MARTOCK RIDGE COMMUNITY WIND PROJECT

ENVIRONMENTAL ASSESSMENT REGISTRATION DOCUMENT

Proponent
Scotian Windfields Inc.
and
Scotian Wind Inc.
and
WEB Wind Energy North America Inc.

Document Prepared By:
Strum Environmental

January 2013

Executive Summary

Scotian WindFields Inc., Scotian Wind Inc., and WEB Wind Energy North America Inc. have proposed to develop a 6.0 MW wind project at a site in the community of Three Mile Plains, Nova Scotia. The Martock Ridge Community Wind Project will be located approximately 7 km southeast of Windsor, Nova Scotia in West Hants County (44°55'41.03"N, 64° 6'50.81"W), and will consist of approximately 119 ha of forest owned by the Town of Windsor.

The province of Nova Scotia recently developed the Community Based Feed-In Tariffs program, an incentive-based program in which municipalities, First Nations, cooperatives, local non-profits, and small businesses, operating through Community Economic Development Investment Funds, are eligible to apply.

The Project is considered a Class 1 undertaking under the Nova Scotia Environmental Assessment Regulations and as such, requires a registered Environmental Assessment as identified under Schedule A of the Regulations. The Environmental Assessment and the registration document have been completed according to the methodologies and requirements outlined in the document "Proponent's Guide to Wind Power Projects: Guide for Preparing an Environmental Assessment Registration Document", as well as accepted best practices for conducting environmental assessments. Under the criteria listed in the Guide, the Project has been designated as "Small" with a potential site sensitivity of "Very High", due to the confirmed presence of bird species with provincial rankings of "endangered" (red). Although the Project involves only three turbines, the site sensitivity determination, under the Guide, categorizes this Project as a Category.

A number of environmental components were evaluated for this assessment. Based on field data and associated research, mitigation strategies and best management practices were identified to avoid or mitigate potential effects of the Project for the majority of the components. Following the preliminary assessment, the valued components identified for further assessment were: avifauna, bats, and species of conservation concern. The effects assessment determined that residual effects are not expected to be significant. Cumulative effects were also considered to be not significant.

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APPENDICES

1.0 PROJECT INFORMATION

This section of the Environmental Assessment (EA) report provides a summary of the Project, description of the proponent, and regulatory requirements. The structure of the overall document and the investigators and authors involved are also provided.

1.1 Project Summary

Table 1.1: Project Summary

General Project Information	Scotian WIndFields Inc., Scotian Wind Inc., and WEB Wind Energy North America Inc. intend to construct and operate a 6 MW wind project (the Project) at a site in the community of Three Mile Plains, Nova Scotia.
Project Name	Martock Ridge Community Wind Project
Proponent Name	Scotian WindFields Inc., Scotian Wind Inc. and WEB Wind Energy North America Inc.
Proponent Contact Information	Scotian WindFields Inc. and Scotian Wind Inc. Dan Roscoe 108F Trider Crescent Dartmouth, NS B3B 1R6 Phone: 902.468.3132 Fax: 902.468.3002 Email: droscoe@scotianwindfields.ca WEB Wind Energy North America Inc Detlef Krollpfeiffer 480 University Ave, Suite 1500 Toronto, ON M5G 1V2 Phone: 647.367.0930 Email: dk@webwindenergy.com
Project Location	• The Project site is located in the community of Three Mile Plains, approximately 7 km southeast of Windsor, Nova Scotia in West Hants County. • The approximate center of the Project site is located at 44°55'41.03"N, 64° 6'50.81"W. • Project lands include Property Identification Numbers (PIDs) 45337284, 45337276, and 45002482 (119 ha)
Landowner(s)	Town of Windsor
Closest distance from a turbine to a permanent residence	>2 km
Expected rated capacity of proposed project in MW	6 MW

1.2 Proponent Description

Scotian WindFields Inc. (SWFI) is a Nova Scotia based, owned and operated company whose primary mandate is to develop investment opportunities in renewable energy from funds raised

within Nova Scotia. Approximately 36% of the shares in SWFI are held by community Wind Fields, community-owned investment funds covering the entire geographical region of the province. These Community Economic Development Investment Funds (CEDIF) provide the opportunity for Nova Scotia citizens to invest in and provide renewable energy to the province.

WEB Wind Energy North America Inc. (WEB N.A.) is a wholly owned subsidiary of WEB Windenergie AG (WEB AG). WEB AG is a publicly traded Austrian-based renewable energy company with experience in complete life cycle wind energy development and operation. The companyhas been involved in planning, developing, financing, constructing and operating renewable energy projects in Austria, Germany, France, Italy, Czech Republic and Canada. WEB AG operates, and has 100% ownership, of over 153 wind energy plants, some of which have been in operation for 17 years. Comprising a total capacity of more than 260 MW, WEB AG is seeking to grow its core business within Europe and North America. WEB AG adds significant value to the Project team through their exceptional experience in the wind energy industry, as well as their financial capabilities with their group of more than 3,300 shareholders and access to financing.

Scotian Wind Inc. (SWI) was formed to be the Community Feed-In Tarrif (COMFIT) eligible entity, to raise local investment in community-based wind energy projects, and to assist in the community engagement part of the development process. SWI will obtain CEDIF status as part of this process. SWI is currently owned by a broadly distributed group of locally based shareholders, which includes four other CEDIF entities.

1.3 Regulatory Framework

1.3.1 Federal

A federal EA is not anticipated to be required for the Project as it is not located on federal land or listed as a physical activity that constitutes a "designated project" as listed under the *Regulations Designating Physical Activities* of the *Canadian Environmental Assessment Act (CEAA),* 2012.

1.3.2 Provincial

The Project is subject to a Class I EA as defined by the Environmental Assessment Regulations under the *Nova Scotia Environment Act (NSEA)*. As such, the proponents are required to register the Project with Nova Scotia Environment (NSE) and subsequently comply with the Class I registration process as defined by the Proponent’s Guide to Environmental Assessment (NSE 2009a).

The use of provincial roads during the construction, operation, and decommissioning phases of the Project will be in compliance with the Nova Scotia Temporary Workplace Traffic Control Manual (2009).

Additional provincial permits will be required as outlined in Section 16.

1.3.3 Municipal

Land use by-laws exist in the Municipality of the District of West Hants, which require approval for wind power projects. Approval for 'Large Wind Turbines' (>100 kW production capacity) is only considered by development agreement (Municipality of the District of West Hants 2012).

All required municipal permits and approvals will be obtained prior to construction.

1.4 Structure of Document

Table 1.2 outlines the content of each section of the EA report.

Table 1.2: EA Report Structure

Section	Content
Section 2	Project Description including an overview of Project location, activities and schedule.
Section 3	General Environmental Mitigation/Best Practices.
Section 4	Environmental Management.
Section 5	Project Schedule.
Section 6	Project Scope.
Section 7	EA Methodology.
Section 8	Biophysical Environment.
Section 9	Socio-Economic Environment.
Section 10	Cultural and Heritage Resources.
Section 11	Mi'kmaq Ecological Knowledge Study.
Section 12	Consultation and Engagement.
Section 13	Effects Assessment.
Section 14	Effects of the Environment on the Project.
Section 15	Cumulative Effects Assessment
Section 16	Other approvals.
Section 17	Conclusions.

1.5 Author of the EA

This EA was completed by Strum Environmental, an independent, multi-disciplinary team of consultants with extensive experience in undertaking EAs across Atlantic Canada and internationally. This report was prepared and reviewed by:

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2.0 PROJECT DESCRIPTION

2.1 Turbine Specifications

The Project will be powered by three wind turbines, each rated at 2.0 MW, for a nominal capacity of 6.0 MW in total. Under normal conditions the turbines will operate 24 hours per day, 7 days per week. The Vestas V100 has been selected as the turbine model for the Project. Specifications are provided in Table 2.1.

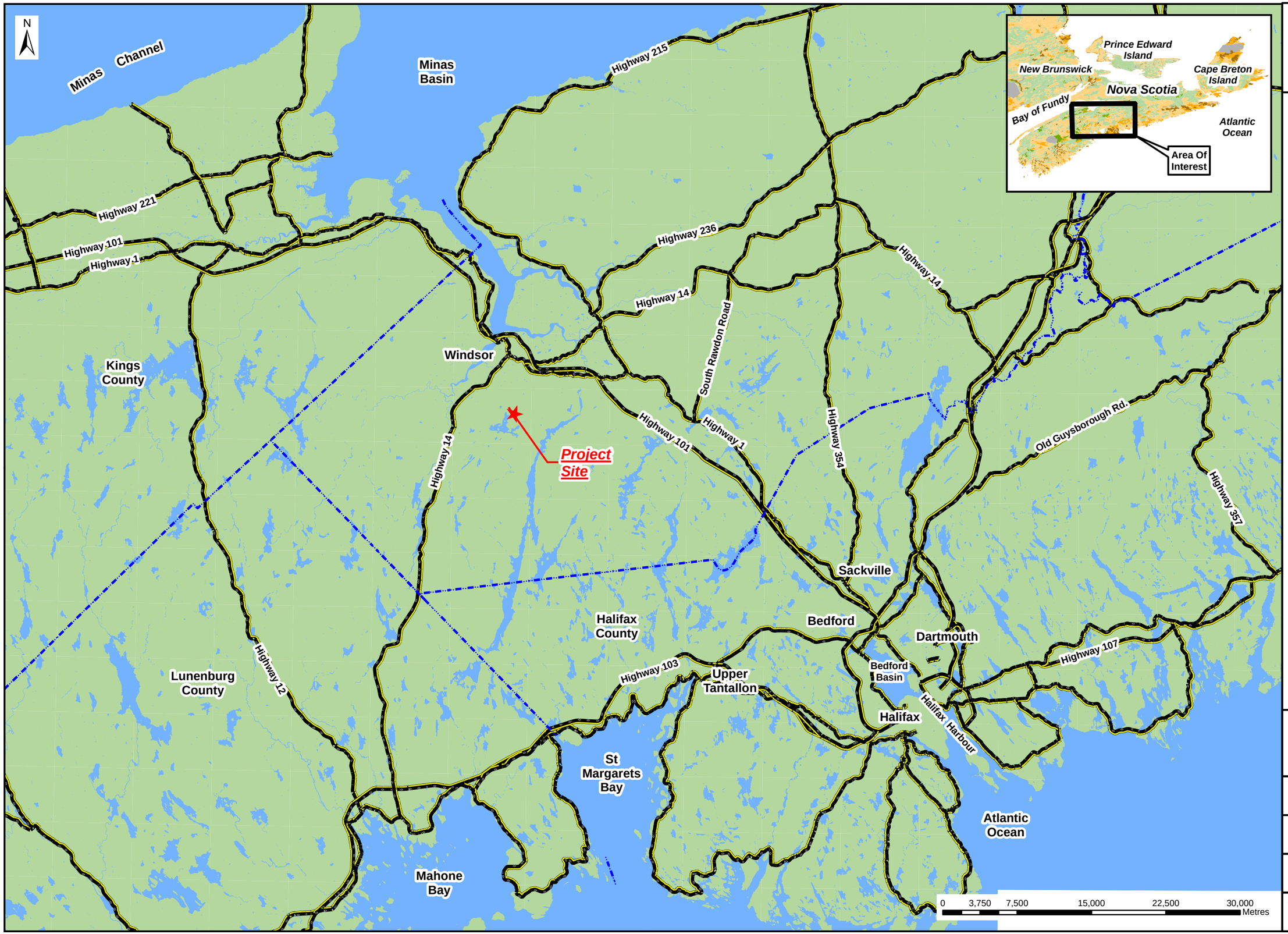
Drawings 2.1 and 2.2 show the site location and site layout, respectively.

Table 2.1: Turbine Technical Specifications Vestas V100

Turbine Component	Specifications
Rated capacity	2 MW
Cut – in wind speed	3.0 m/s
Cut – out wind speed	20.0 m/s
Rated wind speed	12.5 m/s
Number of blades	3
Diameter	100.0 m
Swept area	7,850 m2
Rotor speed (variable)	8.8 – 14.9 rpm
Tower (hub) height	100 m
Generator	Synchronous, permanent magnet, liquid-cooled
Yaw system	6 electric gear motor(s)
Control system	Vestas

2.2 Project Phases

The proposed Project will include three phases: site preparation and construction; operations and maintenance; and decommissioning. Activities and requirements associated with each phase are discussed in the following sections. Standard environmental mitigations that have been incorporated into Project design are presented in Section 3.0.



Notes:

1. Reference: Digital Topographic Mapping By Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.

Legend:

- County Boundary
- Major Roads and Highways

Site Location

Strum ENVIRONMENTAL

Date: August 2012	Project #: 12-4402
Scale: 1:350,000	Drawing #: **2.1**
Drawn By: H. Serhan	
Checked By: M. Henley	

N

Highway 1

Alexander Dr

Denise Dr

Mountain Rd

Highway 14

Juniper Dr

Windsor Back Rd

Ashland Rd

Pantuke

Miller Lakes

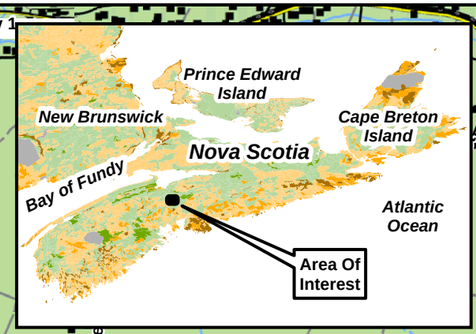
Mill Lakes

Fall Brook

T1

T2

T3



0 150 300 600 900 1,200 1,500 Metres

Notes:

1. Reference: Digital Topographic Mapping By Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.

Legend:

- Proposed Turbine
- Proposed Road
- Project Site Boundary
- Building
- Major Roads and Highways
- Roads
- Access Roads / Trails
- Mapped Stream
- Indefinite Stream
- Water Bodies
- Mapped Wet Area
- Cleared Area
- Large Structure

Turbine and Road Layout

Strum ENVIRONMENTAL

Date: January 2013	Project #: 12-4402
Scale: 1:20,000	Drawing #: **2.2**
Drawn By: H. Serhan	
Checked By: A. Walter	

2.2.1 Site Preparation and Construction

Services required prior to and during construction include, but are not limited to:

- Staging and storage facilities;
- Temporary offices;
- Laydown areas for construction and maintenance equipment;
- Temporary sanitary facilities;
- Water and rinsing facilities;
- Utilities and communications; and
- Garbage collection and off-site disposal.

Site preparation activities include:

- Land surveys for placement of roads, turbines, and associated works;
- Geotechnical investigations;
- Placement of erosion and sedimentation control measures; and
- Clearing of trees and grubbing areas for construction.

General construction activities include:

- Access road upgrading and construction;
- Laydown area and turbine pad construction;
- Turbine assembly;
- Grid connection;
- Removal of temporary works and site restoration; and
- Commissioning.

Weather constraints may affect the proposed schedule and weather dependent activities (e.g. turbine delivery construction) which have been scheduled to occur during optimal time frames to minimize delay. For example, the delivery of the turbine pieces will occur outside of the spring weight restrictions, which are pursuant to Subsection 20(1) of Chapter 371 of the Revised Status of Nova Scotia, *The Public Highways Act (*NSTIR 1989*).*

Equipment needs will likely include:

- Light trucks;
- Drilling rigs;
- Backhoes; and
- Bunch feller (and similar harvesting equipment).

Access Roads Upgrading and Construction

Existing roads within the Windsor Water Treatment facility will be used as starting points, where possible, for site access. These roads will be upgraded to a standard carriageway width of 6 m; plus shoulders sloped at a ratio of 2:1. There will be areas where the road width could increase to 8 to 10 m to allow multidirectional traffic flow. The existing access road for the Windsor Water Treatment

Plant is approximately 2.0 km in length and will require minimal upgrades. There are approximately 3.5 km of proposed roads required to access the turbine locations.

During the construction phase, the Project roads will be maintained with additional stone or periodic grading. Any material removed for road construction will be stored or disposed of in accordance with regulations and best practices for road construction. Any material stored on-site will be accompanied with appropriate erosion and sedimentation control measures, or re-used.

The following equipment is typically used during road upgrading and construction:

- Excavators;
- Dump trucks;
- Bull dozers;
- Rollers;
- Graders;
- Crusher; and
- Light trucks.

Laydown Area and Turbine Pad Construction
General activities during the creation of the laydown and turbine pad construction areas may include:

- Installation of erosion and sedimentation control measures;
- Removal of vegetation;
- Removal of overburden and soils;
- Blasting/chipping of bedrock (to be determined);
- Pouring and curing of concrete pads (complete with reinforcing steel);
- Placement of competent soils to bring area to grade;
- Compaction of soils; and
- Excavation for electrical conduits and fibre optic communication trenches.

The tower foundations will be approximately 15 m diameter (typical for a 2 MW wind turbine) and extend to a depth of 3 m below grade.

Each turbine pad and laydown area is expected to be approximately 90 m x 90 m. The exact arrangement of each turbine pad and crane pad will be designed to suit the specific requirements of the turbine and the surrounding topography during the detailed design process.

The construction of a typical turbine pad (from clearing to final preparation for erecting of the turbine) can take between 1 to 4 months, depending on weather, soil, and construction vehicle access.

The following equipment may be used for the laydown area and turbine pad construction:

- Excavators;
- Dump trucks;
- Bull dozers;

- Rollers;
- Graders;
- Crusher (not required if a local quarry can supply gravel sizes);
- Concrete trucks;
- Light cranes; and
- Light trucks.

Turbine Assembly
The wind turbine assembly includes tower sections, the nacelle, the hub, and three-blade rotors (a total of eight major components). All sections will be delivered by several flatbed trucks and the pieces will require a crane for removal from the vehicle at each of the prepared turbine pads.

The tower sections will be erected in sequence on the turbine foundation, followed by the nacelle, hub, and rotors (rotors are usually attached to the hub on the ground prior to lifting). This assembly will occur with the use of cranes. Erection will depend on weather, specifically wind and lightening conditions. Typical assembly duration should be between 2 to 5 days.

The following equipment is expected to be used for turbine assembly:

- Main crane unit (up to 400' high in some cases);
- Assembly cranes; and
- Manufacturer's support vehicles.

Grid Connection
Electricity produced from the turbine will be stepped up to 34.5 kV via a pad mounted transformer, located adjacent to each turbine. A line extension from each turbine will extend the circuit to the Windsor Water Treatment Plant.

The following equipment is expected to be used during the grid connection process:

- Excavator and/or back hoe;
- Bucket trucks;
- Light cranes; and
- Light trucks.

Removal of Temporary Works and Site Restoration
Once construction has been completed, all temporary works will be removed and the site will be appropriately graded.

The following equipment is expected to be used this process:

- Excavator and/or back hoe;
- Grader;
- Hydroseeder; and
- Light trucks.

Commissioning
The turbines will undergo a series of tests for mechanical, electrical, and controls prior to unit start-up sequence. Once the start-up sequence has been initiated, another series of performance checks for safety systems will be completed. When the turbines have cleared all tests, the commissioning of the units can begin.

Commissioning will require coordination with NS Power as electrical energy will need to be managed both within the substations and on the transmission line. These performance tests will be completed by qualified wind power technicians and electrical utility employees.

Additional testing may also be required for transformers, power lines, and substation components, all of which will be performed by qualified engineers and technical personnel.

2.2.2 Operations and Maintenance
Maintenance generally conforms to manufacturer equipment specifications, industry best management practices, and standard operating procedures.

The life span of the Project is estimated to be a minimum of 20 years. During this time, roads will be used to access the turbines by staff and maintenance personnel. The roads will be maintained with additional gravel and grading, as required. During the winter months, all roads will be plowed, sanded, and/or salted, as required for safe driving and to ensure access in the event of an emergency.

A vegetation management plan will be initiated to ensure that access roads and turbine locations remain clear of vegetation. Vegetation management will include removal and pruning. Timing of vegetation management will depend on site specific conditions.

Due to the potential for public access to the wind farm, signage will be affixed and maintained on all access roads to provide essential safety information such as emergency contacts and telephone numbers, speed limits, and the hazards associated with being within close proximity to the turbines (i.e. ice throw). These signs will be maintained during the life of the Project.

Scheduled maintenance work will be carried out on a periodic basis. Maintenance work may require the use of a variety of cranes for brief periods of time for replacement of blades or other turbine components. The most common vehicle during maintenance work will be light/medium pickup trucks.

2.2.3 Decommissioning
As noted above, the operational life of the Project is estimated to be 20 years. Prior to year 20, NSE will be either provided with decommissioning plans or a copy of the new power purchase agreement.

Generally, the decommissioning phase will follow the same steps as the construction phase:

- Dismantling and removal of the turbines from the Project site.

- Removal of the turbine foundations to below grade and reinstatement with top soil to ensure stabilization of the land.
- Removal of all on-site roads. Once removal is complete, all lands will be reinstated and stabilized.
- Removal, recycling (where possible), and disposal of collection system, conductor, and poles.
- Removal of all other equipment and reinstatement and stabilization of land.

3.0 GENERAL ENVIRONMENTAL MITIGATION/BEST PRACTICES

The following general environmental mitigation is considered to be standard practice and will be implemented as part of the Project design. Specific mitigation, monitoring, and follow-up that may be required to address residual environmental effects are discussed in Section 13.

3.1 Clearing and Grubbing

- Environmentally sensitive features will be identified and clearly marked where feasible (e.g., watercourses, wetlands, areas of high archaeological potential).
- All watercourses will be kept free of chips and debris resulting from clearing activities.
- Appropriate erosion and sedimentation controls will be implemented to stabilize the slopes/banks on either side of watercourses and prevent sediment run-off.

3.2 Blasting (if necessary)

- Blasting will be conducted in accordance with provincial legislation and subject to terms and conditions of applicable permits.
- All blasts are to be conducted and monitored by certified professionals.
- Once the location of any required blasting is confirmed and the geotechnical investigation is completed, the need to implement mitigation measures or monitoring programs will be evaluated, with specific consideration for the protection of the Mill Lakes Protected Water Area.
- If required, all protective measures will be outlined in the Environmental Protection Plan (EPP) and approved by NSE in advance of blasting activities.
- Landowners will be notified of any blasting activities
- Where blasting is planned within 500 m of residences, activities will comply with the requirements of any applicable existing by-laws.
- Following any blasting or disturbance of soils or bedrock, exposed soils or bedrock will be recovered with soil and re-vegetated as required to minimize any exposure.
- Blasting near watercourses will only occur in consultation with Fisheries and Oceans Canada (DFO), and will follow the requirements of the *Fisheries Act* as well as the requirement of the DFO Factsheet: Blasting – Fish and Fish Habitat Protection (DFO 2010); and/or the DFO Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky 1998) as applicable.
- If sulphide bearing materials are identified through pre-construction geotechnical surveys, these areas will be referenced in the EPP.
- Rock removal in known areas of elevated potential will conform to relevant legislation (e.g., the Sulphide Bearing Material Disposal Regulation of the *NSEA*), and in consultation with relevant regulatory departments.

3.3 Avifauna

- Tree clearing activities will be executed in a manner that complies with the *Migratory Bird Convention Act* (*MBCA*) and the *Species at Risk Act* (*SARA*), specifically to avoid incidental take. Primary mitigation will be through Project planning and scheduling of clearing activities, on a best-efforts basis, to avoid key migratory bird nesting periods

3.4 Dust and Noise

- Where required, dust will be controlled by using water or a suitable, approved dust suppressant.
- Construction equipment will be maintained in good working order and properly muffled.
- Noise control measures (e.g., sound barriers, shrouds, enclosures) will be used where warranted.
- Noise-generating construction activities will comply with the requirements of existing by-laws (where applicable).
- Engine idling will be restricted.

3.4 Erosion and Sedimentation Control

Contractors will use the erosion and sedimentation control measures listed below at all sites where soil or sub-soil has been exposed and there is potential for erosion:

- A site specific erosion and sedimentation control plan will be developed during the design phase of the Project.
- The area of exposed soil will be limited, and the length of time soil is exposed without mitigation (e.g., mulching, seeding, rock cover) will be minimized through scheduled work progression.
- Both temporary and permanent control measures for erosion and sedimentation will be implemented in an appropriate time frame.
- Erosion and sedimentation control structures will be maintained and inspected regularly with particular emphasis before and after forecasted heavy rain events, and with consideration of the timing and types of activities involved.
- Existing roads and access routes will be used to the extent feasible.
- With the exception of temporary water crossing locations, travel through wetlands and within watercourse buffers with machinery will be avoided, when feasible. If travel through a wetland is required, the appropriate mitigation measures will be employed, (e.g., geotextile matting, work timed to occur during frozen ground conditions, and travel routed through drier portions of the wetland).
- Care will be taken to ensure that the potential for surface run-off containing suspended materials or other harmful substances is minimized.
- Where necessary, erosion and sedimentation control measures will remain in place after work is completed, areas have stabilized, and natural re-vegetation occurs. All temporary erosion and sedimentation control materials will eventually be removed from the construction site.
- Permits/approvals related to site construction will be kept on-site.

3.5 Watercourse Crossings

- Any watercourse crossings required will comply with existing regulatory requirements.
- Crossing of watercourses will not result in permanent diversion, restriction, or blockage of natural flow.
- Crossings will be restricted to a single location on a watercourse and occur at right angles to the watercourse or wetland. Crossings should be located in areas which exhibit a stable soil type and where grades approaching the crossings will not be too steep.
- The approaches to watercourse crossings will be stabilized with brush mats, where necessary. Stream banks prone to erosion may require additional stabilization. Material used to stabilize/repair stream banks will be clean, non-erodible, and will not come from the stream bank or bed.
- Any wash water from the cleaning of construction vehicles will be disposed of on-site, using standard industry practices and following environmental regulations/guidelines for the protection of watercourses.

3.6 Mill Lakes Protected Water Area

- The development and implementation of a site specific EPP and erosion and sediment control plan will mitigate risks to surface water quality.
- Once the location of any required blasting is confirmed and the geotechnical investigation is completed, the need to implement mitigation measures or monitoring programs will be evaluated, with specific consideration for the protection of the Mill Lakes Protected Water Area.

3.7 Wetlands

- Wetlands will be avoided to the extent possible. Where unavoidable, wetland crossings/alteration will be completed in accordance with the *Nova Scotia Wetland Conservation Policy* and the wetland alteration application process during the permitting stage of the Project.
- Run-off from construction activities will be directed away from wetlands.
- Crossing of wetlands will not result in permanent diversion, restriction, or blockage of natural flow.
- Hydrologic function of wetlands will be maintained.
- Any wash water from the cleaning of construction vehicles will be disposed of on-site, using standard industry practices and following environmental regulations/guidelines for the protection of wetlands.
- Work vehicles and/or heavy equipment will be cleaned and inspected prior to use to prevent the introduction of weed/invasive/non-native species to sensitive habitats such as wetlands.

3.8 Dangerous Goods Management

- All fuels and lubricants used during construction will be stored according to containment methods in designated areas, located a minimum 30 m from surface waters, wetlands, and private wells.
- Where possible, refueling in the field will not occur within 30 m of watercourses and water bodies.

- Storage of all hazardous materials will comply with Workplace Hazardous Materials Information System (WHMIS) requirements. Appropriate material safety data sheets (MSDS) will be located at the storage site.
- Transportation of dangerous goods will comply with Transport Canada's *Transportation of Dangerous Goods Act*.
- Equipment will be kept in good working order, will be inspected regularly, and any observed leaks will be repaired.

3.9 Waste

- Solid wastes, including waste construction material, will be disposed of in approved facilities.
- Temporary storage of waste materials on-site will be located at least 30 m from known watercourses, wetlands, and water bodies.
- Waste materials will be removed from the site by a qualified waste hauler and disposed/recycled in accordance to provincial waste regulations. All applicable materials will be stored as per WHMIS requirements and transported as per the *Transportation of Dangerous Goods Act* requirements.

3.10 Excavation and Site Reinstatement

- All soils removed during the excavation phase will be stored according to provincial regulations and best practice guidelines.
- Any soil needed for backfilling, after foundations have been poured, will be stored temporarily adjacent to the excavations until needed. Any remaining excavated material will be used on-site or removed and sent to an approved facility.
- Prior to excavation activities, erosion and sedimentation control measures will be deployed and assessed on a regular basis.
- Once backfilled material has stabilized, temporary erosion and sedimentation controls will be removed. Attention will be paid during site reinstatement to ensure areas will promote wildlife return to the area, to the extent possible.

4.0 ENVIRONMENTAL MANAGEMENT

4.1 Environmental Protection Program

An EPP will be developed following approval of the Project. The EPP will be approved by NSE prior to start of construction of the Project and will detail best practices and mitigative measures to be employed during construction to minimize potential environmental impacts. The EPP document is the primary mechanism for ensuring that mitigation is implemented, as determined through the EA process, to avoid or mitigate potential adverse environmental effects that might otherwise occur from construction activities, and as required by applicable agencies through permitting processes.

The EPP is a plan for all Project personnel, including contractors, and describes the responsibilities, expectations, and methods for environmental protection associated with Project activities. The EPP will incorporate:

- means to comply with requirements of relevant legislation;
- environmental protection measures identified as part of the EA; and
- environmental commitments made as part of the EA.

A suggested Table of Contents for the EPP is provided in Appendix A.

5.0 PROJECT SCHEDULE

Table 5.1 presents the Project schedule from EA approval to Project decommissioning.

Table 5.1: Project Schedule

Project Activity	Timeline
EA Approval	March 2013
Follow-up Environmental Studies	2013/2014
Geotechnical Assessment	Winter 2013
Engineering Design	Winter-Spring 2013
Power Purchase Agreement	Winter 2013
Clearing	Winter 2013
Construction	Spring/Summer 2013
Commissioning	Fall 2013
Operations	Fall/Winter 2013
Decommissioning	TBD

6.0 PROJECT SCOPE

As a Class 1 EA, this registration document and supporting studies have been developed to meet all requirements under Section 9(1A) of the *NSEA.*

In addition, the document has been prepared using the following provincial guidelines:

- "A Proponent's Guide to Wind Power Projects: Guide for preparing an Environmental Assessment" (NSE 2012a); and
- "A Proponent's Guide to Environmental Assessment", published by the Environmental Assessment Branch of NSE and revised in 2009 (NSE 2009a).

The following regulatory bodies have been contacted by the Project team to provide input into the Project planning process and advice regarding the EA scope:

- Canadian Wildlife Service (CWS);
- Nova Scotia Department of Communities, Culture and Heritage;
- NSE; and
- Nova Scotia Department of Natural Resources (NSDNR).

During the EA review process, additional consultation may be required with these and other agencies.

6.1 Site Sensitivity

Potential wind farms are assigned a category level, according to a matrix provided in the Proponent's Guide to Wind Power Projects (NSE 2012a). This matrix considers the overall Project size and the sensitivity of the Project site to determine the category level. The category level then outlines guidance with respect to the collection of baseline data for the EA, as well as post-construction monitoring requirements.

As the Project consists of three turbines, it is considered a small project. Based on the known existence of two bird species ranked 'red' by NSDNR; and the presence of a bat hibernacula less than 25 km from the Project site, the Project is classified as having a 'Very High' potential sensitivity. As such, the Project is determined to be a Category 4.

6.2 Assessment Scope

EA is a planning tool used to predict the environmental effects of a proposed project, identify measures to mitigate adverse environmental effects, and predict whether there will be significant adverse environmental effect after mitigation is implemented.

The EA focuses on specific environmental components called valued environmental components (VECs). VECs are specific components of the biophysical and human environments that, if altered by the Project, may be of concern to regulatory agencies, Aboriginals, stakeholders, resource managers, scientists, and/or the general public. VECs incorporate biological systems as well as human, social, and economic conditions that are affected by changes in the biological environment. As such, VECs can relate to ecological, social, cultural, or economic systems that comprise the environment as a whole.

The scope of the assessment for this Project includes: selection of VECs (preliminary and final); identification of environmental effects; and identification of the standards or thresholds that are used to determine the significance of residual environmental effects. This scoping relies upon direction from regulatory authorities; consideration of input from stakeholders; and the professional judgment of the study team.

6.3 Spatial and Temporal Boundaries of the Assessment

For this Project, unless otherwise identified, the assessment of effects was undertaken for the area identified as the Project site (Drawing 2.1). For the purpose of data collection and the socio-economic environment, the Municipality of the District of West Hants was considered. In addition, residences located within a 2 km buffer of the Project site were assessed as potential receptors for the purposes of evaluating potential impacts from sound.

The temporal scope of this assessment covers the construction, operation, and decommissioning phases of the Project, and associated activities, as described in Sections 2.2.1, 2.2.2, and 2.2.3. Accidents, malfunctions, and unplanned events are addressed separately.

7.0 EA METHODOLOGY

The methodological framework used in this EA has been developed to meet the requirements of the *NSEA*. This framework is based on a structured approach that:

- focuses on issues of greatest concern;
- considers Aboriginal concerns as well as concerns raised by the public and other stakeholders; and
- integrates Project design into mitigative measures.

The methodology provides an overview of the baseline conditions and an assessment of any VEC that reflects key issues of concern. Within the specified spatial and temporal boundaries, the potential for interaction between individual environmental components and Project activities are determined. Where there is potential for Project-related environmental effects, each effect is assessed using the results of preliminary investigations, guidance from regulators, and the collective knowledge and expertise of the Project team. The residual Project-related environmental effects, (i.e., after mitigation has been applied), are characterized using specific criteria (direction, magnitude, geographic extent, duration, frequency, and reversibility) that are applied to each VEC. The significance of these residual effects is then determined based on pre-defined and VEC-specific thresholds.

Project-related environmental effects are assessed and include potential interactions; mitigation and environmental protection measures proposed to reduce or eliminate adverse environmental effects; and the characterization of the residual environmental effects of the Project. The ultimate focus of the assessment is on residual environmental effects that remain after planned mitigation has been applied.

7.1 Preliminary VEC Selection

A preliminary assessment of potential interactions for the Project was undertaken and is summarized in Table 7.1. For some of the identified components, additional information has been provided in the report. Many of the interactions can be addressed using industry best management practices to mitigate potential effects. Where environmental best practices are considered to be insufficient to fully mitigate potential effects, or where additional information is required, these interactions are identified as final VECs and subject to further assessment. Specific environmental requirements and mitigation practices are identified in this additional assessment and will be refined in subsequent environmental regulatory permitting processes.

Table 7.1: VEC Selection Table

Environmental Component	Description	VEC Assessed further?	Applicable Section in the Report
Atmospheric Environment	Atmospheric environment includes consideration of air quality and climate conditions. Concerns include: - A minimal amount of dust may be generated by Project construction activities. Dust control will be employed as necessary (Section 3). - There is expected to be a minor interaction with air quality due to exhaust emissions, including greenhouse gas emissions from Project equipment and vehicles during construction. Air emissions will be mitigated as described in Section 3. - Construction activities will result in localized and temporary noise emissions. Mitigation for noise is described in Section 3. Given that Project-related air emissions are anticipated to be temporary, localized, and minor in nature, they are considered unlikely to result in a measurable change in ambient air quality.	No	Section 8.1
Geophysical Environment	Geophysical components include consideration of hydrogeology, groundwater, and bedrock and surficial geology. Concerns include: - Damage to domestic water sources. - Localized disturbances to surface soils and shallow bedrock. - Presence of radon gas. No domestic wells occur within 1 km of the Project therefore blasting activities (if completed) are not expected to impact private water supplies. On-site bedrock is unlikely to contain sulphide bearing minerals, hence reducing potential for acid rock drainage (ARD) impacts. As a proactive measure, any structures placed at the Project site can be provided with venting if radon is suspected. Further mitigation for disturbance or exposure of this rock type (i.e. from blasting) will be outlined in the EPP. Given that Project-related effects on the geophysical environment are anticipated to be temporary, localized, and minor in nature, they are considered unlikely to result in measurable changes.	No	Section 8.2

Environmental Component	Description	VEC Assessed further?	Applicable Section in the Report
Freshwater Environment	Freshwater environments involve consideration of fish and fish habitat and the Mill Lakes Protected Water Area, which may be impacted by watercourse crossings, erosion and sedimentation, in-stream work, etc. It is expected that a small number of watercourse crossings will be required (refer to Section 8.3.3). The access plan is based on the optimum use of existing roads, and will also identify locations for crossing watercourses. No in-stream work is required. All construction activities near watercourses will comply with the applicable regulations and guidelines. Additional mitigation is described in Section 3. Additional protection for freshwater environments includes: - Where possible, refuelling in the field will not occur within 30 m of watercourses/waterbody. - Temporary storage of waste materials on-site will be located 30 m from watercourses/waterbody. - The implementation of a site specific erosion and sediment control plan, which will be developed with specific consideration for the Mill Lakes Protected Water Area. Given that Project-related effects on the freshwater environment are anticipated to be temporary, localized, and minor in nature, they are considered unlikely to result in measurable changes.	No	Section 8.3
Terrestrial Habitat (including wetlands)	Concerns related to terrestrial habitat include habitat fragmentation, introduction of invasive species, damage to wetland ecosystems, etc. - Habitat fragmentation is considered to be minimal due to utilization of existing access roads and the small-scale clearing required. - Introduction of invasive species will be controlled during construction (refer to Section 3) and monitored via vegetation management plan. Wetland habitats are an important feature of the landscape. In Nova Scotia, if wetland alteration	No	Section 8.4

Environmental Component	Description	VEC Assessed further?	Applicable Section in the Report
	cannot be avoided approval must be sought under the *NSEA*. The Nova Scotia Wetland Conservation Policy (NSE 2011a) aims for a no net loss of wetland area and function. If wetland disturbance cannot be avoided, it will be undertaken under the relevant provincial requirements. Accordingly, if wetlands are permanently altered, compensation measures will be required. Avoidance of wetland habitat has been taken into consideration in Project planning and design including access roads and placement of turbines. Additional mitigative measures (refer to Section 3) will protect wetland habitat. Micro-siting of the final Project layout will be completed prior to construction to confirm wetland boundaries. Given that Project-related effects on the terrestrial environment are anticipated to be temporary, localized, and minor in nature, they are considered unlikely to result in measurable changes.		
Flora and Fauna	Concerns related to general flora and fauna include: - Introduction of invasive vegetative species - Mortality of some smaller faunal species and due to clearing activities. - Loss of vegetation and effects to fauna and flora species due to herbicide application (vegetation management) General mitigation will include: - Environmental protection practices will be incorporated into clearing and grubbing activities (Section 3). - Work vehicles and/or heavy equipment will be cleaned and inspected prior to use to prevent the introduction of weed/invasive/non-native species. - Herbicides will not be used. - Where feasible, vegetation management activities will take place outside of the identified bird breeding season (May-August). - Work near wetlands and watercourses will adhere to the conditions of relevant permits. Loss of flora and fauna species is considered	No	Section 8.5 and 8.6

Environmental Component	Description	VEC Assessed further?	Applicable Section in the Report
	minimal due to the utilization of existing access roads, small scale clearing requirements, and attention to seasonal mitigation. *SOCI, avifauna, bats are considered below separately.*		
Species of Conservation Interest (SOCI)	SOCI are those species defined as being at risk to some degree under *SARA* or the *Nova Scotia Endangered Species Act* (*NSESA*). Selection of the SOCI to be considered in the assessment was determined based on a review of existing information and field surveys. Due to special status under federal and provincial federal legislation, SOCI were identified as a potential issue through field studies and desktop reviews. Six SOCI have potential to exist at the Project site. Project interactions with SOCI may include direct and indirect adverse environmental effects on habitat (loss or alteration) and direct mortality of individuals.	Yes	Sections 8.6 and 13.2.1
Avifauna	Due to the potential effects of wind turbines on avifauna, this component is considered for further assessment. The effects of wind turbines on avifauna are variable and depend on factors such as the development design, topography of the area, habitats affected, and the bird community in the wind farm area. Potential effects include: - mortality resulting from direct collision; - habitat alteration; and - sensory disturbance. The requirements as set out in the *MBCA* will be adhered to for clearing activities (Section 3).	Yes	Sections 8.7 and 13.3.2
Bats	Due to the potential effects of wind turbines on bat populations, this component is considered for further assessment. The installation of wind turbines has the potential to impact bats both directly and indirectly. Impacts include: - mortality resulting from direct collision and/or barotrauma; - habitat alteration; and - sensory disturbance.	Yes	Sections 8.8 and 13.2.3

Environmental Component	Description	VEC Assessed further?	Applicable Section in the Report
	The significance of these impacts at the population level depends on a number of biotic and abiotic variables, including the number of individuals affected and the stability of the population, season, physiologic condition of the individuals affected, and weather factors.		
Local Economy/ Recreation and Tourism	The socio-economic aspects such as economy, land use/value, and recreation and tourism will be affected by the Project. The Project will likely create more local jobs and increase municipal tax revenues thereby resulting in a positive change for economy. Impacts to land use are not expected in the area since the Project is located away from other economic activities. Since wind turbines are located at least 2 km away from residential development, land values are unlikely to be impacted. The Project site is owned by the Town of Windsor. The area is primarily for source water protection and as such access is restricted at the Windsor Water Treatment Plant for both tourism and recreation. Fencing around the immediate area of individual turbines will be in compliance with West Hants Wind Turbine Regulations (Municipality of the District of West Hants 2012). Effects on economy, land use/value, and recreation and tourism are expected to be positive in nature, or minor if experienced at all.	No	Section 9.1
Human Health	Human health aspects include shadow flicker, electromagnetic fields (EMF), electromagnetic interference (EMI), air quality, and risk of ice throw. - Shadow flicker effects are expected to be minimal since there are no permanent residential receptors within 2 km of a turbine. - No discernible evidence that there is health risks associated with EMF. - The EMI study completed for the Project indicates that consultation with relevant government agencies was completed, and no objections regarding EMI effects associated with the Project have been provided to date. - Air quality effects are expected to be minimal to none (refer also to Section 3.4). - Setbacks and safety awareness measures	No	Section 9.2

Environmental Component	Description	VEC Assessed further?	Applicable Section in the Report
	minimize any potential risk from ice throw (refer also to Section 9.2.5 regarding safety signage). Effects to human health are considered minimal or non-existent due to the size and location of the wind farm, air quality mitigation, and setback distances.		
Visual Landscape	Wind farms produce visual effects to the local landscape. - A Visual Impact Assessment study was completed for the Project. Results concluded that although the turbines will be visible from many areas, the set-back distances from residential homes result in minimal effects as the turbines do not dominate the landscape. Effects to the visual landscape are considered minimal to non-existent due to the size and location of the wind farm and setback distances.	No	Section 9.2.6
Sound	Sound is generated during all phases of the wind farm and could potentially induce annoyance and unpleasantness for local residents in close vicinity. - Construction and decommissioning phases are short-term. Effects are expected to be minimal for these phases of the Project. - Operational sound effects are long-term; however, there are no permanent residences within 2 km of the Project site. Effects to sound are considered minimal to non-existent due to the size and location of the wind farm and setback distances.	No	Sections 9.2.7
Transportation	A detailed transportation study will be completed by the turbine supplier as part of the design phase to determine appropriate routes and means for equipment and materials to be delivered to Project site.	No	Section 9.3
Cultural and Heritage Resources	- An Archeological Resource Impact Assessment indicated that no impacts to cultural and heritage resources are expected. Effects to cultural and heritage resources are considered non-existent. Procedures related to potential discovery of archaeological items or sites during construction will be described in the EPP.	No	Section 10

Environmental Component	Description	VEC Assessed further?	Applicable Section in the Report
Mi'kmaq Ecological Knowledge Study (MEKS)	- A MEKS has been commissioned for the Project and will be completed in 2013.	No	Section 11

Based on the VEC selection screening process summarized in Table 7.1, the final list of VECs addressed in this assessment is as follows:

- SOCI;
- Avifauna; and
- Bats.

8.0 BIOPHYSICAL ENVIRONMENT

8.1 Atmospheric Environment

8.1.1 Weather and Climate

Nova Scotia's climate is quite varied and is largely governed by coastal influences and elevation (Davis and Browne 1996). The Project site (centered at 44°55'41.03"N, 64° 6'50.81"W) borders the Eastern and Western Ecoregions of Nova Scotia (Neily *et al.* 2003). This region is protected from direct coastal influences by the North Mountain and is sheltered by two notable uplands bordering the area; the Rawdon Hills and Wittenburg Ridge. The climate consists of warm, early springs and warm, dry summers which, when combined with the coarse, shallow soils, creates periods in the growing season where moisture deficits can be significant (Neily *et al*. 2003). Temperatures are typically cool and moist in the winter. The typical growing season in the area of the Project site is 198 days (Webb and Marshall 1999).

Local temperature and precipitation data were obtained from the Martock meteorological station (44°56'00.000" N, 64°10'00.000" W) located approximately 3.4 km west of the Project site. For the period from 1971-2000, the mean annual temperature was 7.4°C, with a mean daily high of 12.3°C and a mean daily low of 2.4°C [Environment Canada (EC) 2011a]. January and February were the coldest months (-5.2°C and -4.4°C, respectively), during which mean annual snowfall was 234.6 cm, falling mostly in January and February (63.4 cm and 50.1 cm, respectively) (EC 2011a). The warmest months were July and August (19.8 °C and 19.3°C, respectively) (EC 2011a).Rainfall during this time was 1073.6 mm received mostly during October and November (108.5 mm and 127 mm, respectively) (EC 2011a).

An obvious consideration with regards to local climate, particularly in the context of wind power development, is wind speed and direction under typical and extreme conditions. Environment Canada measures wind conditions in Nova Scotia at those meteorological stations that are under long term observation. The closest such station to the Project site is the Halifax Stanfield International Airport meteorological station (44°53'00.000"N, 63°31'00.000"W) located 47.3 km east of the Project site. The Canadian Climate Normals (1971-2000) for this station indicate an annual

wind speed of 16.8 km/h, most commonly out of the south (EC 2011b). The maximum hourly wind speed for this station was 89 km/h, recorded on February 10, 1969, with the highest single wind gust measuring at 132 km/h on December 26, 1976 (EC 2011b). According to the NS Wind Atlas (NSDE 2012), average wind speeds at 30 m and 50 m above the ground at the Project site range from 16.2-21.6 km/h, and range from 19.8-23.4 km/h at 80 m above the ground.

8.1.2 Air Quality

Currently in Nova Scotia, 42% of total greenhouse gas (GHG) emissions come from electricity use and 89% of electricity comes from fossil fuels (NSDE 2009). Because of this heavy reliance on coal and other fossil fuels for electricity, every megawatt (MW) of wind power installed reduces GHG emissions by as much as 2,500 tonnes per year (NSDE 2011). By reducing Nova Scotia's reliance on fossil fuels, wind energy will therefore contribute to improving local air quality (NSDE 2011). Nova Scotia monitors air quality at six stations throughout the province. Measured parameters include ground-level ozone (O_3), particulate matter (PM2.5), and nitrogen dioxide (NO_2), and these values are used to calculate a score on the Air Quality Health Index (AQHI) (EC 2011c). The AQHI is a scale from 1-10+, in which scores represent the following health risk categories: Low (1-3), Moderate (4-6), High (7-10), and Very High (10+). The AQHI monitoring station closest to the Project site is located at Kentville, approximately 34 km northwest of the Project site. The AQHI at this site is usually low at all times of the year (EC 2011c).

8.2 Geophysical Environment

8.2.1 Physiography and Topography

The Project site lies within two Ecodistricts: the Rawdon/Wittenburg Hills Ecodistrict and the South Mountain Ecodistrict. The northern portion of the Project site lies within the two slate ridges of the Rawdon/Wittenburg Hills rising notably above the surrounding valleys of the Stewiacke, Musquodoboit, and Shubenacadie rivers in central Nova Scotia (Neily *et al*. 2003). The deeply dissected northeast trending ridges are comprised of folded Meguma Group slate. Sandy clay loams occupy the side slopes of these ridges, while well drained soils of loams derived from shales and slates occupy the ridge tops.

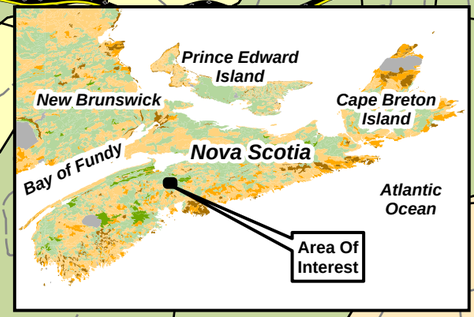
The southern half of the Project site is located within the South Mountain Ecodistrict which extends from the headwaters of the Tusket River to the Halifax peninsula. The ecodistrict is underlain by Devonian granite of the South Mountain Batholith where well drained, coarse sandy loams have developed (Neily *et al*. 2003).

The Project site is located on a broad hill, with elevations ranging from 145 m to 200 m. Elevations surrounding the site range from 125 m northeast of the site to 150 m to the southwest.

8.2.2 Surficial Geology

The surficial geology of the Project site is characterized as a stony till plain otherwise referred to as ground moraine (Drawing 8.1). The stony, sandy matrix material is derived from local bedrock sources. Till thickness ranges from 2 – 20 m, creating a flat to rolling topography (Stea *et al*. 1992). Near the southern extent of the Project site, towards Mills Lake, organic deposits of sphagnum moss, peat and clay form bogs, fen and swamps.

N



Miller Lakes

Mill Lakes

T1

T2

T3

0 150 300 600 900 1,200 Metres

Legend:

- Proposed Turbine
- Proposed Road
- Project Site Boundary
- Roads
- Access Roads / Trails
- Water Bodies

Surficial Geology By Unit

- Alluvial Deposits
- Kame Fields and Esker Systems
- Organic Deposits
- Outwash fans, Deltas, and Valley Train Deposits
- Silty Till Plain
- Stony Till Plain

Notes:

1. Reference: Nova Scotia Department of Natural Resources Map ME 1992-3, Surficial Geology Map of the Province of Nova Scotia, 1:500 000, by R. R. Stea, H. Conley and Y. Brown, 1992. Digital product compiled by R. R. Stea and B. E. Fisher.
2. Projection: NAD83(CSRS), UTM Zone 20 North.

Surficial Geology

Strum ENVIRONMENTAL

Date: January 2013	Project #: 12-4402
Scale: 1:20,000	Drawing #: **8.1**
Drawn By: H. Serhan	
Checked By: A. Walter	