Environmental Assessment

Proposed Pugwash Wind Farm

111257.00 ● Report ● January 2012

ISO 9001
Registered Company

Prepared for:
Atlantic Wind Power Corporation

ATLANTIC WIND POWER CORPORATION

Prepared by:
CBCL LIMITED
Consulting Engineers

Contents

Appendices

Acronyms

AADT	Annual Average Daily Traffic
ACCDC	Atlantic Canada Conservation Data Centre
ARIA	Archaeological Resource Impact Assessment
AWPC	Atlantic Wind Power Corporation (2005) Ltd.
CanWEA	Canada Wind Energy Association
CDC	Conservation Data Centres
C@P	Community Access Program
CEAA	*Canadian Environmental Assessment Act*
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CREDA	Cumberland Regional Economic Development Association
CWS	Canada Wildlife Service
DND	Department of National Defence
DTM	Digital Terrain Model
EC	Environment Canada
ELC	Ecological Land Classification
EMF	Electric and Magnetic Field
EPP	Environmental Protection Plan
GHG	Greenhouse Gas
GSPA	Gulf Shore Preservation Association
IARC	International Agency for Research or Cancer
KMK	Kwilmuk Maw-klusuagn
MEKP	Mi'kmaq Ecological Knowledge Protocol
MEKS	Mi'kmaq Ecological Knowledge Study
MW	Megawatts
NCWF	North Cumberland Wind Farm LP
NSDNR	Nova Scotia Department of Natural Resources
NSE	Nova Scotia Environment
NSPI	Nova Scotia Power Inc.
NSTIR	Nova Scotia Department of Transportation and Infrastructural Renewal
NSUARB	Nova Scotia Utility and Review Board
NWA	National Wildlife Area
PWFI	Pugwash Wind Farm Inc.
RABC	Radio Advisory Board of Canada
REA	Renewable Electricity Administrator
RFP	Request for Proposals
SARA	*Species at Risk Act*
TC	Transport Canada
VEC	Valued Ecosystem Components
WAM	Wet Areas Mapping
WTG	Wind Turbine Generators

CHAPTER 1 INTRODUCTION

1.1 Proponent Information

The following may be contacted to provide additional information on the Project:

Project Name:	Pugwash Wind Farm
Project Location:	Approximately 2 km to the east of the Village of Pugwash in Cumberland County (see Figure 1.1)
Size of the Project:	Up to 33 Megawatts (MW)
Proponent Information:	North Cumberland Wind Farm LP (NCWF), an affiliate of Pugwash Wind Farm Inc. (PWFI) and Atlantic Wind Power Corporation (2005) Ltd. (AWPC) NCWF, PWFI and AWPC are Nova Scotian registered entities.
Proponent Contact Person:	Charles Demond, President North Cumberland Wind Farm LP Phone: (902) 835-3340 Fax: (902) 484-7075 Email: cdemond@awpc.com
Applicant:	CBCL Limited 1489 Hollis Street Halifax, Nova Scotia B3J 2R7
Applicant Contact Person:	Ann Wilkie, VP Environment CBCL Limited Phone: (902) 492-6764 Fax: (902) 423-3938 Email: annw@cbcl.ca

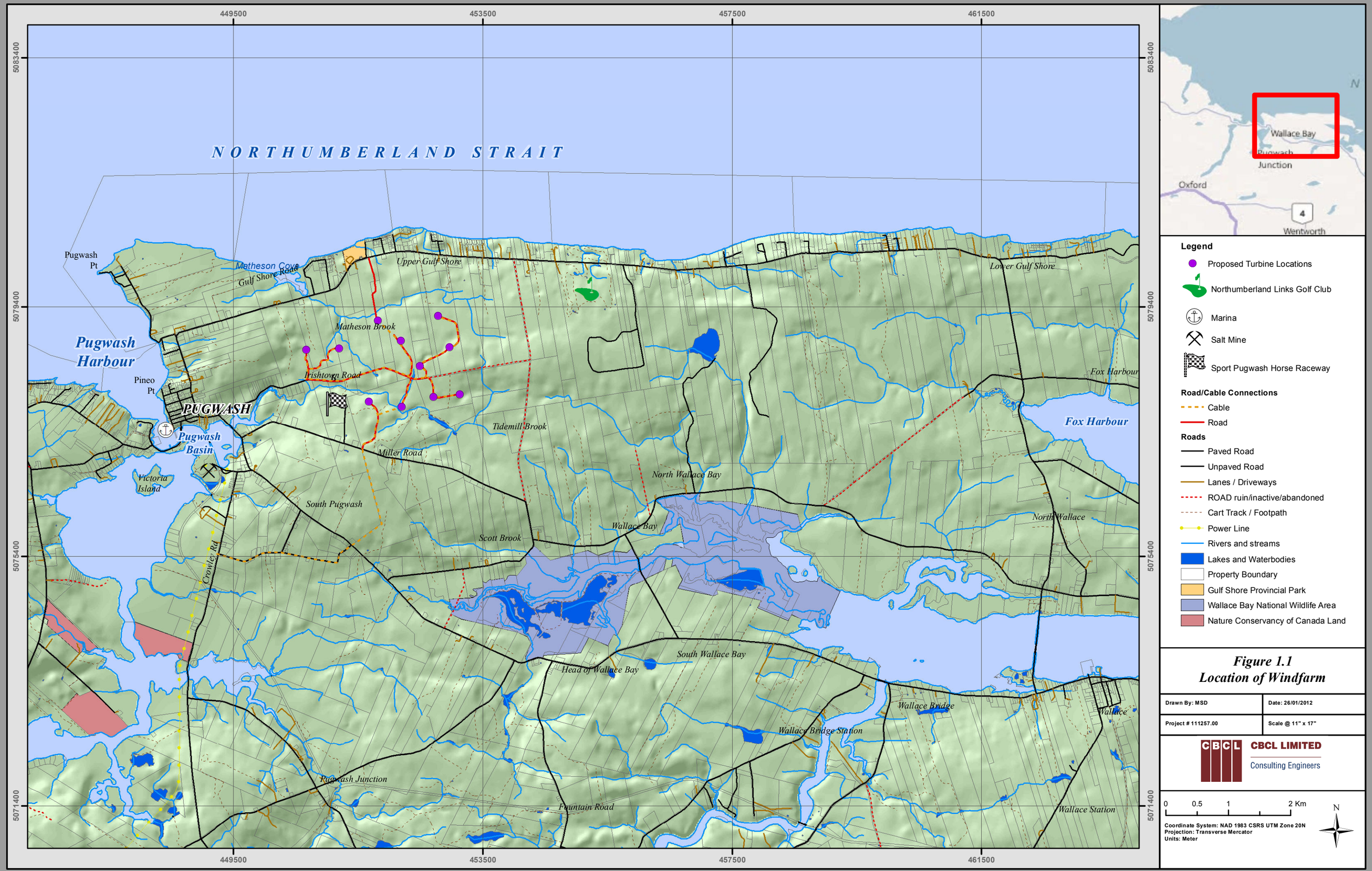
The following documentation was prepared in accordance with the requirements of the *Nova Scotia Environment Act* and associated regulations.

Proponent's Signature CHARLES J. DEMOND

Applicants Signature

Date: 26·01·12

Date: 27th Jan '12.



Legend

- Proposed Turbine Locations
- Northumberland Links Golf Club
- Marina
- Salt Mine
- Sport Pugwash Horse Raceway

Road/Cable Connections

- Cable
- Road

Roads

- Paved Road
- Unpaved Road
- Lanes / Driveways
- ROAD ruin/inactive/abandoned
- Cart Track / Footpath
- Power Line
- Rivers and streams
- Lakes and Waterbodies
- Property Boundary
- Gulf Shore Provincial Park
- Wallace Bay National Wildlife Area
- Nature Conservancy of Canada Land

Figure 1.1
Location of Windfarm

Drawn By: MSD	Date: 26/01/2012
Project # 111257.00	Scale @ 11" x 17"

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0 0.5 1 2 Km

N

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Units: Meter

1.2 Proponent and Associated Team

AWPC is a Nova Scotia based company which has more than a decade of presence and experience in the province. PWFI is a project specific company owned 100% by AWPC and the principals of AWPC. Under the direction of AWPC and its principals, PWFI has advanced the development of the revised Pugwash Wind Farm, i.e., the Project, through 2010 and 2011. NCWF, i.e., the Proponent, is a limited partnership which has been established to complete the development, construction and commissioning of the wind farm; NCWF will thereafter own and operate the Project. NCWF has acquired all of the development assets of the wind farm from PWFI. All of the units of NCWF and the general partner of NCWF are owned 100% by PWFI.

AWPC is a leading wind farm developer based in and committed to the advancement of renewable energy resources in Atlantic Canada. Since 2001, AWPC has developed wind farms from initial site identification, wind testing and community interaction through to contract procurement, construction and operation. The principals of AWPC have over 20 years of combined experience in the development, construction and operation of wind farms; the AWPC principals were a key part of the team responsible for the successful development of the first commercial wind farm in Nova Scotia, i.e., the Pubnico Point wind farm, and they subsequently developed the Nuttby Mountain wind farm that went into full operation in 2010.

In addition to their internal competencies, AWPC and PWFI engage reputable professionals and companies having expertise in required areas including the following:

- **Wind Data Analysis:** AWPC regularly compliments its internal work with a European based analyst and his team who have completed hundreds of wind energy assessments in varied topographical and metrological conditions around the world. This depth of experience and accumulated knowledge is necessary to successfully arrive at reliable conclusions in the early planning stages of a project**;**
- **Environmental and Engineering Services (including Electrical and Civil)**: AWPC's environmental and engineering consultants, CBCL Limited, are both locally based and among the most experienced in the fields of environmental, electrical, civil and project management with regards to both pre and post wind farm construction;
- **Financial Capacity:** Although AWPC internally funds its development activities, it draws from outside sources for activities to complete the project, such as construction of the wind farms that they build. By maintaining key, confidential relationships with a select group of capable capital providers, AWPC has accessible sources of capital for project execution when development efforts lead to a commercially ready project;
- **Traditional Ecological Analysis**: Membertou Geomatic Consultants has played a key role in the determination of protocols for the execution of traditional ecological studies in Nova Scotia and have worked with CBCL Limited and AWPC on other assignments. Membertou Geotmatics has again been engaged to assist AWPC and PWFI in this Project;
- **Other Sub-Consultants:** Garrad Hassan were subcontracted by AWPC and PWFI to conduct the noise and flicker analysis, while Davis MacIntyre and Associates have undertaken the necessary archaeological work pertaining to the site since the inception of the Project.

In addition to the above, AWPC engages and interacts with many other suppliers and will welcome new contacts as the project proceeds.

1.3 Project Overview

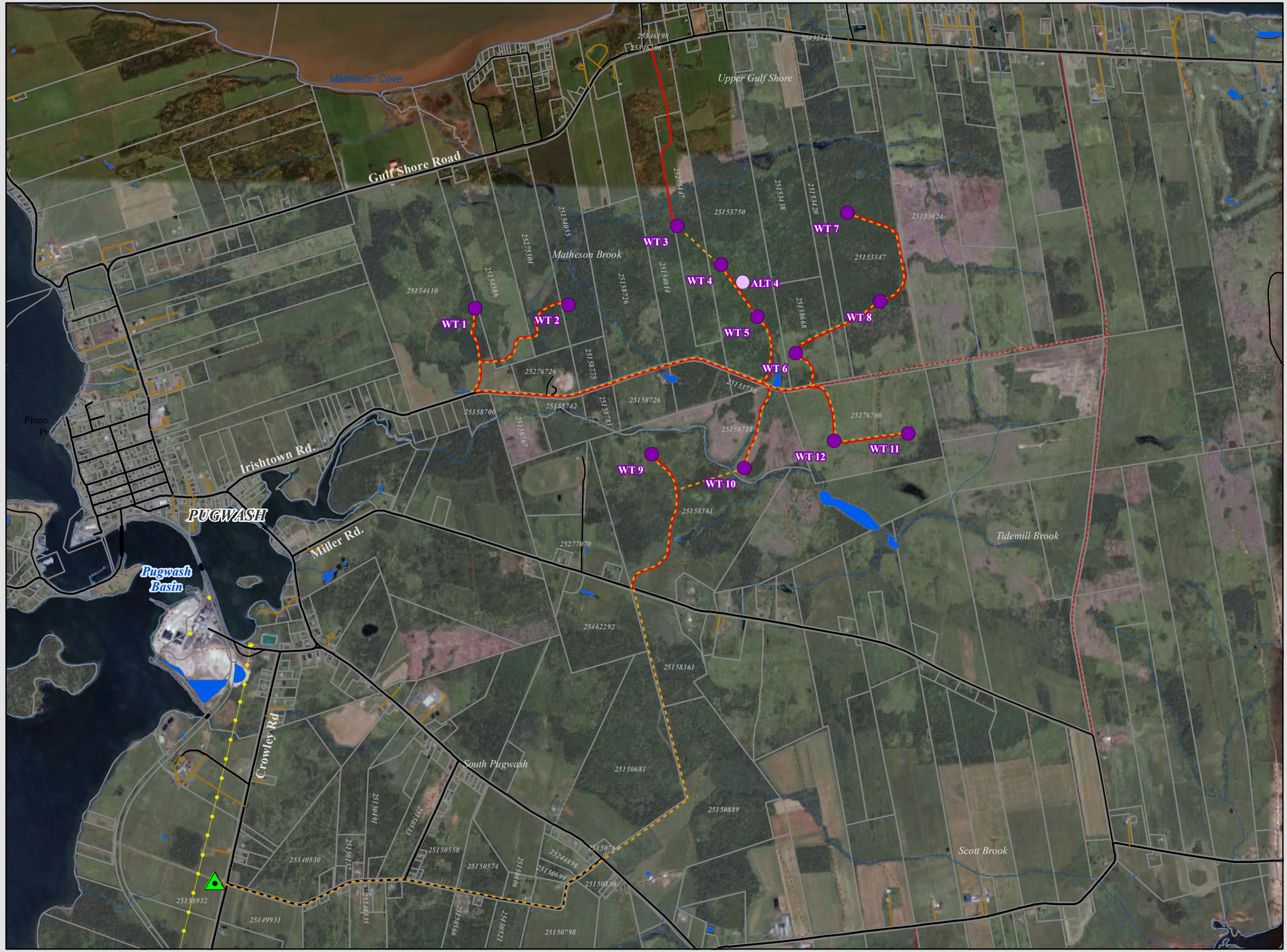
NCWF plans to construct and operate up to 12 wind turbine generators (WTGs)[1] to generate up to 33 MW which will be fed into the Nova Scotia Power Inc.'s (NSPI) provincial power grid. The principle components associated with the proposed works are the WTGs consisting of towers, nacelles and blades; the concrete foundations and laydown areas; access roads; a cable collection system interconnecting the turbines; an electrical substation and physical connection to the grid. Each WTG will have a maximum rated capacity of 2 – 3 MWs (depending on the specific turbine procured); the towers will be up to 99 m in height and the blade swath diameter will be up to 113 m. This Project will contain no more than 12 WTGs.

As depicted in Figure 1.2, the Pugwash wind farm is located on approximately 450-500 ha of land to the east of the village of Pugwash and on lands on either side of the Irishtown Road. Access to most of the WTGs, as illustrated in Figure 1.2 will be from the Irishtown Road; the latter is an important existing access spine to the development of the Project. Access to the individual WTGs will involve new construction. The geographical coordinates of WTGs are provided in Table 1.1 including two alternative locations for WT4. Further information on the Project is provided in Chapter 2, Project Description.

Table 1.1: Geographical Coordinates of WTGs

Turbine Number	*X*	*Y*	*LAT*	*LONG*
WT 1	450666.211	5078715.412	45.860	-63.636
WT 2	451194.604	5078735.925	45.860	-63.629
WT 3	451812.809	5079183.757	45.865	-63.621
WT 4	452063.600	5078963.000	45.863	-63.618
ALT 4	452187.000	5078863.000	45.862	-63.616
WT 5	452271.117	5078667.685	45.860	-63.615
WT 6	452490.000	5078461.000	45.858	-63.612
WT 7	452782.758	5079257.844	45.865	-63.608
WT 8	452967.680	5078753.020	45.861	-63.606
WT 9	451669.979	5077884.636	45.853	-63.623
WT 10	452196.686	5077806.600	45.852	-63.616
WT 11	453127.600	5078004.000	45.854	-63.604
WT 12	452706.000	5077961.000	45.854	-63.609

[1] 13 possible WTG locations are shown on the figures, but it anticipated that one location in the interior of the site will be dropped after further study and the final determination of the configuration of the WTGs. A maximum of 12 WTGs will be erected.



Legend

- Alternative Layout
- 2012 Proposed Turbine Locations
- Proposed Substation

Road/Cable Connections

- Road
- Cable

Roads

- Paved Road
- Unpaved Road
- Lanes / Driveways
- ROAD ruin/inactive/abandoned
- Cart Track / Footpath
- Power Line
- Lakes and Waterbodies
- Rivers and streams
- Property Boundary

Figure 1.2
Property Boundaries

NOTE: If ALT 4 is used, WTG 4 and WTG 5 will be omitted from the layout.

Drawn By: MSD	Date: 26/01/2012
Project # 111257.00	Scale @ 11" x 17"

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0 187.5 375 750 m

N

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Units: Meter

The WTGs and interconnecting roads are located on 13 parcels of land, and PWFI has entered into nine option and lease agreements with those involved. During the option period, these agreements allow PWFI to further explore the wind resource, conduct reasonable geotechnical sampling for foundation construction design, conduct environmental field programs and undertake other requisite studies. After all the authorizations are in place, the agreements will enable the proponent to occupy portions of the lands to construct, operate and maintain the wind farm; this will include the installation of roads, cable collection systems, turbine pads and lay-down areas. These option and lease agreements are all very similar. The proponent has also entered into option agreements with two land owners having land between Miller Road and Highway 6 to the south of the wind farm and a landowner on Crowley Road in south Pugwash. The former are for power line easements to accommodate the cable collection system going from the wind farm to the grid, and the latter gives the proponent the right to purchase land and a transmission line easement upon pre-defined terms for the purposes of installing its substation and interconnection to the grid. These agreements also allow environmental considerations to be explored during the option period. There are 12 agreements in total covering the foregoing aspects. Except for one out-of-province owner, the parties to these agreements are people living in or near the community. These landowners will derive reasonable economic benefits from the Project in exchange for hosting components of the wind farm.

The cable collection system that will interconnect the turbines and the wind farm to the NSPI transmission grid will be installed on overhead wires on poles similar to those commonly used in the electrical distribution network in communities throughout the province. The routing of these transmission lines are depicted on Figure 1.2. The proponent intends to install that portion of the collection system between Highway 6 and the Crowley Road within the right-of-way that belongs to the Department of Transportation and Infrastructure Renewal (NSTIR) along the Rabbittown Road. An application for a Pole Line Permit has been filed with the Minister of NSTIR for this purpose. However, the proponent may, as an alternative, install that particular portion of the collection system on private lands situated to the south of Rabbittown Road. This would be done pursuant to an easement or right-of-way agreement; various landowners have expressed an interest in providing such land rights to the proponent for this purpose.

1.4 Spatial and Temporal Boundaries

The study area for this environmental assessment includes the footprint of all works associated with the construction and operation of the proposed WTGs and those areas within which project-environment interactions could reasonably be expected to occur. It is not possible to establish a single study area boundary that accurately accommodates the spatial characteristics of all potential project-environmental interactions. For example, the study boundary for the archaeological field programs is very much determined by the siting of the turbines, associated access roads and lay down areas, i.e., areas that will be disturbed by the construction of the proposed facility. The study area for flora is larger and takes into account the nature of all habitats in proximity to areas that may be disturbed. The study area for the ornithological work is greater still and that referenced for the socio-economic analysis is geographically the most extensive in order to take into account the consequences of the Project for local residents and communities.

Temporal Project boundaries include the timeline for the short term construction activities as well as the long term operation of the facility and its eventual decommissioning.

1.5 Regulatory Context

1.5.1 Requirement for Provincial Environmental Assessment

In accordance with the Nova Scotia Environmental Assessment Regulations pursuant to the *Nova Scotia Environment Act*, the proposed wind farm at Pugwash will be subject to a Class I environmental assessment as defined by those regulations. This necessitates the registration of the Project with Nova Scotia Environment (NSE). The department has prepared the "*Proponent's Guide to Wind Power Projects: Guide to Preparing an Environmental Assessment Registration Document*".

The following factors must be addressed and shall be considered by the Minister in formulating a decision:

(a) the location of the proposed undertaking and the nature and sensitivity of the surrounding area;
(b) the size and scope of the proposed undertaking;
(c) concerns expressed by the public about the adverse effects or the environmental effects of the proposed undertaking;
(d) steps taken by the proponent to address environmental concerns expressed by the public;
(e) potential and known adverse effects or environmental effects of the technology to be used in the proposed undertaking;
(f) project schedule;
(g) planned or existing land use in the area of the undertaking;
(h) other undertakings in the area; and
(i) such other information as the Minister may require.

Each of the above factors has been addressed in the documentation that follows.

Following registration of the environmental assessment with NSE, the proponent will publish notification of so doing in two newspapers, one having province-wide circulation and one having general circulation in the locality of the proposed Project. This notification will indicate where the document can be viewed and will invite written comments on the Project to be submitted to NSE within 30 days following publication of the notice.

No later than 50 days following the date of registration, NSE shall advise the proponent in writing of the Minister's decision. At this stage the Minister may require additional information prior to making a decision, may make a decision to enable the Project to proceed with or without conditions, or may require the proponent to comply with a more extensive assessment process.

1.5.2 Requirement for Federal Environmental Assessment

Federal departments and agencies must complete an environmental assessment whenever one or more triggers occur as defined in the *Canadian Environmental Assessment Act (CEAA)*; the potential triggers are:

(i) the federal department or agency carries out a project;
(ii) the federal department or agency provides financial assistance to enable a project to be carried out;
(iii) the federal department or agency sells, leases or otherwise transfers control or administration of land to enable a project to be undertaken; or
(iv) the federal department or agency issues an authorization to enable a project to go forward.

This Project will be developed by NCWF, a private limited partnership. No federal monies are involved, nor have any federal monies been provided to PWFI or AWPC in connection with Project; no federal land is involved either through sale or lease. Triggers i), ii) and iii) do not apply. There are brooks within and in proximity to the project area, but the wind turbine sites and access roads have been sited to avoid these brooks and therefore impact to any fish bearing waters. No authorization or approvals are required under federal legislation identified in Law List Regulations.

1.5.3 Municipal Authorizations

In May 2007, the members of the Municipality of the County of Cumberland amended their Municipal Planning Strategy and Land Use Bylaw in order "to recognize the benefits of renewable energy; the County's renewable energy resources and development opportunities, particularly for wind power".

In 2010, the Municipality of the County of Cumberland unveiled its Regional Energy Strategy, a 10-15 year plan towards community sustainability through increased energy security, economic development, environmental protection and health. Goals include identifying, promoting, developing and investing in local energy opportunities including tidal, wind, geothermal, solar, and coal bed methane resources (CREDA, 2011). As a component of this strategy, in August 2011, the Municipality released the Cumberland Wind Energy Development Plan, which outlines the outcomes and methodologies of a public consultation program focused on wind energy knowledge sharing and information gathering. Feedback from participants from across the Municipality, including Pugwash, was then incorporated into proposed amendments to the Municipality's Land-use By-laws and the creation of wind turbine suitability mapping for Cumberland County.

By-law amendments include, but are not limited to the following:

- Increasing the existing 500 m (1,640 ft), or three times the *height,* separation distance to 600 m or three times height from all *habitable buildings* on a neighbouring property. *Habitable building* is defined as a dwelling unit, hospital, hotel, motel, nursing home or other similar buildings occupied or capable of being occupied as a home, residence or sleeping place of one or more persons either continuously, permanently, temporarily or transiently; and
- The creation of a category for *Domestic Wind Turbines* to better define the different between *Small-scale* and *Large-scale Wind Turbines*.

The proposed changes to the Municipal Planning Strategy and Land Use Bylaw were amended during a Municipal Council meeting on November 9, 2011; this bylaw is now in effect and the proponent has designed the Project to comply in all respects with this newly amended Land Use Bylaw.

1.6 Approach and Expertise Involved

The approach to the preparation of this environmental assessment has been to address regulatory requirements and to focus on the issues raised by the study team, the public and others involved in the process. In addition to the research and the consultation program undertaken, a range of field programs were executed at different times in 2006 and 2007; further work in the field to minimize impacts to wetlands was undertaken in the fall of 2011. The programs executed are described in Chapter 3. Table 1.2 identifies the team leads responsible for the research and field work undertaken.

Table 1.2: Team Leads

Name	*Topic*
Clinton Pinks, CBCL Limited	Determination of habitats including wetlands
Ian Bryson, CBCL Limited	Characterization of forest stands and Species at Risk
Carrie Bentley, CBCL Limited	Characterization of fish habitat
Chris Kennedy, CBCL Limited	Winter bird survey
Brian Dalzell, Atlantic Bird Surveys	Execution of avian field programs
Sean Blaney, ACCDC	Execution of plant inventory
Ross Hall	Survey for freshwater mussels and wood turtles
Hugh Broders, St. Mary's University	Execution of bat field program
Steffen Käubler, CBCL Limited	Visibility analysis and land use investigations
Stephen Davis, Davis MacIntyre and Associates Archaeological Consultants	Execution of archaeological field programs
Jason Googoo, Membertou Geomatics Consultants	Mi'kmaq Ecological Knowledge (MEK) Study
Shant Dokouzian, Garrad Hassan	Flicker and Noise Modelling

1.7 Structure of the Document

This report documents the environmental assessment of the environmental effects of the proposed construction, operation and decommissioning of the Pugwash Wind Farm. This report consists of the following sections:

- Section 1.0 provides an introduction to the proponent and the proposed Project, an overview of the environmental assessment process and an account of the approach to the environmental assessment;
- Section 2.0 provides information on the site's wind resources, justification for the Project and a review of Project alternatives. This section also identifies the principal Project components, activities, scheduling, anticipated emissions and discharges, as well as outlining the Project's health, safety and environmental management plan and how malfunctions and accidents will be addressed;
- Section 3.0 describes the environmental work program that has been undertaken;
- Section 4.0 provides the environmental baseline, i.e., data on the existing biophysical and socio-economic environment;
- Section 5.0 describes the consultation undertaken by the proponent;

- Section 6.0 describes the approach taken to the environmental evaluation, identifies the Valued Ecosystem Components (VECs), the socio-economic issues, the evaluation criteria and references how cumulative effects and effects of the environment on the project are addressed;
- Section 7.0 details the analysis of anticipated environmental effects, identifies mitigation measures, discusses cumulative effects, provides a summary of the residual environmental effects, references the proposed environmental management system and describes follow-up commitments and monitoring initiatives; and
- Section 8.0 summarizes the assessment results.

This environmental assessment report includes mapping and the following appendices:

A ACCDC Short List of Species of Conservation Concern
B Archaeological Resource Impact Assessment
C Noise Impact Assessment
D Shadow Flicker Assessment
E Materials Generated for Consultation