernacula, or potential cave or abandoned mine; within 500 m from a coast line or other major water bodies; or located on or near forested ridge habitats). Critical habitat as defined in the proposed recovery strategy (ECCC, 2015) is not anticipated near the proposed project. A review of existing information indicates that there are no known hibernacula, caves or abandoned mines (based on the Province of New Brunswick's Mine Opening Inventory Map) within 5 km of the project area and it is not within 500 m of a coast line or major water body (ECCC, 2015).

2.1.2 Spatial Boundaries

For the purpose of this assessment, the spatial boundaries (i.e., the assessment area) have been identified as the area encompassing the access roads, each turbine location (plus a 150 m radius surrounding each turbine), and the transmission/connection lines (consisting of a 150 m-wide corridor), extending between the proposed project location to the existing power infrastructure. Refer to **Figure 4** for an illustration of the proposed project area.

2.1.3 Temporal Boundaries

The temporal boundaries for the assessment define the time periods for which likely environmental effects of the Project are considered. The temporal boundaries of this assessment include the duration of the construction phase (approximately 1 year in duration during 2019) and subsequent operation phase (approximately 30 years following construction) of the Project. In the construction phase, specific construction-related effects are anticipated to be short term and limited to either the duration of the activities that produce the effects or the duration of the construction phase. Effects associated with the operation phase are longer term, as the proposed Project is intended to be operational for at least 30 years (although the lifespan may be extended with routine maintenance or refurbishment as appropriate).



NATURAL FORCES TECHNOLOGIES
Wocawson Energy Project

Wocawson Energy
Project Assessment Area
FIGURE 4

- Proposed Turbine Locations
- Substation
- Met Tower
- Collector
- Road Upgrade
- Proposed Transmission Line

Road Network
- Collector
- Roads
- Watercourses
- Regulated Wetlands
- Assessment Area

NBDELG Draft Beta Wetland Mapping (unregulated)
- Provincially Significant Wetlands
- Intermediate Wetlands
- Forested Wetlands

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MAP DRAWING INFORMATION:
DATA PROVIDED BY NBDERD

MAP CREATED BY: SCN
MAP CHECKED BY: ACS
MAP PROJECTION: NAD 1983 CSRS New Brunswick Stereographic

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SUSSEX EAST WIND PROJECT\MAPS FOR REPORT\STUDY AREA
JULY 9 2018_JNH

PROJECT: 18-6975 STATUS: DRAFT DATE: 2018-07-18

2.1.4 Scope of Work

Bats and bat habitat were selected as a valued component (VC) related to the proposed project with potential interactions due to the possible environmental effects of:

- A potential change or alteration of, of habitat as a result of the proposed project activities; and
- Effects to individuals due to collisions or modifications of flight paths.

Based on the Pre-Construction Bat Survey Guidelines (NBDNR, 2009), a background and desktop analysis followed by one year of pre-construction survey including the summer and fall season is required. A minimum of 40 hours of survey distributed over a minimum of 10 nights with a minimum of 4 hours per night starting 30 minutes after sunset is required for the early summer breeding (June 1st – June 30th) and late summer/fall migration (August 15th – September 15th) periods. Additional surveys during the summer breeding (July 1st – July 31st) and fall migration (September 15th – October 15th) periods are recommended in high risk areas with 40 hours of survey over a minimum of 5 nights. Although the site is not considered as a high risk area, surveys were designed to commence prior to the breeding season and extend through the late fall migration period (June 1 until October 31, 2018 inclusive). This approach allowed for collection of data which could capture bat activity levels during the vulnerable periods (i.e., breeding and migration) while considering seasonal and environmental fluctuations. Methodologies used for the scope of the desktop analysis and field surveys listed above are outlined within the following sections.

WLP understands that one of the key environmental concerns associated with wind projects is the potential for effects to bats. As such WLP undertook consultation with NBDERD regarding the level of effort for the acoustic survey program. In email correspondence dated May 17, 2017, the NBDELG EIA project manager indicated that NBDERD was satisfied with the level of effort for the acoustic survey program; however, it was recommended that one of the acoustic monitors be relocated. The acoustic monitor was thus set up in the location suggested by NBDERD prior to starting the survey as a result of the feedback.

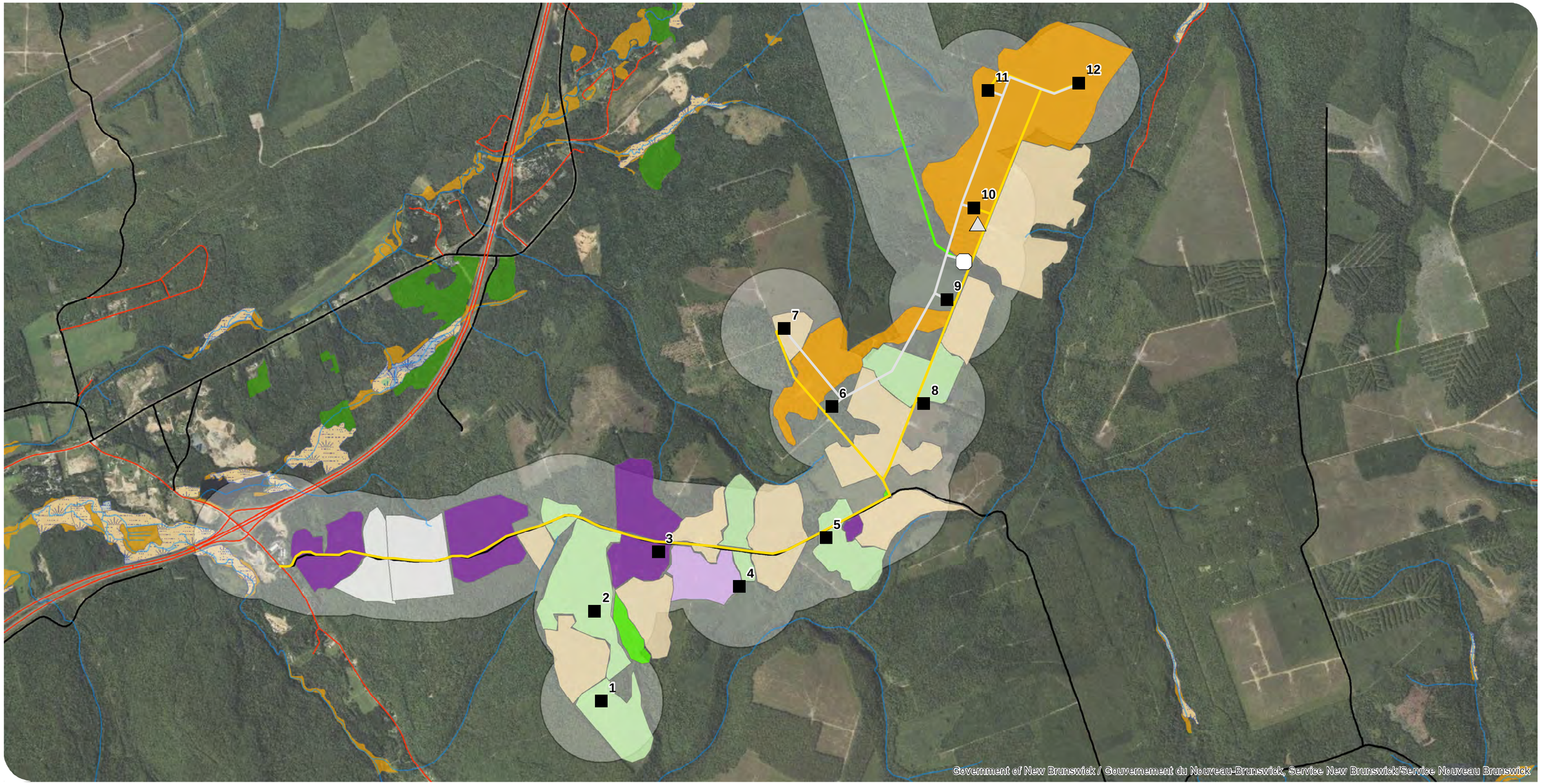
2.2 Desktop Assessment Methodology

Prior to completing the acoustic surveys, Dillon reviewed readily available information from reputable sources. The information was reviewed to evaluate the potential for high risk habitat features or other available information that could be used to refine the survey program. Dillon completed a review of the following sources, data lists, and publications prior to completing the field surveys:

- Atlantic Canada Conservation Data Centre (AC CDC);
- Environment and Climate Change Canada (ECCC) Species at Risk Reports;
- New Brunswick Department of Natural Resources (NBDNR) Species at Risk Reports;
- The federal Species at Risk Registry;
- The Committee on the Status of Endangered Wildlife in Canada (COSEWIC);

- Publicly available GIS map layers (e.g., ecological land classification, forest and non-forest inventory, wetland inventory, Protected Natural Areas, Wildlife Management Zones);
- Environmentally Significant Areas Database;
- Ecological Reserves in the Maritimes;
- Province of New Brunswick's Mine Opening Inventory Map;
- The General Status of Wildlife in New Brunswick publication; and
- Available aerial photography.

Approximate extents of different habitat types in the assessment area are presented on **Figures 5A and 5B** respectively.



NATURAL FORCES TECHNOLOGIES
Wocawson Energy Wind Project

Wocawson Energy Wind Project
Terrestrial Habitat Types
FIGURE 5A

- Proposed Turbine Locations
- Substation
- Met Tower
- Road Upgrade
- Collector
- Proposed Transmission Line
- Watercourses

Road Network
- Collector
- Roads
- Regulated Wetlands
- Study Area

Terrestrial Habitats
- Pre-Commercial Thinning
- Clear Cut
- Strip Cut
- Select Cut Mixedwood
- Immature Mixedwood
- Semi-Mature to Mature Mixedwood
- Softwood Plantation
- Semi-Mature to Mature Softwood
- Semi-Mature to Mature Hardwood
- Pine Retention
- Potential Wetland

NBDELG Draft Beta Wetland Mapping (unregulated)
- Provincially Significant Wetlands
- Intermediate Wetlands
- Forested Wetlands

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MAP DRAWING INFORMATION:
DATA PROVIDED BY NBDERD

MAP CREATED BY: JNH
MAP CHECKED BY: ACS
MAP PROJECTION: NAD 1983 CSRS New Brunswick Stereographic

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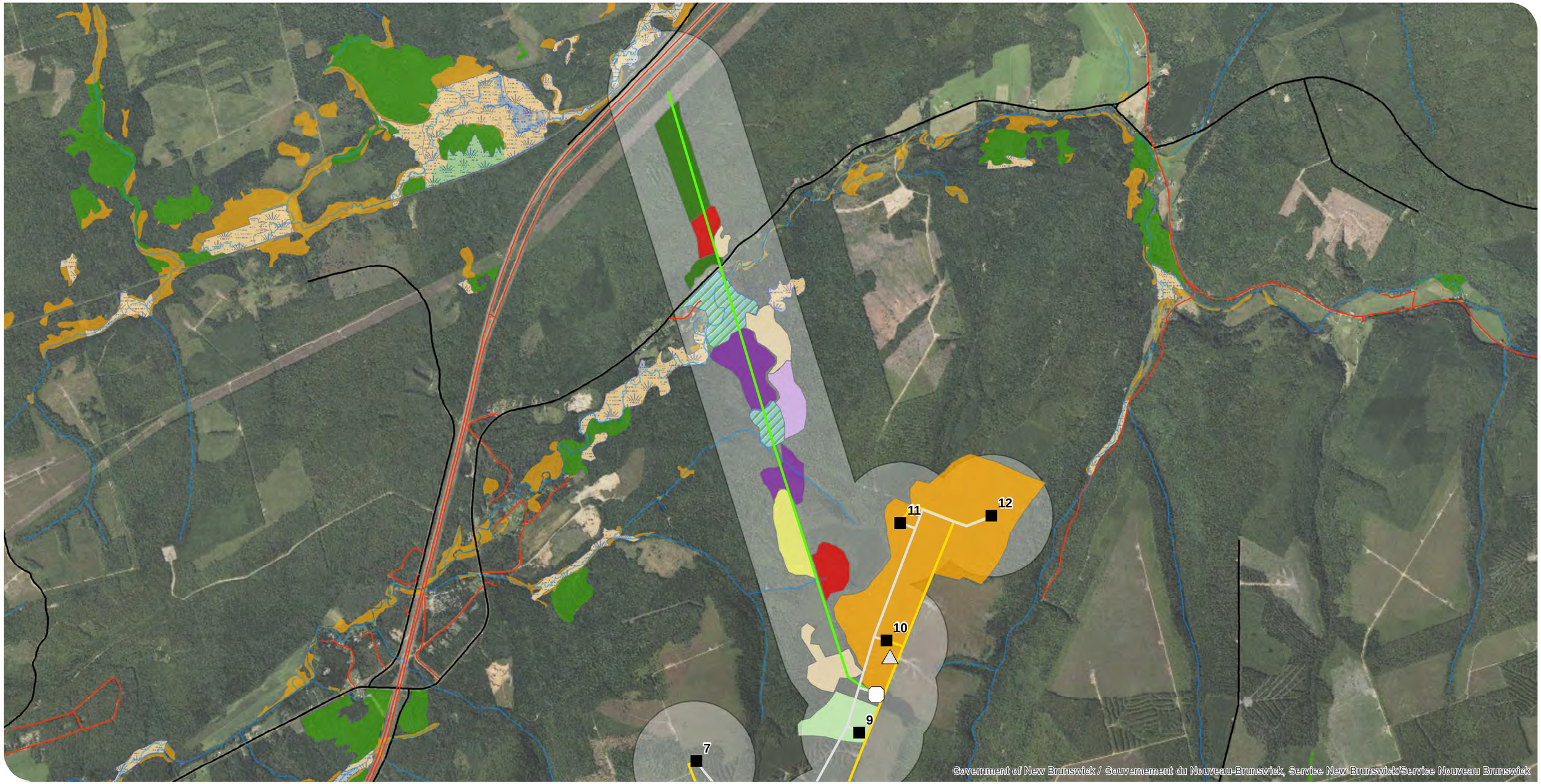
PROJECT: 18-6975 STATUS: DRAFT DATE: 2018-07-10



NATURAL FORCES TECHNOLOGIES
Wocawson Energy Wind Project

Wocawson Energy Wind Project
Terrestrial Habitat Types
FIGURE 5B

- Proposed Turbine Locations
- Substation
- Met Tower
- Road Upgrade
- Collector
- Proposed Transmission Line
- Watercourses

Road Network
- Collector
- Roads
- Regulated Wetlands
- Study Area

Terrestrial Habitats
- Pre-Commercial Thinning
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MAP CREATED BY: JNH
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PROJECT: 18-6975 STATUS: DRAFT DATE: 2018-07-10

2.3 Field Survey Methodology

Four acoustic survey stations were installed in the assessment area of the proposed project (**Figure 6** and **Table 2**) to collect data from the different terrain and habitat types located in the area of the proposed project. Each station was equipped with a Wildlife Acoustics SM3BAT or SM4BAT ultrasonic bat detector and condenser microphones (i.e., SMM-U1/U2) (**Photo 1** and **Photo 2**), aimed upward and away from the prevailing wind direction, that has an effective recording range of approximately 25 – 30 m. Each bat detector included the following programmed settings:

- Trigger Frequency Minimum: 16 kHz;
- Trigger Frequency Maximum: 192 kHz;
- Trigger Level: Automatic (12dB);
- Trigger Wind Setting (recording continues until no trigger is detected): 3 seconds, or when the maximum file duration (i.e., 15 seconds) was reached;
- Sample Night: from dusk to sunrise; and
- Gain Level: Automatic (12dB).

Each station was deployed on May 31, 2018. Bat activity data was collected daily at each of the acoustic survey stations from dusk to sunrise, between June 1 to present (and planned to be ongoing until and October 31).

Photo 1. Wildlife Acoustics SM3BAT detector used at Station 3.

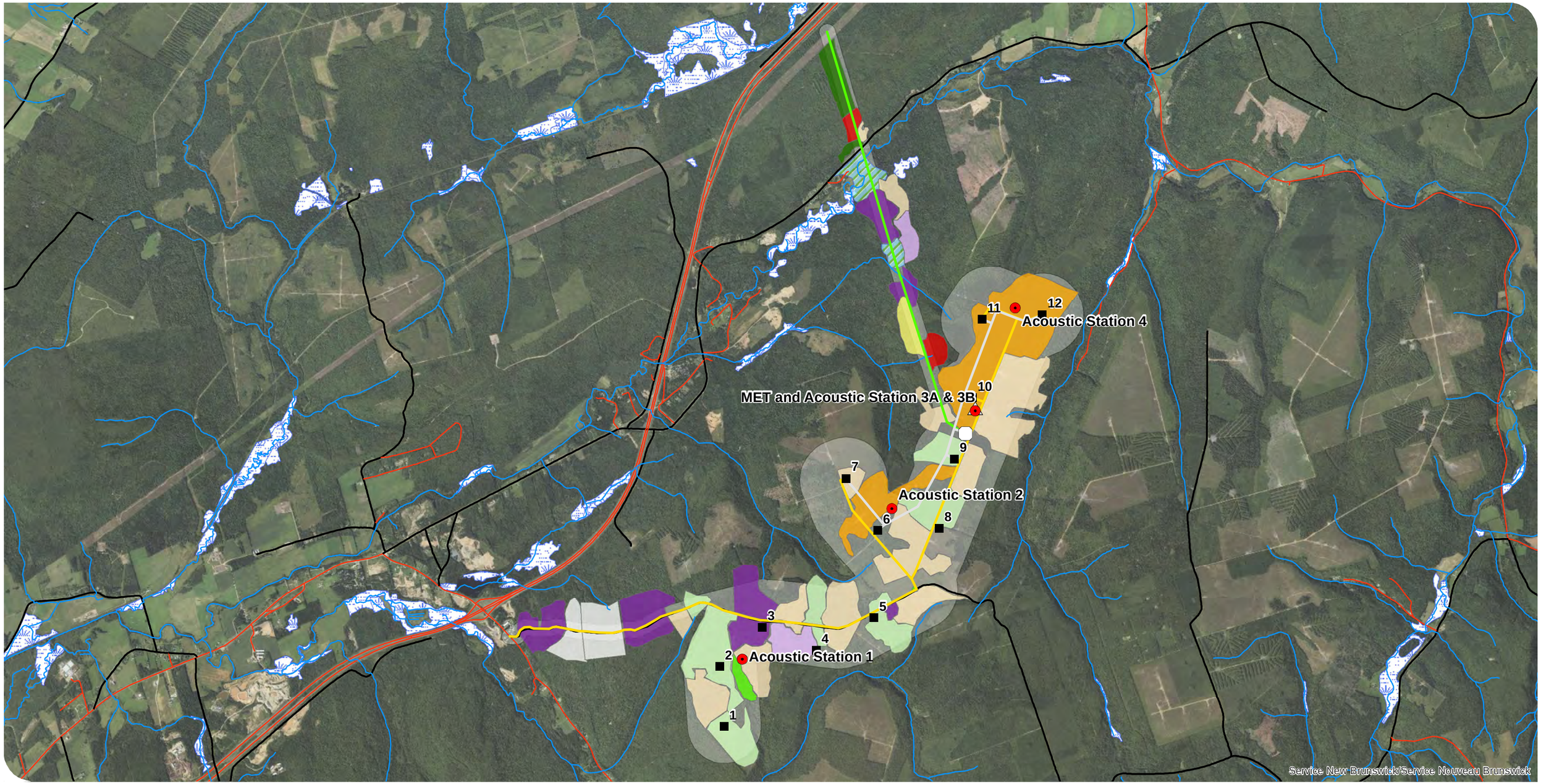
Photo 2. Wildlife Acoustics SM4BAT ultrasonic bat detector and condenser microphone used at station 1.

One station was located on the existing meteorological tower (MET) at approximately 30 m above ground level, to collect bat activity within the blade sweep area, with the remaining 3 acoustic survey stations at ground level such that they capture the site boundaries, turbine clusters and unique habitat types. In an attempt to determine whether significant differences exist between bat activity collected at

Table 2: Acoustic Station Characteristics

Acoustic Station ID	Representative Photo	Station Height	Description
Acoustic Station 1		Ground Level	Acoustic station 1 was deployed at the southwestern end of the ridge near the proposed locations of turbines 1-4 at the edge of a recent clear cut adjacent to a small patch (approx. 3.2 ha) of mature mixed softwood trees.
Acoustic Station 2		Ground Level	Centrally located in the project assessment area near the proposed locations of turbines 6-7 at the edge of a clear cut adjacent to an area of hardwood dominant mixed forest that has been strip cut.
Acoustic Station 3a and 3b		30 m Above Ground Level and Ground Level.	At the on-site MET tower, near turbine 10, in a large clearing adjacent to semi-mature mixed forest and a large clear cut. One microphone was raised to 30 m above ground with an additional microphone recording at ground level.
Acoustic Station 4		Ground Level	At the northeastern end of the project assessment area at the edge of a hardwood dominant stand between the proposed locations of turbines 11 and 12.

The locations of acoustic stations are illustrated on **Figure 6**.



NATURAL FORCES TECHNOLOGIES
Wocawson Energy Project

Wocawson Energy
Acoustic Station Locations
FIGURE 6

Acoustic Station Locations
Proposed Turbine Locations
Substation
Met Tower
Road Upgrade
Collector
Proposed Transmission Line
Watercourses

Road Network
Collector
Roads
Regulated Wetlands
Assessment Area

Terrestrial Habitats
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NBDELG Draft Beta Wetland Mapping (unregulated)
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MAP CHECKED BY: ACS
MAP PROJECTION: NAD 1983 CSRS New Brunswick Stereographic

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PROJECT: 18-6975 STATUS: DRAFT DATE: 2018-07-23

3.0 Acoustic Survey Results

At the time of this report, the acoustic survey was ongoing. Following the completion of the survey, bat acoustic data will be analyzed using the automated software Kaleidoscope Pro (Wildlife Acoustics) with the following settings:

- Minimum number of pulses = 2;
- Division Ratio = 8;
- Time Expansion Factor = 1;
- Duration = 2 – 500 ms; and
- Frequency Range = 16 – 120 kHz.

Using the automatic species identification feature provided by Kaleidoscope Pro, each acoustic file will be first identified to species and species groups (where possible), or identified as either NOID (i.e., no identification - pulses recorded but unable to identify species) or NOISE (i.e., no pulse recorded). Species/species groups will be identified based on maximum frequency, minimum frequency, call duration and shape (Jones and Siemers, 2010) and will be classified as follows (van Zyll de Jong 1985):

- **EPFU/LANO/LABO** – [Big brown (*Eptesicus fuscus*)/ silver-haired (*Lasionycteris noctivagans*)/eastern red bat (*Lasiurus borealis*)]: Both silver-haired bats and big brown bats produce calls with a constant frequency (CF) tail around 22 – 25 kHz. Although eastern red bats are the only species to produce calls with a minimum frequency between 30 – 35 KHz, they also produce calls with lower minimum frequencies within the range of big brown and silver-haired bats. As such, eastern red bats were included in this species group.
- **LACI** – Hoary bat (*Lasiurus cinereus*): Noticeably lower in frequency, with calls ranging from 25 to 18 kHz (maximum to minimum frequency). Calls are also noticeably longer in duration, with a longer CF tail compared to other bat species known to occur within the project assessment aea. Hoary bats can, therefore, be reliably differentiated from all other species.
- **MYOTID SSP** (*Myotis*): Unlike the species outlined above, the species in this group produce shorter duration calls with a minimum frequency between 40 – 45 kHz, and maximum frequencies ranging between 120 kHz and 80 kHz. Occasionally, myotis calls can have a minimum call frequency of 35 kHz.
- **HFUN** (High Frequency Unknown) – NOID files with ≥ 2 pulses: Given that the main goal of the bat acoustic data program is to determine bat activity, NOID files with ≥ 2 pulses with a minimum frequency of ≥ 30 kHz were classified as HFUN bat calls. In this case, for data interpretation purposes HFUN bat calls will be included in the reported data.
- **LFUN** (Low Frequency Unknown) – NOID files with ≥ 2 pulses: Given that the main goal of the bat acoustic data program is to determine bat activity, NOID files with ≥ 2 pulses with a

minimum frequency of < 30 kHz were classified as LFUN bat calls. In this case, for data interpretation purposes, LFUN bats calls will be included in the reported data.

The final reported data will identify the mean number of bat passes per detector and per detector period (e.g., breeding and migration). Once analyzed, the data will provide temporal and seasonal peaks in bat activity, of which the data could be used as a mechanism to minimize potential adverse effects on bats during the operation of the wind farm.

4.0 Environmental Effects Assessment

4.1 Identification of Project Interactions

Although the survey program is ongoing, some anticipated effects to bats can be predicted based on the nature of the project and effects to bats on similar type projects in the region. The identification of anticipated potential interactions between the Project and bats or bat habitat is presented below. Following the completion of the acoustic survey program and the analyzed results, the environmental effects assessment will be updated and an amendment to this report will be prepared.

4.1.1 Approach to Project Components

As presented in Section 1.1.3, this assessment recognizes four main distinct Project phases. The potential interactions with the surrounding environment have been considered in terms of each distinct phase. Additionally, accidents and malfunctions will be considered.

The phases of the Project include:

1. *Development Phase;*
2. *Pre-Construction Phase;*
3. *Construction Phase; and*
4. *Operation Phase.*

This initial screening (i.e., project interaction matrix) assists in determining if an interaction between the activities being carried out in each phase of the proposed project and the valued component is possible. The matrix is presented below in **Table 3**.

Table 3: Project Interactions with Environmental Components

Valued Component	Project Phases				
	Development Phase	Pre-Construction Phase	Construction Phase	Operation Phase	Accidents and Malfunctions
Bats and Bat Habitat			✓	✓	✓

Legend: ✓ = Potential interaction identified

Those project phases for which a checkmark is provided indicates that the project may interact with the VC, and thus an environmental effects assessment is warranted in Section 4.2 below.

Those project phases for which no interaction was noted with the VC (namely the development and pre-construction phases) are not carried forward or discussed further in this report. Bats and bat habitat will not interact with the development and pre-construction phases of the proposed project due to the conceptual, planning, administrative, and design nature of these phases. Since there are no "on the ground" activities associated with these phases, no environmental effects are expected to result and therefore no interaction is anticipated.

As described in Section 1.1.3, the decommissioning phase of the project is not considered within the scope of this assessment; a decommissioning plan will be completed prior to this phase of the project that reflects the guidance and regulations of the time.

4.2 Assessment of Residual Environmental Effects

4.2.1 Identification of Potential Environmental Effects

Without mitigation, the proposed project is anticipated to interact with bats and/or bat habitat and cause environmental effects in the following ways:

- Loss of habitat, or displacement from surrounding habitat, due to construction activities;
- Fatalities due to collisions with turbine towers or blades or the transmission line infrastructure during operation; and
- Modifications to existing flight paths as bats avoid the project area or are attracted to the area by tower lights.

4.2.2 Standard Mitigation of Potential Environmental Effects

Standard mitigation has been identified for the anticipated interaction and/or effect in relation to bats and bat habitat in an attempt to prevent the interaction from occurring if possible, or to reduce the magnitude, geographic extent, frequency, duration, reversibility, or ecological/socioeconomic context of the interaction. Best management practices (based on industry guidelines and regulatory guidance documents) have been proposed as mitigative measures. In addition, several acts, codes, regulations and guidelines may require appropriate actions be conducted as mitigative measures prior to or during the interaction.

The federal and provincial legislation and codes that could apply to the proposed project include (but may not be limited to):

- *Canadian Environmental Protection Act* and regulations;
- *Species at Risk Act*;
- *Transportation of Dangerous Goods Act*, and regulations;
- New Brunswick *Clean Environment Act*, and regulations;

- New Brunswick *Clean Water Act*, and regulations;
- New Brunswick *Clean Air Act*, and regulations;
- New Brunswick *Occupational Health and Safety Act*, and regulations; and
- New Brunswick *Species at Risk Act* and regulations.

The following standard mitigation measures have been identified to reduce the likelihood of occurrence, or minimize potential extent of effects of the proposed project on bats or bat habitat. Planned standard mitigation measures for the proposed project include the following:

- The area of disturbance associated with the development of the physical components of the proposed project (e.g., turbines, transmission line) will be minimized to the extent possible to limit the associated environmental effects associated with such disturbance;
- The area od disturbance shall be revegetated as soon as feasible;
- Existing access roads will be utilized where possible to reduce the loss of habitat;
- Tree clearing will occur outside of the typical roosting periods for bats (May 30 to September 30);
- Post construction surveys will be completed during the operation phase of the project to identify if additional mitigative measures are required, in consultation with NBDERD. Additional measures could include:
    - Temporary shutdown of one or more turbines during high risk periods.
    - Temporary feathering of turbine blades during high risk periods.
    - Completion of additional habitat studies to evaluate factors that may be contributing to the increased mortality rates.
- Non-operational towers shall be dismantled if not expected to be put back into operation; and
- Lighting installed on the turbines will follow, but not exceed, the Transport Canada requirements.

Once the acoustic survey program is completed and the results are analyzed, a complete list of mitigation measures related to specific phases of the project will be provided.

4.2.3 Characterization of Residual Environmental Effects

Based on the anticipated effects on bats, residual effects that may occur as a result of the construction and operation phases of the Project. Although the effects are expected to be of low magnitude and be reversible, a full evaluation will be completed following the conclusion of the acoustic survey. The characterization of the residual environmental effects will be revisited at that time.

With the implementation of planned mitigation, and with the careful development and implementation of contingency and emergency response plans, it is anticipated that effects posed by accidents and unplanned events related to the Project will not be substantive. However, a full evaluation will be completed following the conclusion of the acoustic survey.

5.0 Summary and Conclusion

This report has been prepared for the construction and operation of the Wocawson Energy Project. The proposed project is expected to provide renewable electricity to approximately 3,600 – 7,200 New Brunswick homes and support New Brunswick Power in attaining their future renewable energy targets.

The information provided in this document is based on the current available design/planning information and existing environment information obtained during focused field surveys conducted throughout 2018. Based on the anticipated effects on bats, residual effects that may occur as a result of the construction and operation phases of the Project. Although the effects are expected to be of low magnitude and be reversible, a full evaluation will be completed following the conclusion of the acoustic survey.

6.0 Closure

This report was prepared by Dillon Consulting Limited (Dillon) on behalf of the Wocawson Energy Limited Partnership, in support of the Wocawson Energy Project EIA. Dillon has used the degree of care and skill ordinarily exercised under similar circumstances at the time the work was performed by reputable members of the environmental consulting profession practicing in Canada. Dillon assumes no responsibility for conditions which were beyond its scope of work. There is no warranty expressed or implied by Dillon.

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Yours truly,

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