McLellans Brook Wind Farm Environmental Assessment

Prepared for: Watts Wind Energy Inc.

Prepared by: Eon WindElectric

In Association with: Verterra Group

1/21/2013

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LIST OF ACRONYMS

ACCDC	Atlantic Canada Conservation Data Centre
ARIA	Archaeological Resource Impact Assessment
asl	above sea level
BOP	Balance of plant
CanWEA	Canadian Wind Energy Association
CAO	Chief Administrative Officer
CEDIF	Community Economic Development Investment Fund
CLC	Community Liaison Committee
cm	centimeter
COMFIT	Community Feed In Tariff
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWS	Canadian Wildlife Services
dBA	A-weighted decibel
DND	Department of National Defence
EA	Environmental Assessment
EC	Environment Canada
ELC	Ecological Land Classification
EPP	Environmental Protection Plan
GIS	Geographic Information Systems
GJ	Gigajoule
ha	Hectares
km	kilometer
KMK	Kwilmu'kw Maw-klusuaqn
kV	kilovolt
m	meter
m^2	square meter
m^3	cubic meter
MAPC	Maritime Aboriginal Peoples Council
MARI	Maritime Archaeological Resource Inventory
MBBA	Maritime Bird Breeding Atlas
MBCA	Migratory Bird Convention Act
MBR	Migratory Bird Regulations
MBWF	McLellans Brook Wind Farm
MEKS	Mi'kmaq Ecological Knowledge Study
MFN	Millbrook First Nation
MW	Megawatts
NSDNR	Nova Scotia Department of Natural Resources
NSDOE	Nova Scotia Department of Energy
NSE	Nova Scotia Environment
NSM	Nova Scotia Museum
NSPI	Nova Scotia Power Inc.

NSTIR	Nova Scotia Department of Transportation and Infrastructure Renewal
OAA	Office of Aboriginal Affairs
PGI	Pellet Group Inventory
PLFN	Pictou Landing First Nation
PMN	Paqtnkek Mi'kmaw Nation
PPA	Power Purchase Agreement
RDA	Regional Development Agency
RABC	Radio Advisory Board Canada
RCMP	Royal Canadian Mounted Police
RFP	Request for Proposals
RRSP	Register Retirement Savings Plan
SARA	Species at Risk Act
SNSMR	Service Nova Scotia and Municipal Relations
SPL	Sound Power Level
VEC	Valued Environmental Component
WAM	Wet Area Mapping
WTBL	Water table
WTG	Wind Turbine Generator
^{o}C	degree Celcius

1.0 Introduction

1.1 Overview

The McLellans Brook Wind Farm (Project; MBWF) is proposed as a six megawatt (MW) wind energy project installation about 10 kilometers (km) south of New Glasgow in the Municipality of Pictou County (Pictou County). The site is located in the community of McLellans Brook which is approximately 2km east of Forbes Lake.

Watts Wind Energy Inc. (Proponent; Watts Wind) is a Nova Scotia based company that has been given approval from the Nova Scotia Department of Energy (NSDOE) under the Community Feed-in-Tariff (COMFIT) program. This approval allows the Project to be part of the COMFIT program but it is pending other requisite approvals such as a release under the Nova Scotia Environmental Assessment Regulations. This document was prepared to satisfy the requirements for an environmental assessment (EA).

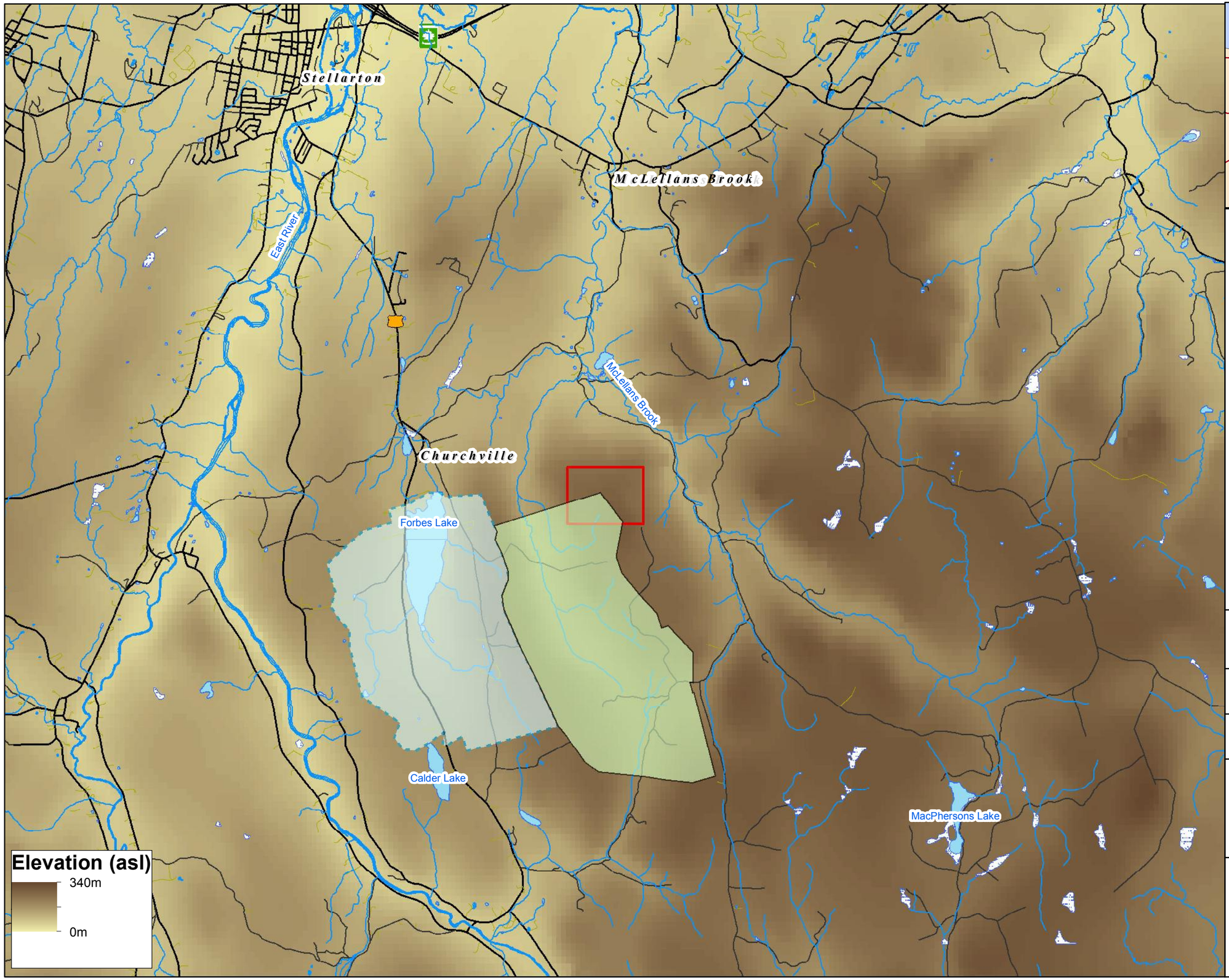
The Project is organized as a Community Economic Development Investment Fund (CEDIF) which is Registered Retirement Savings Plan (RRSP) eligible and provides additional tax benefits to eligible Nova Scotia investors. Nova Scotia residents, including residents of Pictou County, will have an opportunity to invest in the Project as part of the CEDIF structure. In addition, the Project is expected to create opportunities for construction, electrical and transportation contracts in nearby communities and Pictou County itself. The Project is funded privately; no government funding has been or will be provided.

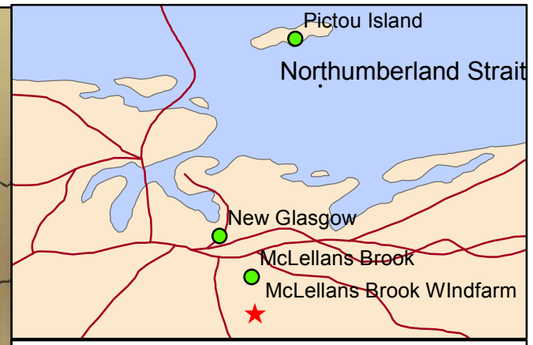
The general site location and setting is shown on Figure 1.1. The area is rural in nature with some ribbon residential development along the roadways; the closest residence is more than 600m distant from the nearest turbine. Watercourses and wetlands have been identified on the property and will be avoided by the Project. An equipment laydown area is required at each turbine site to facilitate the construction, including assembling and erecting the wind turbine generators (WTGs). An access road will be required from Brookville Road to deliver WTG components and for subsequent maintenance of the turbine. An electrical connection is needed from the WTGs; this will largely follow an existing access road from Irish Mountain Road. No maintenance buildings, fencing or a substation will be required. Extent of clearing required for Project construction will be well under 10 hectare (ha). More detail on location, site layout, wind regime, and proposed Project activities with a schedule can be found in Section 2.0.

1.2 Proponent

The Proponent is an independent power producer and has been awarded in excess of 20 MWs of wind power projects through the COMFIT program. The NSDOE COMFIT program is designed to encourage the development of community owned renewable energy projects across Nova Scotia. The program offers a fixed price for the sale of qualifying renewable electricity to Nova Scotia Power Inc (NSPI), thus reducing the risk to the community entities by guaranteeing a market for the electricity.

The Proponent was awarded a COMFIT contract from the NSDOE on April 13th, 2012 for a total of 6 MW at McLellans Brook (Appendix 1). The company has an additional 14MWs of projects pending approval from the NSDOE at alternative locations across Nova Scotia. The company was formed in 2008 as a





Legend

- Hwy 104
- Hwy 348
- Paved Roads
- Unpaved
- Driveway
- Watercourse
- MBWF location
- Lake Waterbody
- DNR Wetland
- Forbes Lake Watershed - Zone 1
- Forbes Lake Watershed - Zone 2

FIGURE 1.1

General Site Location

Drawn by: AWA	Date: 2013/01/02
Project #: 2012043	Scale @ 11"x17"

EON WindElectric

0 750 1,500 3,000

Meters

Coord. System: NAD83 CSRS UTM Z20N
Projection: Trasnverse Mercator
Units: Meters

N

special purpose CEDIF to fund the development and construction of a 1.5MW wind power project in Watt Section, Nova Scotia. They were awarded a 20 year PPA for this eastern shore project from NSPI. This followed their response to a request for proposals (RFP) for distribution level wind power projects. This project was successfully funded by the community and commenced operation on March 30, 2011, following Federal EA approval. Since this time, Watts Wind has pursued many other opportunities for community wind energy projects under the COMFIT program.

Partners of Seaforth Engineering Group, Eon WindElectric Inc. and others came together to form Watts Wind. The principals in Watts Wind have extensive experience in all facets of renewable energy project development, operation and management, having collectively installed more than 200MWs of wind and hydro power projects and raised in excess of $50 million in public market equity and debt. Watts Wind Energy Inc. and its principals have been involved with several projects that required a provincial environmental assessment (Digby Wind Farm, Amherst Wind Farm, and Fermuse Wind Farm in Newfoundland). The principals are Watts Wind include:

- Stanley Mason, President of Watts Wind, is the co-founder of Seaforth Engineering Group Inc., Atlantic Orient Canada Inc. and Seaforth Energy Inc. He has over 20 years of marine engineering and project management experience in the provision of consulting engineering services to the renewable energy and marine industries**.**
- Paul Pynn, Vice President of Watts Wind, is the President and founder of Eon WindElectric Inc. Since its inception in 2006, Eon has provided engineering and project management services to more than 200MW of wind energy projects in Eastern Canada and abroad.
- David Regan, Chairman of Watts Wind, is Executive Vice President, Corporate Development of DHX Media Ltd. and previously worked in finance and consulting in New York and London.

1.3 Regulatory Framework

1.3.1 Federal

There are no environmental approvals expected to be required from Federal authorities for the Project. The Project will not result in impacts such as a harmful alteration, disruption or destruction of fish habitat or impact to navigable waters. No work is proposed on Federal lands nor are Federal monies involved. Environment Canada (EC) / Canadian Wildlife Service (CWS) have been informally consulted with respect to migratory birds.

Aviation approvals are required for wind energy projects. The Proponent has made appropriate applications to NAV CANADA, Canadian Coast Guard, Transport Canada, and Department of National Defence (DND). Appendix 2 shows all responses and approvals from Federal aviation and navigation authorities.

For more information on consultation with Federal authorities, refer to Section 5.3.

1.3.2 Provincial

As the Project is a 6MW wind energy project, it is triggered for a Provincial EA as per the Environmental Assessment Regulations. For any wind energy project with a capacity exceeding 2MW, a Class 1 EA is required according to Schedule A of the Regulations.

Wetlands and watercourses have been located and proposed to be avoided as part of planning the Project; the one exception is an existing culvert which will be upgraded as part of extending the electrical distribution line from Irish Mountain Road. As this work will be completed in a manner consistent with current applicable guidelines and standards issued by Nova Scotia Environment (NSE) and the culvert will be installed between June 1 and September 30, no approval is required though a Culvert Notification will be submitted to NSE (i.e., Category 1 Water Approval) as per Section 5(1)(d) of the Activities Designation Regulations (Government of Nova Scotia, 2011a).

As this site is within the Forbes Lake Secondary Watershed (i.e., Zone 2), approval of the road construction and any watercourse alteration is required of the New Glasgow Water Works Operator, as well NSE.Erosion and sediment control is required to protect the receiving water and as specified in the Forbes Lake Watershed Protected Water Area Regulations. These Regulations have other stipulations to protect the watershed, including fuel storage. These environmental management practices are included in the MBWF's Environmental Protection Plan (EPP); refer to Appendix 3 for the draft EPP.

As work will be completed at the intersection of Brookville Road and the access road, a Working Within Highway Right-of-Way will be required from Nova Scotia Transportation and Infrastructure Renewal (NSTIR). A Transportation Study and Traffic Management Plan, Sign Permit, and a Special Move: Over-Dimension Permit will all be required for the construction of the MBWF from NSTIR or Service Nova Scotia Municipal Relations (SNSMR) as appropriate.

No other permits or approvals are expected to be required from the Province; however, should this change, the Proponent commits to obtaining all requisite approvals prior to work. For more information on consultation with Provincial authorities, refer to Section 5.3.

1.3.3 Municipal

The Project is located within the Municipality of Pictou County, and the development of wind power projects is guided by the Municipal Planning Strategy, effective November 7, 2007 (Municipality of Pictou County, 2007). The Proponent has secured two development permits for the installation of 4 WTGs (refer to Appendix 4) according to the following guidelines for utility scale wind turbines:

> *o Minimum setback from residences, except residences located on the same lot as the wind turbine, shall be 600 metres (1968.5 feet). There is no setback requirement from residences located on the same lot.*
>
> *o Minimum setback from all property lines shall be one times the height of the turbine.*
>
> *o Minimum setback from the boundary of a public road shall be 300 metres (984.3 feet);*

The Proponent is aware of the requirement of a construction permit from the Municipality of Pictou County prior to the construction of turbine foundations. For more information on Municipal consultation, please refer to Section 5.3.

1.4 Structure of Document

This report documents the assessment of the environmental effects of the proposed construction, operation and decommissioning of the MBWF. The EA has been completed based on potential for

interaction of the proposed Project with the environmental and socio-economic setting. This report has been prepared in accordance with the Proponent's Guide to Wind Power Projects: Guide for Preparing an Environmental Assessment Registration Document (Nova Scotia Environment, 2012).

The document was prepared by Eon WindElectric in association with Ms. Janis Rod of Verterra Group Environmental Strategies Ltd. As an environmental consultant, Ms. Rod has completed numerous federal and provincial EAs within various industries, including the renewable energy industry. Her professional experience on scoping and reviewing the EA supported the expertise of Mr. Paul Pynn, President of Eon WindElectric, and Mr. Andrew Arbuckle, Project Engineer-in-training with Eon WindElectric, who compiled primary and secondary data sources and drafted the majority of the EA document. Other expertise was contracted externally as defined later in this report.

Following this introduction of the EA report, the Project is described in Section 2 in terms of location, wind regime, and the proposed WTGs. In addition, activities in major phases of the Project are described. The potential for accidents and malfunctions are also described, as well as a discussion on limitations for potential for future phases. Section 3 presents the scoping and methodology used in the EA. The environmental setting is presented in Section 4 including biophysical and socio-economic aspects. Section 5 describes the consultation program completed to date and ongoing plans within the community at McLellans Brook, the Mi'kmaq, and regulators. The analysis of the interaction of the Project and the environmental setting is presented in Section 6 based on valued environmental components (VECs) and socio-economic aspects. Section 7 presents the commitments of Watts Wind Energy Inc. to follow up and monitoring of the Project while the closure, including signature of the Proponent, is provided in Section 8. Following the bibliography, the appendices contain supporting information as referenced in this document including correspondence and reports completed for the Project.

2.0 Project Description

2.1 Site Location and Layout

The MBWF is located on privately owned land at the location of 45°30'20.40"N, 62°36'24.13"W. The Proponent plans to construct and operate a 4 WTG, 6MW wind farm near McLellans Brook, in Pictou County (Figure 2.1). The nearest communities surrounding the site are Churchville (3.2kms NW), Kirkmount (2.75km NE), and McLellans Brook (2.2km N). The Town of Stellarton is located 7km north of the site. Setback distances from the nearest receptors (i.e., residential dwellings) are greater than 600m.

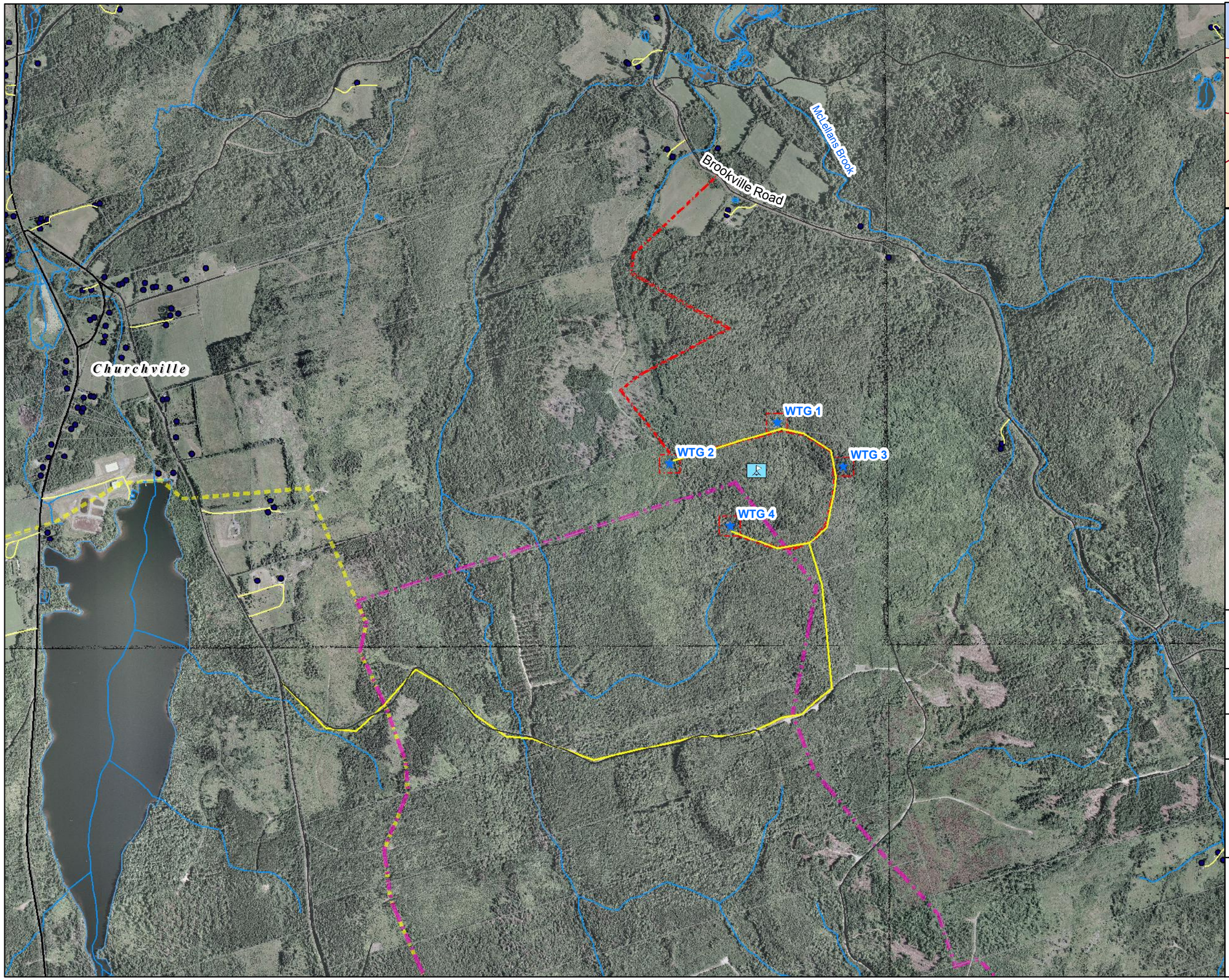
A portion of the proposed development area of the MBWF is within the boundaries of the Forbes Lake Secondary Watershed (i.e., Zone 2 as per Figure 2.1). All work will be carried out according to the requirements of the Forbes Lake Watershed Protected Water Area Regulations (see Section 4.1.3 for more information on watercourses and wetlands). Several discussions have occurred with the Water Works Operator, the engineer for the Town of New Glasgow which is the area served by Forbes Lake Watershed, and the residents who sit on the Watershed Advisory Board. Communication with these parties will continue for the life of the project, as appropriate.

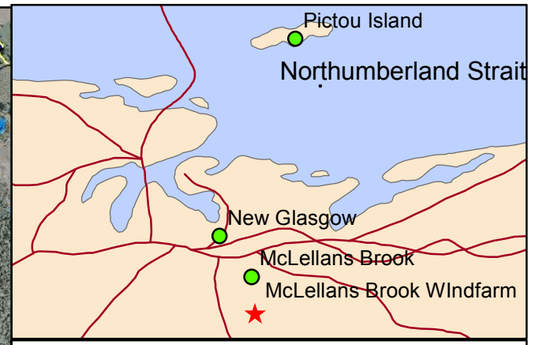
The MBWF will be connected to the distribution grid on Irish Mountain Road, which feeds the nearby Stellarton substation via a 25 kilovolt (kV) distribution feeder emanating from the substation along Highway 348. The Project components include the WTGs (nacelle, blades, tower sections), access roads, medium voltage (25kV) power lines and pole infrastructure, laydown areas, concrete foundations, and pad mount transformers. The MBWF will not require the construction of a substation because it will connect to the pre-existing distribution substation (i.e., 62N in Stellarton).

The lands under option agreements encompass an area of 143 ha with mixed hardwood and softwood tree growth. All properties are zoned as General Development and allow for the installation of utility scale wind turbines. The site is mainly used for silviculture and private landowner wood harvesting, and is located approximately 20 kilometers south of Pictou Harbour, i.e., greater than 5km inland of coastal waters.

The access road will be constructed off the Brookville Road and appropriate permits will be obtained from NSTIR prior to construction. Watercourse and wetlands have been identified in the areas of the Project; all work will be within applicable watercourse and wetland legislation. The proposed area of disturbance, which refers to turbine laydown areas, turbine foundations and crane pad construction, will equate to approximately 0.8 ha per turbine (see Figure 2.2). Total area of disturbance is approximately 5.5 ha, which includes access roads and utility routing.

Beginning with the 2008 RFP contract award, the Proponent has gained extensive expertise in the prospecting and development of community-owned, distribution level wind energy projects across Nova Scotia. The COMFIT program allows community entities to connect projects with a total capacity less than the minimum load on the local distribution substation. Numerous constraints limit the areas suitable for the development of a distribution level COMFIT project; these include NSPI infrastructure in the surrounding area, wind regime, socio-economic factors (e.g., property setbacks, regional park areas, etc.) and ecological concerns. Consideration of these key factors have led the Proponent to consider the





Legend

- Building Points
- WTG
- Proposed Utility Route
- MET tower
- Paved Roads
- Unpaved
- Driveway
- Watercourse
- Road/Laydown area
- Forbes Lake Watershed - Zone 1
- Forbes Lake Watershed - Zone 2

FIGURE 2.1

SIte Layout

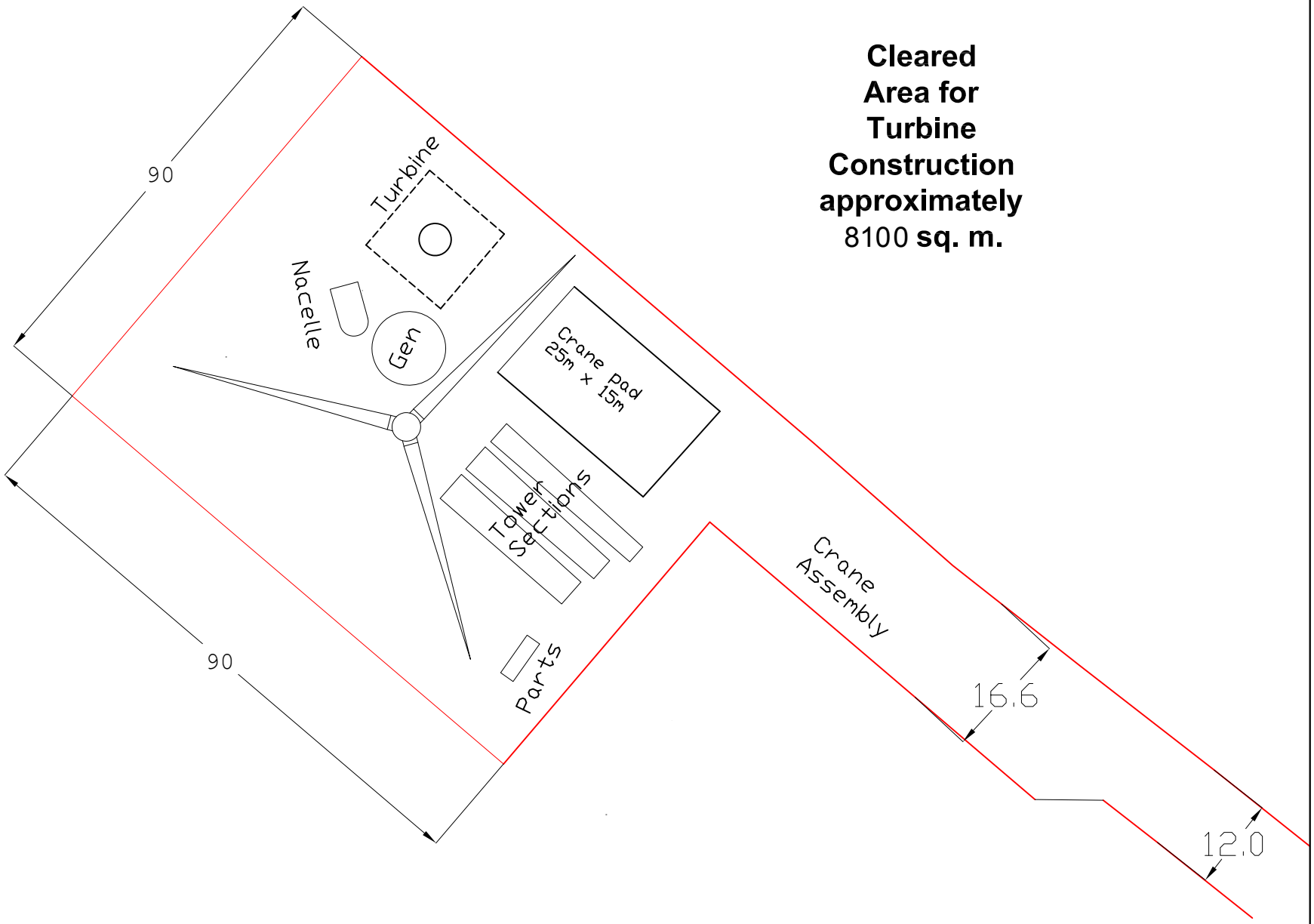
Drawn by: AWA	Date: 2013/01/02
Project #: 2012043	Scale @ 11"x17"

EON WindElectric

0 250 500 1,000
Meters

Coord. System: NAD83 CSRS UTM Z20N
Projection: Trasnverse Mercator
Units: Meters

N



All Dimensions in m

Watts Wind Farm
Typical Turbine
Laydown Area

Project Manager	Owner
EON WindElectric	Watts Wind Energy

Date:	September, 2012
Scale:	NTS
Revision:	0
Drawing No:	1000

MBWF site as the best alternative given the regulatory, socio-economical, ecological and technical considerations.

2.2 Wind Turbine Generator

Selection of the WTG make and model is ongoing for the Project. The Proponent will select WTGs based on, but not limited to:

i – performance of the WTG with site wind regime
ii – economic considerations
iii – sound power level (SPL) at turbine hub height.

Final turbine selection will be made after the completion of supplier due diligence and additional technical studies. Individual turbine capacities will be in the range of 1.5-3MW, and tower heights will range from 78m to 98m. Total height (i.e., base to tip of turbine blade) will range from 117m to 144m. Lighting of wind turbine will conform to Transport Canada Standard 621. Correspondance on aviation approvals can be found in Appendix 2. Turbine coloring will be industry standard white or light coloring. An effort will be made by the Proponent to source WTG components (blades, towers, generators) domestically under commercially reasonable terms.

Each turbine will produce 60Hz, 3 phase power, and will be isolated and protected via a low voltage breaker located within the turbine. The turbine will be connected to the grid by low voltage cables that are connected to the system with a transformer either located outside of the turbine, or located in the basement of the foundation. A final pole mounted re-closer switch located on NSPI owned poles will further help to isolate and protect the turbine.

Maximum SPL at 95% of rated turbine capacity of 105.5 A-weighted decibel (dBA) has been used to conservatively model noise from the MBWF. This is the highest SPL from the WTG types that are under consideration; hence a worst case scenario. This was used in the predictive noise modeling as described in Section 4.2.4.

The Proponent will ensure final WTG selection and site layout will comply with Municipal setback regulations, and do not exceed 40dB(A) SPL at the nearest dwellings from Project operation. While not regulated in Nova Scotia, 40dBA is considered an acceptable noise level from community sources to protect sleep (e.g., Health Canada, Ontario provincial regulations, etc.); hence, it has been adopted by NSE as a guideline. Noise studies have been conducted using the turbines with the highest sound power levels in order to ensure conservative analysis results. Refer to Section 4.2.4 for a detailed description of the noise evaluation completed for the Proponent.

2.3 Wind Regime

A detailed wind resource assessment at the MBWF site commenced in May 2012 with the installation of a 60m meteorological tower. Wind direction, wind speed, atmospheric pressure and temperature are recorded and monitored on a daily basis. The wind turbine selected for the site will be based on International Electrotechnical Commission (IEC) standard 61400-1 for wind turbines among other technical and economic constraints listed in Section 2.2. The IEC 61400-1 is a set of international

standards which are based on three wind regime characteristics which guide the selection process for wind turbines. The three characteristics of the wind regime are the 50 year gusts, turbulence intensity and annual average wind speeds. Meteorological tower data, correlated with nearby long term weather stations, will be used to determine the parameters outlined by IEC 61400-1, which will help guide the turbine selection process.

2.4 Planning and Design

Many of the impacts associated with projects can be avoided at the planning and design stage rather than relying on mitigation implemented only during construction and operational phases. In terms of the MBWF, the site itself is an excellent candidate to locate WTGs due to its excellent wind resource, distance from residents, suitability of electrical connection, and lack of ecological sensitivities.

As part of work completed to plan and design the Project, a review of the site was completed from ecological and socio-economic perspectives. The WTGs were located to avoid wetland and watercourses. The selection of locations also considered the distance from residential dwellings and visual impact. These types of considerations were combined with the assessment of wind resource to optimize the selected site.

The alternative to the Project is electrical generation with fossil fuels or another renewable energy project. The 6MW wind energy capacity will provide approximately 75,000 gigajoules (GJ) of renewable energy, which will satisfy the energy needs of approximately 2400 Nova Scotian homes according to the Statistics Canada data on electricity consumption (Statistics Canada, 2007). The implementation of renewable energy such as the MBWF is in line with Nova Scotia's Renewable Electricity Plan (Department of Energy, 2012). As a community energy project, it provides the renewable electricity locally, i.e., via the distribution grid, which also reduces losses of electricity that occurs in transmission lines. In addition, community members will be given the opportunity to share in ownership of the Project as investors in the CEDIF.

In summary, this is a small, community-based project which will provide distributed renewable energy to the grid and local economic benefit. It has been sited in consideration of technical, financial, social and ecological issues. Practical, mitigative measures have been included in the Project design to minimize residual environmental effects.

2.5 Construction

The construction phases deemed to be most relevant to the EA process are discussed in further detail: this includes site development; civil balance of plant (BOP) and electrical BOP Work, and turbine delivery, erection and assembly.

Table 2.1 outlines the proposed work schedule for the MBWF. The schedule is subject to change, and proper notification will be given to the regulators and other stakeholders as appropriate.

Table 2.1: Project Schedule

Site Activity	Start Date (mm/yyyy)	Duration
Geotechnical Investigation-Site Survey	03/2013	2 weeks
Engineering Design and Procurement	03/2013	2 months
Clearing and Grubbing	07/2013	2 months
Civil/Electrical BOP Construction	08/2013	3 to 4 months
Turbine Installation	11/2013	1 to 2 months
Commissioning	12/2013	1 month
Commercial Operation Date	01/2014	N/A
Follow-up and Monitoring	01/2014	as required

The site development phase incorporates the activities needed to complete the design and tendering aspects of the MBWF. The major components include completion of land surveys for placement of roads and foundation pad, completion of geotechnical and engineering studies for foundation, road and electrical design, implementation of sediment and erosion control site clearing (i.e., trees, shrubs) and grubbing. The site development stage will require the use of light duty trucks, excavators and backhoes, forestry harvesting equipment and drill rigs.

The Proponent will complete a survey for for breeding activity (i.e., nesting) prior to clearing. The Proponent is aware of the Migratory Bird Regulations (MBR), under the *Migratory Birds Convention Act* (MBCA), and the fact that Canadian Wildlife Service (CWS) cannot authorize incidental take of migratory bird nests or eggs for activities such as the construction of a wind farm and associated infrastructure. Therefore, trees will only be removed during bird nesting season pending outcome of the nesting survey. Site clearing will be completed with the use of standard forestry and road building equipment.

The construction phase activities include upgrading of existing access road off Brookville Road, new construction of access road to turbine pads, laydown area and crane pad construction, turbine delivery and assembly related activities, electrical infrastructure construction, temporary work structure installations, site restoration and remediation, and commissioning of site and turbines.

Environmental protection is a key part of construction. A draft EPP has been developed to communicate these protection mechanisms to the contractor, sub-contractors and site personnel (Appendix 3). This will be finalized based upon regulator comments, subsequent field work and final design of the Project. Wetland and watercourse identification is complete, and precautions will be taken to avoid buffer zones during the construction phase. Archaeological studies have indicated there is a low likelihood for the presence of pre-Contact or European artifacts on site. Construction crews and site managers will be on alert for the presence of old foundations or artifacts with apparent archaeological significance. Erosion and sediment transport control will be followed according to the current version of the Province of NS Erosion and Sediment Control Handbook for Construction Sites (1988). Standard hazardous materials protocols will be followed during the project, including a 100m setback from watercourses and wetlands while refueling equipment as per Section 4(5) of the Forbes Lake Watershed Protected Area Regulations.

Turbine sites typically require construction of a level laydown area (typically 90m by 90m) for storage of turbine components and to create a safe and level working area. A crane pad (level, structurally sound area) typically 8m by 10m will be required at each turbine location as an operating platform for the main turbine erection crane. It is typically constructed using structural fill (surge and/or gravel).

The access roads will be upgraded and built to accommodate the size requirements of the crane and the load specifications to support the delivery of approximately 55 flatbed truck loads of turbine and crane components. The roads will be approximately 6-8m wide with ditches and culverts added where required to allow for proper drainage. Total length of access roads will be based on final road routing and turbine micrositing. Refer to Figure 2.3 for a typical road cross section drawing. At present, approximately 3.0 km of new road is estimated to be required. Road routing based on a four WTG layout is shown in Figure 2.1.

Road grades will vary from 4%-8% depending on road curvature and placement of switchbacks. Construction of new road will involve the removal of 0.5-1.5m of overburden and soil (depending on ground conditions) and will use NS Standards for Municipal Services as best practices for gravel based roads while accommodating for heavy truck and machinery transport. Geo-textile membrane may be used to reduce the amount of gravel required during construction of the access roads depending on soil conditions. Approximately 1 cubic meter (m^3) to $2m^3$ of gravel will be used for every meter of road construction.

The gravel used to supply the compacted surface will be obtained on site from borrow pits and/or along the side of the construction located within the Project boundary. Depending on soil conditions, some gravel may be obtained from approved gravel pits off site. The surface soil and grubbing will be re-located to 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.

Following removal of any overburden 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.

Following the completion of a wind resource assessment and geotechnical investigations (i.e., boreholes and core samples), turbine foundations will be designed and constructed. The activities associated with turbine foundation construction include: site clearing and grubbing, blasting of rock (if required), excavation of soils, building of forms and pouring of concrete pads, placement and compacting of backfill material to grade, trenching for electrical and communication conduit. Sediment control precautions and procedures will be implemented for the duration of foundation and crane pad construction. Turbine foundations will typically require approximately 300 m^3 of concrete which will be supplied from a redi-mix plant off site. Blasting Safety Regulations of Nova Scotia (2008) will be adhered to for any blasting required on site including the requirement for a pre-blast survey for water wells within 800m of the point of blast.

Notes:

1. All dimensions in meters (m)
2. All dimensions are approximate
3. Widths will vary on turns
4. Thicknesses will vary depending on grade

Key:

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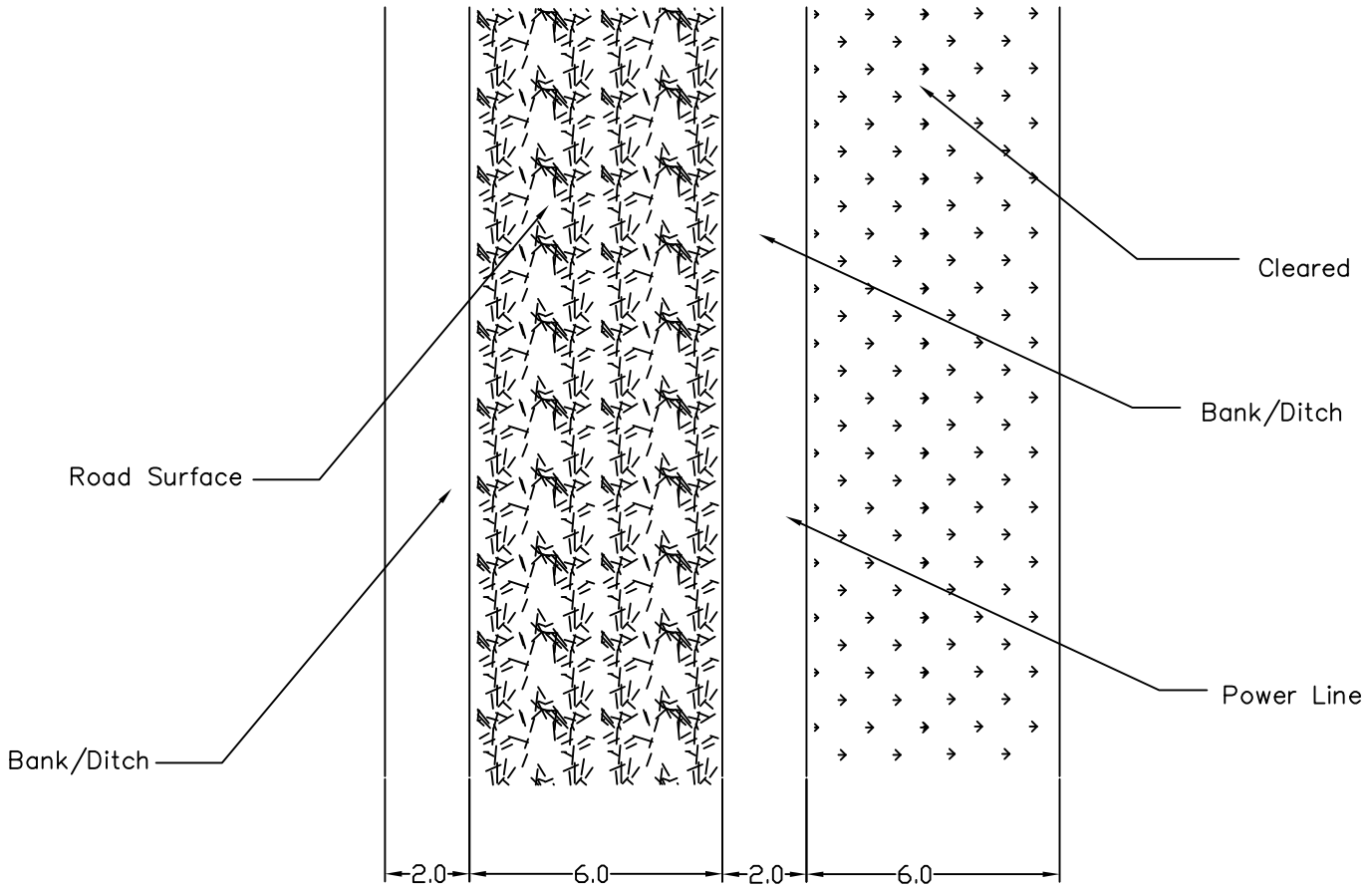
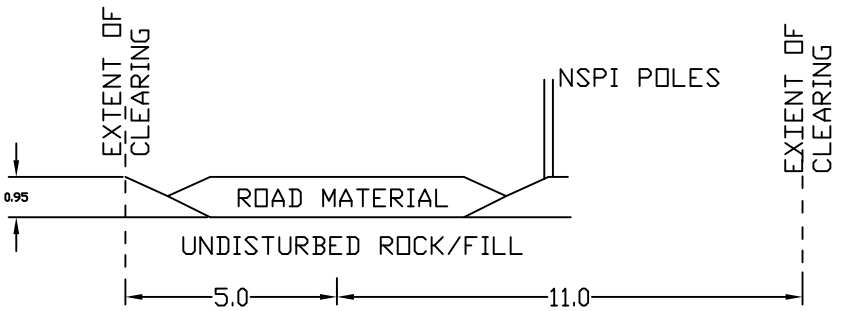




Title:

Figure 2.4
Road Cross Section

Project:

TYPICAL

Client:

Watts Wind Energy Inc.

Date: January 13, 2013

Scale: NA

Revision: 1a

Drawing No: NA

Electrical BOP construction will take place in conjunction with the civil BOP construction phase. The MBWF is a distribution-connected wind power project, connecting to the local distribution infrastructure. Three phase 25kV power lines will be constructed along existing NSPI and NSTIR easements along the Irish Mountain Road. Three phase power infrastructure will be built along an existing woods road which is maintained by the water treatment plant operators at the Forbes Lake facility. Substation construction will not be required for this project as it is connecting to the 25KV distribution system.

Approximately 0.5km of new road construction is anticipated to be required for the construction of the power line infrastructure to the MBWF. Roads required for power lines are typically narrower than wind farm site roads (described above) and will be limited to a width of 5m with appropriate culverts and ditching to ensure proper drainage. Tree clearing (approx. 18m width) is expected to be required for the construction of the power line infrastructure. Precautions listed above relating to breeding and migratory birds will be implemented prior to clearing associated with the construction of the electrical infrastructure.

Wind turbine delivery will involve flatbed trucks and specialized trailers for delivery of the turbine towers, blades and nacelle. Access to the Project site for the construction of the WTGs will be via the Brookville Road from McLellans Brook Road from Highway 347 off of Exit 26 Highway 104. NSTIR imposed spring weight restrictions will be incorporated by the Proponent when coordinating delivery of large and heavy components to the project site. Several bridges along the Brookville Road will also require inspection and coordination with NSTIR. The Proponent is aware of these delivery constraints and has engaged NSTIR to co-ordinate requirements. Turbine components will be delivered after civil and electrical BOP has been completed.

Crane and lifting contractors will build the WTGs. Tower components will be placed sequentially on the turbine foundation with the use of a large crane (up to about 120m). Assembly of the WTG components should take between 4-10 days depending on wind conditions.

Equipment used during the construction, delivery and assembly of the WTGs include dump trucks, excavators, concrete trucks, small, medium and large cranes, graders, rollers, bulldozers, flatbed trucks and specialized trailers, crushers (if material cannot be sourced locally), and light trucks. Local residents will be made aware of Project schedule and major construction activities (e.g., blasting – if required, turbine deliveries, etc.). During high traffic periods (e.g., concrete delivery during foundation pours), the Proponent will employ dust mitigation techniques, such as use of a water truck, as appropriate depending on weather. The Proponent will work with NSTIR to implement best practises for dust mitigation on the Brookville Road.

Site restoration after completion of construction activities will include dispersing or removal of unused gravel and soil, grading of all areas, installation of permanent sediment and erosion controls, including stabilization, and removing construction materials from the site. Temporary shelters will be dismantled and removed from site. A gate will be installed at the entrance of the access road. Proper signage will be installed to notify wind turbine technicians and the general public of safety concerns onsite.

2.6 Operations and Maintenance

Operation and maintenance of the McLellans Brook Wind Farm involve distinct activities. The operations side of the MBWF will involve the following activities:

- ensuring compliance with environmental obligations and conditions;
- ensuring compliance with utility contracts and landowner commitments;
- monitoring of wind turbine performance;
- monitoring of grid or WTG faults;
- BOP maintenance (road maintenance and clearing, pad mount transformer inspection, site security); and
- dispatching of turbine technicians for scheduled and unscheduled maintenance.

The maintenance regime for the MBWF will include the following activities:

- performance of regular maintenance; and
- performance of unscheduled service.

The Proponent will ensure their technicians handling of hazardous waste (i.e., oils and lubricants) will conform to applicable legislation and best practices throughout the maintenance life of the MBWF. The Watts Wind Energy MBWF EPP outlines how the Proponent will deal with hazardous material handling onsite (Appendix 3).

2.7 Decommissioning

The design life of a wind turbine is typically 20 to 30 years; capital improvement and replacement programs can extend safe and efficient operations well beyond 40 years. Decommissioning of both the WTGs and the site, when it is necessary or desirable, will be undertaken in accordance with the regulatory regime in place at the time.

At the end of their useful life, the WTGs will be decommissioned, and all equipment will be dismantled and disposed of in a manner that meets all regulatory requirements. Such activities would likely involve the preparation of the site, e.g., the establishment of access for construction equipment and the mobilization of that equipment including cranes. The sections of the towers would be taken apart and would be reused, recycled or disposed of in accordance with regulatory requirements. After the towers had been dismantled and removed from the site, the site itself would be restored to a state similar to that which currently exists through re-grading and re-vegetation. Foundation pedestals may be removed to approximately 0.3m below grade and re-filled with local soils.

2.8 Accidents and Malfunctions

Malfunctions and accidents that pose a risk to human health and safety and to the environment can occur during any activity. As such, the Proponent is committed to ensuring that protocols are in place to minimize the risk to human health and safety and the environment during both construction and operation.

These protocols are identified in the EPP; they will ensure the application of environmental protection measures and good management practices through construction (draft EPP can be found in Appendix 3). The EPP includes an emergency response plan to address responses in the unlikely event of an accident during either construction or operation (e.g., key contacts information, etc.).

The construction and operation of wind turbines employs techniques and technologies that are familiar to the construction industry. The likelihood of serious malfunctions or accidents associated with their development and operation that would pose a risk to human health and safety, or the environment, are substantially less than those associated with many other forms of power generation. Further, the Proponent is very experienced in construction and operation of wind turbines.

2.9 Future Project Phases

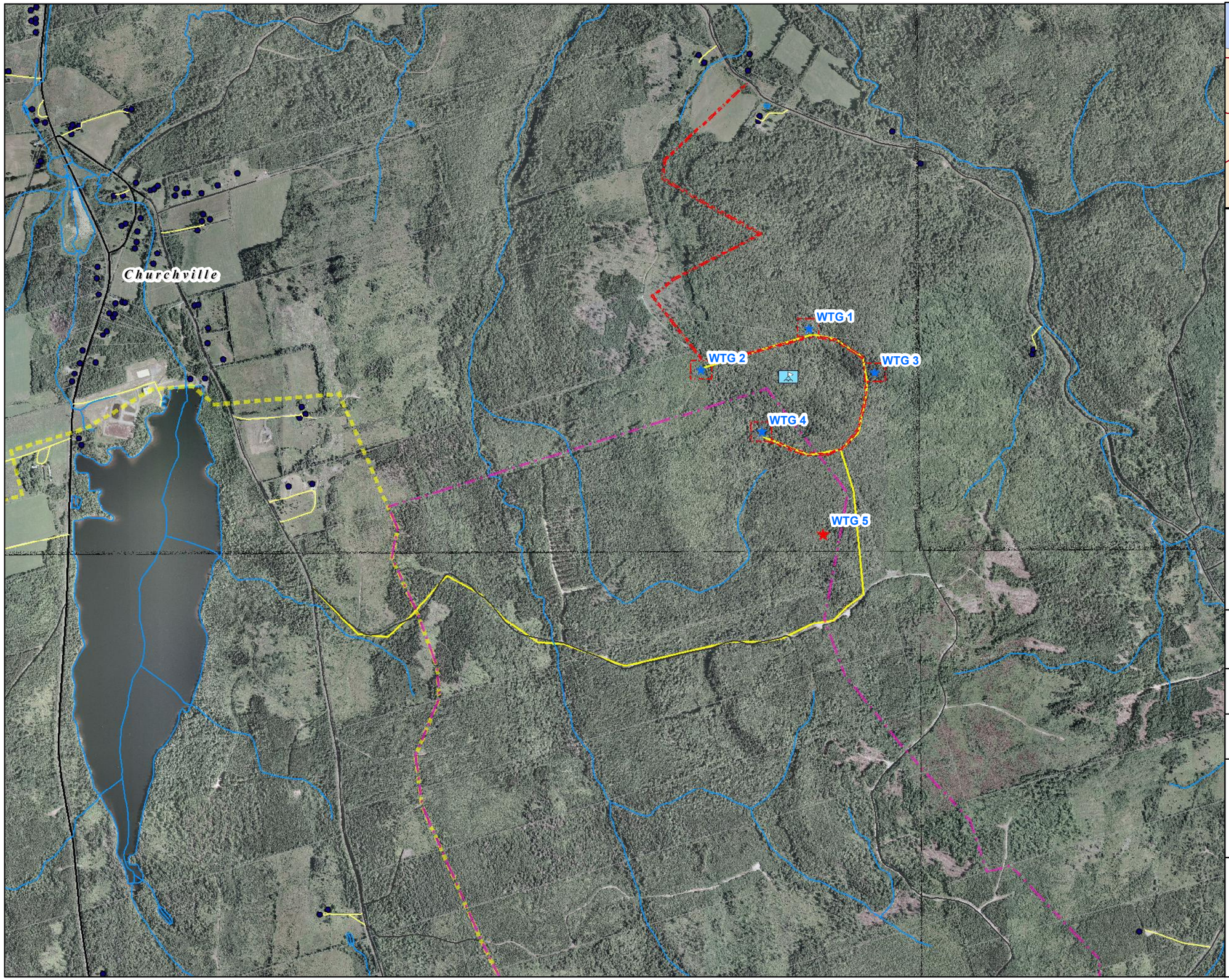
The MBWF has been approved from the NS Department of Energy's COMFIT program for a total of 6MW. The Proponent may have the ability to increase the capacity of the MBWF should additional capacity become available within the substation 62N (Stellarton) distribution network. The Proponent will ensure that NSE, along with other stakeholders, is informed if this opportunity arises.

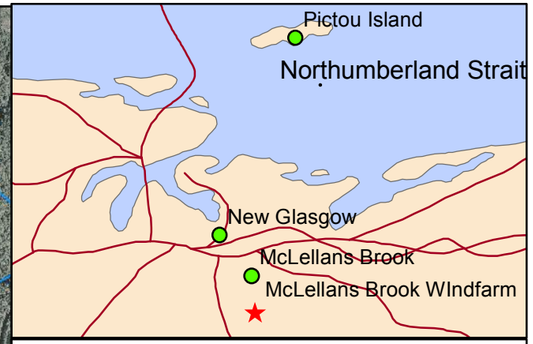
Consultants were instructed to survey an area suitable for the installation of five WTGs to facilitate the assessment of additional capacity at the Project site as part of potential expansion. Environmental field work has been carried out to accommodate this possibility. Figure 2.4 outlines the site layout based on a five turbine scenario, should the capacity become available within the distribution system.

While this EA is being submitted for a 6MW project with four WTGs, the field work and noise modeling has been completed including the possible expansion to include a fifth WTG. Should the additional capacity become available and NSDOE approval granted under the COMFIT program, the Proponent will consult with the community and provide any necessary information and analysis to NSE as appropriate.

2.10 Other Projects in Area

A wind energy project consisting of a single WTG is proposed to be constructed approximately 2km southwest of the MBWF site. The single WTG project is not expected to interact with the MBWF; however, possible cumulative effects are included in the EA where interactions may occur. This is discussed in Section 6 for each biophysical VECs and socio-economic aspect included in this EA.





Legend

- Building Points
- Possible Expansion
- WTG
- MET tower
- Watercourse
- Paved Roads
- Unpaved
- Driveway
- Proposed Utility Route
- Contours
- Municipal bounds
- Road/Laydown area
- Forbes Lake Watershed - Zone 1
- Forbes Lake Watershed - Zone 2

FIGURE 2.4

Site Layout (Expansion)

Drawn by: AWA	Date: 2013/01/02
Project #: 2012043	Scale @ 11"x17"

EON WindElectric

0 250 500 1,000
Meters

Coord. System: NAD83 CSRS UTM Z20N
Projection: Trasnverse Mercator
Units: Meters

N

3.0 Approach to the Assessment

3.1 Scoping and Bounding of the Assessment

The scoping process identifies those biophysical VECs or socio-economic aspects that are valued and that may be subject to impact given the works proposed as described in Section 2.These works are primarily the construction and operation / maintenance phases, including accidents and malfunctions, but decommissioning is included as part of the EA process. The identification of VECs is based upon the potential interaction of the Project within the environmental and socio-economic setting as described in Section 4. In addition, any stakeholder concerns identified in consultation as described in Section 5 are heavily weighted when identifying aspects or VECs to be assessed.

The potential interaction of Project activities with the VECs forms the scope of the assessment. Indeed this scoping was completed at a preliminary level to define the primary and secondary studies completed for the Project. Environmental assessment is an iterative process. The scoping is continually refined as the project is further developed, the environmental setting is studied and consultation is held. As it is impractical, if not impossible, to assess all potential effects of a project, the scoping of the assessment is key.

The study team has determined the biophysical VECs and socio-economic aspects that will be subject to assessment based upon its collective knowledge and experience, review of the regulatory requirements, and feedback from the community, First Nations, regulatory authorities and others as part of the consultation program and selected field programs. Based on this process, the biophysical VECs and socio-economic aspects that are evaluated for the Project are identified in Table 3.1.

Table 3.1 Identified VECs and Aspects

Physical Components	***Ecological Components***	***Socio-economic Aspects***
Ground and surface water quality and quantity	Wetlands & watercourses	Land use
Radar and radio signals	Fish habitat	Aboriginal resources / uses
Ambient noise	Migratory and breeding birds	Archaeological resources
Ambient light	Flora and fauna	Recreation
	Species of concern	Vehicular traffic
		Landscape aesthetics
		Tourism
		Health and safety
		Local economy

An important factor in the assessment process is the determination of spatial and temporal boundaries, i.e., those periods and areas within which the VECs are likely to interact with, or be influenced by, the Project. Temporal boundaries encompass the times that Project activities, and their effects, overlap with the presence of a VEC. Spatial boundaries are the areas within which the Project activities are undertaken and the facilities are located, and the zone of influence of effects of the Project, i.e., of emissions, effluents and discharges.

The study area itself includes a spatial bound which includes the footprint of all works associated with the construction and operation of the proposed Project and those areas within which most project-environment interactions could reasonably be expected to occur. It is not possible to establish a single study area boundary that accurately reflects the spatial characteristics of the potential project-environmental interactions. Temporal project boundaries include the timeline for the short term construction activities, as well as the long term operation of the facility of approximately thirty years and its eventual decommissioning. Such boundaries are identified for each VEC as an integral part of the analysis in Section 6.

3.2 Desktop and Field Work Completed

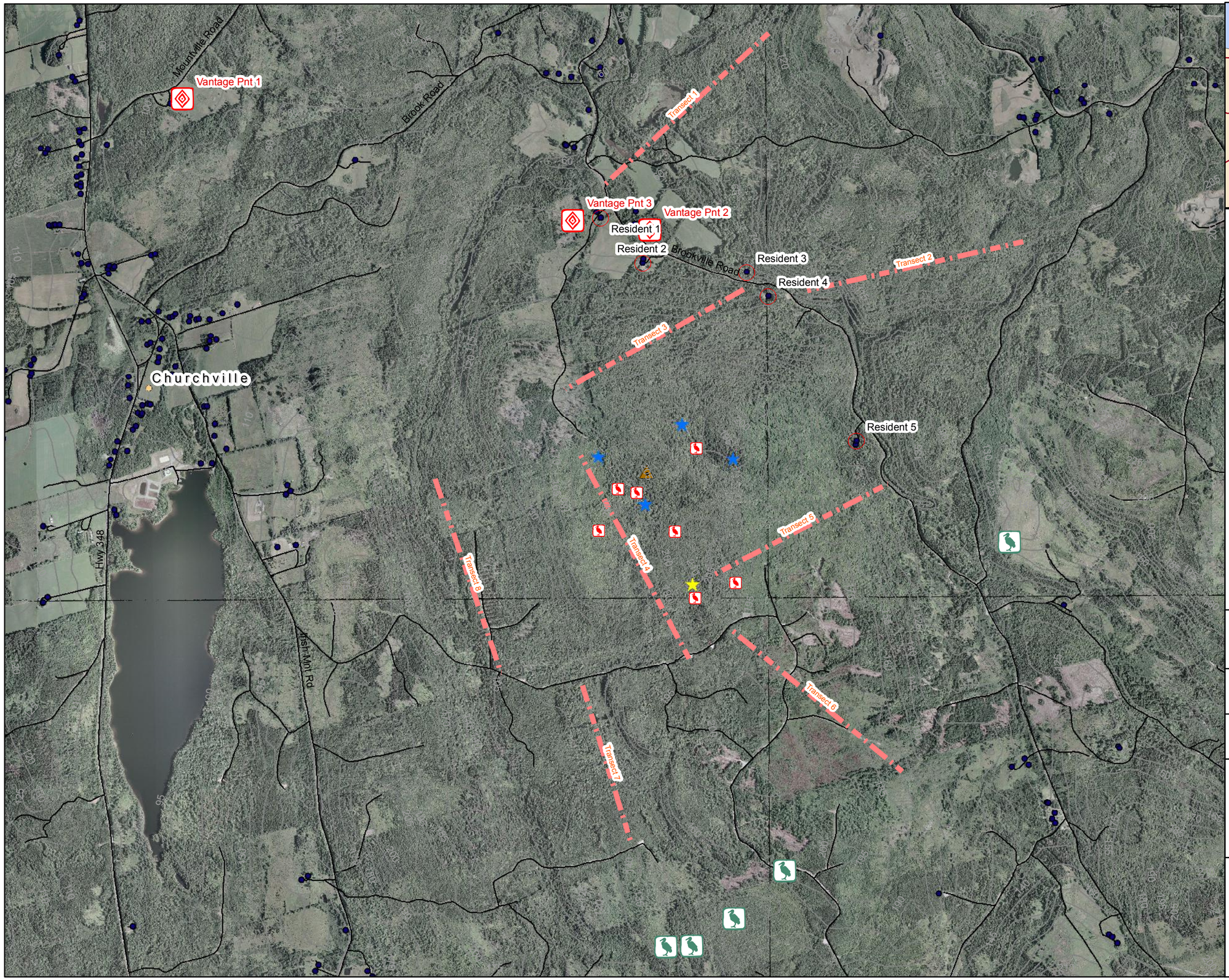
Ecological, social and geophysical desktop data was compiled and analysed with the intent to design targeted field investigations at the Project site. Data was compiled from the following sources:

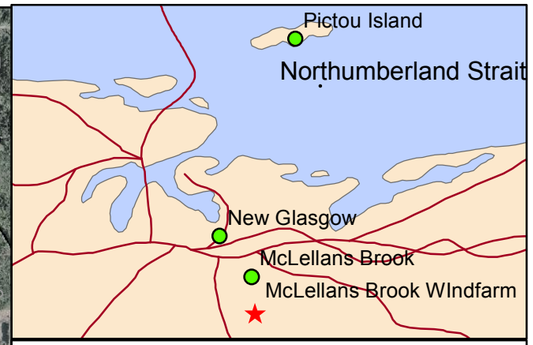
- Nova Scotia Department of Natural Resources (NSDNR);
- Service Nova Scotia and Municipal Relations (SNSMR);
- Atlantic Canada Conservation Data Center (ACCDC) site specific information;
- Species at Risk Act (SARA);
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC) listings;
- Maritime Breeding Bird Atlas (MBBA);
- NSDNR General Status Ranks of Wild Species; and
- Geobase, a database of Canadian GIS information.

Field programs commenced in April 2012 and concluded in November 2012. All consultants were familiar with documented protocols related to the completion of a Nova Scotia wind energy registration document. The lead proponents of the field consultants can be found in Table 3.2. Key locations executed during field work activities are displayed in Figure 3.1.

Table 3.2: Field Programme Consultants

Field Study	Field Program	Consultant
Bird Surveys	Spring, Fall migration counts and Summer breeding survey	Andy Horn (Dalhousie University) with Ken McKenna
Bat Monitoring	Acoustic surveys, trapping, tagging	Hugh Broders, St. Mary's University
Archaeology Investigation	Archaeology Screening and Reconnaissance	Bruce Stewart, CRM Group
Rare Plant Survey and Wetland	Rare plant survey, wetland	Jim Jotcham (Marbicon) with





Legend

- Building Points
- Nearest Dwellings
- WTG
- Possible Expansion
- Viewshed locations
- Bat Monitoring Station
- Bird Survey Pnts
- Migration Vantage Pnts
- Existing Roads
- Moose Transects
- Contour Lines (5m)

FIGURE 3.1

Field Programmes

Drawn by: AWA	Date: 2013/01/02
Project #: 2012043	Scale @ 11"x17"

EON WindElectric

0 250 500 1,000
Meters

Coord. System: NAD83 CSRS UTM Z20N
Projection: Trasnverse Mercator
Units: Meters

N

Identification	identification	Nick Hill
Moose Survey	Moose presence/absence survey, transects	Jody Hamper, independent consultant

Bird Surveys

Bird migration surveys, passage counts and breeding bird surveys were carried out by Ken McKenna, under the direction of Andy Horn. Ken has extensive knowledge of the bird populations in the County of Pictou and was the lead field consultant for the completion of the MBBA inventory in the area of Pictou County. The study was designed using Canadian Wildlife Services *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (Environment Canada, 2007a).

The site was visited during the main spring migration period, April 15 to May 31, with an effort to visit every three days during the peak migration period (May 1-21) and every five days outside that period. Most visits included a line transect and point counts between dawn and four hours after sunrise. The line transect (the shortest line connecting all the point count stations) was initially planned to follow the methods in (Environment Canada, 2007a), but was found to detect the same birds as in the point counts, so after the first few visits it was only used to detect any species not detected during the point counts. Point counts were conducted approximately every 250m along each transect. Each lasted 5 minutes (initial trials showed that extending the time to 10 minutes gained few additional individuals). All detections were estimated as occurring within 50, 100, or >100 m from the observer. The line transect and point counts were accompanied by less standardized area searches, focused on searching for species or habitats that are suspected of being present but missed by the other methods. Suitable days for daytime migration (i.e., those with no precipitation and light to moderate tail winds) included passage migration counts totaling 4hour 40 minutes, following the methods in (Environment Canada, 2007a), noting flight heights, positions, and directions relative to the proposed turbines.

The site was visited ten times during the autumn migration period from September 2 to November 7, with an attempt to visit on days with suitable tail winds. Visits included 7 1-2 h passage counts from a vantage point with a full view of the turbine area (Figure 3.1) and 7 transect surveys along the transects described in the Spring migration survey protocol.

One evening visit (29 April) searched for crepuscular species, such as American Woodcock, and owls (using playback).

CWS protocols (Environment Canada, 2007a) recommend that a breeding bird survey last at least 4-10 days between late May and July. Given that it had already been visited throughout May as part of the migration surveys, only four additional visits were made, across at least two weeks as recommended in (Environment Canada, 2007a). Line transect methods were as described above, except the point counts were 10 min long and no passage counts were done.

Location of survey points are shown on Figure 3.1. Interim and final reporting for the Spring, Summer and Fall surveys can be found in Appendix 5.

Bat Monitoring

Bat monitoring was completed by Hugh Broders, and involved acoustic surveys, and harp trap surveys. The acoustic surveys involved the use of the Anabat II detector to passively record the echolocation calls of bats (location shown on Figure 3.1). The survey equipment was installed at ground level, surveying the time period from July 8th to September 18th, 2012. A technical error occurred on August 9th, and was corrected on September 8th. As a result, data from that time period was not collected. The harp trap surveys involved the use of two harp traps to capture bats in the wooded trails in the study area. Tissue samples from the bats were collected and analysed. With our permission, Dr. Broders is including the results of the McLellans Brook survey results in the formulation of a broader, province wide study on wind farm impacts on bat populations. Appendix 6 includes the results and analysis of the field program in Dr. Broders' report.

Archeology Investigation

CRM Group was retained to undertake archaeological screening and reconnaissance of the proposed MBWF. The objective of the archaeological assessment was to evaluate archaeological potential within the area that may be impacted by development of the wind farm project. CRM Group developed a work plan which consisted of the following components: a review of relevant site documentation to develop an archaeological potential model (screening); archaeological reconnaissance of the areas that may be impacted by development activities; and, a report summarizing the results of the background research and field survey, as well as providing cultural resource management recommendations. Final CRM Group reporting has been approved by the Nova Scotia Museum (NSM) (Appendix 7).

Rare Plant Survey/Wetland Identification

Jim Jotcham and Nick Hill were procured to perform rare plant inventory and wetland identification at the Project site. The surveys were designed based on knowledge of the specialists and the ACCDC report (Appendix 8). Both Jim and Nick performed the spring rare plant inventory and wetland identification on June 22, 2012. The summer survey was completed by Nick Hill on August 15, 2012. The site visits included characterization of the ecological habitats, identification of all vascular plants and incidental identification of wetland locations. Geographic coordinates for each turbine and proposed access road routing was provided to each consultant prior to each site visit. Final reporting can be found in Appendix 8.

Moose

Jody Hamper performed the Pellet Group Inventory (PGI) (Appendix 10) survey in the spring of 2012. Discussion with NSDNR staff officials prior to field investigations was completed to ensure compliance with field investigation protocols. The transects used by the independent consultant around the Project site can be seen in Figure 3.1.

3.3 Methodology of Assessment

The assessment focuses on evaluation of predicted environmental effects resulting from potential interactions between the biophysical VECs and socio-economic aspects and the Project activities (construction, operation and maintenance, and decommissioning).

An "environmental effect" is defined in Nova Scotia's *Environment Act* as:

> *(i) any change, whether negative or positive, that the undertaking may cause in the environment, including any effect on socio-economic conditions, on environmental health, physical and cultural heritage or on any structure, site or thing including those of historical, archaeological, paleontological or architectural significance, and*
> (ii) *any change to the undertaking that may be caused by the environment*.

To allow the Province to make a subsequent decision on the suitability of a project, the assessment needs to determine the significance of any residual adverse environmental effects. Residual environmental effects are those that remain after mitigation strategies are implemented. The prediction of residual environmental effects requires the determination that: the environmental effect is adverse; the adverse environmental effect is significant; and the significant adverse environmental effect is likely to occur.

Evaluation of environmental effects in this assessment uses the following definitions which consider the nature, magnitude, reversibility, duration and aerial extent of the effect:

- *Significant*: Potential effect could threaten sustainability of the resource in the study area and should be considered a management concern;
- *Minor*: Potential effect may result in a small decline of the quality of the resource in the study area during the life of the project, as such, research, monitoring and/or recovery initiatives should be considered;
- *Negligible*: Potential effect may result in a very slight decline of the quality of the resource in the study area during the life of the project, as such, research, monitoring and/or recovery initiatives would not normally be required; and
- *Beneficial*: Potential effect is expected to enhance the specific VEC or socio-economic aspect.

Where there is no predicted interaction of the Project and the biophysical VEC and socio-economic aspect prior to mitigative and control measures, there is no predicted effect and accordingly, it is not assessed. This is shown in Table 6.1.

To set the Project into its broader ecological and regional development context, the assessment considers how the proposed Project may interact with past, present or likely (i.e., approved) future projects within the spatial and temporal bounds identified. This evaluation of cumulative effects is completed for each VEC and socio-economic aspect in the assessment.

Further, a review of the effect of the environment on the Project is completed. This includes climatic fluctuations and extreme events, such as fire and spills.