BATESTON COMMUNITY WIND POWER PROJECT BATESTON, NOVA SCOTIA

ENVIRONMENTAL ASSESSMENT REGISTRATION DOCUMENT

PROPONENT

CELTIC CURRENT LP.
10442 Route 19,
Southwest Mabou, Nova Scotia, Canada
B0E 1X0

Report Prepared by:
McCallum Environment Ltd.

December 20, 2013

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Environmental Assessment Registration Document

Name of Project: Bateston Community Wind Power Project

Location: Bateston, Cape Breton County, Nova Scotia

Size of the Project: 2.3 MW

Proponent: Celtic Current LP

Report Prepared by: McCallum Environmental Ltd.

Date: December 20, 2013

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Executive Summary

Celtic Current LP (Celtic Current) intends to construct a 2.3 MW (nameplate capacity) single turbine on private land [PID 15619596] within the community of Bateston, on Cape Breton Island, Nova Scotia. This Project consists of a single access road and turbine pad, a system of above ground distribution lines and an Enercon E-92 2.3 MW turbine. The proposed schedule involves construction during Spring 2014 with a tentative operation date of Fall 2014.

The field data, regulatory consultation and subsequent conclusions of this assessment indicate there are no expected significant residual environmental effects resulting from the Bateston Community Wind Power Project once all appropriate mitigation and monitoring has been implemented and completed.

Standard construction mitigation methods will be implemented during all phases of the building of the Project to ensure there are no significant impacts of the Project on Valued Ecosystem Components (VEC). These methods were included in the development of the Environmental Protection Plan (EPP) which is included as part of this assessment.

The proposed turbine location is within a recently harvested forest habitat. The turbine will be located near the existing MET tower and the Project will be able to use the existing access road constructed for the MET tower installation as the access road for the entire scope of the Project.

Natural areas remaining following Project construction will continue to include disturbed and undisturbed tracts of forests, wetlands, or stands of trees or other vegetation within the Project Area. These forested natural areas are continuous outside of the Project boundaries, and provide suitable habitat, travelling corridors, thermal and security cover for wildlife. Habitat fragmentation will be minimal given the small size of the Project.

Species at risk inventories within the Project revealed that no flora species at risk were identified. It is possible that Canada Lynx use the Project Area although this area of Cape Breton is not its expected preferred habitat. The small size of the Project and the construction of only a single access road are expected to result in low residual impact to the Canada Lynx.

Avian species at risk were identified within or near the Project Area and bats are expected to be present within the habitat and surrounding the Project Area. The environmental assessment process has determined that residual environmental effects on birds and bats is expected to be low, post-mitigation, and Celtic Current is committed to completing follow up monitoring as recommended by CWS and NSDNR.

There are no areas of cultural significance identified with the Project Area during assessments of historical resources. As well, there are no adverse effects anticipated on health and socio-economic conditions, physical and cultural heritage areas, traditional land use, and traditional structures or sites as a result of environmental changes from the Project.

Celtic Current has exceeded typical residential setbacks, with the closest residence or other sensitive receptor being located 1009 meters from the turbine. Sound models indicate that the regulatory criterion of 40 dBA for sound output at all identified receptors within 1500m is not expected to be exceeded.

Both McCallum Environmental Ltd. and Celtic Current are confident that the community-at-large support the development of this Project. Positive feedback received from the communities in proximity for the proposed Project suggests that community support for this Project is positive. Celtic Current will continue to conduct public consultation on this Project.

The magnitude of disturbance and risk associated with the Project are all considered minimal given the size of the Project, abundance of similar VEC within and surrounding the Project Area and the mitigation techniques and technologies currently available. Furthermore this assessment concludes there are no significant environmental concerns and no significant impacts that cannot be effectively mitigated through well established and acceptable practices, or ongoing monitoring and response. Residual environmental effects have been determined to be minimal or low for identified Valued Ecosystem Components.

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List of Acronyms

ACCDC	Atlantic Canadian Conservation Data Centre
AGL	Above Ground Level
AL-PRO	AL-PRO Wind Energy Consulting Canada Inc.
ASL	Above Sea Level
ATV	All-Terrain Vehicle
BOP	Balance Of Plant
BWEA	British Wind Energy Association
CanWEA	Canadian Wind Energy Association
CBC	Canadian Broadcasting Corporation
CLC	Community Liaison Committee
CMM	Confederacy of Mainland Mi'Kmaq
COMFIT	Community Feed in Tariff
COSEWIC	Committee On the Status of Endangered Wildlife In Canada
CWS	Canadian Wildlife Service
dBa	Decibel
DSME	Daewoo Shipbuilding and Marine Engineering
EMI	Electro-Magnetic Interference
EPP	Environmental Protection Plan
GE	General Electric
GHG	Greenhouse Gas
GIS	Geographic Information System

GPS	Global Positioning System
GRP	Glass-fibre Reinforced Plastic
IEC	International Electro-technical Commission
IPP	Independent Power Producers
ISO	International Standards Organization
KMK	Kwilmu'kw Maw-klusagn
KMKNO	Kwilmu'kw Maw-klusagn Negotiation Office
kV	Kilovolt
LIDAR	Light Imaging Detection And Ranging
MET	Meteorological
MORI	Market & Opinion Research International
MW	Megawatt
NSDNR	Nova Scotia Department of Natural Resources
NSE	Nova Scotia Environment
NSESA	Nova Scotia Endangered Species Act
NSPI	Nova Scotia Power Inc.
NSTIR	Nova Scotia Transportation and Infrastructure Renewal
PID	Property Identification Number
PIF	Partners In Flight
PM	Particulate Matter
POR	Point Of Reception
PPA	Power Purchase Agreement
RABC	Radio Advisory Board of Canada
SAR	Species At Risk
SARA	Species At Risk Act
SIA	Sound Impact Assessment
SSHD	Significant Species and Habitat Database
TBD	To Be Determined
TDG	Transportation of Dangerous Goods
TSP	Total Suspended Particulate
UTM	Universal Transform Mercator
VEC	Valued Ecosystem Components
WHMIS	Workplace Hazardous Material Information System
WNS	White Nose Syndrome
WPP	Wind Power Project
WTG	Wind Turbine Generator
ZVI	Zone of Visual Influence

1. General Information

Table 1. Project Summary

General Project Information	Celtic Current LP (Celtic Current) intends to construct and operate a community wind power project with 2.3 MW of total capacity, located on PID 15619596 .
Project Name	Bateston Community Wind Power Project (the "Project")
Proponent Name	Celtic Current LP (Celtic Current)
Proponent Contact Information	10442 Route 19, Southwest Mabou, Nova Scotia, Canada B0E 1X0 Business: (902) 945-2300 Facsimile: (902) 945-2087 email: martha@celticcurrent.ca
Proponent Project Director	Martha Campbell Chief Executive Officer (CEO) Peter Archibald Project Manager
Project Location	· The Project lands are located within the boundaries of PID 15619596 · The Project lands are located 25km southeast of Sydney and 11 km north of Louisburg, in Cape Breton County, Nova Scotia; · Project lands are located entirely within Cape Breton County, Nova Scotia; and, · The approximate centre of the Project lands are located at 274521 m E and 5097780 m N.
Landowner(s)	The project lands are located on freehold (private) land
Closest distance from a turbine to a residence	The nearest house will be **1009 metres** from the proposed turbine location
Expected rated capacity of proposed project in MW	2.3 MW consisting of one Enercon 2.3 MW (nameplate capacity) turbine.
Federal Involvement	No federal departments are providing funding. No Canadian Environmental Assessment Act triggers (*Section 5, CEAA*) occur or are expected.

Required Federal Permits & Authorizations	· Department of National Defense Authorization; · Transport Canada; · NAV Canada; · No other federal authorizations are anticipated at this time;
Provincial Authorities issuing Approvals	a. Nova Scotia Department of Environment; b. Nova Scotia Department of Natural Resources; c. Nova Scotia Transportation and Infrastructure Renewal;
Required Provincial Permits & Authorizations	The following permits, authorizations and/or approvals may be required for this Project which will allow for the construction and operation of the Project 1. *Environmental Assessment Approval.* Approved pursuant to Section 40 of the *Environment Act* and Section 13 (1)(b) of the *Environmental Assessment Regulations* in Nova Scotia, Canada; 2. *Approval to Construct – Culvert(s),* Pursuant to *Part V of the Environment Act, S.N.S 1994-95, c.1;;* 3. Nova Scotia Transportation and Infrastructure Renewal: *Work within Highway Right of Way Permit;* 4. Service Nova Scotia and Municipal Relations: *Special Move Permit for over dimensional and/or overweight vehicles and loads* 5. *Wetland Alterations* Pursuant to Activities Designation Regulations, Division I, Section 5(1)(na)
Provincial Regulatory Authorities Consulted during EA and Project Development Process	Nova Scotia Environment (NSE), Policy & Corporate Services: · Steve Sanford, Environmental Assessment Officer Nova Scotia Department of Natural Resources: · Mark Elderkin, Species at Risk Biologist Office of Aboriginal Affairs: · Laurent Jonart, Consultation Advisor
Municipal Authorities	Cape Breton County
Required Municipal Permits & Authorizations	*Development Permit* – Cape Breton County

Environmental Assessment Document Completed By:	Meghan Milloy, MES Robert McCallum, P.Biol Melanie MacDonald, MREM McCallum Environmental Ltd. **McCallum Environmental Ltd.** 9 North Street Bedford, N.S. B4A 2N1

2. Project Information

2.1 PROPONENT PROFILE

Celtic Current LP (Celtic Current) intends to own and operate community based wind projects in northeastern Nova Scotia . Their goal is to generate up to 10 MW of electricity annually under the Community Feed in Tariff (COMFIT) program in Nova Scotia. Celtic Current currently holds COMFIT approvals for 8.7 MW of renewable wind energy and is proposing turbines in the communities of Cheticamp, Bateston, Goldboro, Point Acoini and Bateston.

Celtic Current is committed to the development of renewable energy projects utilizing the best available wind technologies. Celtic Current constructs, develops and operates renewable energy generation facilities on behalf of its investors and in cooperation with the landowners and communities where the projects are located. Celtic Current is committed to using their combined strengths and capabilities to promote strong sustainable communities.

Celtic Current's Executive Management Team consists of:

- Leonard van Zutphen, President
- Martha Campbell , Chief Executive Officer (CEO)
- Peter Archibald, B. Eng, CSS, Director and Project Manager

The Environmental Assessment Project Team is:

- Meghan Milloy, MES, McCallum Environmental Ltd.
- Robert McCallum, P.Biol., McCallum Environmental Ltd.
- Melanie MacDonald, MREM, McCallum Environmental Ltd.
- Kirk Schmidt, Al-Pro Wind Energy Inc.
- Laura Saunders, avifaunal specialist
- Steve Davis, Professional Archeologist, Davis McIntyre & Associates

2.2 NEED FOR PROJECT/REGULATORY FRAMEWORK

The Government of Nova Scotia has committed to a target of 25 percent renewable electricity supply by 2015 as part of Nova Scotia's Renewable Energy Plan that was announced in 2010. Nova Scotia's total renewable electricity content is expected to more than double from 2009 levels to satisfy this target. Furthermore, the Government of Nova Scotia has committed to a target of 40% renewable electricity supply by 2020. The renewable energy production is expected to include hydro, wind, biomass, and tidal sources.

As legislated in the 2010 amendments to the *Electricity Act,* Nova Scotia will produce 25% of total electricity from renewable energy by 2015. To enable the province to achieve this goal, a minimum of 100 MWs will be procured through the Community Feed in Tariff (COMFIT) program administered by the Nova Scotia Department of Energy. The Nova Scotia Community Feed-In Tariff, or COMFIT, is designed for locally-based renewable electricity projects. To be eligible, the projects must be community-owned and connected at the distribution level (i.e., typically under 6 MW).

This Project is being developed in response to this government initiative, and has received COMFIT approval under this program from the Nova Scotia Department of Energy

2.3 PROJECT LOCATION

The project lands are located in the community of Bateston, located 25 km southeast of Sydney and 11 km north of Louisburg in Cape Breton County, Cape Breton Island, Nova Scotia (Figure 1). The Project lands are located on PID 15619596 located on the Main-A-Dieu Road. The approximate centre of the Project lands is located at 274521 m E and 5097780 m N.

The southeastern boundary of the Project is marked by MacVicars Lake. The Main-A-Dieu Road is located northwest of the Project Area. Johnson Lake is located south of the Project Area, and the Mira May (Atlantic Ocean) is located 1.3 km north of the Project Area.

Physical access to the project site will be from the Main-A-Dieu Road from the northwest end of the Project Area. The connection point to the distribution lines is located at the takeoff pole at the entrance to the Project Area on feeder circuit 57S-401 off of the Main-a-Dieu Road. The 25kV feeder circuit is supplied from the Albert Bridge Sub-station (57S) approximately 14 km from the project site along Highway 22. From this point, it will be necessary to convert the last 4.5 km of overhead line along the Main-a-Dieu Road from three phase 12.5kV line to 25kV and relocate the 25kV - 12.5kV step-down transformer (61S) to the point of interconnection. From the point of interconnection to the turbine's location, 1 km of new overhead line will be installed to the riser pole next to the foundation. From this point, approximately 50 meters of underground cables will be installed to connect to the transformer and switchgear located inside the tower.

The Project Area is situated in a sparsely populated rural setting. The land proposed for the site is undeveloped in an early stage of re-growth after recent harvesting activity. This property is set back from residences, roads and other public areas.

The nearest house will be **1009 metres** from the proposed turbine location.

The Project Area is defined in its entirety by PID 15619596. Please refer to Figure 1 for a map with the property location and PID boundaries

CELTIC CURRENT

Bateston Community Wind Project

Figure 1
Project Lands
PID 15619596

Legend:

Project Features

- Project Area
- Existing Access Road
- Met Tower
- Proposed E92 Turbine

Existing Features

- Road
- Trail
- Building
- Stream
- Contour
- Water
- Swamp
- Forest

No Window

Turbine Model: Enercon E-92
Hub Height: 98 m
Rotor Diameter: 92 m
Rated Power: 2,350 kW

TN

Scale: 1: 17,500

Source:	Base Data: Nova Scotia Geomatics Centre, Nova Scotia Topographical Database (NSTDB) Nova Scotia Well Logs Database

Dec 13, 2013	Coordinate System: NAD 1983 UTM Zone 20N	Version: 1.1

GIS By: Nortek Resource Solutions Inc.

2.4 PROJECT COMPONENTS

The Bateston Community Wind Power Project will be powered by one Enercon E-92 turbine rated with a nameplate capacity of 2.3 megawatts (MW). Under optimal conditions, the turbine would operate 24 hours per day, 7 days per week. However, as is fairly typical in the wind industry, turbines usually only operate at a 30-40% capacity factor.

The key components of the Project include the wind turbine generator (the "turbine") with a total installed capacity of 2.3 MW, a pad-mounted or nacelle situated transformer, a 25 kilovolt (kV) electrical collector system with both overhead (1 km) and buried cable (50m), and a single access road to the turbine from the Main-a-Dieu Road located northwest of the Project Area.

2.4.1 Turbine

The representative values for the characteristics of the proposed wind turbine manufacturer are shown below.

Table 2: Turbine Characteristics Enercon E-92

OPERATING DATA	
nominal power	2.35 MW
Cut-in wind speed	3 m/s
Rated wind speed	8.5 m/s
Cut-out wind speed	28 – 34 m/s (with activated storm control features)
Hub height	98 m
ROTOR	
Pitch system	Principle: Independent Blade Pitch Control Actuation: Individual Electric Drive
Diameter	92 m
RPM	5-16 min^{-1}
Blade material type	Glass-fibre reinforced plastic (GRP)/Epoxy
GENERATOR	
Type	Synchronous, direct drive ringgenerator
Rated power	2300 kW
Rated voltage	400 Volts
Frequency	60 Hertz
Protection	IP 23
BRAKING SYSTEM	
Aerodynamic brake	Electrically independent blade pitch systems with emergency supply
Rotor brake	Exists. But no technical details available

Wind turbines and supporting structures typically consist of eight key components:

1. tower foundations;
2. three or four tower sections of steel or concrete with service access provided by stairs and/or service person lifts;
3. stainless steel nacelle housing the mainshaft and generator,
4. three fibre glass or carbon fibre rotor blades;
5. cast iron hub;
6. tower mounted transformer;
7. electrical and grounding wires; and
8. buried grounding grid at perimeter of foundation

The average cleared area required for the turbine, including assembly areas for the turbine components but excluding the access road, power line and temporary laydown area, will be 0.8 hectares.

The 2.3 MW turbine will be 98 metres in height from ground level to the hub ("98 metre hub height"). The swept diameter of each three bladed rotor will measure 92 metres. Therefore all components will reach a maximum height of 144 metres. The rotors are variable speed, with revolutions per minute dependent upon wind conditions.

The nacelle includes bedplate/frame, stainless steel enclosure, rotor hub, mainshaft, generator, turbine control equipment, instrumentation, and cooling/heating equipment. These components are located at the top of the tower sections and are connected to the three bladed rotor via a main shaft and hub assembly. Tower foundations may range from three to eight metres in depth depending upon site-specific soil conditions.

A transformer and switch gear is located in the tower base of the turbine to transform the low voltage electricity created in the nacelle to medium voltage collection system level (i.e., 400 V to 25 kV). The electrical collection system will be comprised of an above ground power lines to the turbine. The cables will then go underground from the last riser pole to the turbine pad mounted transformer or directly into the turbine tower.

2.4.2 Lighting

Turbine lighting will meet the design requirements and quality assurance for lights required under *Canadian Aviation Regulations 2010-1* Part VI - General Operating and Flight Rules Standard 621.19 - Standards Obstruction Marking, Section. Transport Canada generally recommends the use of medium intensity flashing red beacon lights.

2.4.3 Electrical Collection System

The 25 kV medium voltage collection system will be used to take the power from the wind turbine to the Nova Scotia Power distribution lines located along the Main-A-Dieu Road northwest of the Project Area.

An underground collection line (50 m) will be installed from the turbine out to the main access road. At the main road, an above ground collection system will be used (Photo 1).

Photo 1. Example of above ground distribution line

2.4.4 Access Road

During the early stages of the environmental assessment process, an access road was constructed from the Main-A-Dieu Road to the location of the MET tower and also the proposed general location of the turbine. This road was built to facilitate the installation of the site MET tower.

The current access road will be upgraded as necessary and built to accommodate the size requirements of the crane and the load specifications to support the delivery of turbine and crane components. The final access road surface may be 8m wide along straight sections, but may be widened through turns if necessary to allow adequate access for turbine components. Ditches and culverts will be added where required to allow for proper drainage. The surface soil and grubbing will be re-located in borrow areas along the road side and graded to prevent erosion and sediment runoff. The ditches will be constructed along the road edge following provincial guidelines and procedures to control for surface water runoff. Crossover culverts and two watercourse crossing culverts have already been installed under the road as necessary (details provided in subsequent sections of this environmental assessment, and necessary permits were received from the local NSE office).

The access road is approximately 1 km long and provides access to the turbine from the Main-A-Dieu Road northwest of the Project Area.

The access road will be constructed similar to the ones shown in the following photo.

Photo 2. Example Access Road

2.4.5 Meteorological (MET) Towers

There is a single Meteorological Tower located within the Project Area. This MET tower carries meteorological instrumentation and anemometers (devices to measure wind speed) installed at different heights on the mast, and one or two wind vanes (devices to measure wind direction). These are connected to a data logger, at the base of a mast, via screened cables. This system is battery operated using a solar panel for recharge.

Signals that are recorded for each sensor with a ten-minute averaging period are as follows:

- Mean wind speed;
- Maximum gust wind speed;
- True standard deviation of wind speed;
- Mean wind direction;
- Mean temperature;
- Air Pressure;
- Logger battery voltage.

In recent years, it has become standard practice to download data remotely, via either modem or a satellite link. This approach has made managing large quantities of data from masts, on a range of prospective sites, significantly more efficient than manual downloading.

This MET tower was installed in February 2013 and has been collecting valuable wind and meteorological data for 10 months.

2.4.6 Temporary Components

During the construction phases of the Project, the following temporary Project components may be required:

1. A storage yard will be required to store construction equipment, the turbine, cranes, shacks, offices, parking and other necessary components. An operations building or trailers will be brought in prior to leasing or purchasing of a building for the operation and maintenance facility; and,
2. Temporary work space may be required along the access road and at the turbine site. These temporary work spaces will be used as required and will be reclaimed/restored following turbine erection.

2.5 PROJECT ACTIVITIES

2.5.1 Anticipated Schedule of Activities

The following milestone schedule outlines the typical project schedule.

Table 3. Schedule Of Project Activities

Task	Anticipated Completion Date
Geotechnical Study	completed
Engineering Design	Winter 2013
Environmental Assessment Approval	February 2014
Turbine Purchase Agreement	Winter 2013
Commence Construction -Pour concrete mud slabs for turbine foundations -Turbine foundations, turbine delivery, erection	Spring 2014
Commission and Testing	Fall 2014
Commercial Operation Date	Fall 2014

2.5.2 Activity Phases

Phase	Details
Pre-Construction	
	· Notification of residents/landowner of construction commencement · Survey turbine site location in field · Trucking & set up of temporary facilities – construction offices, workers trailers, temporary washroom facilities, etc. · Construction equipment delivery
Construction	
General	· Clearing and Grubbing of overstory vegetation where necessary · Construction of storage yard · Construction of temporary work space
Civil	· Stripping of surface soils at turbine location and at other required work areas · Widening and final construction of access road · Construction of turbine location and crane pad · Installation of erosion and sediment control structures · Site grading · Excavation of foundation with blasting (as required) and excavator · Creation of crane pad using excavated material · Installation of site drainage (aka- weeping tile) at base of turbine foundation · Installation of re-bar at turbine foundation · Installation of below ground transmission infrastructure · Installation of turbine base · Pouring of concrete for foundation · Testing of concrete foundation · Backfilling of foundation with previously excavated soils · Reclamation of surplus soils · Grading of site
Turbines	· Turbine component delivery · Crane delivery · Tower/turbine erection · Install Turbine Electrical & Padmount Transformer
Collection System	· Installation of poles and guide wires for overhead (O/H) collection system · Run overhead wires and associated infrastructure · Install and connect underground collector system
Operations & Maintenance	
	· Reclamation of subsoils and disturbed surface soils · Weed Control · Re-seeding of disturbed soils · Grading of road · Road maintenance · Culvert maintenance

	· Turbine maintenance · Equipment testing
Decommissioning	
	· De-energize facility · Removal of above ground infrastructure which includes turbine blades, nacelles, tower components, O/H distribution lines, power poles, and other support structures · Removal of crane pad and gravel from access road · Recontouring of crane pad and access road grades · Reclamation of surface soils · Re-seeding or re-planting · Reclamation monitoring

2.5.3 Access Road Construction Methods

As discussed, an access road was constructed prior to installation of the site MET tower at the general location of the proposed turbine. Minimal upgrades to the existed access road may be necessary in order to facilitate turbine component delivery. Should upgrades be necessary, the Proponent will follow the following standard methodologies:

- Cutting, de-limbing and decking all salvageable timber, as necessary, using feller buncher, skidders, chainsaws and logging trucks;
- Following removal of overstory vegetation, lands will be brushed with a bulldozer and backhoe to remove non-salvageable wood and brush. Scrub brush/grubbings will be piled along disturbance boundaries and will have breaks installed to allow for water flow where necessary. Limbs and non-merchantable material may be left in brush piles or buried underground for natural decay; depending on the site conditions;
- Dozers will push soils to the edge of the access road boundary;
- Subsoils will be excavated with a backhoe from a trench line that parallels the access road alignment. These subsoils will be placed on the area of travel for the access road;
- Previously removed grubbings and topsoils will be placed into the excavated trench line and the trench line recontoured;
- Subsoils placed on the access road traveling area will be spread out using a dozer;
- This new access road will the packed with a roller;
- Crushed rock may be placed on the road and re-packed with a roller;
- A second and final layer of crushed rock may be placed over top and packed with a roller if required;
- Gravel may be used on the access road on an as-needed basis during the construction and operational life;
- The access road will be compaction tested to ensure it meets the compaction requirements for turbine component delivery;
- All ditches will be re-vegetated as per the Environmental Protection Plan (EPP), provided in Appendix I;

2.5.4 Turbine Site Construction

The erection of a turbine requires a large level work area for safe operation and the following site dimensions will be typical for the project:

Table 4. Infrastructure and associated dimensions of workspace

Infrastructure	Dimensions of Workspace Required
Total Cleared Work Space Per Turbine (required for storage of turbine blades, nacelle, and tower sections during the erection process)	90 m x 90 m
Permanent Lease: Turbine base with Power Cables and Pad Mounted Transformer for use during operational life	25 m x 25 m
Crane Pad	16 m x 25 m

Initial clearing and levelling was completed prior to the environmental assessment commencing and during MET tower installation. Final construction of the turbine locations will consist of the following:

- Surveying of the turbine site boundaries to 90 metre x 90 metre dimensions;
- Boundaries will be flagged by surveyors;
- Cutting, de-limbing and decking any remaining salvageable timber using feller buncher within the remaining turbine pad area where clearing was not completed for MET tower installation;
- Following removal of overstory vegetation, lands will be brushed with a bulldozer and backhoe to remove non-salvageable wood and brush. Scrub brush will be piled along disturbance boundaries and will have breaks installed to allow for water flow where necessary;

Photo 3. Typical clearing operations of a turbine site following timber removal

- The turbine site may require soil stripping and leveling using a two lift soil stripping method in areas where bedrock is not found at or immediately below the surface;
- Drainage patterns will be maintained by installing adequate crossing structures;
- Blasting of uneven surface bedrock and foundation areas will be completed as required. All blasting will be conducted in accordance with the *General Blasting Regulations, N.S. Reg. 77/90*, or any updated versions thereof;
- Following blasting of bedrock, blasted bedrock will be excavated and used for the development of a crane pad on the turbine location. The turbine base will be excavated to appropriate dimensions (determined by engineering requirements);
- The turbine base is anticipated to require installation of a support structure using approximately 300 m^3 of cement and re-bar (Photos 6, 7);
- Installation of rebar and other required infrastructure;
- Pouring of concrete;

Photo 4. Typical turbine re-bar installation for the spread foot foundation.

Photo 5. Typical turbine spread footing foundation following concrete pour. Note blasted rock from foundation used on site.

2.5.5 Turbine Erection

The erection of the turbine is based upon specific site conditions found at the turbine site. Engineering lift procedures will be required for the turbine and generated by the construction contractor.

- Lifting and construction equipment will be placed on the ground and leveling techniques will be used as required, for the safe operation of equipment;
- Two cranes will be used for each turbine component installation (one main lifting crane and one tailing crane). The main lifting crane will be situated on the leveled crane pad area immediately adjacent to the foundation pedestal. The tailing crane will be located nearby.
- Hydraulic torque wrenches will be used to tighten bolted connections between turbine tower sections.

Photo 6. Tower section installation

Photo 7. Nacelle Installation

Photo 8. Hub and Blade Lift.

2.5.6 Equipment Delivery

For the Bateston Community Wind Project, turbine components are expected to be shipped to the Port in Sydney, Nova Scotia and then loaded onto trucks and transported by road along Highway 22 southeast approximately 25 km to Catalone; then east along the Main-A-Dieu Road 6 km to the Project Site.

This route has been chosen due to equipment and truck sizes, turning radii available on the route, avoidance of major traffic corridors, and road characteristics. The route will be subject to Nova Scotia Transportation and Infrastructure Renewal (NSTIR) approval and transportation company (TBD) approval and may therefore change.

The following types of construction vehicles are expected to be used to construct the proposed wind turbine:

Foundation Construction

- Track Hoe
- Loader
- Roller
- Concrete Trucks
- Concrete Pump Truck
- Tractor Trailer (rebar, anchor bolts& templates)
- Rock Trucks

Access Roads Construction (if necessary- final road construction)

- Bulldozer

- Grader
- Gravel Haul Trucks

Collection System Installation
- Trackhoe or Trencher
- Tractor Trailers (delivery of cable spools and transformers)

Turbine Erection
- Tractor Trailers (required for delivering crane components to project area. Turbine components would be delivered using tractor trailers of various lengths, widths and axle configurations required to accommodate the large weights and dimensions of the components).

Component deliveries / turbine include:
- Down Tower Assembly (6 delivery trucks)
- Hub (1 delivery truck per turbine)
- Nacelle (1 delivery truck per turbine)
- Tower Sections (3 delivery trucks per turbine)
- Blades (1 delivery trucks for every turbines, i.e. three blades per truck)

The approximate sizes of trucks required to deliver equipment are listed as follows:

Component	Length of trucks (feet)	Height of trucks (feet)	Approx. Gross Vehicle Weight (lbs.)	Clearance Radius on Turns (feet)
Nacelle	112’ 10”	14’ 8:	197,000	111’ 3”
Hub	78’ 0”	13’ 6”	75,000	48’ 4”
Blade	153’ 11”	13’ 6”	<70,000	133’ 0”
Tower Base	140’	15’	212,000	80’ 5”
Tower Mid	128’ 2”	15’	132,000	75’ 0”
Tower Top	123’ 7”	14’ 6”	112,000	74’ 6”

- Two support cranes will be required to offload each of the turbine components at their respective turbine site laydown area(s).
- Tower components will be either erected directly from delivery trailers or stored at the turbine laydown site.

2.5.7 Electrical Collection System

The Collection System will be installed within the Project boundaries, and will mainly consist of above ground utility wooden power poles, spaced approximately 50 metres apart. All power poles will be purchased from a supplier which has treated the poles in accordance with appropriate regulations.

Construction of the 1 km long collection system will consist of the following:

- Surveying of the pole locations;

  If necessary, drilling of borehole into bedrock to approximately 5 – 8 metres depending upon subsoil/bedrock conditions;
- Installation of power poles;
- Installation of cross arm supports and pole infrastructure;
- Unspooling and stringing of power lines and fiber optic cable; and,
- Installation of pole-mounted disconnect switches as may be required by the electrical design.

2.5.8 Waste Disposal

All hazardous materials on work sites are controlled under federal and provincial legislation. The legislation requires that employers provide specific information to workers for the safe use, handling, production and storage of hazardous materials on work sites.

There are limited waste by-products created from the wind energy generation process. Some waste will be produced from ongoing maintenance for the turbine (e.g., lube and hydraulic oils). Hazardous waste materials will not be generated in large quantities and will be disposed of through conventional waste-oil and hazardous waste disposal streams as regulated in the province of Nova Scotia.

All solid waste must be properly sorted for recycling, reuse, composting, or landfilling. The segregated materials must be stored in a manner so that they will not degrade, burn, or become buried on site until they are sent to the appropriate, provincially approved waste disposal, recycling, or composting facilities.

Non-hazardous waste will be disposed of through conventional, local waste handling facilities operated by the local municipalities. As appropriate, materials suitable for recycling will be reused and/or recycled.

Controlled products are products, materials, and substances that are regulated by Workplace Hazardous Materials Identification System (WHMIS) legislation. All controlled products fall into one or more of the six WHMIS classes and each has specific handling, transport, storage, and safety requirements.

3. PROJECT SCOPE

3.1 Site Sensitivity

The determination of site sensitivity was undertaken in consultation with the Canadian Wildlife Service (CWS) and the Nova Scotia Department of Natural Resources (NSDNR).

Based on the document Nova Scotia Environment (NSE) *Guide to Addressing Wildlife Species and Habitat in an EA Registration Document* (NSE September 2008), facility size and site sensitivity combine to determine the Level of Concern.

There are five Important Bird Areas (IBA) within 25km of the Project area. (Bird Studies Canada, 2012)

1. Northern Head and South Head (IBA NS 053) is located 9 km north of the Study Area. The steep, rocky cliffs found in Northern & Southern head range from 15m to 30m in height. They provide colonial breeding habitat for the Great Cormorant, and for the Black-legged Kittiwake (Bird Studies Canada, 2012a). Both of these species are listed as yellow under the NSDNR General Status of Wild Species, but lack Provincial or Federal designation as species at risk.
2. Scatarie Island (IBA NS052) is located 10km east of the Project area. Scatarie Island has rocky shores leading to stunted forests of spruce and balsam fir, along with sphagnum bogs and heath barrens. It is protected under Nova Scotia's Protected Areas program as a Designated Wilderness Area. According to Bird Studies Canada, Scatarie Island is thought to hold between 10-25 territorial male Bicknell's Thrushes, although no systematic survey has been conducted (Bird Studies Canada, 2012b). The Bicknell's Thrush is listed as Threatened under the Federal Species at Risk Act, Vulnerable under the Provincial Endangered Species Act, and Red under NSDNR's General Status of Wild Species. This neo-tropical migrant breeds in high elevation, dense and stunted fir/spruce forests.
3. The Portnova Islands (IBA NS006) is located approximately 11km southeast of the Project area. It is a remote island, surrounded by rough waters, with a relatively undisturbed breeding colony of Great Cormorants (Bird Studies Canada, 2012c).
4. Big Glace Bay Lake (IBA NS007) is located approximately 17km north of the Project area. It is a coastal lagoon with a sandy barrier beach (one of very few in this area). During low tide, expansive mudflats are exposed. Due to the input of warm wastewater from nearby industrial facilities, this site typically remains ice free during the winter. The Big Glace Bay Lake IBA is a Federal Migratory Bird Sanctuary, primarily due to the important feeding grounds provided by the mud flats. Canada Geese are known to use this area during spring migration (Bird Studies Canada, 2012d).

5. Harbour Rocks (IBA NS049) is located approximately 23km south of the Project area. Similar to the Portnova Islands, Harbour Rocks is an isolated island which provides breeding habitat for colonial Great Cormorants.

The habitats provided within these aforementioned IBAs are not consistent with habitat available within the Project Area. The Project Area is predominantly cleared of timber, surrounded by mixed forest and softwood forest. The IBAs are mainly associated with coastal colonial nesting species and shorebirds dependant on exposed mudflats.

The Project Area is not used as primary habitat for any of the species listed above within the IBA sections. The Project Area may be used by passing migrants en route to the Important Bird Areas but the site does not contain major islands, peninsulas, or ridgelines which may funnel bird movement.

The Project will not disrupt large contiguous wetland or forest habitat that may be of importance to birds. The closest significant migration staging area for waterfowl and shorebirds is Big Glace Bay Lake, approximately 17 km north of the Project area. At this time, there is no knowledge of a large heron, gull or tern colony located near the site. Several colonial nesting locations for the Great Cormorant are found 9 and 11km away from the Project area (Northern Head & South Head, and Portnova Islands, respectively). McVicar's Lake is the nearest water body, located approximately 500m southeast of the site, and the Atlantic coastline is 1.3km to the north.

A priority list of species was compiled to identify potential species of conservation concern and Species at Risk which may be using the Project Area and surrounding lands. A review of Atlantic Canada Conservation Data Centre findings confirms the presence of several priority species in proximity to the Project area. A summary of Federally and Provincially protected species identified within 20km of the Project area (along with preferred nesting habitat) is listed below. Breeding status as documented in the Maritime Breed Bird Atlas square summary (square 21TL79) is also included. If the species was observed during atlas surveys, with no breeding evidence noted, this is indicated below as well.

- Piping Plover - NS Endangered, COSEWIC& SARA Endangered. 14 km
    - Nests on sandbars, barrier beaches and shorelines
    - MBBA – observed, no breeding evidence noted
- Red Knot - NS Endangered, COSEWIC & SARA Endangered, 13 km
    - Nests on tundra, tidal flats, rocky shores and beaches
    - MBBA – not observed during atlas surveys
- Chimney Swift - NS Endangered, COSEWIC & SARA Threatened, 14 km
    - Nests and roosts in chimneys
    - MBBA – observed, no breeding evidence noted
- Common Nighthawk – NS Threatened, COSEWIC & SARA Threatened, 4 km
    - Nests in gravelly substrates, and even on rooftops
    - MBBA – observed, no breeding evidence noted

- Canada Warbler – NS Endangered, COSEWIC & SARA Threatened, 6 km
    - Nests in cool, moist woodlands in a nest of dried leaves, often at the base of a stump
    - MBBA – observed, no breeding evidence noted
- Barn Swallow – NS Endangered, COSEWIC Threatened, 4 km
    - Agricultural lands, suburban areas, marshes & lakeshores, nests in buildings
    - MBBA – confirmed breeder
- Olive-sided Flycatcher – NS Threatened, COSEWIC & SARA Threatened, 9 km
    - Softwood forests, near openings such as burns, ponds, and bogs
    - MBBA – observed, probable breeder
- Bobolink – NS Vulnerable, COSEWIC Threatened, 6 km
    - Prairies and meadows, stays on marshes during migration, nests in grassland
    - MBBA – observed, no breeding evidence noted
- Bicknell's Thrush – NS Endangered, COSEWIC & SARA Threatened, 8 km
    - High elevation, alpine areas, dense, shrubby softwood stands
    - MBBA – observed, no breeding evidence noted
- Harlequin Duck - Eastern pop. NS Endangered, COSEWIC & SARA Special Concern, 17 km
    - Prefers swift-moving streams in summer.
    - MBBA – not observed during atlas surveys
- Peregrine Falcon - NS Vulnerable, COSEWIC & SARA Special Concern, 17 km
    - Prefers tundra, savannas, coasts, mountains and tall buildings
    - MBBA – not observed during atlas surveys
- Short-eared Owl - COSEWIC & SARA Special Concern, 16 km
    - Prefers open spaces such as grasslands, prairies, fields, salt marshes and meadows
    - MBBA – observed, no breeding evidence noted
- Rusty Blackbird – NS Endangered, COSEWIC & SARA Special Concern, 14 km
    - Prefers beaver ponds, roadsides, landfills, wet meadows and shrubby shorelines
    - MBBA – observed, no breeding evidence noted

Using the matrix provided in the *Wind Turbines and Birds. A Guidance Document for Environmental Assessment.* (Environment Canada, 2006), and the document Nova Scotia Environment (NSE) *Guide to Addressing Wildlife Species and Habitat in an EA Registration Document* (NSE September 2008), the overall level of concern category associated with the Project was determined. The matrix matches the sensitivity of the site and the size of the proposed facility to rank projects into one of four possible categories. Generic guidance is then provided on the nature and extent of baseline information and follow-up requirements for each category. The "level of concern" is therefore relative to other wind energy projects and does not reflect the threat to birds/bats posed by wind energy in comparison to other types of projects.

The characteristics of the region/area resulted in a potential sensitivity of "High" (Environment Canada, March 2006). The criteria for a potential sensitivity of "High" are as follows:

- having landform factors that concentrate species (e.g., shoreline, ridge, peninsula or other landform that may funnel bird movement) or significantly increase the relative height of the turbines;
- a coastal island, or less than 5 km inland from coastal waters;
- an area of large local bird movements (between habitats) or is close to significant migration staging or wintering area for waterfowl or shorebirds;
- an area recognized as provincially or nationally significant for habitat conservation and/or protection;
- Having increased bird activity from the presence of an area recognized as nationally and/or provincially important habitat for birds (e.g., a National Wildlife Area, Migratory Bird Sanctuary, Important Bird Area, National Park , or similar area protected provincially or territorially because of its importance to birds); and
- Containing species of high conservation concern (e.g. Species listed as 'Yellow' under NS General Status of Wild Species.).

Table 5. Facility Size

Size	Definition
Very Large	Contain more than 100 turbines
Large	Contain 41-100 turbines
Medium	Contain 11-40 turbines
Small	**Contain 1-10 turbines**

Table 6. Project Category

	Site Sensitivity			
Facility Size	Very High	High	Medium	Low
Very Large	Category 4	Category 4	Category 3	Category 2
Large	Category 4	Category 3	Category 2	Category 2
Medium	Category 4	Category 3	Category 2	Category 1
Small	Category 4	**Category 2**	Category 1	Category 1

Based on the parameters identified above the Project should be classified as high (EC, 2006b). The primary reasoning behind defining this Project as highly sensitive is the proximity to several Important Bird Areas and a Migratory Bird Sanctuary. It should be noted, however, that the habitat within the Project area is not suitable for those species which depend on the Important Bird Areas (for instance, colonial nesting species such as the Great Cormorant, or coastal nesting species such as the Piping Plover or Red Knot). No other species at risk have been identified within the Project Area.

With a high site sensitivity and small size (1 turbine), the Level of Concern Category for this Project will be Category 2. Projects in this category present a moderate level of potential risk to wild species and/or their habitat(s), and require basic surveys, usually spread over a one year period, to obtain quantitative information on wild species and habitats on the site and to identify any potential mitigation measures to minimize environmental impacts during construction.

3.2 Assessment Scope

The environmental assessment planning process allows for the prediction of environmental effects of a proposed project. Furthermore, the EA identifies measures to minimize and then mitigate potential adverse environmental effects. Finally, the EA will attempt to predict significant residual adverse environmental effects once mitigation measures are implemented.

The EA focuses on specific environmental components called valued environmental components (VECs). VECs are specific components of the biophysical, social, and economic environments. A valued ecosystem component is important (not only economically) to a local human population, or has a national or international profile. If altered, a VEC will be important for the evaluation of environmental impacts of industrial developments (NSE 2007, updated 2012). The scope of the assessment for this Project includes: the selection and assessment of potential VECs; evaluation of the potential VEC interactions with Project activities, identification of environmental effects if any for each VEC; and identification of thresholds to determine the significance of residual environmental effects.

3.3 Boundaries of the Assessment- Spatial and Temporal

Assessment of effects was undertaken within the Project Area [PID 15619596] (Figure 1). The Cape Breton Regional Municipality was considered for the purpose of data collection and the socioeconomic environment. Residences located within a 1.5 km buffer of the Project site were assessed as potential receptors to evaluated sound.

This assessment covers the construction, operation, and decommissioning phases of the Project, and associated activities.

3.4 Site Optimization and Constraints Analysis

A key aspect of planning a wind power project is the determination of project lands for the development and the subsequent identification of specific turbine location(s) within these lands.

This chapter details how Celtic Current determined project lands and turbine locations:

A. Site Optimization: determination of the most appropriate location for the project to minimize overall impact on the landscape.

B. Project Level Constraints Analysis: analysis used to determine appropriate lands for the Project.
C. Turbine Level Constraints Analysis: assessment within identified project lands to determine available lands for the placement of wind turbines.
D. Turbine Site Selection: final determination of optimal turbine locations based on the wind resource, engineering and turbine manufacturer requirements, and environmental and social considerations.

This section describes how multiple factors were considered in order to determine the project footprint for the Bateston Community Wind Project. These factors include technical (i.e. wind resource), financial, construction, socio-economic, landowner, biophysical constraints, as well as any community and stakeholder feedback.

This exercise was completed considering one turbine (one utility scale 2.3 MW machine). The Project Area and turbine location were chosen for the following reasons:

1. **Appropriate wind regime** to make the Project economically viable.
2. Presence of **freehold lands** for placement of the turbine.
3. **Detailed biophysical and technical assessment** of the Project Area allowed for identification of potential lands for the placement of this community wind project.
4. **Relatively level topography and land characteristics** to allow for placement of the turbine.
5. Ability to place turbine to **meet regulatory setbacks for sound** from receptors.
6. Ability to place turbine to **meet and municipal setbacks from property lines and residences**.
7. **Proximity to the NSPI grid** to connect the Project without a significant length of interconnection, and,
8. **No unique or isolated habitat types** identified within the Project area.

Once this more general process of site optimization was completed and a Project Area confirmed, more detailed and site specific process of constraints analysis was completed as a major component of project planning and final turbine micro-siting.

A constraint can be specified as something to *maintain* or something to *avoid*. Many constraints can be expressed either way, such as to maintain a certain separation between known classes of objects. The desired effect of constraints analysis is to reduce the number of possible non-compliant results of Project development, while at the same time increasing the proportion of acceptable ones. A constraint can be *independent* or *contextual*. Independent constraints consider only one object, e.g., the setback distance around a known species at risk. Contextual constraints consider relations between objects, e.g. Use of a habitat area by a species at risk, resulting in expansion of the constraint.

Site specific constraints that were used for the Bateston Community Wind Power Project are as follows:

- Wind regime mapping was used to identify optimal wind resource areas within the land base. This allows for effective placement of the turbine to maximize power generation from the wind resource for the Project based upon expected energy outputs within the modeled wind regimes. The mapping was completed using meteorological tower data which has been collected continuously for just under 1year;
- Once wind resource mapping and optimization of the wind resource models were completed, different wind turbine manufacturers were selected for modeling. As each manufacturer has different engineering inputs, designs, and outputs, each manufacturer had to be modeled independently. Each turbine type was then placed within the wind regime and mapped within the available lands according to specific engineering criteria for power production, yield, energy loss;
- Geographic Information System (GIS) mapping of the Project lands was completed using datasets for landform, land use, topography, watercourses, historical resources, and wildlife. In addition, aerial photography was used to complement the GIS datasets, with the final goal of building a robust, dynamic, and temporally valid constraints map that could be modified as turbine selection is finalized;
- Within the GIS datasets the following parameters were mapped:

    1. Project area;
    2. Topography;
    3. Land Use;
    4. Existing infrastructure;
    5. Broadcasting (T.V. & Radio);
    6. Meteorological Towers;
    7. Residences;
    8. Existing roads (classified & unclassified) and including ATV trails;
    9. Existing distribution lines;
    10. Known wildlife sites;
    11. Known species at risk locations;
    12. Known heritage sites;
    13. Lakes, ponds or other visible open water bodies;
    14. Watercourses;
    15. Wetlands; and
    16. Property boundaries (PIDs);

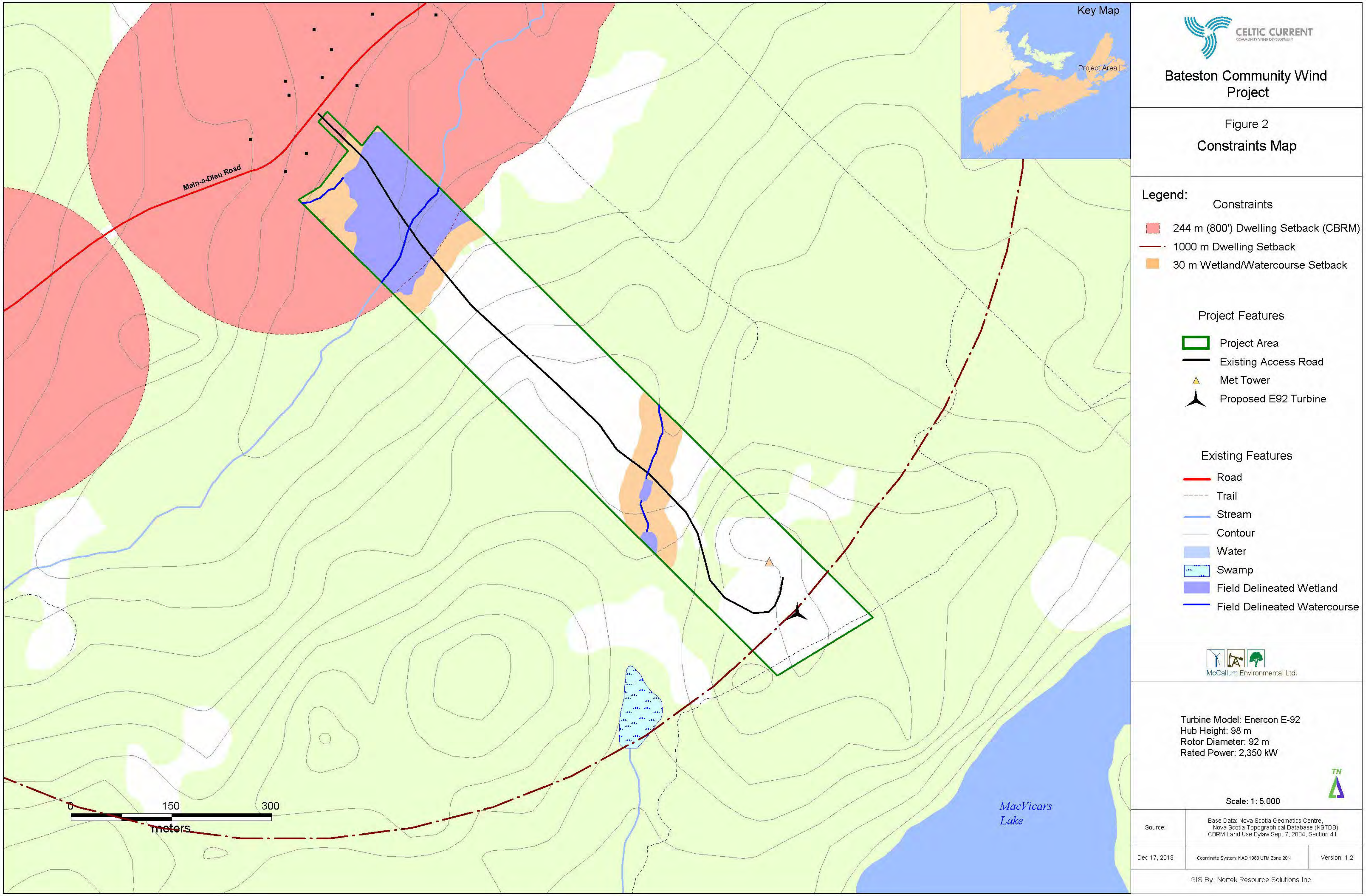
- Once mapping of the above parameters was complete, setbacks were placed on the datasets for planning purposes:

    - A minimum thirty (30) metre setbacks from lakes, ponds, open water, watercourses, and wetlands were imposed;

- Celtic Current has been able to meet a one thousand (1000) metre setback from the proposed turbine.
- The Cape Breton Municipality Utility Scale Wind Turbine setback requirements were considered. For the Project turbine, the set back to residences was determined to be 244m (800 feet) (based on height of turbine);

- Once known site specific setbacks were incorporated, the Project lands GIS map was created to show available lands for Project development after setbacks were imposed (Figure 2)**;**
- The wind analysis was completed, resulting in the turbine location being placed onto this setback map;
- GPS coordinates were then used to field verify the turbine location. Further constraints analysis was completed during field assessments;
- Using the above noted information, Balance of Plant (BOP) was created (BOP includes all remaining infrastructure requirements such as the access road and distribution lines using the same datasets and field data to ensure regulatory setbacks are maintained for all phases of the Project);
- Constraints analysis using GIS based systems, and subsequent field verification methodologies allowed development of the layout and BOP in an environmentally sustainable and regulatory compliant manner.

Figure 2 shows the constraints identified for the Bateston Community Wind Project.
Celtic Current understands the importance of minimization of the project footprint in order to protect habitat and reduce overall fragmentation of the landscape for wildlife, at risk species, and general ecosystem health.


Key Map
Project Area
Main-a-Dieu Road
0
150
300
meters
MacVicars Lake
CELTIC CURRENT
Bateston Community Wind Project
Figure 2
Constraints Map
Legend:
Constraints
244 m (800') Dwelling Setback (CBRM)
1000 m Dwelling Setback
30 m Wetland/Watercourse Setback
Project Features
Project Area
Existing Access Road
Met Tower
Proposed E92 Turbine
Existing Features
Road
Trail
Stream
Contour
Water
Swamp
Field Delineated Wetland
Field Delineated Watercourse
McCallum Environmental Ltd.
Turbine Model: Enercon E-92
Hub Height: 98 m
Rotor Diameter: 92 m
Rated Power: 2,350 kW
TN
Scale: 1: 5,000
Source:
Base Data: Nova Scotia Geomatics Centre,
Nova Scotia Topographical Database (NSTDB)
CBRM Land Use Bylaw Sept 7, 2004, Section 41
Dec 17, 2013
Coordinate System: NAD 1983 UTM Zone 20N
Version: 1.2
GIS By: Nortek Resource Solutions Inc.

4. ENVIRONMENTAL ASSESSMENT METHODOLOGIES

The EA registration document for the Bateston Community Wind Project will describe the biophysical, social, and economic environment, as well as outline other considerations considered important for wind power projects. All Valued Ecosystem Components (VECs) will then be identified, and the potential for interaction between individual VECs and Project activities will be determined. Methods to minimize and mitigate environmental effects resulting from the Project will be provided.

Through an evaluation of the VECs, the project team identified project environmental effects that, post-mitigation, have the potential for a residual effect on the environment. The significance of these residual effects was then determined and evaluated (Section 10.2).

This chapter details the following key aspects of the environmental assessment methodologies:

A. Biophysical: birds and bats, species at risk, wildlife, vegetation, watercourse identification, aquatic habitats, and wetland assessment and delineation.
B. Electro-magnetic interference assessment
C. Archaeological Resource Assessment;
D. Sound Assessment; and,
E. Visual Influence Assessment.

4.1 Biophysical Assessments

The field components of the biophysical environmental assessment were initiated in Winter 2013 and carried through until Fall 2013 complying with the *Category 2* requirements listed in Section 3.1. These studies were aimed at highlighting the ecological linkages within the Project Area, as well as with the habitats surrounding the Project Area. This work included:

1. Spring and Fall bird migration surveys 2013; Breeding bird surveys (Summer 2013); and Winter Bird Survey (March 2013);
2. Vegetation surveys for priority species across the Project Area (August 2013);
3. Bat monitoring using an ANABAT detector (August to September 2013);
4. Opportunistic herpetofauna and mammal survey for priority species across the Project Area (May to September 2013);
5. Transect for Lynx observations (Winter 2013); and,
6. Wetland and watercourse identification and surveys across the Project Area.

4.1.1 Wildlife Species and Habitats

Assessment of wildlife, including vegetation, and habitat was completed based on the requirements outlined in the Nova Scotia Environment (NSE) *Guide to Addressing Wildlife Species and Habitat in an EA Registration Document* (NSE September 2008). Development of a priority list of species for each taxonomic group was completed based on a compilation of listed species from the following sources:

1) Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the Federal Species-at Risk Act (SARA 2003). All species listed as Endangered, Threatened, or of Special Concern.
2) Nova Scotia Endangered Species Act (NSESA 1999). All species listed as Endangered, Threatened, or Vulnerable.
3) Nova Scotia General Status of Wild Species: All species designated as Species of Conservation Interest (Red or Yellow).

This priority list of species was narrowed by broad geographic area (for the Bateston Community Wind Project- the geographic area considered was Cape Breton Island). The priority list of species was then further narrowed by identifying specific habitat requirements for each species. For example, if a listed NSESA species required open water lake habitat, and no open water lake habitat is present inside the Project footprint, this species was not carried forward to the final list of priority species for field assessments within the Project Area.

The final priority list of species used for field assessments is attached in Appendix II.

Field surveys were completed in Summer 2013 to assess for all identified priority species across the Project Area. For this survey, a list of all rare species records found within 100 km of the Project area was also assembled prior to the survey being undertaken (from Atlantic Canada Conservation Data Centre- ACCDC data results) to provide additional information regarding the potential presence of priority species within the Project Area.

General vegetation and habitat observations were also noted at the turbine and access road location.

4.1.2 Avian Monitoring

Bird surveys were completed from Winter 2013 to Fall 2013 by a local bird expert, Ms. Laura Saunders. Avian surveys were conducted in accordance with methodologies outlined in *Wind Turbines and Birds: A guidance Document for Environmental Assessment* (Environment Canada/Canadian Wildlife Service, 2006) and the protocols recommended by CWS (2007).

An avian use report was prepared by MEL in the Fall 2013 outlining the methodologies and results of baseline work. This report is included as Appendix III.

4.1.3 Bat Monitoring

Monitoring for bats occurred on the Project Area in 2013 as part of the baseline assessments. The methodologies used were as follows:

McCallum Environmental Ltd. used an Anabat bat detectors in August and September 2013 (Titley electronics, Ballina, NSW, Australia) to passively record the echolocation calls of bats at the MET tower location.

Table 7. Anabat Monitoring Location, Fall 2013

Anabat #	Anabat Location	Coordinate NAD83 UTM Zone 20T	Date Deployed	Date Removed	Notes
Anabat 1	MET tower	274794.63 m E 5097487.76 m N	August 26, 2013	September 21, 2013	Hoisted on 3 m pole within cleared area for the MET tower

Anabat 1: located within the clearing for the MET tower hoisted on a 3 m pole near the forest edge. No significant water was identified near this location.

The Anabat detector was deployed to cover the Project Area in order to gain a general understanding of bat species present in the area. The location was identified to reflect where the 2.3 MW turbine will be placed.

The detecting distance of the Anabat is affected by a number of factors, the most important one being the species of bat. Bats with high frequency, quiet or directional calls (such as horseshoes or long eared bats) may only be detected at distances of typically less than 5 metres. Bats with low frequency and loud calls such as Noctules and Serotines may be detected as far away as 100m or more. The detection range is therefore dependent on the sound characteristics of the call rather than the detector, although the most receptive zone of the Anabat is within a 90 degree cone in front of the microphone.

The raw acoustic files collected by MEL were then analysed by Boreal Environmental Ltd. (Mr. Derrick Mitchell). The objectives of this Project were:

1. To provide information on occurrence and relative magnitude of activity level in the proposed development area, based on analysis of acoustic data;
2. To provide relevant information on resource requirements of local species that might be useful for informing the decision-making process on the proposed development; and,

3. To make any relevant recommendations based on the results of this Project and any recent developments in the field.

Identification of many bat species is possible because of the distinctive nature of their echolocation calls (Fenton and Bell, 1981; O'Farrell et al., 1999). Species were qualitatively identified from echolocation sequences by comparison with known echolocation sequences recorded in this and other geographic regions. In the case of species in the genus *Myotis* (northern long-eared bat and little brown bat), there was no attempt to identify sequences to the species level, as their calls are too similar to be reliably separated. Identifications were accomplished using frequency-time graphs in ANALOOK software (C. Corben, www.hoarybat.com). An Anabat echolocation file approximates a call sequence, defined as a continuous series of greater than two calls (Johnson et al., 2004), and this was used as the unit of activity

4.1.4 Wetlands & Aquatic Surveys

A desktop review of available topographic maps, appropriate provincial databases and aerial photography was completed to aid in determination of wetland habitat and watercourses in the Project Area. Predicted wetland areas were identified from the NSDNR Wetland Inventory Database. Stereo pairs of air photos were also consulted as a predictor of where wetlands may exist within the landscape. Topography maps were reviewed (1:50,000, 1:30,000, and 1:10,000) to identify all mapped watercourses.

During early field work completed in March and April 2013, a wetland was identified within the right-of-way for the proposed access road to the MET tower and proposed turbine location. A watercourse (with moderate to high fish potential) was also identified within this right-of-way and within the wetland habitat. Based on the presence of this wetland and watercourse system, and the need to construct an access road to reach the MET tower, MEL recommended that Celtic Current complete necessary watercourse and wetland permitting for this system in advance of environmental assessment registration. Watercourse permitting was completed by Celtic Current with NSE local office in Sydney, Nova Scotia. Approval was received from NSE (Sydney Office) in April 2013. Wetland permitting was completed by MEL for Celtic Current and approval for wetland alteration was received from the Sydney NSE office on August 14, 2013 (Karen Madden).

Additional field surveys were conducted between June 1 and August 31st, 2013 across the Project Area for the presence of additional wetland habitat and compared against the predicted wetland areas from the desktop review. All watercourses observed across the Project Area were field assessed for general characteristics, fish habitat and navigability.

Delineation was completed based on micro-topography, and observed surface hydrology and vegetation and soils in accordance with Nova Scotia Environment wetland delineation methodology. Wetlands were delineated by approved wetland delineators. Wetland boundaries were documented using an SXBlue GPS unit and hand held field computer capable of sub 1m accuracy. Any inlet and outlet streams or features to each wetland were marked during the delineation processes and walked and mapped as necessary where stream crossings may be required for access.

All identified watercourses within the Project Area were assessed. Each watercourse was walked and stream habitat was assessed, morphological channel measurements were taken, and pool habitats were visually observed for presence of fish.

The locations of delineated wetland habitats and identified watercourse features were mapped as shown in various Project Figures throughout the EA document and were then considered as biological constraints to the layout and development of the proposed Project.

4.1.5 Herptofauna and Mammal Surveys

Herptofaunal searches of rock outcrops, deadfall, wetland, and stream habitats were conducted and incidental observations were recorded during completion of other field surveys. No targeted mammal surveys were undertaken, other than surveys associated with the Canada Lynx, described in the following section. Incidental observations of mammals and various mammal signs across the Project Area were documented and photographed during field surveys. Signs included such features as dens and nests, scat, tracks, and forage evidence. Herptofaunal and mammal observations were collected throughout the field season in 2013.

4.1.6 Canada Lynx

Celtic Current completed field assessment for the Canada Lynx involving one snow tracking survey completed in Winter 2013.

This snow tracking survey was completed in March 2013 by foot by Ms. Melanie MacDonald to look for sightings of Canada Lynx including observable tracks, scat and hair snags. Ms. MacDonald walked the along the right-of-way for the proposed access road from the Main-A-Dieu Road to the MET tower two days after a 10cm+ snowfall.

4.2 Archaeological Resource Assessment

Davis MacIntyre and Associates Limited completed an archaeological resource impact assessment for the Bateston Community Wind Power Project in May 2013. This assessment consisted of two components:

i. Phase I archaeological resource impact assessment
ii. Field reconnaissance Phase II archaeological resource impact assessment

The methodologies of these two components are described below.

4.2.1 Phase I

The assessment included consultation of historic maps, manuscripts, and previous archaeological assessments as well as the Maritime Archaeological Resource Inventory in order to determine the potential for archaeological resources in the Project Area.

As part of this assessment, a historic background study was also conducted. Historical maps and manuscripts and published literature were consulted at Nova Scotia Archives and Records Management in Halifax. The Maritime Archaeological Resource Inventory, held at the Nova Scotia Museum's Heritage Division, was searched to understand prior archaeological research and known archaeological resources neighboring the Project Area.

4.2.2 Phase II

A field reconnaissance of the proposed impact areas (access road and turbine candidate site) was directed by Stephen Davis on May 8, 2013.

GPS tracklogs of all reconnaissance areas were retained for records, and any sites determined to have potential for archaeological resources were recorded with photographs and GPS coordinates. The terrain and vegetation was noted in the interest of recording negative evidence for historic cultural activity.

4.3 Sound Impact Assessment

The objectives of the Sound Impact Assessment (SIA) are to:

1. Confirm the sound level limit requirements for the Project;
2. Predict the noise levels generated by the Project and adjacent existing projects at all Points of Reception within 1.5 km of the turbines.
3. Compare the predicted sound level from the Project with the sound level limit.

The SIA also provides information on the noise sources, the prediction method and the parameters used for the assessment.

47 receptor locations (i.e. Points of Reception) for the Project were validated within 1.5 km of the Bateston Community wind turbine and were considered in the analysis.

The predicted overall (cumulative) sound pressure levels at each critical noise receptor for the wind turbine associated with the Project were calculated based on the ISO 9613 method, using the Wind Pro Version 2.9 software.

4.4 Visual Influence

In general, the degree of visibility of wind turbine(s) depends on their number, their relative distance, and on the span of their layout. The visibility of a project is evaluated with two tools.

The first tool is the zones of visual influence (ZVI) cartography. It illustrates the degree of visibility across the overall study area by taking into account the locations of the wind turbine(s) and the topography of the study area. Vegetation cover and existing structures are not considered.

The second tool is the photomontages. Photomontages are produced by the superimposition of a technical drawing that shows wind turbine(s) on the photograph of a landscape. Photomontages allow the appreciation of the degree of perception from specific viewpoints that are selected for their representativeness or for their sensitivity (inhabited areas, road of moderate to high traffic, trails and/or tourist attractions). Photomontages underline the importance of land components such as topography, vegetation cover and existing structures which all influence the degree of visibility of the wind turbines.

4.5 Electro-magnetic Interference (EMI) Assessment

A system inventory was compiled for potential receptors surrounding the Bateston Community Wind Project area.

This system inventory is consistent with the requirements of the documents: *Technical Information and Coordination Process Between Wind Turbines and Radio communication and Radar Systems, Radio Advisory Board of Canada and Canadian Wind Energy Association, 2010* (RABC/CanWEA, 2010) and *the Guidelines for a Technical Engineering Report on the Impacts of Wind Turbines on CBC/Radio-Canada Services, Canadian Broadcasting Corporation - Société Radio-Canada Services, June 2008* (CBC, 2008).

5.0 BIOPHYSICAL ENVIRONMENT

5.1 General Spatial Setting for Project

The proposed Project is located in the Atlantic Coast Ecoregion and the Cape Breton Coastal Ecodistrict, as defined by the Nova Scotia Department of Natural Resources (Neily, Quigley, Benjamin and Stewart, 2003).

The Atlantic Coast Ecoregion extends along the Atlantic coast of the province from Yarmouth to Scaterie Island. The Atlantic Coastal Ecoregion seldom exceeds five km in width, except along the Cape Breton shoreline where the coastal influence can extend almost 20 km inland.

The underlying geology is quite varied because of the extent of this Ecoregion. However, since most of it is comprised of the lower elevations of the tilting Appalachian peneplain, the bedrock is predominately granite, quartzite or slate on the mainland. The Chedabucto Bay area is underlain by carboniferous sedimentary rocks.

Along the east coast of Cape Breton Island, older precambrian rocks underlie the Ecoregion. The soils of the Ecoregion for the most part are thin and stony. However, thicker tills are found where drumlins extend into the Ecoregion. Particularly in the east, significant portions of the Ecoregion are covered with deep organic soils that have developed on flat or level topography where drainage has been impeded and the cool moist climate has favoured the development of the peat material. In areas where deeper sandy materials occur, a hardpan formation (also known as an ortstein layer) will be found restricting drainage and creating thick humus layers under forest stands. The total area of the Atlantic Coastal Ecoregion is 5532 km_2 or 10 % of the province (Neily et al., 2003).

5.1.1 Natural Subregion

The Atlantic Coast Ecoregion is further subdivided into five Ecodistricts. The Bateston Community Wind Power Project exists in the Cape Breton Coastal Ecodistrict.

Extending along the north shore of Chedabucto Bay and along the coast of Cape Breton Island this is the widest coastal Ecodistrict in the province. Including both sheltered and exposed Ecosections, the coastal forest still dominates the vegetative cover of the area. The complexity of the underlying geology is masked by the dominance of the coastal climate. Since the construction of the Canso Causeway in 1953, there has been no movement of spring ice from the Gulf of St. Lawrence through the Strait of Canso where currents once flowed at 4.26 x 10_3 to 8.46 x 10_3 cubic metres per second from St. George's Bay. The total area of this Ecodistrict is 2,013 km^2 or 36% of the ecoregion (Neily et al., 2003).

Sedimentary rocks, such as siltstones, sandstones, shales and conglomerates, predominate on the Chedabucto north shore, Isle Madame and north-easterly to Loch Lomond. However, from Point Michaud to Scaterie Island the Forchu group of rocks (volcanic granites, rhyolites and andesite) as well as metamorphic sediments (slate and quartzite) underly a deep deposit of glacial till, sand and gravels with the underlying bedrock visible only along the coast. The glacial history of the Cape Breton portion of this Ecodistrict includes various depths of glacial deposits and drumlins. Two dominant soils define the Ecodistrict. On the north shore of Chedabucto Bay finer textured, well to imperfectly drained soils occur and extend to St. Peter's. From L'Ardoise to Mira Bay coarse, better drained soils are found, especially on the drumlins and elevated glacial deposits. However, several large areas of coarse textured, imperfectly drained soils will be found around the Bays of Forchu and Gabarus and some poorly drained coarse soils occur at Little Lorraine. Lakes and rivers are significant within this Ecodistrict, occupying 14,549 hectares or 7.2% of the Ecodistrict.

The dominant forest of the Cape Breton Coastal Ecodistrict is the white spruce, balsam fir and black spruce mix which is prevalent in Nova Scotia's coastal forests and extends several kilometres inland. Species of the Acadian forest climax type start to appear as one moves inland from the coast. In sheltered areas occasional white pine will be noticed and tolerant hardwoods will be found on the drumlins. For the most part, however, red maple and white birch dominate the hardwood component of the coastal forests. These coastal forests are also subjected to serious wind damage and both stand level disturbances and/or small gap disturbances will occur. The absence of white pine, sugar maple and beech are usually strong indicators of a coastal influence (Neily et al., 2003).

5.1.2 Land Use

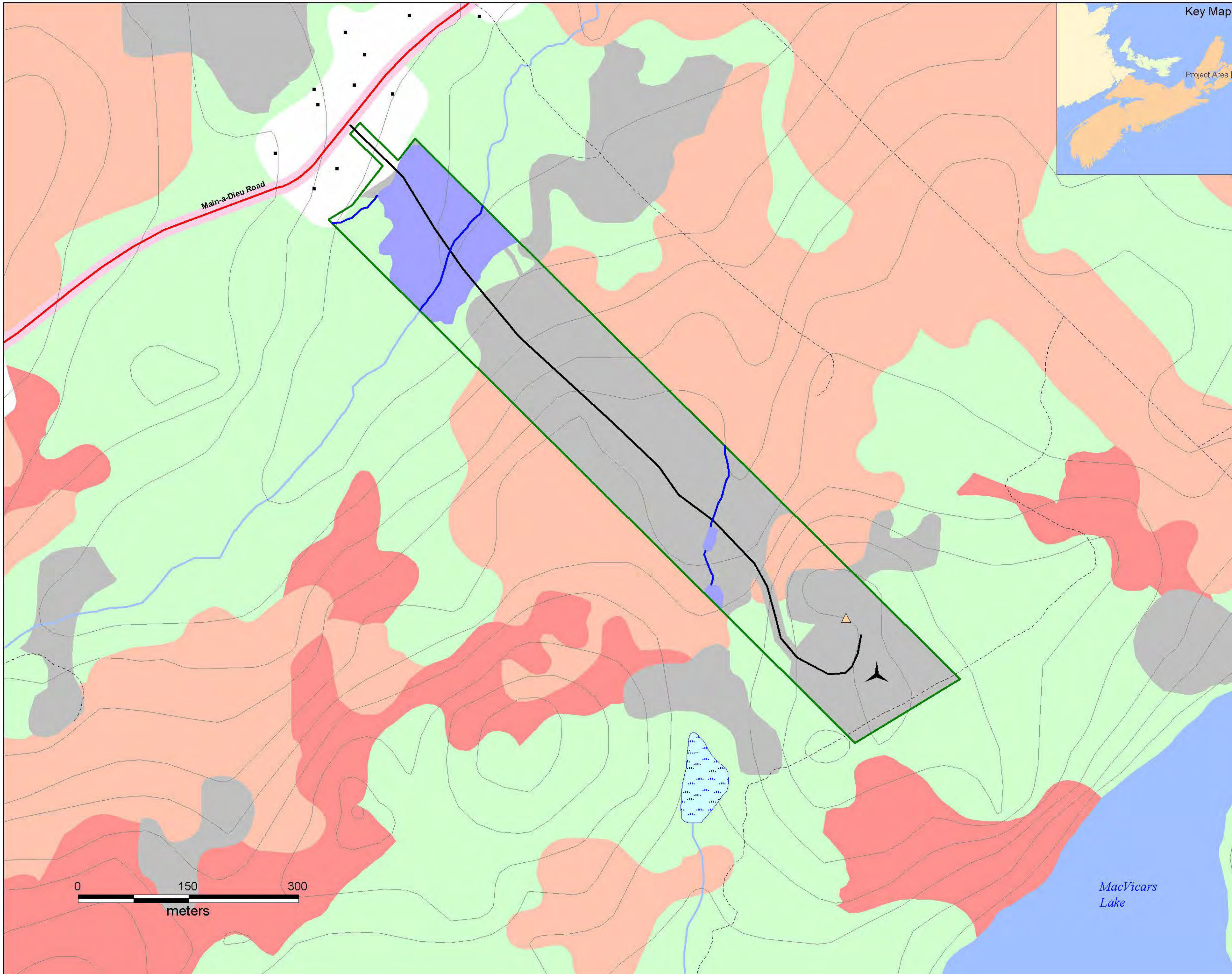
The following table displays the land use components and area (in hectares) of each component within the Project area:

Table 8. Calculations of Land Use

Land Use/Land Type	Area (hectares)	% of Project Area*
Wetland Habitat	2.7	16.1
Urban	0.3	1.8
Productive Forest	2	11.9
Recently Harvested	11.8	70.2
TOTAL	16.8	100%

Land use within the Project area is dominated by recently harvested lands and a large treed fen near the northwestern end of the Project Area. The total area of forests (including recently harvested) accounts for 82% of the Project Area land base.

Figure 3 shows land use within and adjacent to the Project Area.



CELTIC CURRENT

Bateston Community Wind Project

Figure 3

Land Use (Habitat Type)

Legend:

Habitat Type
- Softwood Forest
- Mixedwood Forest
- Hardwood Forest
- Recent Harvest
- Road ROW

Project Features
- Project Area
- Existing Access Road
- Met Tower
- Proposed E92 Turbine

Existing Features
- Road
- Trail
- Stream
- Contour
- Water
- Swamp
- Field Delineated Wetland
- Field Delineated Watercourse

McCallum Environmental Ltd.

Turbine Model: Enercon E-92
Hub Height: 98 m
Rotor Diameter: 92 m
Rated Power: 2,350 kW

TN

Scale: 1: 5,000

Source:	Base Data: Nova Scotia Geomatics Centre, Nova Scotia Topographical Database (NSTDB)

Dec 17, 2013	Coordinate System: NAD 1983 UTM Zone 20N	Version: 1.1

GIS By: Nortek Resource Solutions Inc.

5.2 Atmospheric Environment

5.2.1 Weather and Climate

There is no disputing the impact of the Atlantic Ocean on the climate of the Atlantic Coast ecoregion. The most notable impact of the coastal influence is that the ecoregion has the longest frost-free period in the Maritimes. Provincially, the ecoregion has the mildest winter, but this is offset by a slow spring warm-up and the lowest number of growing degree days in Nova Scotia. Annual precipitation is 1400-1500 mm, the bulk of which falls as rain with only an estimated 15% occurring as snow. Overall, the ecoregion is exposed to high winds, high humidity, salt spray, and fog during the summer and fall. The movement and mixing of the offshore currents, the warmer Gulf Stream and the colder Labrador Current, contribute to the significant variation in weather patterns from year to year. The late arrival of warmer offshore currents in the fall impacts the growing season and frost-free period (Neily et al, 2003).

The average low temperature (based on statistics from the past 30 years) was recorded at -11.1 degrees Celcius in February and the average high temperature was recorded at 23 degrees Celcius in July (recorded in Sydney Nova Scotia) located 28 km northwest of the Project Area (The Weather Network, 2013). Average annual rainfall is 1212 mm with maximum rainfall levels in October of each year (average 144mm in October). Average annual snowfall has been measured at 298 cm with the maximum snowfall occurring each year in January (71 cm).

According to the NS Wind Atlas (NSDE 2007), average wind speeds at 30 m above the ground at the Project site range from 6.51-7.0 m/s. At 50 m, the average wind speeds range from 7.01-7.5 m/s to and from 7.51-8 m/s at 80 m above the ground.

5.2.2 Air Quality

In Nova Scotia, about half of total greenhouse gas (GHG) emissions come from electricity use and nearly 90% of electricity comes from fossil fuels (NSDE 2010). As a result of this reliance on fossil fuels for electricity, every MW of wind power installed in Nova Scotia reduces GHG emissions by as much as 2,500 tonnes per year (NSDE 2011).

Measured air quality parameters across Nova Scotia include ground-level ozone (O3), particulate matter (PM2.5), and nitrogen dioxide (NO2), and these values are used to calculate a score in the Air Quality Health Index (AQHI) (EC 2011). The AQHI is a scale from 1-10+, representing the following health risk categories: Low (1-3), Moderate (4-6), High (7-10), and Very High (10+). The monitoring station closest to the Project site is located in Sydney, Cape Breton. The AQHI at this site is usually low at all times of the year (EC 2011).

5.3 Geophysical Environment

5.3.1 Physiography and Topography

The dominant forest within this Ecodistrict is the white spruce, balsam fir and black spruce mix which is so prevalent in Nova Scotia’s coastal forests and extends several kilometers inland.

Species of the Acadian forest climax type start to appear as one moves inland from the coast. In sheltered areas occasional white pine will be noticed and tolerant hardwoods will be found on the drumlins. For the most part, however, red maple and white birch dominate the hardwood component of the coastal forests. These coastal forests are also subjected to serious wind damage and both stand level disturbances and/or small gap disturbances will occur.

5.3.2 Surficial Geology

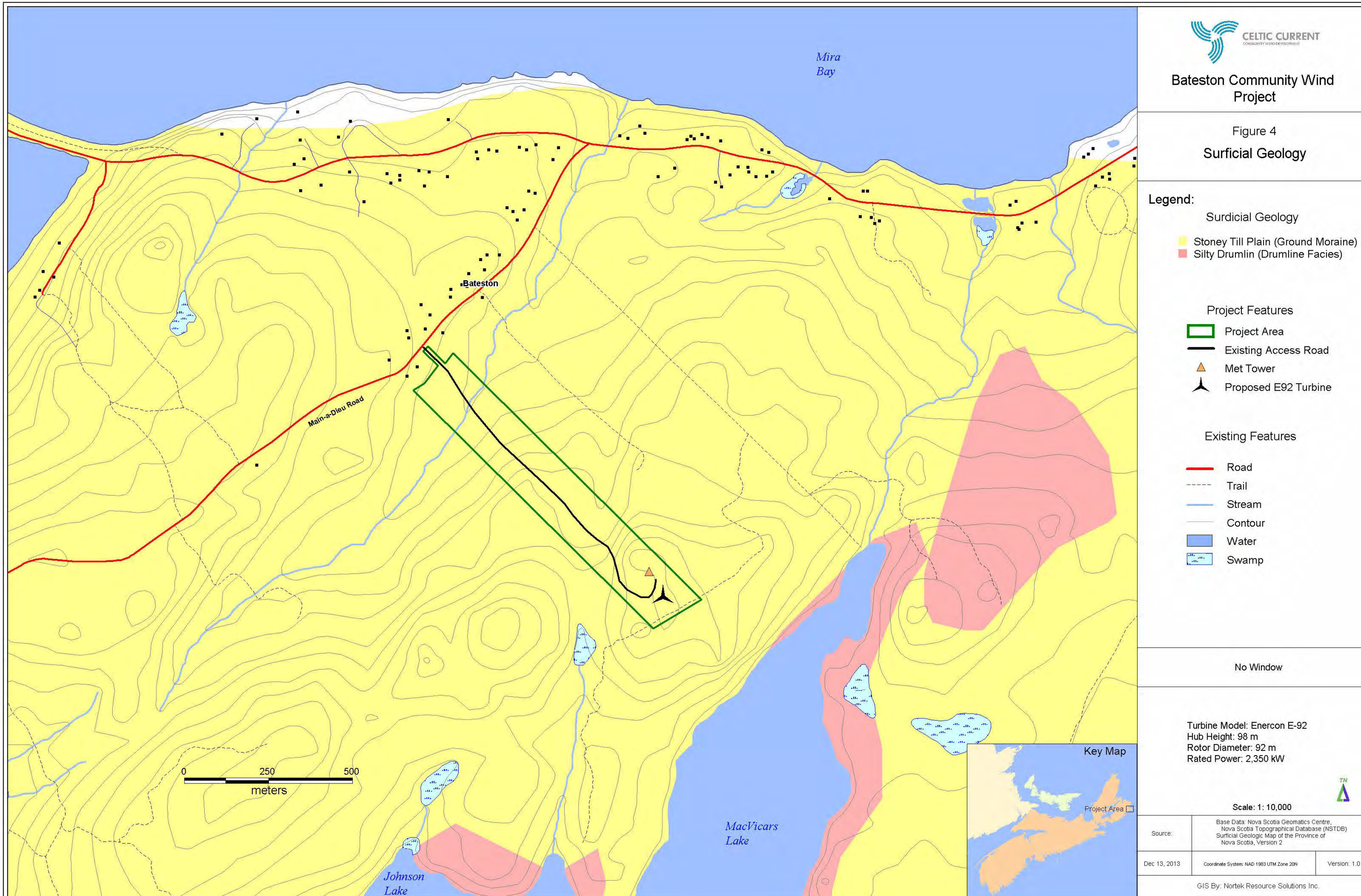
The Atlantic coast between Yarmouth and Scatarie Island has been submerging with rising sea levels over the last 10000 years. This slow sinking has resulted in a highly irregular coastline with drowned estuaries and headlands, resulting in an indented coast fringed with islands. Along the eastern shore, fault lines have had a strong influence in shaping deep inlets. This old peneplain surface is composed predominantly of Paleozoic metamorphic and granitic bedrock mantled by a discontinuous veneer of stony glacial till. Where drumlins are numerous, tills are deeper and less stony and the topography is more rolling. The flat, low-lying Atlantic coast section on Cape Breton Island is covered with stony till derived from the underlying Precambrian volcanic and metamorphic rocks. Loamy Humo- Ferric Podzols and Ferro-Humic Podzols, frequently with peaty surface horizons, are dominant and alternate with areas of exposed bedrock, peatlands, and barrens. Ortstein Podzols are commonly found in deep sandy materials. Gleyed Podzols and Gleysols are notable inclusions (Webb and Marshall, 1999).

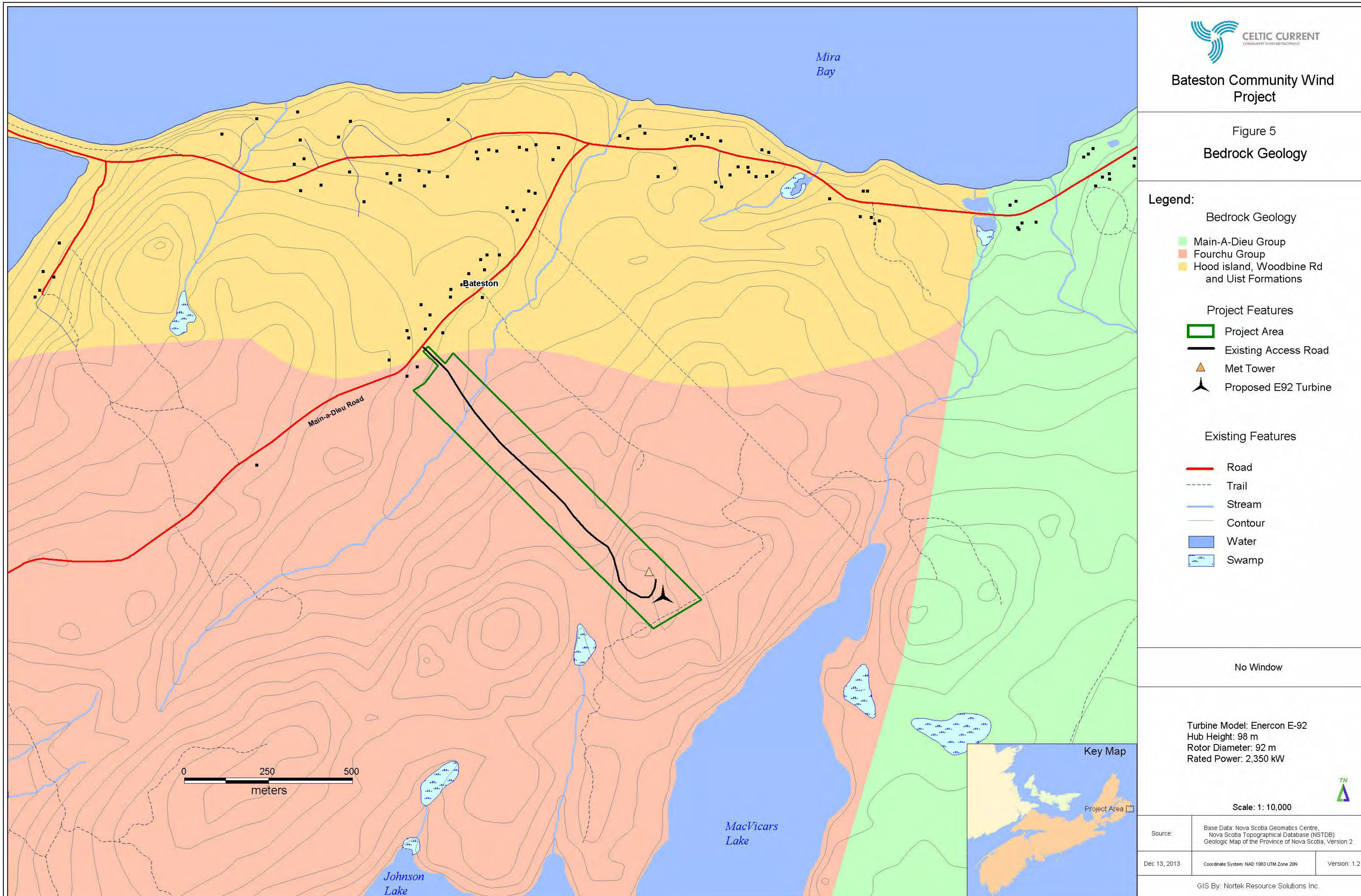
The surficial soils within the Project Area are dominated by stoney till plain (ground moraine) consisting of till (mixtures of sand, gravel, and mud of direct glacial origin) often sandy and stony, loose with inclusions of waterlain sediment of variable depths from 2-25 m.

5.3.3 Bedrock Geology

The Project Area overlies bedrock formations of the Forchu Group. This bedrock formation consists of felsic, intermediate and mafic tuff, tholeiitic volcanic arc basalt, conglomerate, arkose, sandstone, and siltstone.

Surficial geology and bedrock geology within the Project Area are shown on the following two figures (Figure 4 and Figure 5).


Mira Bay
Bateston
Main-a-Dieu Road
MacVicars Lake
Johnson Lake
0
250
500
meters
Key Map
Project Area
CELTIC CURRENT
Bateston Community Wind Project
Figure 4
Surficial Geology
Legend:
Surdicial Geology
Stoney Till Plain (Ground Moraine)
Silty Drumlin (Drumline Facies)
Project Features
Project Area
Existing Access Road
Met Tower
Proposed E92 Turbine
Existing Features
Road
Trail
Stream
Contour
Water
Swamp
No Window
Turbine Model: Enercon E-92
Hub Height: 98 m
Rotor Diameter: 92 m
Rated Power: 2,350 kW
TN
Scale: 1: 10,000
Source:
Base Data: Nova Scotia Geomatics Centre, Nova Scotia Topographical Database (NSTDB)
Surficial Geologic Map of the Province of Nova Scotia, Version 2
Dec 13, 2013
Coordinate System: NAD 1983 UTM Zone 20N
Version: 1.0
GIS By: Nortek Resource Solutions Inc.


CELTIC CURRENT
Bateston Community Wind Project
Figure 5
Bedrock Geology
Legend:
Bedrock Geology
Main-A-Dieu Group
Fourchu Group
Hood island, Woodbine Rd and Uist Formations
Project Features
Project Area
Existing Access Road
Met Tower
Proposed E92 Turbine
Existing Features
Road
Trail
Stream
Contour
Water
Swamp
No Window
Turbine Model: Enercon E-92
Hub Height: 98 m
Rotor Diameter: 92 m
Rated Power: 2,350 kW
TN
Scale: 1: 10,000
Source:
Base Data: Nova Scotia Geomatics Centre,
Nova Scotia Topographical Database (NSTDB)
Geologic Map of the Province of Nova Scotia, Version 2
Dec 13, 2013
Coordinate System: NAD 1983 UTM Zone 20N
Version: 1.2
GIS By: Nortek Resource Solutions Inc.
Mira Bay
Bateston
Main-a-Dieu Road
MacVicars Lake
Johnson Lake
0
250
500
meters
Key Map
Project Area

5.3.4 Hydrogeology and Groundwater

Water supplies for individual homes near the Project Area are provided by individual drilled or dug on-site potable wells.

Details associated with individual drilled or dug wells within a 4 km radius of the Project Area were identified through a review of the NS well logs database (NSDNR- http://www.gov.ns.ca/nse/groundwater/welldatabase.asp). This database provides information on more than 100,000 water wells in the province, including information on well locations, geology and well construction, well depth and yield. A search of this database was completed for the Project Area in Cape Breton County. A total of 23 well logs were available for review. General conclusions relating to the groundwater resource in the Project Area were derived from this information.

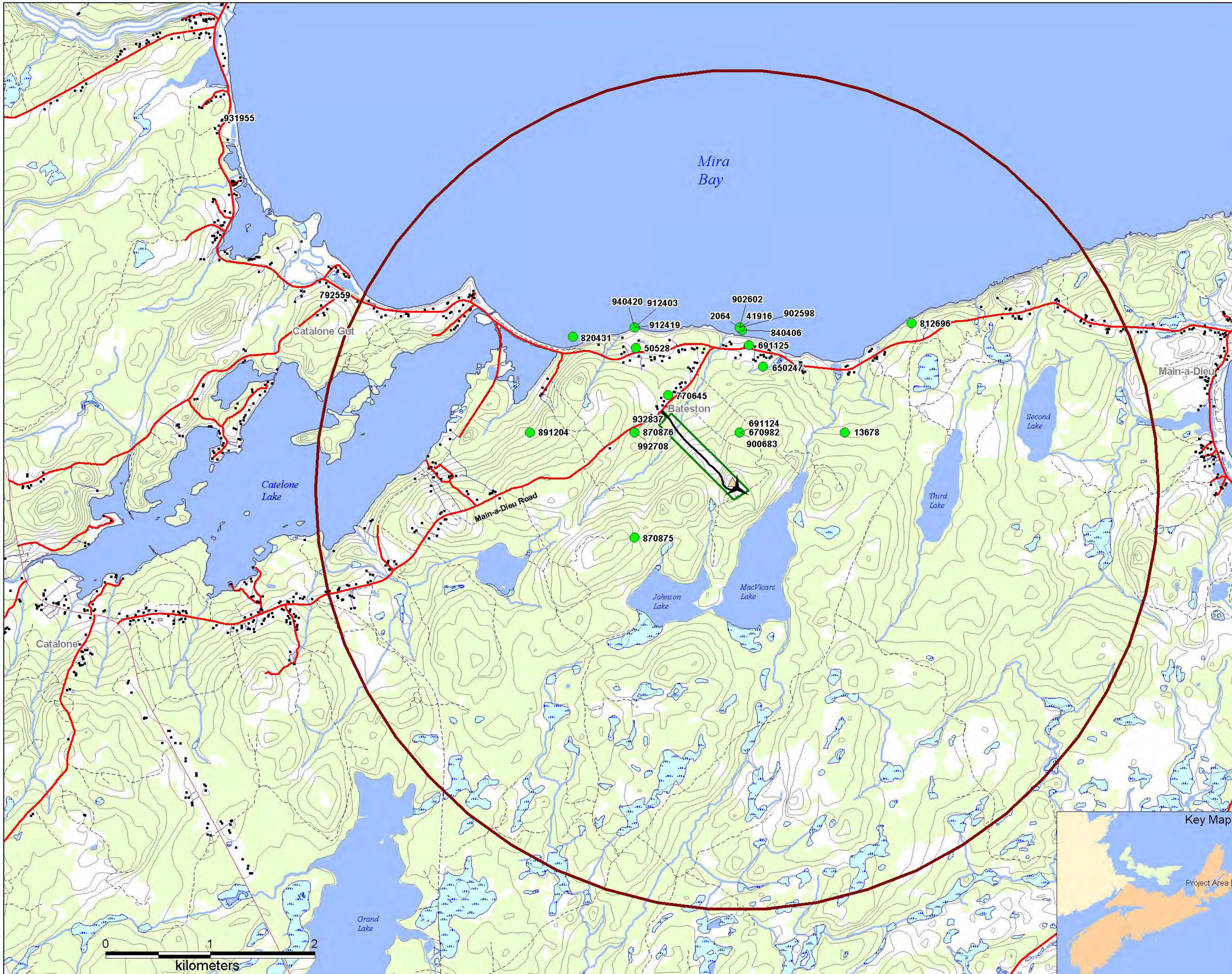
The geology of the Project area was described from the drilling processes as consisting of clay till with boulders overlying quartzite or granite bedrock. The average depth to bedrock based on drilling data was generally 25-35 feet. Wells appeared to be drilled to an average depth of 120 feet below grade, and were constructed as 6 inch wells with standard 50-60 feet depths of casing. Information provided on depth of water bearing fractures during drilling activities indicated that the average depth to the shallowest water bearing fractures was approximately 40 feet below grade. Static water levels were not always recorded in the well logs, but information that was provided indicated an average static depth to water of 35 feet. A general review of water yields for these wells indicated an average yield of approximately 12 imperial gallons per minute (igpm).

Groundwater resources within the Project area are not used to supply residential potable water as there are no residential dwellings within the Project Area. According to the information available in the Well Logs Database, there are several drilled groundwater wells used for potable purposes located north, east and southwest of the Project Area; however, it is known that well locations within the database are not always fully accurate. The closest verified well locations are associated with residences along the Main-A-Dieu Road, just over 1000m away from the turbine location.

Please note however that the locations of wells in the well log database do not provide exact geographic coordinates. Older references indicate a map number only. Newest references are accurate within 50 m. This well log database also only identifies drilled wells. Dug wells may be present in closer proximity to the turbine location.

Please refer to Figure 6 for the location of domestic drilled potable wells surrounding the Project Area.

All surface water located with the Project Area drains north towards the Mira Bay (Atlantic Ocean).



CELTIC CURRENT

Bateston Community Wind Project

Figure 6
Potable Drilled Well Locations

Legend:

Ground Water Wells
- 4 km Buffer
- 32156 Well and Id

Project Features
- Project Area
- Existing Access Road
- Met Tower
- Proposed E92 Turbine

Existing Features
- Road
- Trail
- Stream
- Contour
- Water
- Swamp
- Forest

No Window

Turbine Model: Enercon E-92
Hub Height: 98 m
Rotor Diameter: 92 m
Rated Power: 2,350 kW

TN

Scale: 1: 35,000

Source:	Base Data: Nova Scotia Geomatics Centre, Nova Scotia Topographical Database (NSTDB) Nova Scotia Well Logs Database

Dec 13, 2013	Coordinate System: NAD 1983 UTM Zone 20N	Version: 1.2

GIS By: Nortek Resource Solutions Inc.

5.4 Terrestrial Environment

5.4.1 Vegetation

During the field season in 2013, an assessment of vegetation was completed at the proposed turbine site location as well as along the access road and across the Project Area in general. The turbine site was classified for vegetation by forest cover and age class. Age classifications were based on natural breaks in the data. Forest stand age class (Overmature, Mature, Immature and Regenerating) was determined through qualitative observations of multiple factors. Dominant tree species were identified at the proposed turbine site as was possible as seral age is a useful determinant of stand age. Approximate forest stand age was determined based on a number of criteria, such as total basal area, level of canopy coverage, and species composition of the understory herb and shrub layers. Observations of size and abundance of coarse woody debris were noted. Finally, the level of anthropogenic disturbances was described; particularly the presence of logging roads and harvested trees (clear cut or selective harvest, and approximate time since harvest). All of these factors were used in combination to determine the forest stand age class at the potential turbine location.

As described in the *Guide to Addressing Wildlife Species and Habitat in an EA Registration Document* (NSE, Sept 2008), a full vascular plant survey was not completed. The vascular plant surveys focused on identifying general vegetative communities, with particular focus on identifying priority species. The priority list of vegetation species prepared for this project is attached in Appendix II.

Results

The majority of the Project Area has been clear-cut, and are in early stages of regeneration. Forested 'peninsulas' intrude into the site near the boundaries. These stands are primarily mature mixed stands, with species such as White Spruce, Yellow Birch, Red Maple and Balsam Fir, with occasional Striped Maple and American Beech. In these stands, the shrub layer is sparse, with species such as Canada Fly Honeysuckle, Striped Maple, Grey Birch, Lambkill, and Balsam Fir. Ground cover includes species such as Evergreen Wood Fern, Bunchberry, Twinflower, Starflower and False Lily-of-the-valley.

Three wetlands exist within the Project Area. These are mixed-wood treed swamps or fens, with Yellow Birch, Balsam Fir, and Black Spruce composing the canopy cover. These species are present as saplings in the shrub layer as well. Herbaceous vegetation includes a variety of ferns (such as Spinulose Wood Fern, New York Fern, Cinnamon Fern, Sensitive Fern, Crested Shield Fern), and other species such as Three-seeded Sedge, Bunchberry and Common Wood Sorrel. The identified wetlands drain north towards the Mira Bay (Atlantic Ocean).

The proposed E92 turbine is located within a disturbed habitat type. An access road has been built to provide access to the existing MET tower, which coincides closely with the proposed turbine location. This area has been graded and cleared of vegetation.

A list of all species identified within the Project Area is provided in Table 7 below.

Table 9: Vegetation List Bateston Community Wind Project

Common Name	Latin Name
Balsam Fir	*Abies balsamea*
Red Maple	*Acer rubrum*
Yellow Birch	*Betula alleghaniensis*
Paper Birch	*Betula papyrifera*
White Spruce	*Picea glauca*
Speckled Alder	*Alnus incana*
Sheep Laurel	*Kalmia angustifolia*
Mountain Holly	*Nemopanthus mucronatus*
Shining Rose	*Rosa nitida*
Blackberry	*Rubus alleganiensis*
Red Raspberry	*Rubus ideaus*
White Meadowsweet	*Spiraea alba*
Wild Raisin	*Viburnum nudum*
Sarsparilla	*Aralia nudicaulis*
Nodding Sedge	*Carex gynandra*
Three-seeded Sedge	*Carex trisperma*
Yellow Bluebead Lily	*Clontonia borealis*
Goldthread	*Coptis trifolia*
Bunchberry	*Cornus canadensis*
Flattened Oat Grass	*Danthonia compressa*
Hay-scented Fern	*Dennstaedtia punctilobula*
Flat-topped White Aster	*Doellingeria umbellata*
Crested Shield Fern	*Dryopteris cristata*
Evergreen Wood Fern	*Dryopteris intermedia*
Woodland Horsetail	*Equisetum sylvaticum*
Common Boneset	*Eupatorium perfoliatum*
Wild Strawberry	*Fragaria virginiana*
Common Marsh Bedstraw	*Galium palustris*
Creeping Snowberry	*Gaultheria hispidula*
Fowl Manna-grass	*Glyceria striata*

Short-tailed Rush	*Juncus brevicaudatus*
Soft Rush	*Juncus effusus*
Northern Twinflower	*Linnaea borealis*
Canada Fly Honeysuckle	*Lonicera canadensis*
False Lily-of-the-valley	*Maianthemum canadense*
Whorled Aster	*Oclemena acuminata*
Sensitive Fern	*Onoclea sensibilis*
Cinnamon Fern	*Osmunda cinnamomea*
Common Wood Sorrel	*Oxalis montana*
Northern Long Beech Fern	*Phegopteris connectilis*
Common Plantain	*Plantago major*
Creeping Buttercup	*Ranunculus repens*
Bristly Dewberry	*Rubus hispidula*
Dwarf Red Raspberry	*Rubus pubescens*
Common Woolly Bulrush	*Scirpus cyperinus*
Rough-stemmed Goldenrod	*Solidago rugosa*
Common Dandelion	*Taraxacum officinale*
New York Fern	*Thelypteris noveboracensis*
Northern Starflower	*Trientalis borealis*
Common Speedwell	*Veronica officinalis*

Species of Conservation Interest (SOCI) and Species at Risk (SAR)

The turbine site and associated access road was assessed for rare, sensitive and at-risk vegetation during the field surveys in 2013. Multiple transects across the Project Area were also completed to assess for rare vegetation. Assessment was completed for all priority species identified during preliminary evaluations (desktop) as described in Chapter 3. Care was also taken to assess for potential rare vegetation species that were identified from the ACCDC data search. The ACCDC report documenting the table and map of 3035 records of 335 taxa from 63 sources, a relatively low-to-moderate density of records, is provided in Appendix IV.

A 100km buffer around the study area contains 752 records of 185 vascular, 15 records of 12 nonvascular flora.

During field studies at the proposed turbine site, access road and transects across the Project Area, no flora species of conversation interest (SOCI) or species at risk (SAR) were identified.

5.4.2 Herpetofaunal Species

Herpetofaunal species were inventoried at the Project Area through both targeted searches of appropriate habitats and through incidental observations. Specific focus was given to priority species identified as having appropriate habitat within the Project Area.

Assessed habitats included deadfall within hardwood areas, and aquatic habitats such as wetlands, streams, and riparian zones.

Table 10. Herpetofaunal species inventoried during 2013 field surveys.

Scientific Name	Common Name	ACCDC Prov. Rank	NSDNR Gen. Status
Rana sylvatica	Wood Frog	S5	**Green**
Rana palustris	Pickerel Frog	S5	**Green**
Thamnophis sirtalis	Maritime Garter Snake	S5	**Green**

The Project area provides limited herpetofaunal habitat. The limitation for many turtle and amphibian species is the lack of open water habitats, particularly associated with wetlands. Although there are several wetlands across the Project Area, they do not exhibit vernal pool and open channel habitat, with the exception of Wetland 1 with the central watercourse draining through it. In those wetland areas where there is limited open water habitat, it is extremely unlikely that fish are present, and therefore predation would be low. Species that may use intermittent stream channel habitats are more likely to find adequate habitat within the Project Area.

Rare, Sensitive, At-Risk Herpetofaunal Species

No herpetofaunal species at risk or species of conservation interest were found within the Project Area during 2013 field surveys.

5.4.3 Mammals

Incidental observation of mammal species was documented during all field survey activities during 2013 across the Project Area. Specific focus was given to priority species identified as having appropriate habitat within the Project Area. These species included:

- Canada Lynx;
- Little Brown Bat;
- Long-Tailed Shrew;
- Northern Long-Eared Bat;
- Eastern Pipistrelle;
- Southern Flying Squirrel; and,
- Fisher;

Table 9 lists those species that were confirmed on the Project Area either visually or by sign (scat, footprints, etc.). Presence of bats in the Project Area is described in subsequent sections.

Table 11. Confirmed mammalian species during 2012-2013 field surveys.

Scientific Name	Common Name	ACCDC Prov. Rank	NSDNR Gen. Status
Odocoileus virginianus	White Tailed Deer	S5	Green
Procyon lotor	Raccoon	S5	Green
Canis latrans	Coyote	S5	Green
Erithizon dorsatum	American Porcupine	S5	Green
Tamiasciursus hudsonicus	American Red Squirrel	S5	Green

Ungulate species expected to inhabit the vicinity of the Project were established by examination of distribution maps, comparison of preferred habitat with that in the vicinity of the proposed location and field assessments. Mammal species observed within the Project Area include the white-tailed deer **(***Odocoileus virginianus)***.** Optimal habitat for deer species occurs within young forest stands and riparian and shoreline areas within drainage systems within the Project Area. White-tailed deer forage on grasses, forbs and shrubby browse and require large amounts of easily digested food (Buckmaster et al., 1999).

Raccoon and coyote sign were observed within the Project Area. Other common carnivore/omnivore species such as Red fox *(Vulpes vulpes),* Bobcat (*Lynx rufus),* American mink (*Mustela vision),* Striped skunk (*Mephitis mephitis)*, Short-tailed weasel (*Mustela erminea)* may inhabit the Project Area or surrounding areas, at least periodically.

Rare, Sensitive, At-Risk Mammals

Table 12. Potential Mammalian Species of Conservation Interest within Project Area

Scientific Name	Common Name	ACCDC Provincial Rank	NS Protection or NSDNR General Rank
Lynx canadensis	Canada lynx	S1	Endangered
Glaucomys volans	Southern Flying Squirrel	SNA	Yellow
Martes pennanti	Fisher	S2	Yellow

The Fisher is a Yellow ranked species in the Province of Nova Scotia, and the ACCDC ranks it as S2 for the Province. These rankings suggest the species is both rare and sensitive to human or natural disturbance. Mixed wood forests, found surrounding the Project Area, are appropriate habitats for the Fisher. Fishers inhabit upland and lowland forests, including coniferous, mixed, and deciduous forests. They occur primarily in dense coniferous or mixed forests, including early successional forest with dense overhead cover. Fishers commonly use hardwood stands in summer but prefer coniferous or mixed forests in winter. They generally avoid areas with little forest cover or significant human disturbance and conversely prefer large areas of contiguous interior forest.

The habitat preferences for the fisher are not present within the Project Area as the Bateston Community Wind Project is located within a disturbed forest type. The Project Area has been recently harvested and does not contain blocks of contiguous interior forest.

The Southern Flying Squirrel (also NSDNR yellow ranking) prefers deciduous and mixed forests, particularly beech- maple, oak-hickory and poplar and also occurs in old orchards. The squirrel favours small, abandoned woodpecker holes for den sites; also uses nest boxes and abandoned bird and squirrel nests outside tree cavities. *G. volans* occurs in southern Nova Scotia in an area roughly bounded by the South Mountains to the north, the Gaspereau Valley (Kentville) to the east, the New Ross area in north-east Lunenburg County to the south and Kejimkujik National Park in the west. The Project Area does not support southern flying squirrel habitat.

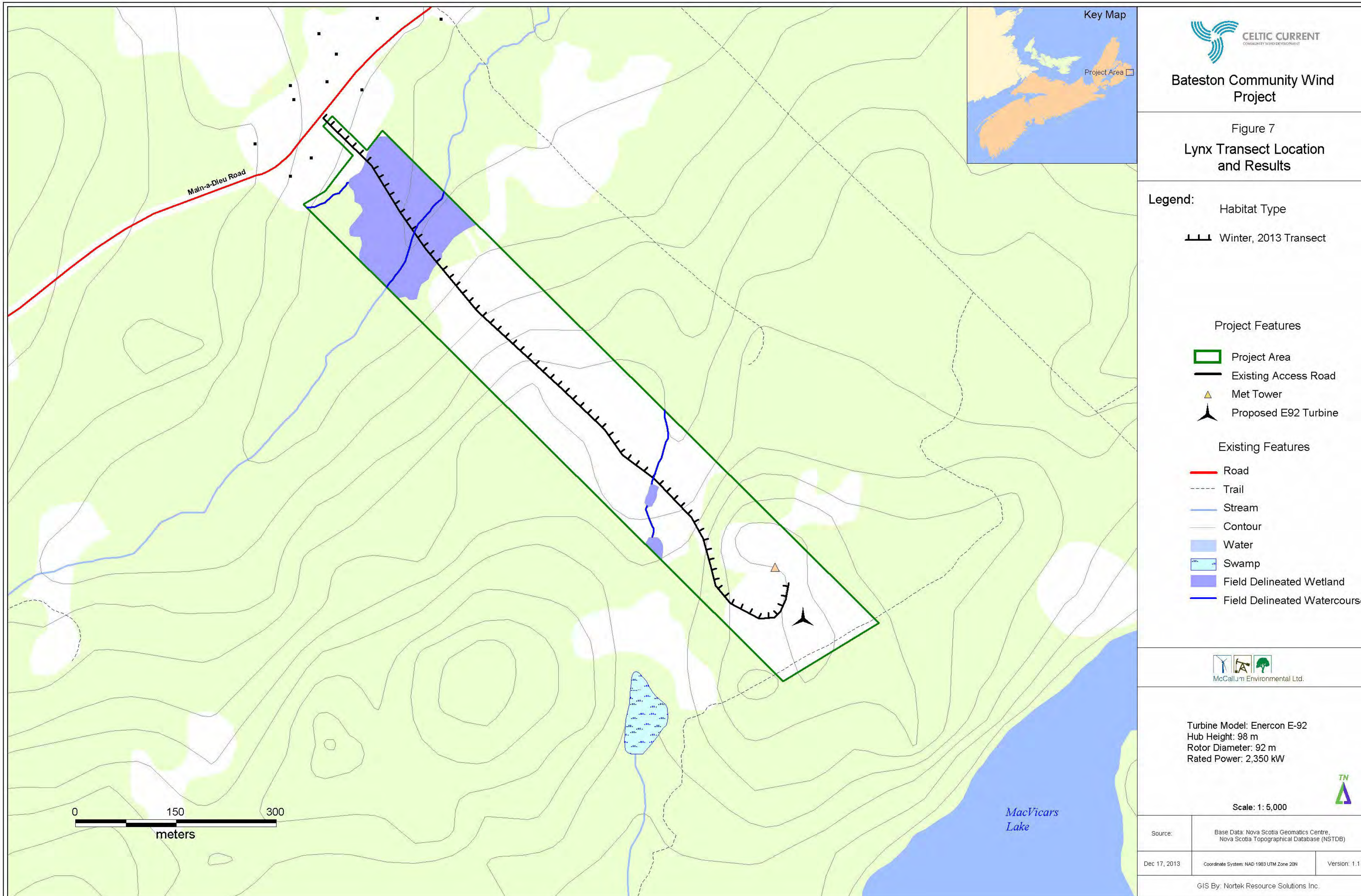
Canada Lynx

Canada Lynx (*Lynx canadensis)* is the only mammalian Species at Risk or Species of Conservation Interest that may potentially be located within the Project Area. Lynx on the mainland of Nova Scotia were extirpated by the beginning of the twentieth century. Lynx numbers fluctuate depending on cyclical highs and lows of its primary prey, the snowshoe hare (*Lepus americanus*), which comprises most of its diet (NSDNR 2007). The habitat requirements for lynx in Nova Scotia are not well defined and therefore habitat deficiencies, if they exist, are as yet unknown. Prolonged deep snow cover and coniferous forest cover are important factors in the distribution of lynx in eastern North America.

The historic breeding range of lynx in Nova Scotia included areas with relatively high elevations such as the Pictou Uplands, Cobequid Mountains, and Musqudobit Hills as well as Cape Breton. The current breeding population of lynx is considered to be restricted to Cape Breton; it has been roughly estimated at 50 to 500 animals. The largest area of contiguous lynx habitat is the Cape Breton Highlands, but traditional knowledge suggests that concentrations of lynx also occur at Boisdale Hills, East Bay Hills, and South Mountain in Richmond County (NSDNR 2007). The likelihood of the presence of lynx within the Project Area is low, based on traditional knowledge of where concentrations of lynx are present on Cape Breton Island. However, MEL completed targeted assessment within the Project Area for this species.

Assessment for the Canada Lynx was completed during the winter field survey completed in March 2013 across the Project Area. A one kilometer transect was completed from the western end of the Project Area to the MET tower location in order to detect visual signs of the lynx.

No lynx tracks, scat or hair snags were identified during the Winter 2013 snow survey. Also, no observations of lynx were recorded as incidental sightings during field assessments throughout Spring, Summer and Fall 2013 within the Project Area. The transect location for lynx observations is shown on Figure 7.


Main-a-Dieu Road
MacVicars Lake
0
150
300
meters
Key Map
Project Area
CELTIC CURRENT
Bateston Community Wind Project
Figure 7
Lynx Transect Location and Results
Legend:
Habitat Type
Winter, 2013 Transect
Project Features
Project Area
Existing Access Road
Met Tower
Proposed E92 Turbine
Existing Features
Road
Trail
Stream
Contour
Water
Swamp
Field Delineated Wetland
Field Delineated Watercourse
McCallum Environmental Ltd.
Turbine Model: Enercon E-92
Hub Height: 98 m
Rotor Diameter: 92 m
Rated Power: 2,350 kW
TN
Scale: 1: 5,000
Source:
Base Data: Nova Scotia Geomatics Centre, Nova Scotia Topographical Database (NSTDB)
Dec 17, 2013
Coordinate System: NAD 1983 UTM Zone 20N
Version: 1.1
GIS By: Nortek Resource Solutions Inc.

5.4.4 Avian Use Assessment

Baseline assessment for birds was completed during the environmental assessment for the Bateston Community Wind Power Project from March to October 2013 by a local bird expert, Ms. Laura Saunders and the MEL project team. Consultation was completed with Nova Scotia Environment and Nova Scotia Department of Natural Resources (NSDNR) in April 2013 (Steve Sanford and Mark Elderkin).

The baseline report is provided in Appendix III for the 2013 surveys (winter survey, spring and fall migration, and breeding bird survey), including detailed methodology and all results.

Summary of avian surveys and conclusions are provided below.

2013 Baseline Survey

A total of 2,751 minutes (45.85 hours) of surveys were completed over 4 seasons. 1289 individual birds, representing 70 known species were identified within the Project Area. Bird species were identified based on functional bird groups to understand how each group of birds is using the Project Area. These functional groups include gulls, passerines, raptors, shorebirds and waterfowl. The most abundant group observed on site is passerines, which account for 75% of all species, and 94.3% of all individuals.

During spring migration, 734 individuals, representing 52 species, were observed. The most abundant species were American robin and Black-eyed junco. Based on the lack of diverse habitats available within, the Project Area does not offer many obvious attractants to passing migrants. Despite this, several obvious migrants were observed during spring. Obvious migrants were primarily solitary, and were not observed in long flight paths or flocks, with the exception of a flock of 24 Blue Jays observed on May 15, 2012. No obvious concentration of sea ducks or shorebirds were observed. The most abundant group observed on site during spring migration was passerines, which account for 78% of all species, and 94.7% of all individuals.

A total of 152 individuals representing 45 species were observed during the breeding season; the three most abundant of which were Magnolia warbler, Dark-eyed junco, and Blue-headed vireo. Since the site surveyed is a relatively small part of the surrounding area, however, it is not possible to confirm that all species listed were actually nesting within the boundaries of the site. For instance, for a bird that was observed carrying food (confirmed breeding evidence), it is possible that the bird was nesting on an adjacent parcel of land.

All of the species identified are native species expected to be found in this area of Nova Scotia and the province in general, and within the typical and common habitat associated with the Project and surrounding landscape. The most abundant group observed on site during the breeding season was passerines, which account for 71% of all species, and 63.8% of all individuals. Raptor species were the next most abundant by number of individuals. However with respect to raptors, it cannot be determined if there were a total of 35 individual birds in the area or a single bird of each species of raptor identified numerous times.

During fall migration, a total of 422 individuals were observed, representing 46 species. The most abundant species observed were the American Robin, Dark-Eyed Junco, and Yellow-rumped warbler. The most abundant group observed on site during the fall migration period was passerines, which account for 82% of all species, and 92% of all individuals. Raptor species were the next most abundant by number of individuals but dropped significantly from numbers found during the breeding bird survey.

One visit was made to the Project Area during the winter season in March 2013. A total of 4 individuals representing 3 species were observed during the transect surveys. The following species were observed: American Crow – 1 individual, Black-Capped Chickadee – 2 individuals, and Red Tailed Hawk – 1 individual. This site does not support a diverse or abundant community of winter resident species. Species noted are typical winter species in Nova Scotia.

In this study, flight height was estimated, however only limited conclusions can be made with respect to risks posed to birds flying at turbine height. Instead, birds identified as flyovers were assessed to determine the level of passing migrants. Birds observed as flyovers during all Point Counts and transect surveys were recorded as such, to provide an indication of the usage of this airspace by passing migrants.

During spring and fall migration, 25 different species of birds were observed flying over the project lands. This is 37% of all species observed over the course of the avian assessment. Of the 25 species, the mean height of 12 species noted flight height was below 60 metres, and the mean flight height of 13 species was estimated between 60 metres and 140 metres, which is within the Rotor Swept Arc ("RSA"). Only a single bald eagle species were observed over 140 metres.

Avian Species of Conservation Interest and Species at Risk

Eleven (11) species of conservation interest (SOCI) or Species at Risk (SAR) were identified within the Project Area during the baseline avian use assessment from Spring 2013 to Fall 2013. A Species at Risk is one which is legally protected under the federal Species at Risk Act (SARA) or the provincial Nova Scotia Endangered Species Act (NSESA), while a species of conservation interest is one which is listed by the Committee on the Status of Endangered Wildlife In Canada (COSEWIC) or one which is classified as red or yellow by the Nova Scotia Department of Natural Resources (NSDNR) general status of wild species (Province of Nova Scotia, 2011). The species observed include:

Table 13: Avian Species of Conservation Interest/Species at Risk

Species	Code	Listing
Canada Warbler	CAWA	NS Endangered (NSESA)
Common Loon	COLO	Red (NSDNR) Not at Risk (COSEWIC)
Pine Grosbeak	PIGR	Red (NSDNR)
Black backed woodpecker	BBWO	Yellow (NSDNR)
Boreal chickadee	BOCH	Yellow (NSDNR)
Golden-crowned kinglet	GCKI	Yellow (NSDNR)
Gray Jay	GRAJ	Yellow (NSDNR)
Pine Siskin	PISI	Yellow (NSDNR)
Ruby-crowned kinglet	RCKI	Yellow (NSDNR)
Spotted Sandpiper	SPSA	Yellow (NSDNR)
Yellow-bellied flycatcher	YBFL	Yellow (NSDNR)

The most abundant of the listed species was a 'Red' species – the Common Loon. The Common loon was most abundant during migration, suggesting the species was not an abundant resident to the area. This is due to the fact no lakes or waterbodies are located within the Project Area. The Common Loon is classified as 'red' under NSDNR's general status ranks. It is not currently protected under the NSESA, SARA, or listed by COSEWIC.

In total, 28 Common loon individuals were observed through the spring, summer and fall surveys. They are most susceptible to activity in and around lakes (for example, boating and shoreline development), so construction of turbines is not likely to impact their breeding habitat, particularly within this Project Area, as it has no water bodies. Loons were commonly observed as flyovers, likely moving over the Project Area. Loons are most susceptible to activity in and around lakes (for example, boating and shoreline development), so construction of turbines is not likely to directly impact their breeding habitat. As such the construction of a single turbine is not expected to pose a significant risk to Common Loons as they pass over the Project Area.

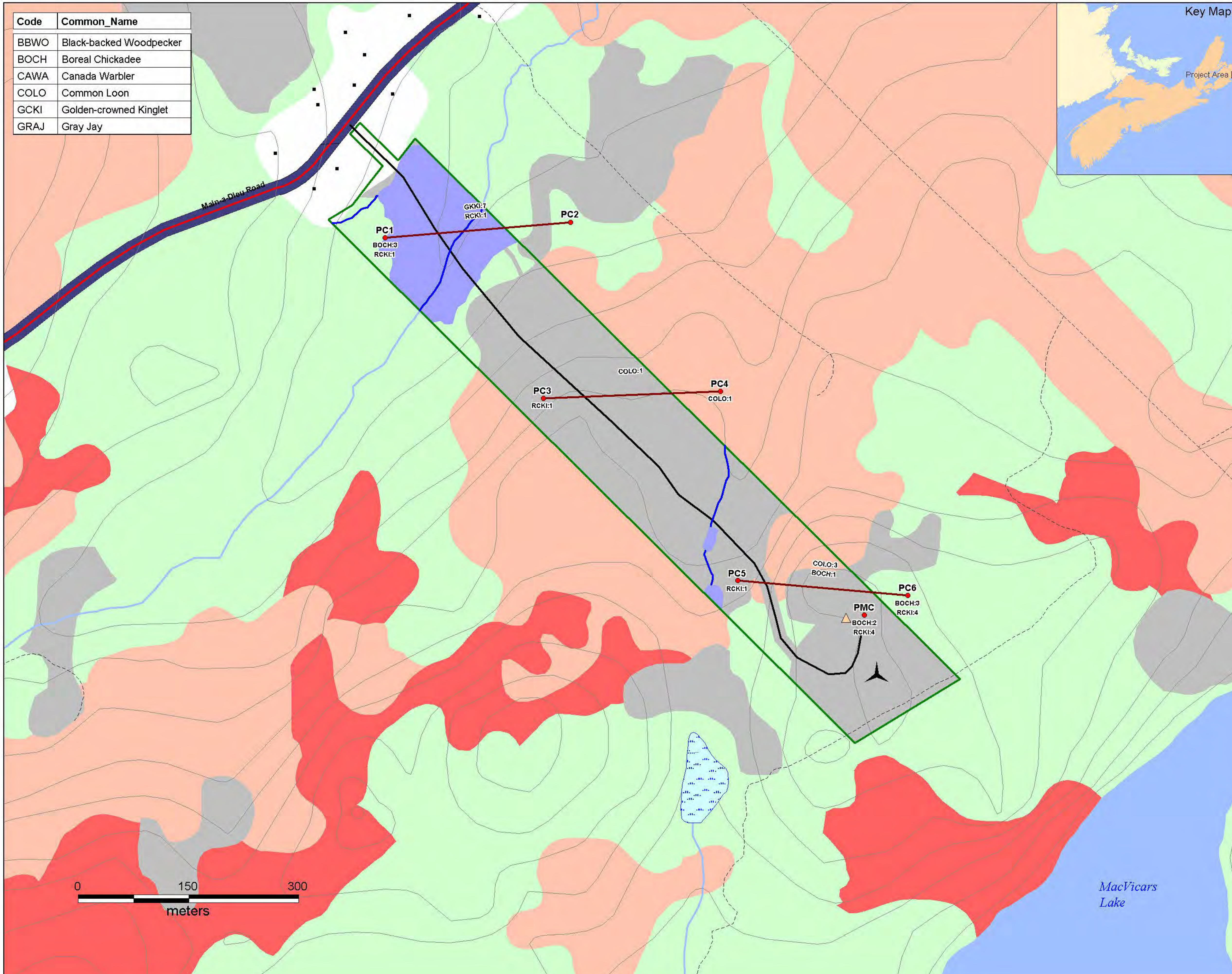
A single Canada Warbler was identified during the breeding bird survey and is listed as endangered under the Nova Scotia Endangered Species Act (NSESA). It is not expected that the Canada Warbler uses the Project area for breeding, as it was not observed more than once within the Project Area during June and July, when the species is typically nesting. The species was identified during area searches, and was noted to be approximately 50 metres from the observer near a stream, located north east of the existing road.

The second most abundant was the "Yellow" listed Ruby Crowned Kinglet, with a total of 25 individuals observed during all baseline surveys, with the most observed during spring surveys.

These species are fairly common in coniferous and deciduous forests throughout Nova Scotia. The Project Area does not offer any rare or unique habitat types upon which these species rely.

Figures 8-10 show all bird survey locations (Spring and Fall migration, and the breeding bird survey). These Figures show the results of bird SOCI and SAR for each survey season.

Code	Common_Name
BBWO	Black-backed Woodpecker
BOCH	Boreal Chickadee
CAWA	Canada Warbler
COLO	Common Loon
GCKI	Golden-crowned Kinglet
GRAJ	Gray Jay



CELTIC CURRENT

Bateston Community Wind Project

Figure 8
Spring Migration Survey Locations and Results

Legend:

Bird Samples
- Point Count
- Transect
- COLO:3 RCKI:1 Species:Frequncy

Habitat Type
- Softwood Forest
- Mixedwood Forest
- Hardwood Forest
- Recent Harvest

Project Features
- Project Area
- Existing Access Road
- Met Tower
- Proposed E92 Turbine

Existing Features
- Road
- Trail
- Stream
- Contour
- Water
- Swamp
- Field Delineated Wetland
- Field Delineated Watercourse

McCallum Environmental Ltd.

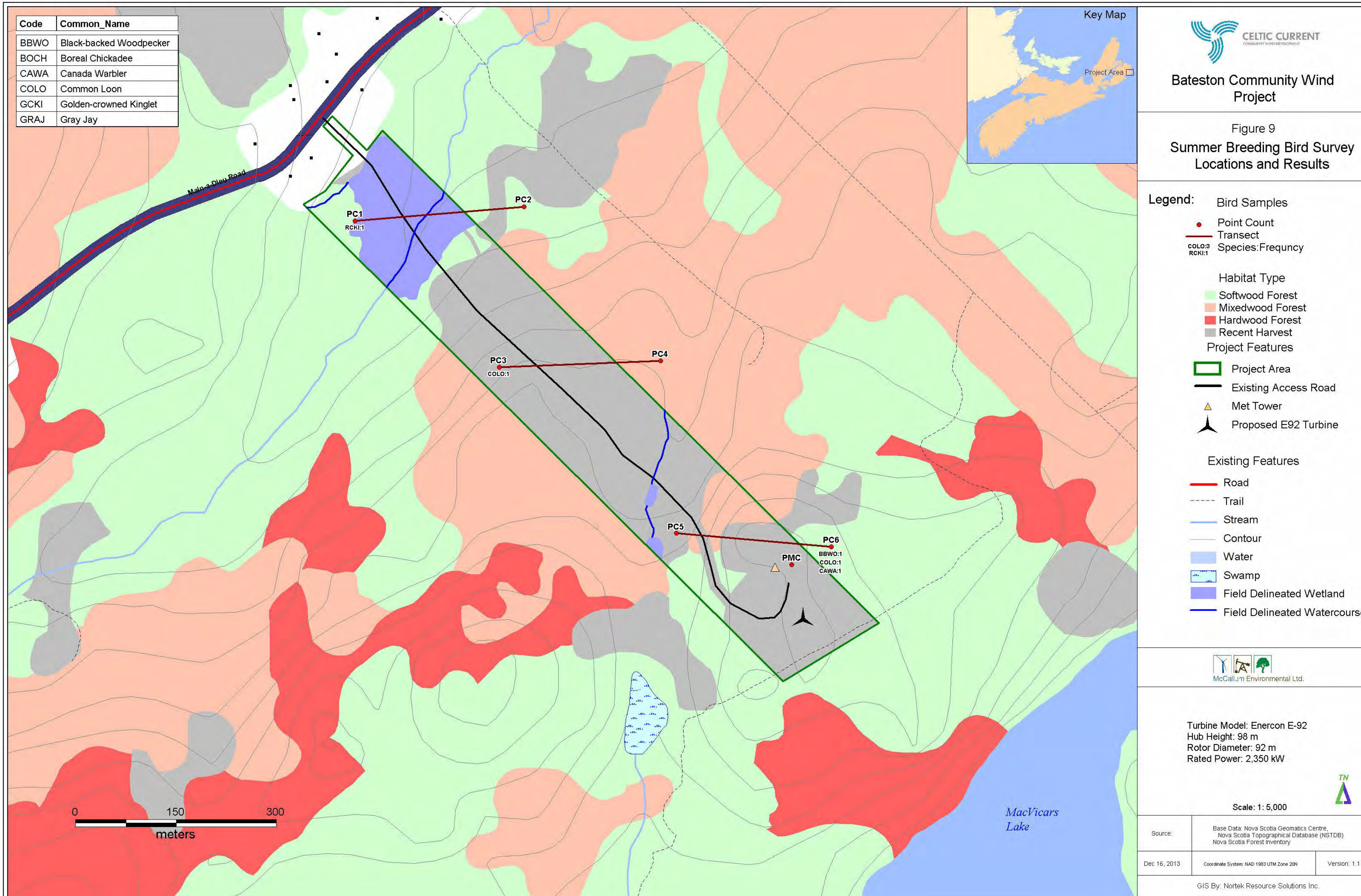
Turbine Model: Enercon E-92
Hub Height: 98 m
Rotor Diameter: 92 m
Rated Power: 2,350 kW

TN

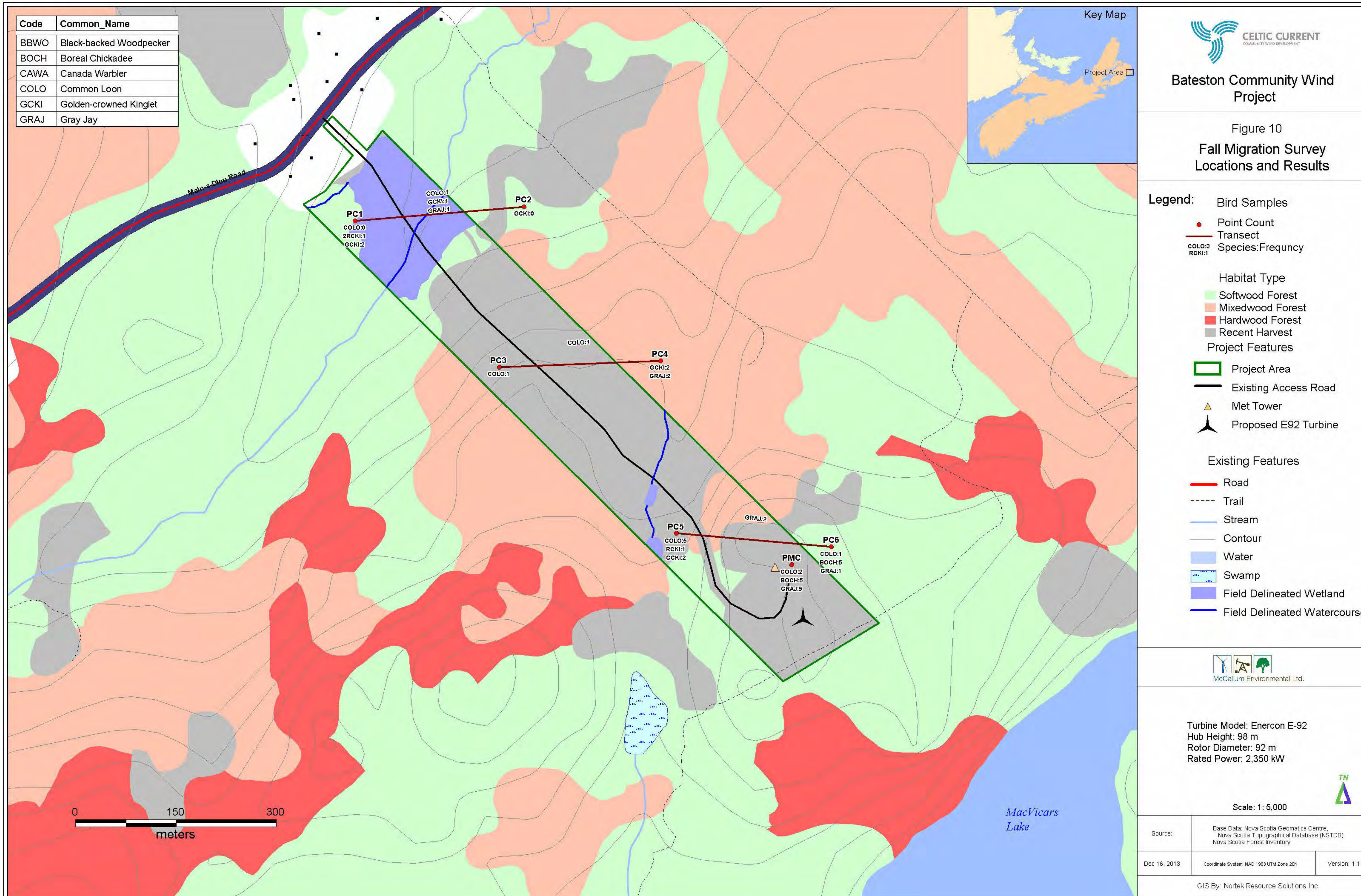
Scale: 1: 5,000

Source:	Base Data: Nova Scotia Geomatics Centre, Nova Scotia Topographical Database (NSTDB) Nova Scotia Forest Inventory	
Dec 16, 2013	Coordinate System: NAD 1983 UTM Zone 20N	Version: 1.1

GIS By: Nortek Resource Solutions Inc.



Code
Common_Name
BBWO Black-backed Woodpecker
BOCH Boreal Chickadee
CAWA Canada Warbler
COLO Common Loon
GCKI Golden-crowned Kinglet
GRAJ Gray Jay
Main-a-Dieu Road
PC1
RCKI:1
PC2
PC3
COLO:1
PC4
PC5
PC6
BBWO:1
COLO:1
CAWA:1
PMC
MacVicars Lake
0
150
300
meters
Key Map
Project Area
CELTIC CURRENT
Bateston Community Wind Project
Figure 9
Summer Breeding Bird Survey Locations and Results
Legend:
Bird Samples
Point Count
Transect
COLO:3
RCKI:1
Species:Frequncy
Habitat Type
Softwood Forest
Mixedwood Forest
Hardwood Forest
Recent Harvest
Project Features
Project Area
Existing Access Road
Met Tower
Proposed E92 Turbine
Existing Features
Road
Trail
Stream
Contour
Water
Swamp
Field Delineated Wetland
Field Delineated Watercourse
McCallum Environmental Ltd.
Turbine Model: Enercon E-92
Hub Height: 98 m
Rotor Diameter: 92 m
Rated Power: 2,350 kW
TN
Scale: 1: 5,000
Source:
Base Data: Nova Scotia Geomatics Centre,
Nova Scotia Topographical Database (NSTDB)
Nova Scotia Forest Inventory
Dec 16, 2013
Coordinate System: NAD 1983 UTM Zone 20N
Version: 1.1
GIS By: Nortek Resource Solutions Inc.



Code | Common_Name
BBWO Black-backed Woodpecker
BOCH Boreal Chickadee
CAWA Canada Warbler
COLO Common Loon
GCKI Golden-crowned Kinglet
GRAJ Gray Jay
Main-a-Dieu Road
PC1
COLO:0
RCKI:1
GCKI:2
COLO:1
GCKI:1
GRAJ:1
PC2
GCKI:0
COLO:1
PC3
COLO:1
PC4
GCKI:2
GRAJ:2
GRAJ:2
PC5
COLO:5
RCKI:1
GCKI:2
PC6
COLO:1
BOCH:5
GRAJ:1
PMC
COLO:2
BOCH:5
GRAJ:9
0
150
300
meters
MacVicars Lake
Key Map
Project Area
CELTIC CURRENT
Bateston Community Wind Project
Figure 10
Fall Migration Survey Locations and Results
Legend:
Bird Samples
Point Count
Transect
COLO:3 RCKI:1 Species:Frequncy
Habitat Type
Softwood Forest
Mixedwood Forest
Hardwood Forest
Recent Harvest
Project Features
Project Area
Existing Access Road
Met Tower
Proposed E92 Turbine
Existing Features
Road
Trail
Stream
Contour
Water
Swamp
Field Delineated Wetland
Field Delineated Watercourse
McCallum Environmental Ltd.
Turbine Model: Enercon E-92
Hub Height: 98 m
Rotor Diameter: 92 m
Rated Power: 2,350 kW
TN
Scale: 1: 5,000
Source:
Base Data: Nova Scotia Geomatics Centre, Nova Scotia Topographical Database (NSTDB) Nova Scotia Forest Inventory
Dec 16, 2013
Coordinate System: NAD 1983 UTM Zone 20N
Version: 1.1
GIS By: Nortek Resource Solutions Inc.

5.4.5 Bat Use

An assessment of bat species composition and activity for the Bateston Community Wind Project was completed by McCallum Environmental Ltd. and Boreal Environmental Ltd. in August and September 2013.

Consistent with the requirements as set out by the Nova Scotia Department of Environment (Nova Scotia Environment, 2007, updated 2012) the following four objectives were established for the proposed Bateston Community Wind Project:

(1) To review of the potential impacts of wind turbine developments on bats;
(2) To provide a summary of the ecology of the bat species that are likely to be present in the area that is relevant to the proposed development;
(3) To assess whether there are any known bat hibernacula within 25 km of the proposed development site; and,
(4) To conduct a survey to count local species richness and assess the level of bat activity levels at the site (as bat passes/night).

In Nova Scotia there are occurrence records for seven bat species, and each have been documented to have experienced fatalities at wind turbine sites (Arnett et al. 2008). Nova Scotia is at, or near the periphery of the current known range for each of these species, except the northern long-eared bat and the little brown bat (van Zyll De Jong, 1985). These two species, as well as the tri-colored bat, appear to be the only bat species with significant populations in Nova Scotia (Broders et al., 2003; Farrow and Broders 2011). Little brown bats and northern long-eared bats have been known to exist across Nova Scotia but the population of tri-colored bats appear to be restricted to southwestern region (Broders et al., 2003; Farrow and Broders 2011; Rockwell, 2005). The low number of echolocation recordings of migratory species (i.e., red, hoary and silver-haired bats; 15 out of 30 000 echolocation sequences) by Broders (2003) and other unpublished work suggests there are no significant populations or migratory movements of these species in southwest Nova Scotia. As for big brown bats, there is only one unconfirmed observation of 2 individuals of this species hibernating at Hayes Caves, there are no other confirmed records (Moseley, 2007; Taylor, 1997).

In July 2013, the three resident species of bat in Nova Scotia (Little brown bat, Northern long-eared bat, and Tri-colored bat), were listed as endangered species under the Nova Scotia Endangered Species Act (NSESA) as a result of a major outbreak of the disease known as White Nose Syndrome (WNS), which is caused by the fungus, *Geomyces destructans*.

Little brown bat, which was once the most common bat in Nova Scotia is now endangered as a result of WNS. The disease has killed nearly 7 million bats in eastern North America in the past 8 years and estimates of a 90% percent decline in Nova Scotia have taken place in just 3 years since the disease was first recorded (NSDNR 2013). There is no known cure for the disease which is lethal and affects all bat species that congregate in caves and abandoned mines used for hibernation through the winter (NSDNR 2013). The Northern long-eared bat is Nova Scotia's second most common bat. It usually hibernates in association with the Little Brown Bat in caves and abandoned mines and at other times of the year is a true forest bat. Northern Myotis are also endangered by White-nose-Syndrome (NSDNR 2013).

The Tri-colored Bat, or Eastern Pipistrelle is the rarest of three congregatory bats that occur in the province. The Nova Scotia population is thought to be geographically isolated (disjunct) from others in eastern North America. Little is known about the ecology of tri-colored bats in the province, but research shows that it uses rivers and streams for feeding. Although white-nose syndrome has not been confirmed in this species in Nova Scotia (likely because the bat was always rare), evidence in the north east US indicates the species has been seriously impacted (NSDNR 2013).

Table 14. Bat species previously recorded in Nova Scotia

Species	Overwintering Strategy	Documented fatalities at wind farms?	Global ranking[2]	Federal, Provincial or ACCDC Ranking
Little brown bat	Resident hibernator (NS and NB)	Yes	G5	NSESA (endangered)
Northern long-eared bat	Resident hibernator (NS and NB)	Yes	G4	NSESA (endangered)
Tri-colored bat	Resident hibernator (NS and NB)	Yes	G5	NSESA (endangered)
Big brown bat	Resident hibernator (NB)	Yes	G5	N/A
Hoary bat	Migratory	Yes	G5	S2
Silver-haired bat	Migratory	Yes	G5	S1
Eastern red bat	Migratory	Yes	G5	S2

1 Bat species documented in fatality events from carcass surveys conducted at wind energy development sites in N.A.
2Global ranking based on the NatureServe Explorer, G5= **Secure**—Common; widespread and abundant: G4= **Apparently Secure**—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
3Atlantic Canada Conservation Data Centre ranking, based on occurrence records from NB and NS; S1= **Extremely rare**--May be especially vulnerable to extirpation (typically 5 or fewer occurrences or very few individuals; S2= **Rare**--May be vulnerable to extirpation due to rarity or other factors (6 to 20 occurrences or few remaining individuals); S4= **Usually widespread**-- fairly common and apparently secure with many occurrences; (?) qualified as inexact or uncertain.
NSESA ranking: http://novascotia.ca/natr/wildlife/biodiversity/species-list.asp

Potential for hibernacula in Project area

The guide to wind development prepared by the Nova Scotia Department of Environment and Labour (NSDEL, 2007, updated January 2012) states that wind farm sites within 25 km of a known bat hibernaculum have a 'very high' site sensitivity.

There are no potential hibernacula identified near the Project Area. The closest site mentioned by Moseley (2007) as a potential hibernaculum is Hirschfield Galena Prospect (an abandoned mine adit with a surveyed length of 215 m). This site is located on the mainland of Nova Scotia approximately 65 km southwest of the Canso causeway. Moseley described this location as a significant hibernaculum with 200-300+bats. The species composition was not confirmed, but probably was mostly *M. lucifugus*.

There are ≥100 government records of abandoned mine openings within 25 kms of the proposed development site. However, the majority of these openings are within the urban area of Glace Bay Nova Scotia approximately 23 km from the Project Area. These sites would not be significantly affected by the development of the Bateston Community Wind Project. Three sites are located southwest of Louisburg approximately 18-20 km from the Project Area. These three records have original depth records <30 m. To the knowledge of the project team, none have been surveyed for bats.

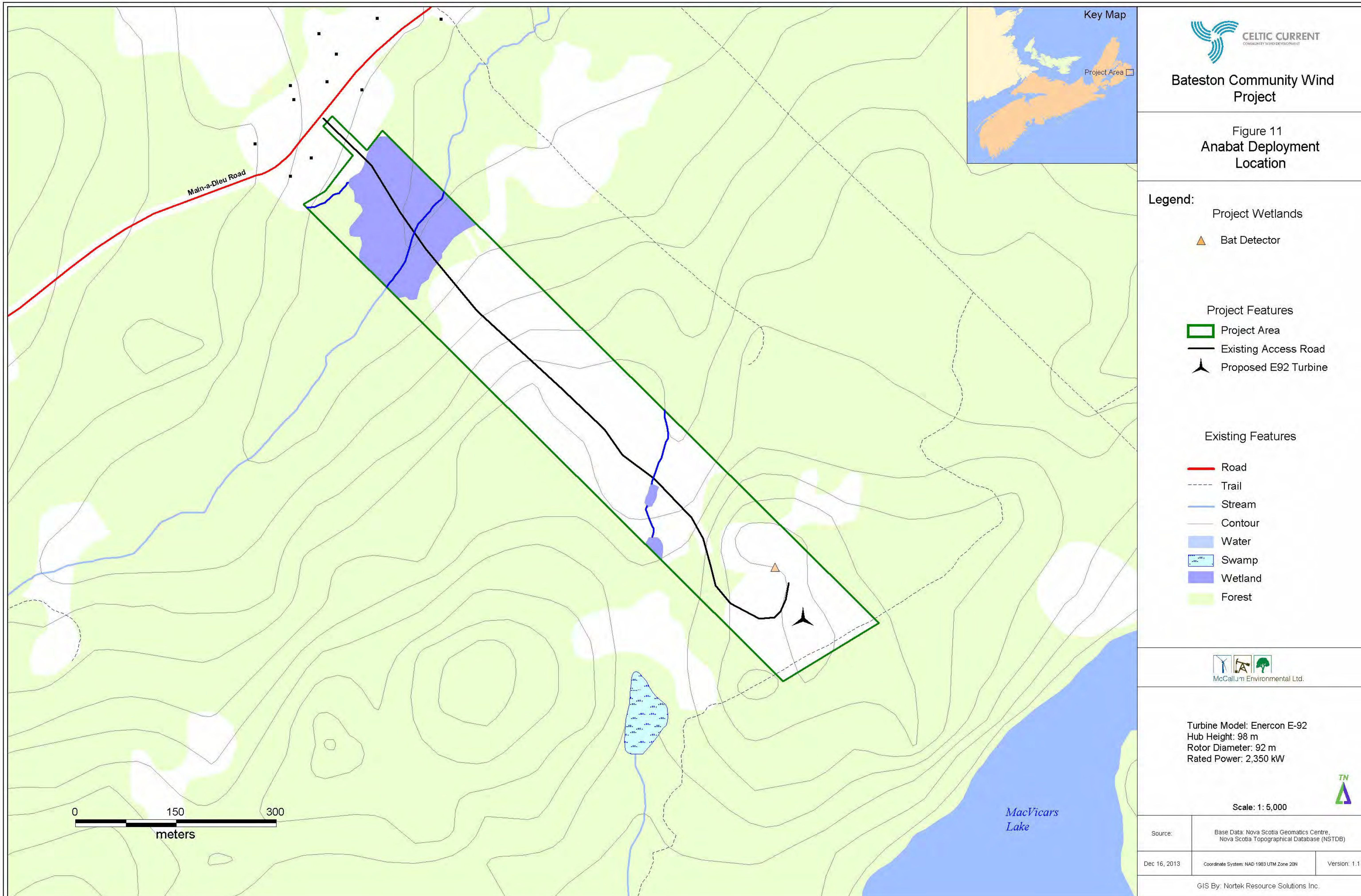
Acoustic Detection Results

An echolocation survey was conducted at one location within the Bateston study area for 28 days from August 25th until September 21nd, 2013. The location of this survey is shown on Figure 11. Echolocation detection equipment was placed at the location of the proposed wind turbine adjacent to an existing meteorological tower. A total of 18 files recorded over the survey period all of the files were determined to be extraneous noise. These files were recorded on August 25th and 26th, no files were recorded beyond this point in the study.

Because no bat generated ultrasound was detected over the duration of the study, log files were examined to determine if the Anabat echolocation detector functioned properly. Log files contain information that allows one to determine if the detection equipment turned "on" and "off" at pre-programmed intervals and whether or not ultrasound files were recorded for each night. The detection equipment appears to have functioned properly during the study period, turning on and off at the pre-program time, 18:00 and 6:00 respectively.

Discussion

There was no acoustic evidence of a movement or concentration of bats at the study sites during the late summer and fall migration season.


Key Map
Project Area
CELTIC CURRENT
Bateston Community Wind Project
Figure 11
Anabat Deployment Location
Legend:
Project Wetlands
Bat Detector
Project Features
Project Area
Existing Access Road
Proposed E92 Turbine
Existing Features
Road
Trail
Stream
Contour
Water
Swamp
Wetland
Forest
McCallum Environmental Ltd.
Turbine Model: Enercon E-92
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Dec 16, 2013
Coordinate System: NAD 1983 UTM Zone 20N
Version: 1.1
GIS By: Nortek Resource Solutions Inc.
Main-a-Dieu Road
MacVicars Lake
0
150
300
meters

5.4.6 Wildlife Habitat

Habitat across the Project Area is described in detail in previous sections above. The majority of the Project Area has been harvested, and is in early stages of regeneration. These areas generally lack tree cover, and are dominated by early colonizing species.

Habitat within the Project Area is currently somewhat fragmented by small logging roads and ATV trails, and forestry operations. An access road was built in order to access the MET tower location. This road will be maintained and upgraded as necessary as the main access road into the project for the installation of the turbine. The majority of the Project Area has been logged a number of times.

5.4.7 Aquatic Habitats/Fisheries

There are no lakes or areas of open water in the Project Area. One mapped watercourse is present within the Project Area. This watercourse, identified as Watercourse 1, is located on the northwestern edge of the Project Area draining north towards the Mira Bay (Atlantic Ocean). This watercourse drains through a previously identified wetland across the Project Area.

This un-named watercourse (Watercourse 1) is 2-3m wide and up to 50cm deep. While this watercourse has moderate coarse woody debris, low in-stream vegetative cover is present and overhanging vegetative cover is provided by herbaceous vegetative cover. The substrate is a combination of muck and boulders. This watercourse flows under the existing access road to the MET tower through a corrugated plastic culvert. Fish habitat potential within this watercourse is high.

Two additional watercourses were identified during site assessment activities across the Project Area. A small inlet watercourse (Watercourse 2) was identified draining northeast into Wetland 1 at the far western extent of the Project Area. This watercourse is 0.5 m wide and 20 cm deep with a mucky substrate. Fish habitat within this watercourse is very low.

Watercourse 3 was identified in the eastern central portion of the Project Area draining north towards the Mira Bay. This watercourse drains out of a wetland identified at the southern edge of the Project Area north through Wetland 2 and then continues off the property to the north. This watercourse is 0.7m wide and 10-40 cm deep with a mucky substrate. This watercourse would not support fish.

During constraints mapping, known watercourses and/or wetlands were mapped and a 30 metre setback imposed as a buffer.

Figure 12 shows all watercourses identified within the Project Area, as well as mapped watercourses outside the Project Area.

The watercourse crossings along the access road were already constructed with approval from Nova Scotia Environment (NSE) (received by Celtic Current LP in 2013). Any additional new installations or upgrades will be completed in accordance with the Nova Scotia Environment Watercourse Alteration approval process, and all appropriate applications for alteration will be sought prior to construction or upgrading as required.

5.4.8 Wetlands

Wetlands are defined as "a swamp, marsh, bog, fen or other land that is covered by water during at least three consecutive months of the year." Wetland functions are the natural processes associated with wetlands and include water storage, pollutant removal, sediment retention and provision of nesting/breeding habitat. Functions may also include values and benefits associated with these natural processes and include aesthetics/recreation, cultural values, and subsistence production (Environment Canada, 2000). The discussions of wetlands presented herein primarily uses terminology associated with the Canadian Wetlands Classification System (Warner and Rubec 1997) or with the Nova Scotia methods for wetland delineation.

The NSDNR Wetlands Inventory Database (SSHD, 2010) was consulted and, based on the information in this database, no wetlands are identified from that source within the Project Area.

During field surveys across the Project Area, several wetlands were observed, including a large wetland (Wetland 1) located near the western end of the Project Area at the access point from the Main-A-Dieu Road. The access road present on the subject property was constructed in order to allow access to the MET tower and for forestry purposes. Alteration of Wetland 1 was required in order for this access road to be built. A wetland alteration application was submitted by McCallum Environmental Ltd. in June 2013 for Wetland 1 and approval was received for partial alteration of this wetland from Nova Scotia Environment (Approval # 2013-086251).

The boundaries of all other wetlands were delineated in the field to confirm wetland edges across the Project Area. A total of three wetlands (including Wetland 1) were identified within the Project Area and these wetlands are shown on Figure 12.

A minimum setback of 30 meters will be maintained from all wetland habitat for the construction of the turbine pad and other miscellaneous infrastructure associated with the Bateston Community Wind Project.

Table 15. Field identified wetlands within the Project Area

Wetland	Wetland Classification	Approximate Area (ha) within Project Area	Description	Comments relating to wetland alteration
1	Mixed Wood Treed Fen	2.59	Wetland 1 is a mixed wood treed fen in a throughflow position. The canopy cover is dominated by Red Maple, Balsam Fir, White Birch, and Black Spruce, with Cinnamon Fern, Royal Fern, and Three-seeded sedge dominating the herbaceous understory. The soil is saturated at surface and underlain by a restrictive layer of rock.	Approval received from NSE (Approval # 2013-086251)
2	Mixed wood Treed Swamp	0.1083	Wetland 2 is a mixed wood treed swamp, in a throughflow position. The canopy cover is dominated by Yellow Birch and Black Spruce, and Balsam Fir is present as a sapling. The Wetland is relatively open, with a sphagnum ground cover. New York Fern and Spinulose Wood Fern are dominant within the herbaceous cover. The soil is saturated at the surface, with a high water table.	
3	Mixed wood Treed Swamp	0.1067	Wetland 3 is a mixed wood treed swamp, with Red Maple, Balsam Fir and Black Spruce dominating the canopy cover. The shrub and sapling layer is sparse, containing mainly Balsam Fir. Herbaceous vegetation within Wetland 3 is dominated by Long Beech	

			Fern and Three-Seeded Sedge in a sphagnum dominated ground cover. Wetland 3 extends south outside of the subject property. It has an outflow watercourse, which flows north into Wetland 2. The soil is saturated at surface, and the water table is present at surface. A forestry road has impacted the downstream edge of the Wetland, near the outlet point.	

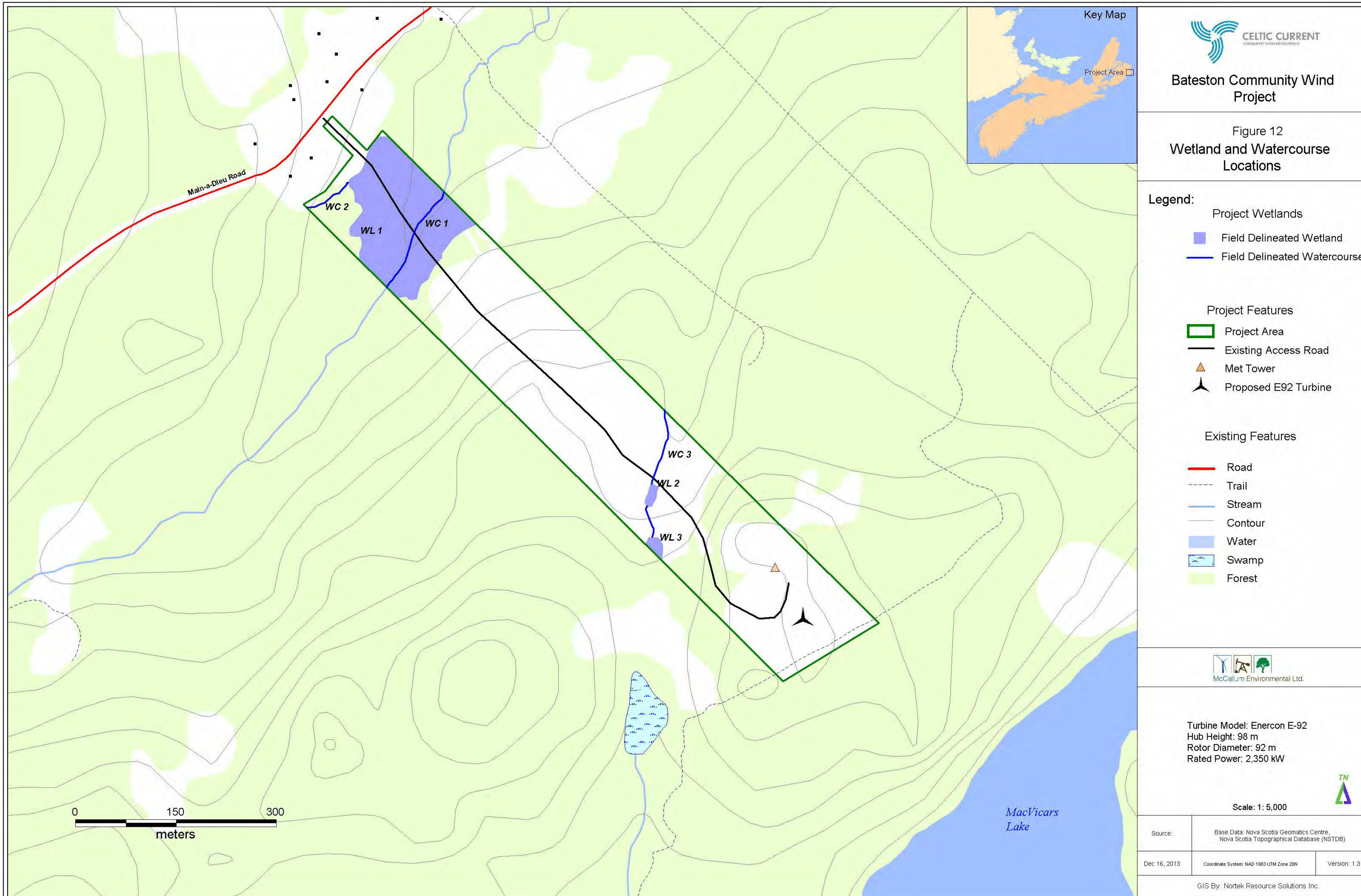
Wetlands identified within the Project Area are in throughflow positions, associated with watercourses draining towards the Mira Bay (Atlantic Ocean) located 1.2 km north of the Project Area.

Wetlands at the Project area are all similar in that they have limited to no open water areas, are generally treed with minimal sapling/shrub understory, and have some depth of peat layer.

Photo 9. Wetland 1.

The characteristics of the wetland systems encountered within the Project boundaries were similar in the following respects:

- Soils display evidence of either periodic or sustained saturation;
- It is expected that the recharge wetlands within the Project boundaries, the surrounding lands watershed complex, and the surface topography contribute to the aquifer quality throughout the region. None of the encountered wetland areas are expected to contribute to aquifer water quality to a greater extent than surrounding areas;
- No water supplies are withdrawn from the wetlands;
- The quality and quantity of vegetation surrounding the wetlands (generally speaking) provide limitations to erosion potential of surrounding lands into the watershed system. Encountered wetlands do not appear to provide erosion control as a function;
- The quantity of vegetation, the low slopes surrounding the wetlands, and the lack of distinguishable flow channels which directly influence water levels suggests that sediment flow to the wetlands are limited and sediment flow stabilization is not a significant characteristic of the wetlands encountered;
- During periods of low precipitation, the wetlands provide nutrient supplies to dependent wildlife. Wildlife indicators around assessed wetlands (i.e. tracks, browse utilization, visible sightings) suggest that the habitat is important for species in the area. Vegetation is consistent with neighbouring wetland areas and as such the wetlands do not appear to provide regionally or locally unique habitat;
- Based upon the results of the public consultation and field assessments, there is no evidence to suggest that any social/commercial/or cultural values are influenced by the wetlands encountered.


Key Map
Project Area
CELTIC CURRENT
Bateston Community Wind Project
Figure 12
Wetland and Watercourse Locations
Legend:
Project Wetlands
Field Delineated Wetland
Field Delineated Watercourse
Project Features
Project Area
Existing Access Road
Met Tower
Proposed E92 Turbine
Existing Features
Road
Trail
Stream
Contour
Water
Swamp
Forest
McCallum Environmental Ltd.
Turbine Model: Enercon E-92
Hub Height: 98 m
Rotor Diameter: 92 m
Rated Power: 2,350 kW
TN
Scale: 1: 5,000
Source:
Base Data: Nova Scotia Geomatics Centre, Nova Scotia Topographical Database (NSTDB)
Dec 16, 2013
Coordinate System: NAD 1983 UTM Zone 20N
Version: 1.3
GIS By: Nortek Resource Solutions Inc.
Main-a-Dieu Road
WC 2
WL 1
WC 1
WC 3
WL 2
WL 3
MacVicars Lake
0
150
300
meters

6 SOCIO-ECONOMIC CONDITIONS

The Project is located in Cape Breton, Nova Scotia, near Johnson Lake and MacVicars Lake, and near the shore of the Mira Bay (Atlantic Ocean). Although the Project location is entirely contained in Cape Breton County, impacts and benefits will be attributed to communities across Cape Breton. Background on the area and populations of the county and nearby centres are summarized below.

6.1 Population and Demographics – Cape Breton County

Cape Breton County, the 2nd most populous county in Nova Scotia, had a total census population of 101,619 in the year 2011, approximately 11.0% of the Provincial population. Over the past six years, the population of the county has declined 4.1% while the population for the Province increased by 0.9%.

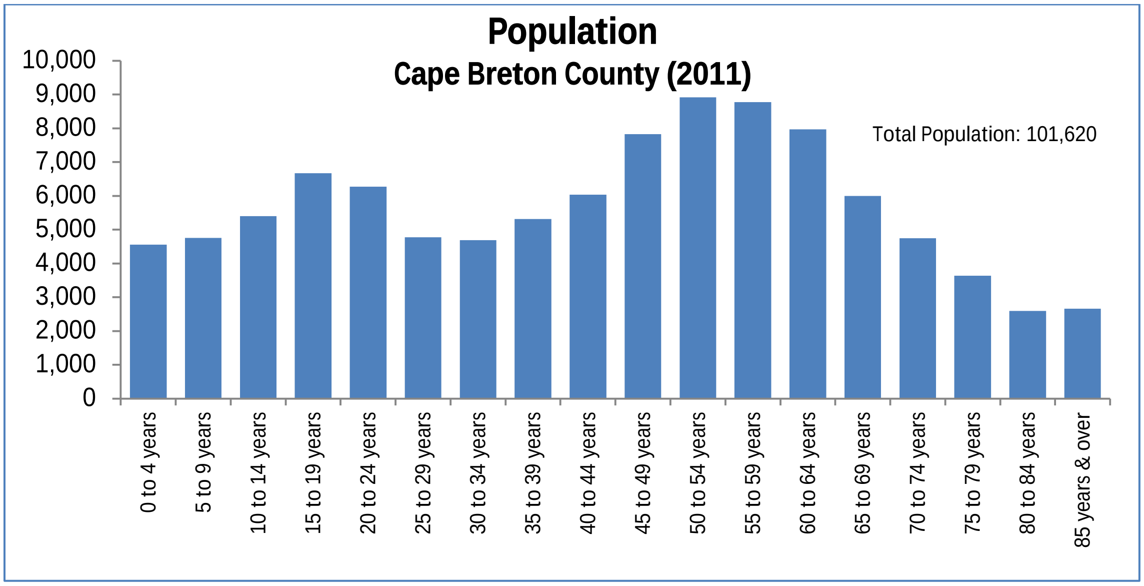
Cape Breton County has several main towns, the largest being Sydney, part of the Cape Breton Regional Municipality. The project location is to the north-east of Louisbourg, and to the south of larger population centres of Sydney, Glace Bay, and New Waterford.

Table 16. Population and Demographics

	Cape Breton County	Nova Scotia
Population in 2011	101,619	921,727
Population in 2006	105,928	913,462
2006-2011 Population Change (%)	-4.1	0.9
Total private dwellings (2011)	45,371	442,155
Total number of households (2011)	41,120	390,280
Population density per square km (2011)	41.1	17.4
Land area (square km) (2011)	2,470.6	52,939.4
Median Age of the Population (2011)	46.6	43.7

The population of Cape Breton County has a median age of 46.6 years, slightly older than that of the province as a whole, which has a median age of 43.7.

Figure 13: Population by Age Cohort, Cape Breton County



Source: Statistics Canada 2011 Census of Population Community Profiles

Median income in Cape Breton County (2011) for persons 15 years and older with income was $23,984. 63.3 percent of income came from earnings, while 23.9% came from Government Transfers.

6.2 Health, Industry and Employment

The Bateston area is served by the Cape Breton Health Authority, which is served by the Cape Breton Regional Hospital, the Collaborative Emergency Centre in New Waterford, as well as the existence of six community health boards. There are various facilities in New Waterford, Glace Bay, North Sydney, Sydney Mines, as well as facilities further away (Neil's Harbour, Baddeck, Cheticamp, and Inverness). Some 3,500 staff members and 270 medical staff are employed by the Cape Breton District Health Authority.

Table 17. Labour Force by Industry, Cape Breton County

Industry	Total	Male	Female
Total labour force population aged 15 years and over by industry - North American Industry Classification System (NAICS) 2007	46,760	23,310	23,455
Agriculture; forestry; fishing and hunting	1,170	990	185
Mining; quarrying; and oil and gas extraction	825	745	80
Utilities	470	415	50
Construction	3,370	3,135	230
Manufacturing	1,450	1,170	285

Wholesale trade	1,120	915	210
Retail trade	6,095	2,835	3,260
Transportation and warehousing	1,810	1,540	265
Information and cultural industries	605	380	225
Finance and insurance	1,025	325	700
Real estate and rental and leasing	510	380	130
Professional; scientific and technical services	1,395	735	660
Management of companies and enterprises	0	0	0
Administrative and support; waste management and remediation services	3,685	1,800	1,885
Educational services	4,120	1,315	2,810
Health care and social assistance	7,500	1,380	6,120
Arts; entertainment and recreation	1,100	595	500
Accommodation and food services	3,470	1,015	2,455
Other services (except public administration)	1,555	795	760
Public administration	3,475	1,700	1,775

Source: Statistics Canada 2011 National Household Survey

About 50 percent of the experienced labour force in Cape Breton County is male. In 2011, the majority of the labour force worked in the service producing industries. Health care and social assistance and retail trade are the largest employer occupations. Accommodation and food services and other services would be included in the tourism sector, which would also be supported by the Wholesale and Retail trade industries. Eleven percent of the labour force in the county worked in the construction and manufacturing industry combined.

The participation rate (the percentage of working age population in the labour force) in 2011 for the county was 55.0 percent, slightly lower than the provincial average of 63.1 percent. The unemployment rate for Cape Breton County in 2011 was 16.6 percent, substantially higher than the provincial average of 10.0 percent.

6.3 Tourism and Cape Breton

Nova Scotia markets itself as a tourism destination, with a tourism industry that contributes more than $722 million to provincial GDP (2010), and with 34,400 direct and spinoff jobs.

Drawing visitor revenues of $251 million in 2010, the tourism industry is important to Cape Breton, with vast wild areas, the scenic Bras d'Or lakes, and Cabot Trail that skirts the top of Cape Breton Island, where the Cape Breton Highlands National Park lies. Provincial parks in the area include Dundee, Burnt Island, Port Michaud beach, Battery, and the Isle Madame parks (Lennox Passage and Pondville Beach)

The greater Cape Breton region boasts heritage sites, and provides many types of all-season tourism. The eastern part of the Island is home to Isle Madame, home to the largest number of lighthouses in Canada. Golf destinations and premiere accommodations are popular destinations for tourists. Historic and cultural destinations such as the Alexander Graham Bell museum in Baddeck, the Fortress of Louisbourg and the Gaelic College of Celtic arts and crafts are important to the rich cultural history of the area. The region is popular for paddling, fishing and hiking.

6.4 Property Values

There were 42,325 private dwellings in Cape Breton County in 2011, with an average value of $129,412 (35.9% lower than the Provincial average). Seventy-one percent of dwellings in Cape Breton County were owned, and the majority (75.5%) of dwellings was constructed prior to 1990.

The concern that property values will be adversely affected by the Project is a concern raised at other wind power projects throughout North America. In 2009, the most comprehensive study known (at that time) was commissioned by the U.S. Department of Energy to determine if this impact does in fact exist. (Hoen, Wiser, Cappers, Thayer, & Sethi, 2009) The study collected data on almost 7,500 sales of single family homes situated within 10 miles of 24 existing wind facilities in nine different U.S. states (Hoen, Wiser, Cappers , Thayer, & Sethi, 2009). In addition, the study reviewed a number of data sources and published material. Although that reviewed information addressed concerns about the possible impact of wind energy facilities on the property values of nearby homes, Hoen et al. found that “the available literature that has sought to quantify the impacts of wind projects on residential property values has a number of shortcomings”. The list of shortcomings identified in that study (Hoen, Wiser, Cappers , Thayer, & Sethi, 2009) are as follows:

1. Studies relied on surveys of homeowners or real estate professionals, rather than trying to quantify real price impacts based on market data;
2. Studies relied on simple statistical techniques that have limitations and that can be dramatically influenced by small numbers of sales transactions or survey respondents;
3. Studies used small datasets that are concentrated in only one wind project study area, making it difficult to reliably identify impacts that might apply in a variety of areas;
4. Many studies had no reported measurements of the statistical significance of their results;
5. Many studies have concentrated on an investigation of the existence of Area Stigma, and have ignored Scenic Vista and/or Nuisance Stigma;
6. Only a few studies included field visits to homes to determine wind turbine visibility and collect other important information about the home (e.g., the quality of the scenic vista); and,
7. Only two studies have been published in peer-reviewed academic journals.

Ultimately, the Hoen et al. study indicated that “none of the models uncovers conclusive evidence of the existence of any widespread property value impacts that might be present in communities surrounding wind energy facilities. Specifically, neither the view of the wind facilities nor the distance of the home to those facilities is found to have any consistent, measurable, and statistically significant effect on home sales prices. Although the analysis cannot dismiss the possibility that individual homes or small numbers of homes have been or could be negatively impacted, it finds that if these impacts do exist, they are either too small and/or too infrequent to result in any widespread, statistically observable impact." (Hoen, Wiser, Cappers , Thayer, & Sethi, 2009)

Critiques have been developed in response to the Hoen report, notably by Wayne Gulden at Wind Farm Realities (2010) and Albert Wilson in 2010. These both outline concerns with methodology in the Hoen report including the conclusion that the analytical methods can not be shown to be reliable or accurate (Gulden 2010 and Wilson 2010). Another study completed by Gardner Appraisal Group Inc. in Texas, USA (Gardner 2009) states that " market data and common sense tell us property values are negatively impacted by the presense of wind turbines." (Gardner 2009). This study was completed for a conference in February 2009.

As a follow up to the Hoen et al. study completed in 2009, a recent study published in August 2013 was conducted to address these apparent gaps in data. This study, completed by Berkeley National Laboratory, involved the collection of data from 51,276 homes across 27 counties and nine states in the USA relating to 67 different wind facilities (Hoen et al, 2013). All homes included in the study were within a 10 mile radius of a wind power project and 1,198 homes were within a 1 mile (1.6 km) radius of a wind power project.

The study results revealed no statistical evidence that residential property values near turbines were affected in the post-construction or post-announcement/pre-construction periods. Therefore, the authors conclude that if effects do exist, either the impacts are sporadic and impact only a small subset of homes, or are relatively small and are present within the margin of error in the models (Hoen et al. 2013).

Further review of available literature did not find significant additional studies to aid in determining effect of wind projects on surrounding property values.

6.5 Recreation

Land use is dominated by active timber harvesting and there is only limited hiking, birding and general human activity within the Project Area. There are no public trails within the Project Area, but small ATV and hiking trails do exist, most likely along old logging trails. All-Terrain Vehicles (ATV) use is present within the Project area along these old logging trails. No other public recreational lands exist within the Project boundaries.

The closest Provincial Park to the Project Area is Mira River Provincial Park located near Albert Bridge on Brickyard Road, just 12 km northwest of the Project Area. Jutting out into the famous Mira River and only minutes from Sydney or Fortress Louisbourg National Historic site, Mira River offers a wide range of outdoor opportunities including camping, walking, boating, canoeing, water skiing, fishing, and swimming.

Fortress of Louisbourg, a Canadian National Historic Site, is located southwest of the Project Area along the southern coast of Cape Breton Island. Louisbourg is approximately 11 km southwest of the Project. The Fortress of Louisbourg was one of the busiest harbours in North America and one of France's key centres of trade and military strength in the New World. It is now a national historic site.

7 ARCHAEOLOGICAL RESOURCES

Two phases of the archaeological resource impact assessment were completed for the Bateston Community Wind Project. The first, Phase I, was a historical assessment of the potential for archaeological resources to be present inside the Project Area. The second, Phase II, was the field reconnaissance program and was completed for all infrastructure associated with the proposed turbine location of this project. The results described below are taken directly from the assessment completed by Davis McIntyre & Associates.

7.1 Phase I

The Maritime Archaeological Resource Inventory, managed by the Nova Scotia Culture and Heritage Development Division, was consulted in May 2013 to determine if known archaeological resources exist near the study area. Five resources were identified through this process, but none within or adjacent to the study area.

It was recommended that an archaeological reconnaissance be conducted once the location of the turbine, access road, and other necessary infrastructure were known, and before any ground disturbance (Phase II).

7.2 Phase II

An archaeological field reconnaissance was conducted on May 8th, 2013 directed by Stephen Davis. The reconnaissance included an access road that had been built of grey gravelly fill prior to reconnaissance as well as a meteorological (MET) tower and its cleared pad at the termination of the road.

During the field reconnaissance, no areas of heightened archaeological potential were noted and no cultural features, aside from modern logging and construction materials, were noted.

Research and field reconnaissance in the study area revealed the presence of no areas of elevated archaeological potential or archaeological features.

The report in its entirety can be found in Appendix V.

8 ADDITIONAL CONSIDERATIONS

8.1 Sound

Wind turbines generate sound from two primary sources: the mechanical equipment (gearbox and generator), and the aerodynamic sound from the interaction of the air with the turbine parts, primarily the blades (NRC 2007). In modern turbine designs, much of the mechanical sound is mitigated through the use of noise insulating materials.

Aerodynamic noise, produced by the flow of air over blades, is created by blades interacting with eddies created by atmospheric inflow turbulence and is thus an unavoidable aspect of wind power operations (NRC 2007). The movement of sound from the turbine source to a receptor, such as a residential dwelling, is influenced not only by the sound power level emitted from the turbine, but also by local factors such as distance to the receptor, topography, and weather conditions (Hau 2006). For example, increases in wind speed result in increases in ambient, natural noise (from vegetation movement) that can mask the sounds emitted from the turbine(s) (NRC 2007).

Nova Scotia has no specific sound regulations for wind projects. Through the environmental assessment process, NSE requires that noise levels at identified residential receptors are modeled to predict sound pressure output. The sound output at each residential receptor should not exceed 40 dBA. NSE guidance also recommends sound modelling for camps/cottages, hospitals, schools, and daycares. This guideline was used in the current sound assessment for the Bateston Community Wind Project.

Construction and decommissioning activities will generate noise from the use of heavy machinery and vehicles, and potential blasting if necessary during the construction period and decommissioning phase. These impacts will occur during normal working hours, be short in duration, and given the rural and industrial location of the Project (adjacent to several quarries), are not expected to be a significant impact on the surrounding communities.

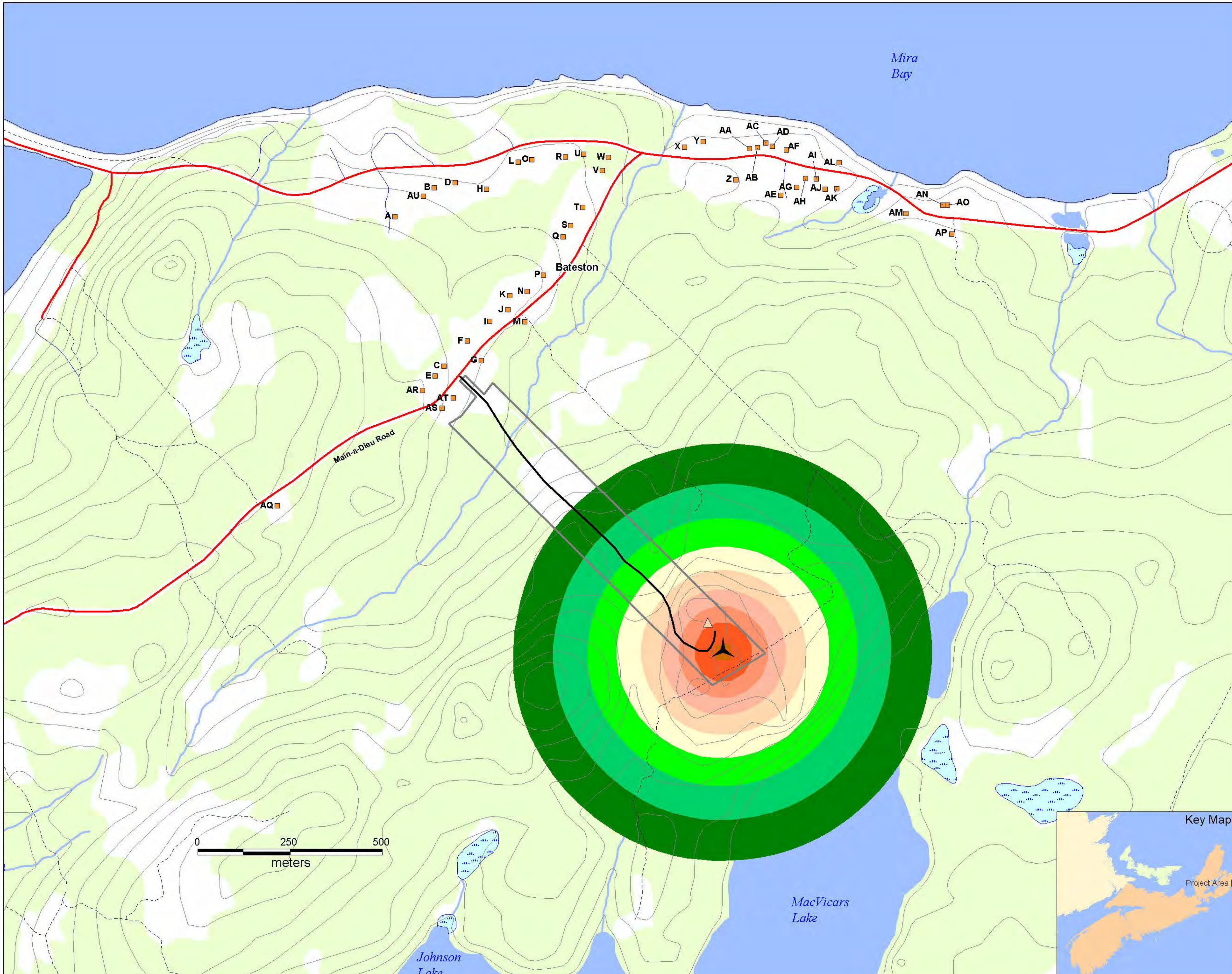
A Sound Impact Assessment (SIA) has been completed for this Project by AL-PRO Wind Energy Consulting Canada Inc. (AL-PRO). This report can be found in Appendix VI.

No sensitive receptors (hospitals, schools, elderly care facilities, daycares) are present within a 2 km radius from the Project Area. All residential receptors present within a 1500 m radius of the Project area were identified during field assessments in 2013. A total of 47 receptors were identified within 1500 m. Characteristics of each residence (i.e. number of stories, permanent residence, seasonal, hunting camp) were recorded.

The closest distance between the Bateston Community wind turbine and a Point of Reception is 1009 m (receptor AT). This receptor is located northwest of the Project Area on the project side (southeast) of the Main-A-Dieu Road. This receptor is expected to receive a combined sound pressure of 34.3 dBA from the Bateston Community Wind Project.

The second closest receptor is located 1013 m from the turbine and is identified as Point of Reception AS. This receptor is also located northwest of the Project Area on the project (southeast) side of the Main-A-Dieu Road. This receptor is expected to receive a combined sound pressure of 34.3 dBA from the Bateston Community Wind Project.

The noise level at each Point of Reception within 1500 m of the turbine proposed for the Bateston Community Wind Project was calculated (see attached report). The results show that the Bateston Community Wind Project complies with the applicable NSE environmental sound threshold of 40 dBA. The SIA was modelled for the Enercon E-92 turbine. A sound iso-contour map illustrating the contribution of the wind turbine is shown in the following Figure 14.



CELTIC CURRENT

Bateston Community Wind Project

Figure 13

Predicted Sound Pressure at 8 m/s

Legend: Sound Pressure (dBA)

- 40
- 42
- 44
- 46
- 48
- 50
- 52
- 54
- 56

Project Features

- Project Area
- Existing Access Road
- Met Tower
- Proposed E92 Turbine

Existing Features

- Road
- Trail
- Stream
- Contour
- Water
- Swamp
- Forest
- Receptor with ID

McCallum Environmental Ltd.

Modeled Using:
DIN ISO 9613-2
Acoustics - Attenuation of sound during propogation outdoors

Turbine Model: Enercon E-92
Hub Height: 98 m
Rotor Diameter: 92 m
Rated Power: 2,350 kW

Scale: 1: 10,000

Source:	Base Data: Nova Scotia Geomatics Centre, Nova Scotia Topographical Database (NSTDB)

Dec 17, 2013	Coordinate System: NAD 1983 UTM Zone 20N	Version: 1.1

GIS By: Nortek Resource Solutions Inc.

8.2 Visual

Any loss of aesthetic value associated with the Project may be as a result from the physical presence of new turbines, trails, increased traffic, and changes in vegetation and wildlife communities. The greatest impact will be associated with the physical presence of the turbine.

Currently, no data is available which indicates how wind power project visual thresholds are defined or exceeded. Therefore it is assumed that much of the aesthetic value is perceived by residents and visitors to the area. In order for the public and regulatory personnel to effectively estimate the visual effect of the Project, the following was completed:

1. A visual representation of the Project from 3 vantage points surrounding the Project Area. The visual representations were provided in poster board format to the public during an Open House on May 16, 2013 at the Bateston Fire Hall located directly across the Main-A-Dieu Road from the Project Area. These visual representations have been recently updated to reflect a change in turbine hub height (from 85 m to 98 m). The updated visual representations are found in Appendix VII.

2. Visual zone of influence analysis. This study uses line of site analysis and incorporates a Digital elevation Model (DEM) obtained from the Nova Scotia Topographic database (1:10,000), the Nova Scotia Forest Inventory database, turbine specific characteristics (hub height, rotor diameter) to create a model that defines the areas from which the tip heights of the turbines can be seen. The incorporation of mean stand height from the forest database provides a realistic viewshed which assumes the observer has an eye height of 1.5 m a.g.l. and that all forests above 1.5 obscure the line of site (Summer conditions). The resultant model identifies whether the turbine will be seen from a geographic area (within which a specific receptor may be located). This map is included in Appendix VII.

In addition to visual impacts and aesthetics experienced by residents, the Project will affect the visual characteristics and, therefore, opinions of visitors to the region. Nova Scotia markets itself as a natural, coastal destination. From a tourism perspective, the question of how the Project will impact the visitor experience from the local scenic perspective is unknown, as that experience is highly subjective.

8.3 Shadow Flicker

The objectives of this analysis are to determine (through computer modeling) the possible visual effects of the designed wind project on the surrounding, local residences.

Shadow flicker caused by wind turbines is defined as alternating changes in light intensity due to the moving blade shadows cast on the ground and objects (including through windows of residences). The effects of shadow flicker are more prevalent when the sun is low in the sky at either sunrise or sunset. The shadow flicker footprint is largest during the winter solstice (December 21st) and is smallest during the summer solstice (June 21) when the suns arc through the sky is higher.

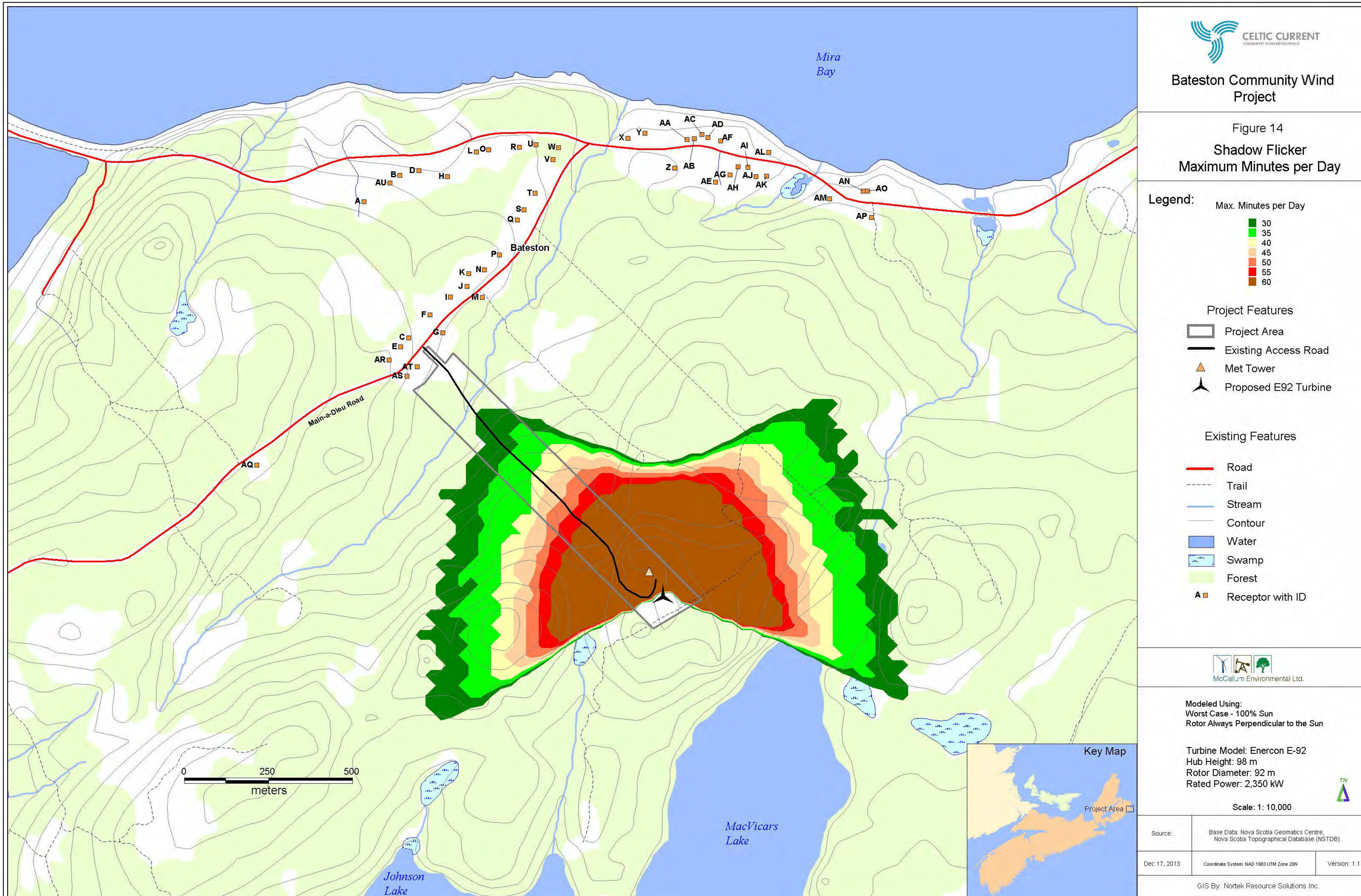
There are no municipal, provincial, or federal regulations related to shadow flicker, but many jurisdictions (including NSE) have adopted the standard of no more than 30 hours of shadow flicker per year, or no more than 30 minutes of shadow flicker on the worst day of the year at receptor locations (e.g., dwellings, cottages/camps, hospitals, schools, and daycares). These guidelines were developed in Germany and are now included under that country's Federal Emission Control Act (as cited in Haugen 2011).

The shadow flicker assessment was completed by AL-PRO and is attached to this document as Appendix VIII. A modeling exercise was completed utilizing the turbine specifications for the Bateston Community Wind Project to determine potential shadow flicker associated with the Project. The potential shadow flicker at multiple Points of Reception surrounding the Project Area was also calculated (see attached report).

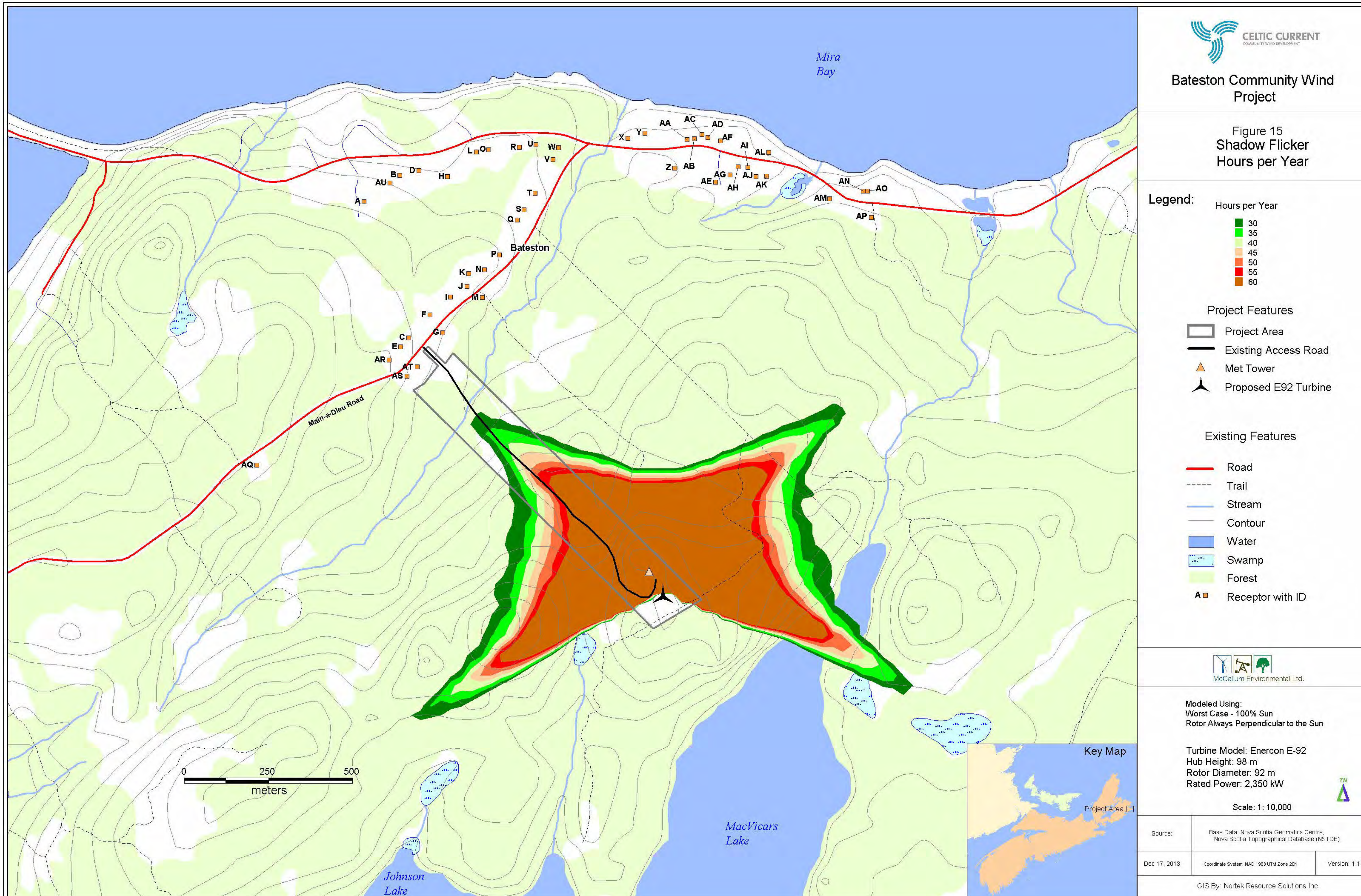
The closest distance between the Bateston Community wind turbine and a Point of Reception is 1009 m (Receptor AT). This receptor is located northwest of the Project Area along the Main-A-Dieu Road. This receptor is expected to receive a maximum of 23 minutes/day and 17hr 28 minutes/year from the Bateston Community Wind Project under a worst case scenario (No cloud cover, turbine is always spinning and is always perpendicular to the sun).

The second closest receptor is located 1013 m from the turbine and is identified as Point of Reception AS. This receptor is also located northwest of the Project Area along the Main-A-Dieu Road. In a worst case scenario (described above), this receptor is expected to receive a maximum of 23 minutes/day and 21hrs 4 minutes/year from the Bateston Community Wind Project.

The results show that the Bateston Community Wind Project is expected to comply with the shadow flicker thresholds of 30 minutes/day and 30 hours/year. Two figures illustrating the extent of shadow flicker from the Project (30 minutes/day and 30 hours/year) are shown in the following Figures 15 and 16.



Mira Bay
Bateston
Main-a-Dieu Road
MacVicars Lake
Johnson Lake
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z AA AB AC AD AE AF AG AH AI AJ AK AL AM AN AO AP AQ AR AS AT AU
0 250 500
meters
CELTIC CURRENT
Bateston Community Wind Project
Figure 14
Shadow Flicker
Maximum Minutes per Day
Legend:
Max. Minutes per Day
30
35
40
45
50
55
60
Project Features
Project Area
Existing Access Road
Met Tower
Proposed E92 Turbine
Existing Features
Road
Trail
Stream
Contour
Water
Swamp
Forest
Receptor with ID
McCallum Environmental Ltd.
Modeled Using:
Worst Case - 100% Sun
Rotor Always Perpendicular to the Sun
Turbine Model: Enercon E-92
Hub Height: 98 m
Rotor Diameter: 92 m
Rated Power: 2,350 kW
Scale: 1: 10,000
Key Map
Project Area
Source:
Base Data: Nova Scotia Geomatics Centre, Nova Scotia Topographical Database (NSTDB)
Dec 17, 2013
Coordinate System: NAD 1983 UTM Zone 20N
Version: 1.1
GIS By: Nortek Resource Solutions Inc.


CELTIC CURRENT
Bateston Community Wind Project
Figure 15
Shadow Flicker Hours per Year
Legend:
Hours per Year
30
35
40
45
50
55
60
Project Features
Project Area
Existing Access Road
Met Tower
Proposed E92 Turbine
Existing Features
Road
Trail
Stream
Contour
Water
Swamp
Forest
Receptor with ID
McCallum Environmental Ltd.
Modeled Using:
Worst Case - 100% Sun
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Dec 17, 2013
Coordinate System: NAD 1983 UTM Zone 20N
Version: 1.1
GIS By: Nortek Resource Solutions Inc.
Key Map
Project Area
Mira Bay
Bateston
Main-a-Dieu Road
MacVicars Lake
Johnson Lake
0
250
500
meters

8.4 Electromagnetic Interference

Due to their large size, wind turbines can interfere with radio waves emitted from telecommunication and radar systems. In response to these potential conflicts, the Radio Advisory Board of Canada (RABC) and the Canadian Wind Energy Association (CanWEA) have issued a set of guidelines which describe the methodology for assessing magnetic interference (EMI).

EMI created by a wind turbine can be classified in two categories:

1. Obstruction - occurs when a wind turbine is placed between a receiver and a transmitter, creating an area where the signal is weakened and/or blocked; and,
2. Reflection - caused by the distortion between a signal and a reflection of the signal from an object. Included within reflection is a sub-category called Scatter. Scatter is a result of rotor blade movement.

The specific characteristics of a wind turbine will influence the type and magnitude of the interference. Furthermore, wind turbines affect different types of signals in various ways as some telecommunication signals are more robust to interference than others.

A preliminary investigation of the potential conflict between the proposed Project and communication systems has been completed. Potential stakeholders relating to the Bateston Community Wind Power project and EMI have been contacted. The complete EMI report and consultation responses to date are included as Appendix IX. The results of the investigation are summarized as follows:

Table 18. EMI Systems and Proximity to the Project Area

System	Result
Point-to-Point Systems above 890 MHz	There are no radio link transmitters or receivers that are within 1.0 km of the proposed wind farm. Additionally, there are no links that pass within the recommended consultation zone.
Broadcast Transmitters	No AM transmitters within the 5 or 15 km consultation zones. No FM Transmitters located within the 2.0 km consultation zone. No TV Transmitters within the 2.0 km consultation zone.
Over-the-Air Reception	A number of potential receivers are located within the 10 km consultation zone recommended by the RABC for digital Television transmitters. **A Baseline Broadcast Reception Study is recommended.**
Cellular Type Networks	No cellular networks located within the 1.0 km consultation zone.
Land Mobile Radio Networks	Non within the 1.0 km consultation zone

and Point-to-point Systems below 890 MHz	
Satellite Systems	No ground satellite stations located within 500 m of the proposed wind farm. No dwellings or buildings located within the projected consultation cone.
Air Defence Radars, Vessel Traffic Radars, Air Traffic Control Radars and Weather Radars	DND contacted – No Issues. Nav Canada Contacted – Final Analysis pending. Vessel Traffic Systems – No Issues Weather Radar – Environment Canada contacted – No Issues.
CBC Preliminary Report	CBC has been contacted in regard to the proposed wind project. No digital TV Transmitters within 89 km of the site. No CBC FM Transmitters located within 5 km of the project.
VOR	There are no VOR sites located within the 15 km consultation zone.

9.0 PUBLIC ENGAGMENT SUMMARY

9.1Public Consultation

Celtic Current believes that open, honest and transparent relationships are essential to their success. Celtic Current also believes that communities have a right to know about its activities in those communities. To this end, Celtic Current attempts to structure its community involvement program to:

- Ensure all stakeholders have the opportunity to learn about operations, and Projects, and are able to provide input;
- Create a positive relationship with stakeholders through community involvement and community investment;
- Work within the Project timeline;
- Resolve issues in a timely, friendly manner; and
- Do the right thing and be seen doing the right thing.

Community involvement at the Bateston Community Wind Project has been on-going since the commencement of the planning process for this community wind project in 2012.

- Celtic Current representatives completed a door to door canvass of closest residences to the proposed wind project location in January of 2013. Ms. Martha Campbell, Leonard van Zutphen and Peter Archibald met with twelve families along the Main-A-Dieu Road in close proximity to the Project Area in order to introduce the Project.

- Resulting correspondence (via email with two families) asked questions about shadow flicker, sound and setbacks from their homes. Celtic Current responded by indicating that shadow flicker and sound would be addressed as part of the environmental assessment process and results would be available at the upcoming Open House. Celtic Current confirmed a 1 km setback to all residences from the proposed turbine location.

- In advance of the open house completed for the Bateston Community Wind Project, over 360 flyers were distributed by Canada Post to properties in the surrounding communities of Main-A-Dieu, Catalone and Bateston. These flyers announced the open house date and location, as well as opened the line of communication directly with the Celtic Current project team if people had questions, comments or concerns, by providing each household with local contact information for Celtic Current.

- Ms. Krystal Therien, COMFIT administrator for the Nova Scotia Department of Energy was personally invited to attend the Bateston Open House. She was able to attend the event.

- On May 16, 2013, Celtic Current hosted an open house at the Bateston Community Fire Fall (6-8 pm). This provided residents and other interested parties an opportunity to view and discuss with Celtic Current representatives (3 in attendance) information on the Project and wind power in general. The Project was introduced to the community through a series of poster boards describing the Project, the environmental assessment process, bird and bat studies, and proposed and expected timelines for construction of the Project.
    - 14 people attended the Open House (signatures on the sign in sheet provided at the front door);
    - Attendees were encouraged to fill out comment cards. 6 comment cards were received.

Photo 10. Public Open House on May 16, 2013

During the open house, discussion between Celtic Current LP and attendants was undertaken surrounding sound outputs at residential receptors in the community of Bateston and property values relating to residences in close proximity to turbine(s).

At the time of submission of the environmental assessment registration document, no concerns have been expressed by the public directly to either Celtic Current or McCallum Environmental Ltd. The sign in sheet and completed comment cards are provided in Appendix X.

9.2 Mi'kmaq Consultation & Traditional Use

Project details were submitted to the Kwilmu'kw Maw-klusuaqn Negotiation Office and the NS Office of Aboriginal Affairs on December 20, 2013. Details included a Project map, description of the work undertaken to date, and invitation to comment.

10 DISCUSSION OF IMPACTS

10.1 Valued Ecosystem Component Selection

The scope, methodology and baseline environmental conditions for the Bateston Community Wind Project have been described in detail in Sections 3 through 9 in this registration document. Each Valued Ecosystem Component (VEC), as identified and defined in the NSE *Proponent's Guide to Wind Power Projects: Guide for Preparing an Environmental Assessment Registration Document*, May 2007 (updated January 2012), has been described and baseline environmental work has been completed to evaluate each VEC based on the site specific conditions relating to the Bateston Community Wind Project.

Based on the environmental baseline work completed for each VEC over the course of ten month period, and the expertise of the various members of the EA Project Team, evaluation of each VEC has been completed to determine which VEC could have potential residual effects once planned mitigation (Appendix I Environmental Protection Plan EPP) has been completed. This evaluation is described in Table 19. VECs with identified potential residual effects are carried forward (in Section 10.2) for further discussion.

Table 19.Valued Ecosystem Component (VEC) Evaluation

VEC Category	Valued Ecosystem Components (VECs)	Description of Impacts	Mitigation	Residual Effects (Section 10.2)	Applicable Section of Report
Atmospheric Environment	**Weather and Climate** **Air Quality**	Potential impacts to localized air quality conditions: · Increase in air emissions due to increased usage of equipment and vehicles during construction and operation; and, · Generation of dust during construction activities.	Project-related air emissions and dust are expected to be temporary and localized in nature. Mitigation for these effects is provided in Environmental Protection Plan (EPP)	No	Description of VEC Section 5.2 Mitigation Recommendations Appendix I EPP
Geophysical Environment	**Physiography and Topography** **Surficial Geology** **Bedrock Geology** **Hydrogeology and Groundwater**	Potential impacts include localized disturbance of surficial soils and shallow bedrock; · Potential for Acid Rock Drainage (ARD); and, · Damage from blasting activities to potable groundwater supplies.	Geotechnical investigations are necessary and the need for blasting has not yet been identified. The need for mitigative measures or monitoring programs relating to potable water resource will be determined post-geotechnical evaluation and determination of blasting needs The likelihood of ARD occurring on site is considered low but will be fully determined once geotechnical assessment has been completed. Project-related effects to the geophysical environment are expected to be temporary and localized. Mitigation for effects is provided in the EPP.	No	Description of VEC Section 5.3 Mitigation Recommendations Appendix I EPP

Terrestrial Environment	**Vegetation** **Herpetofaunal species** **Mammals**	Potential terrestrial impacts to flora and fauna. Please note, species of conservation interest and species at risk, birds and bats have been considered as separate VECs for the purpose of this assessment. Impacts to flora and fauna include: · Temporary loss of vegetation due to clearing activities for project infrastructure; · Habitat fragmentation; · Introduction of invasive species; and, · Mortality of fauna species due to clearing and construction activities.	Cleared areas will be re-vegetated and clearing will be limited to areas needed for construction of access roads and turbine pads. The project size is small (1 turbine) and therefore the effects associated with habitat fragmentation are considered to be minimal. Clearing and grubbing best management practices are described in the EPP. Mortality of fauna is considered to be minimal due to the small overall size of the project.	No	Description of VEC Section 5.4.1, 5.4.2, and 5.4.3 Mitigation Recommendations Appendix I EPP
Terrestrial Environment	**Birds (Avifauna)**	Potential concerns associated with birds include: · Mortality resulting from direct collision with turbine blades; · Habitat alteration; and, · Sensory disturbance.	Due to the potential residual effects of wind turbines on birds once mitigation efforts are employed, this VEC has been considered for further assessment. Detailed effects and mitigation measures are discussed in Section 10.2.	Yes	Description of VEC Section 5.4.4 Effects Assessment and Mitigation Section 10.2
Terrestrial Environment	**Bats**	Potential concerns associated with birds include: · Mortality resulting from direct collision with turbine blades; · Mortality resulting from barotrauma; · Habitat alteration; and, · Sensory disturbance.	Due to the potential residual effects of wind turbines on birds once mitigation efforts are employed, this VEC has been considered for further assessment. Detailed effects and mitigation measures are discussed in Section 10.2.	Yes	Description of VEC Section 5.4.5 Effects Assessment and Mitigation Section 10.2
Terrestrial Environment	**Wetlands**	Potential concerns associated with wetlands include: · Direct impact of roads, the turbine or other project infrastructure with wetland habitat; and, · Indirect impact of wetland habitat through construction in upland buffer area, or impacts to surface water systems that indirectly could affect wetland habitat.	Wetland habitat has been delineated and a 30 meter upland buffer has been identified across the Project Area. All remaining project infrastructures (laydown areas, turbine pad) have been located outside of wetland habitat and its associated buffer. The access road crossed Wetland 1. NSE approval was received for the construction of this road (Approval # 2013-086251)	No	Description of VEC Section 5.4.8 Mitigation Recommendations Appendix I EPP

Terrestrial Environment	**Species of Conservation Interest (SOCI) and Species at Risk (SAR)**	With the exception of bird species SOCI/SAR (assessed separately in this assessment), one fauna species SAR (Canada Lynx) has the potential to be found within or immediately surrounding the Project Area. Potential concerns to the Canada Lynx include: · Sensory disturbance resulting in area avoidance or behaviour changes; and, · Alteration or loss of habitat/habitat fragmentation.	Due to the potential residual effects of wind turbines on lynx once mitigation efforts are employed, this VEC has been considered for further assessment. Detailed effects and mitigation measures are discussed in Section 10.2.	Yes	Description of VEC Section 5.4 Effects Assessment and Mitigation Section 10.2
Freshwater Environment	**Watercourses** **Fish Habitat**	There are three watercourses identified within the Project Area. Potential concerns with the freshwater component include: · Decreased water quality; · Loss or damage to fish habitat; and, · Mortality of aquatic species.	Watercourses located within and between wetland habitat with the Project Area will not be affected by the construction of the Project. The constructed access road has installed two culverts at each watercourse crossing location. A 30 meter buffer has been established and will be maintained around all watercourses with the exception of road crossing locations.	No	Description of VEC Section 5.4.7 Mitigation Recommendations Appendix I EPP
Socio-Economic Environment	**Land Use/Property Values** **Recreation** **Tourism**	The Bateston Community Wind Project is a small project proposed on a privately owned single parcel of land. Therefore, impacts to the tourism in the surrounding community are expected to be low. The project lands are privately owned and do not support public recreation areas. The Project will likely create more local jobs and increase tax revenues within Cape Breton County, and provide a community dividend, resulting in a positive change for the local economy.	A minimum of 1000 meter setback is present from the proposed turbine to all residential properties surrounding the Project Area. Celtic Current will employ, whenever possible, local contractors to complete Project tasks.	No	Description of VEC Section 6.1-6.4

	Local Economy				
Additional Considerations	**Sound**	Sound during construction and decommissioning phases will be temporary and localized. As directed by Nova Scotia Environment and its associated Proponent Guide to Wind Power Projects (NSE 2007), operational sound has been modelled to meet 40 dBA at all receptors.	Post construction, at the request of NSE, Celtic Current will complete sound monitoring to confirm model predictions.	No	Description of VEC Section 8.1
Additional Considerations	**Electromagnetic Interference (EMI)**	Wind turbines can interfere with various types of electromagnetic signals that are emitted from radar and telecommunication systems. An EMI study was completed by the Project Team and consultation with relevant stakeholders has determined that there are no objections regarding EMI effects associated with the Project. provided to date.	No mitigation required at this time.	No	Description of VEC Section 8.4
Additional Considerations	**Shadow Flicker**	Shadow flicker can occur when rotating blades cast flickering light and shadows during times of direct sunlight. As directed by Nova Scotia Environment and its associated Proponent Guide to Wind Power Projects (NSE 2007), shadow flicker has been modelled to meet 30 min/day and 30 hours/year at all receptors.	Post construction, at the request of NSE, Celtic Current will complete flicker monitoring at individual receptors.	No	Description of VEC Section 8.3
Additional Considerations	**Visual**	Wind Projects produce a change in the visual landscape. Predicted view plans from four vantage points have been provided in this registration document and were provided to the public during the public consultation process. No objections were provided or are known at this time	Turbine colors and marking schemes will comply with provincial or municipal requirements.	No	Description of VEC Section 8.2

As indicated in Table 17, three VECs have been carried forward for detailed effects assessment in the following section:

- SOCI/SAR;
- Birds; and,
- Bats.

10.2 Effects Assessment

Effects assessment involves the following steps:

1. Identification of potential negative effects of the Project on selected VEC;
2. Description of recommended mitigation;
3. Identification of expected residual effects (post mitigation);
4. Evaluation of significance of residual effects; and,
5. Description of recommended follow up and monitoring.

Significance of residual effects was determined using four levels of significance identified in the *Environmental Impact Statement Guidelines for Screenings of Inland Wind Farms under the Canadian Environmental Assessment Act (CEAA)* (NRCan, 2003).

Level	Definition
High	Potential impact could threaten sustainability of the resource and should be considered a management concern. Research, monitoring and/or recovery initiatives should be considered.
Medium	Potential impact could result in a decline in resource to lower-than-baseline but stable levels in the study area after project closure and into the foreseeable future. Regional management actions such as research, monitoring and/or recovery initiatives may be required.
Low	Potential impact may result in a slight decline in resource in study area during the life of the project. Research, monitoring and/or recovery initiatives would not normally be required.
Minimal	Potential impact may result in a slight decline in resource in study area during construction phase, but the resource should return to baseline levels.

Potential effects to each identified VEC are discussed and evaluated in the following sections to determine specific mitigation requirements, expected significance of residual effects, and any monitoring and follow up requirements.

10.2.1 Avifauna (Birds)

Potential concerns associated with birds at the Bateston Community Wind Project include:

- Mortality resulting from direct collision with turbine blades or during construction of project infrastructure and decommissioning;
- Habitat alteration; and,
- Sensory disturbance.

Table 20 provides a summary of the potential environmental effects resulting from the potential Project-VEC interactions. The table is divided according to each of the Project phases assessed (Construction, Operation and Maintenance, Decommissioning as well as Accidents, Malfunctions, and Unplanned Events). The discussion following the table provides an analysis of key Project-VEC interactions, by Project phase.

Most potential interactions associated with the construction phase will be limited, based on the infrastructure currently present on the subject site and the small size of the overall project. The access road is present and clearing for the turbine pad has already been completed.

Table 20: Project- VEC Interactions by Project Phase on Avifauna

Project Activities and Physical Works	Potential Environmental Effect		
	Habitat Alteration	Sensory Disturbance	Direct Mortality
Construction			
Site preparation	√	√	√
Roadbed construction			
Watercourse crossing structures			
Turbine pad- levelling and grading	√	√	√
Temporary storage pads/areas	√	√	√
Operation and Maintenance			
Project presence			√
Infrastructure maintenance		√	
Winter maintenance		√	
Vegetation management	√		√
Decommissioning			
Turbine dismantling and removal		√	
Turbine pad and road reclamation	√	√	
Accidents, Malfunctions and Unplanned Events			
Erosion and sediment control failure	√		
Fire			

10.2.1.1 Construction

Wildlife habitat directly within any necessary further alterations to the existing access road layout and turbine pad area will be eliminated during Construction. Clearing and grubbing for site preparation will remove vegetation, reducing the quantity of terrestrial habitat, and will affect the quality of already marginal habitat. The Project will result in a slight increase in edge area, which may act as a barrier for some animal movements and could increase predation on birds and small mammals, but also has potential benefits related to habitat creation (edge nesting birds), and food availability (near edge and ditches).

Very little clearing additional is necessary for this Project, as the majority of necessary lands associated with the access road and turbine pad have already been cleared.

Wildlife, that currently live within the direct area of the turbine pad or access road or laydown area, will be permanently displaced during the initial stages of construction, potentially causing direct mortality of bird species that are unable to relocate to suitable habitat. During construction, birds may be affected by disturbance and noise related to construction activities (i.e. blasting, and forest removal). Birds affected may temporarily move out of the range of disturbance throughout the construction period. Similar and more intact habitat (due to recent harvesting within the Project Area) to that identified within the Project footprint is present surrounding this area to the west, south and north and wildlife and birds would be able to relocate into these adjacent habitats during construction.

Construction, in particular site preparation, during the breeding season for birds has the potential to cause direct mortality to the birds, abandonment of nests, and/or the destruction of nest contents, including losses of species with Species at Risk or Species of Conservation Interest. If adjacent suitable habitat is not available, birds that have been displaced will not likely nest until nearby habitat becomes available, as most birds return to the same general area from year to year. This may result in a higher non-breeding population. Nesting habitat has not been confirmed within the footprint of construction.

Construction of temporary areas associated with the construction phase has the potential to interact with birds and/or bird habitat in a similar fashion to those of site preparation activities, though on a smaller scale.

The additional area required for clearing is expected to be minimal. As there is no unique habitat within the Project Area and the area has been recently harvested, displaced animals should be able, and are expected, to move to similar habitat patches within and adjacent to the Project Area.

The environmental effects of clearing and grubbing are most severe when these activities are conducted during the period when most bird species are breeding (May to September). Clearing and grubbing at this time could result in the direct mortality of eggs and unfledged nestlings. The killing of birds or the destruction of their nests, eggs, or young is an offence under the Migratory Birds Convention Act.

Change in wildlife habitat quality includes the potential fragmentation of habitat during construction. Habitat fragmentation can adversely affect local populations of wildlife living adjacent to the Project Area. This would be a result of specific species not willing to leave their habitat which is currently provided by contiguous forest cover. As such, the species won't enter cleared areas, which results in a reduction in available habitat to a specific species. Habitat fragmentation may adversely affect local populations of birds living adjacent to the access road and project infrastructure. However the size of this project (one access road and a single turbine) suggests that the significance of this impact would be low.

Wildlife including birds may be temporarily displaced from areas adjacent to the Project as a result of Construction-related noise. This potential environmental effect would be temporary, and for a short duration (i.e., during active Construction).

Based on consideration of the potential environmental effects of the activities required for Construction, the proposed mitigation (e.g., avoidance, and limiting area of disturbance), and the residual environmental effects significance ratings criteria, the environmental effects of Construction on birds and bird habitat are rated minimal and not significant.

10.2.1.2 Operation and Maintenance

The most likely potential effect of the Project on birds is direct mortality resulting from collision with project infrastructure, namely turbine blades, during the operational phase.

A recent study (Zimmerling et al., 2013) estimated collision mortality using data from carcass searches for 43 wind farms, incorporating correction factors for scavenger removal, searcher efficiency, and carcasses that fell beyond the area searched. On average, 8.2 ± 1.4 birds (95% C.I.) were killed per turbine per year at these sites, although the numbers at individual wind farms varied from 0 - 26.9 birds per turbine per year (Zimmerling et al, 2013).

Despite concerns about the impacts of biased correction factors on the accuracy of mortality estimates, these values are likely much lower than those from collisions with some other anthropogenic sources such as windows, vehicles, or towers, or habitat loss due to many other forms of development. Species composition data suggest that < 0.2% of the population of any species is currently affected by mortality or displacement from wind turbine development (Zimmerling et al, 2013).

Flying areas used by large numbers of foraging or roosting birds are at risk from collision with turbines, or those areas considered as important migratory flyways (Drewitt and Langston 2006). According to a recent evaluation of operational wind projects in Canada, bird fatalities are dominated by passerines with relatively low numbers of raptors and waterbirds. (EC et al. 2012).

No significant migratory flyways or features that attract large numbers of migrant passerines were detected during pre-construction avian surveys at the Project site, and very few waterfowl and raptors were observed passing over the site during key migratory periods. Although isolated collisions will occur, it is very unlikely that collision mortality resulting from Project operations will have an effect at the population level given the low level of use by birds in this area.

The proposed turbine location is within a habitat type that is relatively common locally and at the landscape level, and has been designed to maintain a buffer from all identified wetlands that contribute to Canada Warbler and other SOCI habitat. Sensitive species potentially breeding in wetland habitats, therefore, should not be disturbed by Project activities.

Based on consideration of the potential environmental effects of the activities during the Operation Phase, the proposed mitigation, and the residual environmental effects significance ratings criteria, the environmental effects of Operation on birds and bird habitat are rated low and not significant.

10.2.1.3 Decommissioning

Decommissioning of turbine components, the turbine pad and access road will result in a positive effect on the Project, involving the reclamation of land and re-establishment of vegetation across the Project Area.

10.2.1.4 Accidents, Malfunctions and Unplanned Events

Accidents, Malfunctions and Unplanned Events that may occur in association with the Project and could have adverse environmental effects on bird and bird habitat are listed below with a discussion of the potential environmental effects.

Erosion and sediment control measures could fail during precipitation events and release sediment, potentially affecting wetland or stream habitat used by wildlife species such as amphibians and reptiles. This type of effect is temporary and short-term, and is highly localized to the affected area.

Fire events during any phase of the Project could remove significant amounts of vegetation, thereby having an environmental effect on habitat for wildlife, and potentially result in their displacement or mortality, particularly during breeding season when the young are less mobile.

10.2.2 Species of Conservation Interest and Species at Risk – Canada Lynx

As discussed in Section 10.1, the only species of conservation interest or species at risk that may be present within or near the Project Area is the Canada Lynx (with the exception of bird species discussed separately in this report). Potential effects on the lynx from the Bateston Community Wind Project include:

- Sensory disturbance resulting in area avoidance or behaviour changes; and,
- Alteration or loss of habitat/habitat fragmentation.

Table 21 provides a summary of the potential environmental effects resulting from the potential Project-VEC interactions. The table is divided according to each of the Project phases assessed (Construction, Operation and Maintenance, Decommissioning as well as Accidents, Malfunctions, and Unplanned Events). The discussion following the table provides an analysis of key Project-VEC interactions, by Project phase.

Most potential interactions associated with the construction phase will be limited, based on the infrastructure currently present on the subject site and the small size of the overall project. The access road and basic turbine pad are present.

Table 21: Project- VEC Interactions by Project Phase on Canada Lynx

Project Activities and Physical Works	Potential Environmental Effect	
	Habitat Alteration	Sensory Disturbance
Construction		
Site preparation	√	√
Roadbed construction		
Watercourse crossing structures		
Turbine pad- levelling and grading	√	√
Temporary storage pads/areas	√	√
Operation and Maintenance		
Project presence		√
Infrastructure maintenance		√
Winter maintenance		√
Vegetation management	√	
Decommissioning		
Turbine dismantling and removal		√
Turbine pad and road reclamation	√	√
Accidents, Malfunctions and Unplanned Events		
Erosion and sediment control failure		
Fire		√

10.2.2.1 Construction

Project construction is not expected to significantly impact Canada Lynx that may be present in the area. Construction will be limited to final work associated with the current access road and turbine pad, and erection of the turbine itself. The lynx may be displaced due to noise and activity. However, this impact is temporary and of short duration.

10.2.2.2 Operation and Maintenance

There is limited research available relating to the potential effect of wind projects on mammals during the operations phase of the project. Some research has identified short term impacts and avoidance of wind projects during the construction phases for species such as elk and wolves (Walter et. Al 2006, and Alvares et al. 2011). However, the potential effect from wind project operations has not been extensively researched and is not well understood.

The study of the response of elk to wind-power development in Oklahoma conducted by Walter et al. (2006) referenced above did determine that elk in the area were not adversely affected by the wind-power development, either through negative effects on diet or through changes in home range. The elk remained in the area throughout the construction and operation phases of the wind farm, and the access roads were no barrier to elk movement.

Based on consideration of the potential environmental effects of the activities required for Operation, the small size of this project and the proposed mitigation (e.g. limiting area of disturbance and only a single access road), and the residual environmental effects significance ratings criteria, the environmental effects of Operation on the Canada Lynx are expected to be low and therefore not significant.

10.2.2.3 Decommissioning

Decommissioning of turbine components, the turbine pad and access road will result in a positive effect on the Project, involving the reclamation of land and vegetation across the Project Area, and reduction in overall habitat fragmentation associated with the access road.

10.2.3.4 Accidents, Malfunctions and Unplanned Events

Accidents, Malfunctions and Unplanned Events that may occur in association with the Project and could have adverse environmental effects on the lynx are listed below with a discussion of the potential environmental effects.

Fire events during any phase of the Project could remove significant amounts of vegetation, thereby having an environmental effect on habitat for wildlife, and potentially result in their displacement or mortality, particularly during breeding season.

10.2.3 Bats

Potential concerns associated with bats at the Bateston Community Wind Project include:

- Mortality resulting from direct collision with turbine blades;
- Mortality resulting from barotrauma;
- Habitat alteration; and,
- Sensory disturbance.

Table 22 provides a summary of the potential environmental effects resulting from the potential Project-VEC interactions. The table is divided according to each of the Project phases assessed (Construction, Operation and Maintenance, Decommissioning as well as Accidents, Malfunctions, and Unplanned Events). The discussion following the table provides an analysis of key Project-VEC interactions, by Project phase. Most potential interactions associated with the construction phase will be limited, based on the infrastructure currently present on the subject site and the small size of the overall project.

Table 22: Project- VEC Interactions by Project Phase on Bats

Project Activities and Physical Works	Potential Environmental Effect			
	Habitat Alteration	Sensory Disturbance	Direct Mortality	Indirect Mortality
Construction				
Site preparation	√	√		
Roadbed construction				
Watercourse crossing structures				
Turbine pad- levelling and grading	√	√		
Temporary storage pads/areas	√	√		
Operation and Maintenance				
Project presence			√	√
Infrastructure maintenance		√		
Winter maintenance		√		
Vegetation management	√			
Decommissioning				
Turbine dismantling and removal		√		
Turbine pad and road reclamation	√	√		
Accidents, Malfunctions and Unplanned Events				
Erosion and sediment control failure	√			
Fire		√		

10.2.3.1 Construction

Project construction is not expected to significantly impact bats that may be present in the area. Construction will be limited to final work associated with the current access road, and erection of the turbine itself. Furthermore, construction will occur during normal working (daylight) hours. Bats that are present in the area fly at night during hunting or migration and would therefore not be affected by construction operations. Finally, no hibernacula are going to be disturbed during the construction phase.

10.2.3.2 Operation and Maintenance

Mortality of bats is a known potential effect during the operational phase of wind energy projects throughout North America. The first large scale wind developments were located in western North America typically in agricultural and open prairie landscapes (reviewed in Johnson, 2005). Fatalities of these non-migratory species were largely absent from these sites. It is likely that this reflects the location of these wind development sites in open non-forested landscapes. These species may be under represented in the bat communities in these open areas due to an association with forested landscapes. More recently however, evidence of Myotis fatalities from wind turbines have been noted at sites in eastern North America (reviewed in Arnett et al., 2008; Jain et al., 2007b; Johnson, 2005). Therefore, although documented fatalities of Myotis are fewer than for migratory species there is still risk.

The prominent causes of bat deaths at wind turbines are direct collision (i.e., blunt-force trauma) and barotrauma. It is difficult to attribute individual fatalities exclusively to either direct collision or barotrauma (Grodsky et al. 2011). Barotrauma involves tissue damage to air containing structures (i.e., lungs) caused by rapid or excessive air pressure change. In this case, it is believed that air pressure change at turbine blades (in movement) causes expansion of air in the lungs not accommodated by exhalation, therefore resulting in lung damage and internal hemorrhaging. Grodsky et al. (2011) used radiology to investigate causes of mortality and found that a majority of the bats (74%; 29 of 39) examined had bone fractures that are likely to have occurred during direct collision with turbines. Approximately one-half (52%; 12 of 23) of bats whose ears were examined had mild to severe hemorrhaging in the middle or inner ears (or both). The true nature of mortality resulting from turbine collision remains poorly understood.

Overall bat activity at the Project site was low during the traditional peak period in bat movements across the landscape. This may suggest that the Project site is not situated within an area of importance to local/regional bats moving to swarming/hibernation sites. Bats may also have avoided the Project Area due to recent harvesting of the forest. However, white-nosed syndrome must also be considered which is resulting is generally low reported numbers of bats during all monitoring activities across Nova Scotia.

Based on consideration of the potential environmental effects of the activities required for Construction and Operation, the proposed mitigation (e.g., limiting area of disturbance and size of project (small)), and the residual environmental effects significance ratings criteria, the environmental effects of Operation on bats and bat habitat are rated low and not significant.

10.2.3.3 Decommissioning

Decommissioning of turbine components, the turbine pad and access road will result in a positive effect on the Project, involving the reclamation of land and vegetation across the Project Area, and reduction in overall habitat fragmentation associated with the access road.

10.2.3.4 Accidents, Malfunctions and Unplanned Events

Accidents, Malfunctions and Unplanned Events that may occur in association with the Project and could have adverse environmental effects on bats and bat habitat are listed below with a discussion of the potential environmental effects.

Erosion and sediment control measures could fail during precipitation events and release sediment, potentially affecting wetland or stream habitat used by wildlife species such as bats. This type of effect is temporary and short-term, and is highly localized to the affected area.

Fire events during any phase of the Project could remove significant amounts of vegetation, thereby having an environmental effect on habitat for wildlife, and potentially result in their displacement or mortality, particularly during breeding season when the young are less mobile.

10.3 Mitigation

10.3.1 Birds

To avoid destroying nesting or breeding species during breeding timeframes, clearing of remaining vegetation will occur prior to April 15, 2014.

A follow-up monitoring program will be implemented after construction and will be designed in accordance with Canadian Wildlife Service and/or NSDNR requirements. The purpose of the follow-up monitoring is to determine rates of mortalities occurring and, if so, to identify any possible mitigation measures.

If it appears that a high number of direct fatalities are occurring, attempts will be made to determine the nature of the fatalities, specific timing or seasonality, weather related effects at the time, so that mitigation such as modifications to turbine operations may be designed (i.e. change to cut-in wind speeds for turbine operation; change to lighting; other).

The Project is committed to use of limited lighting during construction and on turbines while still meeting all lighting requirements of Transport Canada. Furthermore, there will be no general lighting at the Project site (restricted to during times when technicians are on site only).

10.3.2 Bats

The following mitigation is provided for minimizing bat effects at the Bateston Community Wind Project.

Minimize project footprint – Minimized the direct loss of bat habitat resources (e.g., wetlands, riparian areas, mature deciduous-dominated forest stands) and therefore minimized the extent of bat habitat affected. This Project consists of a single access road and turbine.

Follow up on effects and adaptive management – A post-construction monitoring program to quantify bat fatality rates is of utmost importance. These surveys need to be appropriately designed to account for searcher efficiency and scavenger rates and need to be conducted over an entire season (April to October), but especially during the fall migration season from mid-August to late-September. Should fatalities be found, these should be investigated with respect to spatial distribution of fatalities, turbine lighting, weather conditions and other site specific factors which can then be analyzed and operations adjusted in an adaptive management framework.

Celtic Current has the ability to alter the cut-in wind speeds of the Enercon turbine if bat mortality is shown to change during post construction monitoring.

11 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Environmental factors that have the potential to have damaging effects on wind turbines include:

- Ice throw
- Hurricane
- Heavy snow
- Lightening
- Fire

11.1 Ice Throw

Wind turbines can accumulate ice under certain atmospheric conditions, such as temperatures near freezing (0°C) combined with humidity, freezing rain, or sleet. Since changing weather conditions may then cause this ice to be shed, there are safety concerns that must be considered during Project development and operation. However, the Enercon turbine blades are equipped with blade de-icing equipment which is engineering to remove any build up of ice prior to the ice being at risk of shedding.

Any ice that is accumulated may be shed from the turbine due to warmer temperatures, gravity and the mechanical forces of the rotating blades.

In the unlikely event of ice throw the motion of the fragment is governed by specific forces. The ice fragment has an initial velocity due to rotation, while in flight the motion is constrained by gravity and aerodynamic forces.

Due to certification requirements which outline load cases which must be used in the design of wind turbines (including iced blades) manufacturers incorporate ice build up on the blades as a load resulting in additional vibration caused by both mass and aerodynamic imbalance. (LeBlanc, 2007)

Leblanc (2007) used defined methodologies and analyses to determine the probability that an ice fragment will land on a certain target or in a particular area in the range of the turbines. The probability of impact is then multiplied by the probability of ice throw. The final result is the probability that a target fixed at a certain range from the turbine will be hit in one year. If targets are not fixed, such as cars on a roadway, then the probability must be multiplied again by the probability that the target will be in position. Mobile targets are discussed in the analyses.

The calculated probabilities results of this risk analysis are provided in terms of Individual Risk (IR), which is defined as the probability of being struck by ice fragment per year. (LeBlanc, 2007) The results of the Leblanc's (2007) are as follows:

1. Scenario A – Fixed Dwelling: Based upon a location of 300 metres from an individual turbine, calculated risk is 1 strike per 500,000 years;
2. Scenario B – Road: Based upon a road location 200 metres from a turbine, with a 100 vehicles travelling 60 km/h along a 600 metre section of road, during 5 days of icing events, calculated risk is 1 strike per 260,000 years;
3. Scenario C – Individuals: Based upon one ever-present individual within 300 metres of a turbine, who does not impinge within 50 metres of the turbine base, calculated risk is 1 strike per 137,500,000 years.

The calculated strike risk does not factor in the following characteristics at the Bateston Community Wind Project:

1. The presence of forest vegetation providing additional shelter; and,
2. Topographic variations.

All commercial wind turbines include vibration monitors, which will automatically shut the turbine down when vibrations exceed a pre-set level. This vibration safety shutdown feature is also effective when excessive ice builds up on the turbine blades thus further limiting the risk of ice throw. In addition, Celtic Current is committed to the installation of signs at a central access point warning of the potential for ice throw. Operation and maintenance staff and contractors will be made aware of the risk of ice accumulation, throw, or falling as a function of Celtic Current Safety Guidelines.

11.2 Hurricane, Heavy Snow, and Hail

All commercial wind turbines include vibration monitors, which will automatically shut the turbine down when vibrations exceed a pre-set level. This shut down will occur in inclement weather including high winds/hurricane, heavy snow or hail. In addition, Celtic Current is committed to the installation of signs at a central public access point identifying the presence of wind turbines.

11.3 Lightning

There is the potential for a lightning strike causing fire. Or, damage to the electrical systems within a turbine could also cause a localized fire. All commercial turbines are equipped with built-in grounding systems to avoid fire during a lightning strike.

12 CONCLUSIONS

Celtic Current LP (Celtic Current) intends to construct a 2.3 MW (nameplate capacity) single turbine on private land [PID 35124452] within the community of Bateston, Nova Scotia. This Project consists of a single access road and turbine pad, a system of above ground distribution lines and an Enercon E-92 2.3 MW turbine. The proposed schedule involves construction during Spring 2014 with a tentative operation date of Fall 2014.

The field data, regulatory consultation, and subsequent conclusions of this assessment indicate there are no expected significant residual environmental effects resulting from the Bateston Community Wind Power Project once all appropriate mitigation and monitoring has been implemented and completed.

Standard construction mitigation methods will be implemented to ensure there are no significant impacts of the Project on Valued Ecosystem Components (VEC). These methods were included in the development of the Environmental Protection Plan (EPP) which is included as part of this assessment.

The proposed turbine location is located in an area that was recently harvested. The turbine has been located near the existing MET tower and the Project will be able to use the access road constructed for the MET tower installation as the access road for the entire scope of the Project.

Natural areas remaining following Project construction will continue to include disturbed and undisturbed tracts of forests, wetlands, or stands of trees or other vegetation within the Project

Area. These forested natural areas are continuous, and provide suitable habitat, travelling corridors, thermal and security cover for wildlife, and are representative of forest systems throughout the Project Area. Habitat fragmentation will be minimal, based on the size of the Project.

Species at risk inventories within the Project revealed that no flora species at risk were identified. It is possible that Canada Lynx use the Project Area, although the Project Area is not located near the primary areas in Cape Breton where the lynx has been known to reside. The small size of the Project and the construction of only a single access road results in low residual impact to the Canada Lynx.

Avian species at risk were identified within or near the Project Area. Bats are expected to be present within and near the Project Area. The environmental assessment process has determined that residual environmental effects on birds and bats is low, post-mitigation, and Celtic Current is committed to completing follow up monitoring as recommended by CWS and NSDNR.

There are no areas of cultural significance identified during assessments of historical resources. As well there are no adverse effects anticipated on health and socio-economic conditions, physical and cultural heritage areas, traditional land use, and traditional structures or sites as a result of environmental changes from the Project.

Celtic Current has exceeded residential setbacks with the closest residence or other sensitive receptor being located 1009 metres from the turbine. Sound models indicate that the regulatory criterion of 40 dBA for sound output at any identified receptors within 1500m is not expected to be exceeded.

Both McCallum Environmental Ltd. and Celtic Current are confident that the community-at-large support the development of this Project. Positive feedback received from the communities in proximity for the proposed Project, suggest that community support for this Project is positive. Celtic Current will continue to conduct public consultation on this Project.

The magnitude of disturbance and risk associated with the Project are all considered minimal given the size of the Project, abundance of similar VEC within the Project Area and the mitigation techniques and technologies currently available. Furthermore this assessment concludes there are no significant environmental concerns and no significant impacts expected that cannot be effectively mitigated through well established and acceptable practices, or ongoing monitoring and response. Residual environmental effects have been determined to be minimal or low for identified Valued Ecosystem Components.

13 LIMITATIONS

Constraints Analysis

- On some maps, land use or land cover is defined everywhere to form a complete mosaic of polygons. On topographic maps landuse/landcover is depicted only in certain areas. The source data in some cases may need to be conditioned to allow the second type of depiction if it is a mosaic, and certain constraints will operate differently in each case (Agent Consortium, 2001); and,
- Conflicts that might exist between objects in a database are typically of a logical nature, such as topological inconsistencies or duplicate identifiers. We attempted to ensure that our database has addressed any potential inconsistencies, however inconsistencies may still occur. In map generalization, the vast majority of conflicts are physical, spatial consequences of reducing map scale. The greater the degree of scale change, the more cluttered an un-generalized map will be, and this signals the extents of potential conflicts in presentation of the data.

Limitations incurred at the time of the assessment include:

- McCallum Environmental Ltd. has relied in good faith upon the evaluation and conclusions in all third party assessments. McCallum Environmental Ltd. relies upon these representations and information provided but can make no warranty as to accuracy of information provided;
- There are a potentially infinite number of methods in which human activity can influence wildlife behaviors and populations and merely demonstrating that one factor is not operative does not negate the influence of the remainder of possible factors;
- The environmental assessment provides an inventory based on acceptable industry methodologies. A single assessment may not define the absolute status of site conditions;
- Effects of impacts separated in time and space that may affect the areas in question, have not been not been included in this assessment.
- Regulatory standards and requirements for property value analysis have not been established or recommended by Nova Scotia Environment. Therefore, site and regional effects assessment of this VEC has not been completed as part of this environmental assessment.
- Regulatory standards and requirements for assessment of infrasound have not been established or recommended by Nova Scotia Environment. Therefore, effects assessment relating to this potential VEC has not been completed as part of this environmental assessment.

General Limitations incurred include:

- Classification and identification of soils, vegetation, wildlife, and general environmental characteristics (i.e. vegetation concentrations, and wildlife usage) have been based upon commonly accepted practices in environmental consulting. Classification and identification of these factors are judgmental and even comprehensive sampling and testing programs, implemented with the appropriate equipment by experienced personnel, may not identify all factors;
- All reasonable assessment programs will involve an inherent risk that some conditions will not be detected and all reports summarizing such investigations will be based on assumptions of what characteristics may exist between the sample points.

14 GLOSSARY

Balance of Plant (BOP): the infrastructure of a wind farm Project, in other words all elements of the wind farm, excluding the turbines. Includes civil works, SCADA and internal electrical system. It may also include elements of the grid connection.

System Interconnection Study (SIS): A study that evaluates the impact of new generation to the interconnected transmission system, to confirm that it will have no negative reliability impact.

Wake Loss: Wind turbines extract energy from the wind and downstream there is a wake from the wind turbine, where wind speed is reduced. As the flow proceeds downstream, there is a spreading of the wake and the wake recovers towards free stream conditions. The wake effect is the aggregated influence on the energy production of the wind farm, which results from the changes in wind speed caused by the impact of the turbines on each other.

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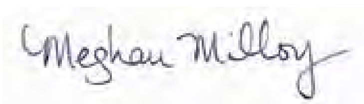
16 CERTIFICATION

This Report has considered relevant factors and influences pertinent within the scope of the assessment and has completed and provided relevant information in accordance with the methodologies described.

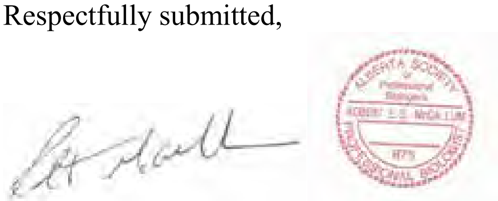
The undersigned has considered relevant factors and influences pertinent within the scope of the assessment and written, and combined and referenced the report accordingly.



Meghan Milloy,
Vice President
McCallum Environmental Ltd.

I have reviewed the information as submitted and completed this report in conformity with the Code of Ethics and the Duties of Professional Biologists and good industry practice.

Respectfully submitted,



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McCallum Environmental Ltd.

December 31, 2013

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Attention: **Bridget Tutty**
Re: **Bateston Community Wind Project**

The Proponent for the Bateston Community Wind Project is Celtic Current LP. Contact information and authorized signature for this Project is provided.

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