Harrietsfield Willamswood Wind Farm Environmental Assessment

Prepared for: Watts Wind 4 LP

Prepared by: EON WindElectric Inc.

In Association With: Verterra Group

April 6, 2015

Watts Wind 4 LP
4 MacDonald Avenue
Dartmouth, NS B3B 1C5

March 30, 2015

Environmental Assessment Branch
Nova Scotia Environment
1903 Barrington Street, Suite 2085
PO Box 442
Halifax, NS B3J 2P8

Subject: Amendment to "20150406 Harrietsfield Williamswood EA"

Dear Ms. Helen Yeh,

The following Harrietsfield Williamswood Environmental Assessment (EA) has been completed for three (3), 1.6MW General Electric (GE) wind turbine generators (WTGs). Watts Wind 4 LP has received Community Feed in Tariff (COMFIT) Approval for a wind energy generating facility of 4.6MW.

The following Harrietsfield Williamswood Wind Farm EA will assess the 3 WTGs at nameplate capacity (1.6MW) and the Wind Farm as a 4.8MW wind energy facility, not as a 4.6MW facility stated throughout the document.

Regards,

Stan Mason, President
Watts Wind Energy Inc.

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LIST OF ACRONYMS

ACCDC	Atlantic Canada Conservation Data Center
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 Defense
EA	Environmental Assessment
EC	Environment Canada
ELC	Ecological Land Classification
EPP	Environmental Protection Plan
GIS	Geographic Information Systems
GJ	Gigajoule
HWWF	Harrietsfield Williamswood Wind Farm
ha	hectare
km	kilometer
KMK	Kwilmu'kw Maw-klusuaqn
kV	Kilovolt
m	Meter
m^2	Square meter
m^3	Cubic meter
MARI	Maritime Archaeological Resource Inventory
MBBA	Maritime Bird Breeding Atlas

MBCA	Migratory Bird Convention Act
MBR	Migratory Bird Regulations
MEKS	Mi'kmaq Ecological Knowledge Study
MFN	Millbrook First Nation
MW	Megawatt
NSDNR	Nova Scotia Department of Natural Resources
NSDOE	Nova Scotia Department of Energy
NSE	Nova Scotia Environment
NSPI	Nova Scotia Power Inc.
NSTIR	Nova Scotia Department of Transportation and Infrastructure Renewal
OAA	Office of Aboriginal Affairs
PGI	Pellet Group Inventory
PPA	Power Purchase Agreement
RDA	Regional Development Agency
RABC	Radio Advisory Board Canada
RCMP	Royal Canadian Mounted Police
RFP	Request for Proposals
RRSP	Registered Retirement Savings Plan
SARA	Species at Risk Act
SNSMR	Service Nova Scotia and Municipal Relations
SPL	Sound Power Level
VEC	Valued Environmental Component
WTG	Wind Turbine Generator
°C	degree Celsius

1. Introduction

1.1. Overview

The Harrietsfield Williamswood Wind Farm (Project; HWWF) is proposed as a 4.6 megawatt (MW) wind energy facility installation about 2.5 kilometers (km) northeast of Williamswood in Halifax Regional Municipality (HRM). The site is located on private land extending off of Fraser Road in Williamswood. Due to significant wind damage of flora in the area, the site is suspected to be a section of forest affected by Hurricane Juan in 2003.

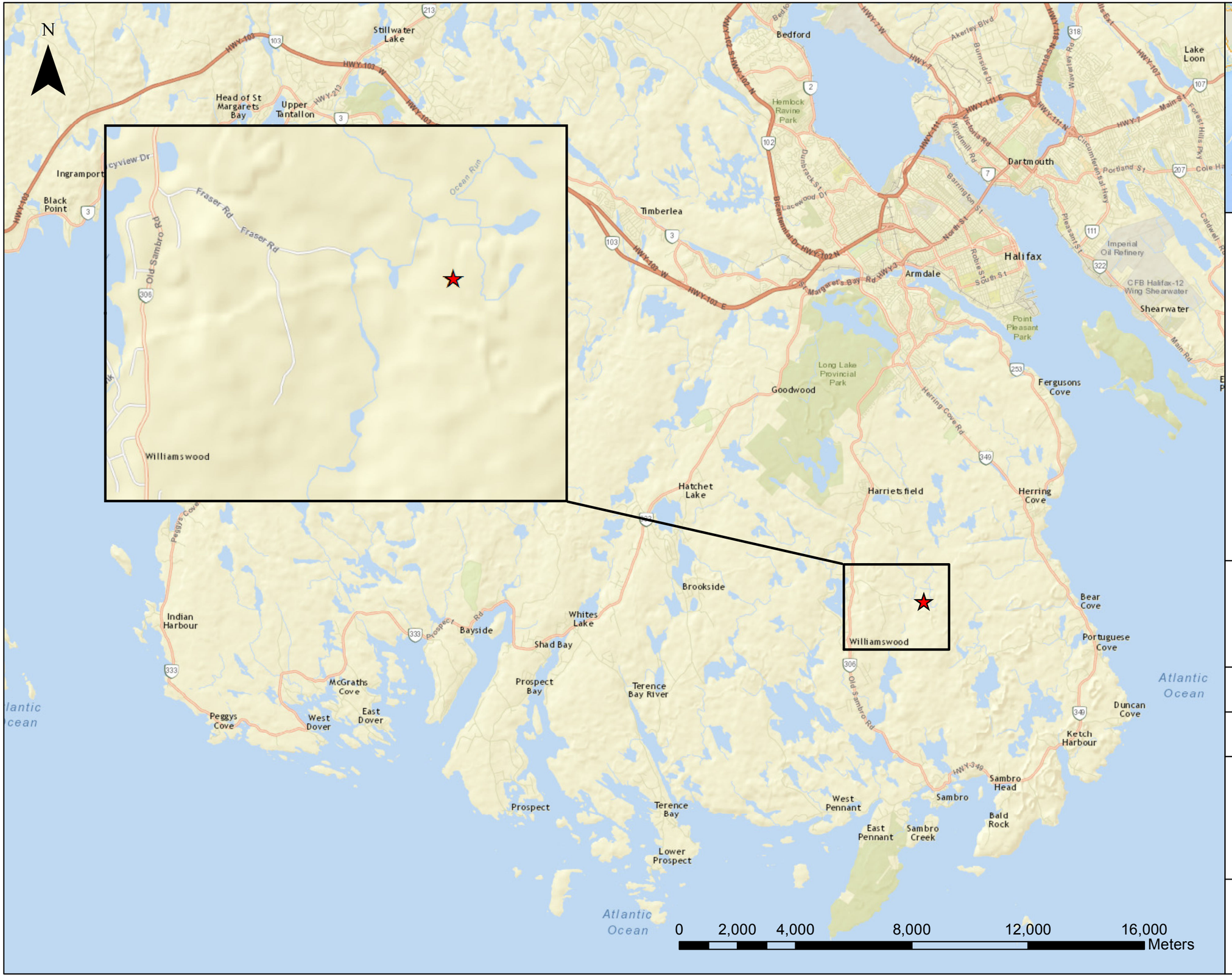
Watts Wind 4 LP (Proponent; Watts Wind) is a Nova Scotia based company developing a number of small wind energy projects around the province as part of the Community Feed-In-Tariff (COMFIT) program. The Project is organized as a Community Economic Development Investment Fund (CEDIF), which is Registered Retirement Savings Plan (RRSP) eligible and provides additional tax benefits to eligible Nova Scotia investors. Nova Scotia residents, including residents of HRM, 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 Halifax Regional Municipality 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 Highway 306 (Old Sambro Road), as well as Fraser Road; the nearest resident is about 1300m in distance from the nearest turbine. Watercourses and wetlands have been identified on the property. One watercourse, Ocean Run, is required to be spanned to access the Project site. All work around Ocean Run will be within Nova Scotia Environment's (NSE) new regulatory requirements, effective October 1st, 2014 (NSE, 2014). Wetland delineation has finished and wind turbine micro-siting has been completed, while minimizing wetland impacts. Two small areas of wetland require alteration; this work will be within the Nova Scotia Wetland Conservation Policy (NSE, 2011) and be in compliance with Nova Scotia's Activity Designation Regulations.

An equipment laydown area is required at each turbine site to facilitate the construction, including assembling and erecting the three wind turbine generators (WTGs). An access road will be required from Fraser Road to deliver WTG components and for subsequent maintenance of the turbines. An electrical connection is needed from the WTGs; this will follow the new access road. No maintenance building, fencing or a substation will be required for the wind energy facility. The total Project footprint will be approximately 6.5 ha in area.

1.2. Proponent

The Proponent is a Nova Scotia based community wind energy developer whose principals have been developing, constructing and operating wind energy projects in Atlantic Canada for over a decade. The Nova Scotia Department of Energy (NSDOE) COMFIT program is designed to encourage



Legend

★ HWWF Location

Figure 1.1

General Site Location

Drawn by: TAM	Date: 1/30/2015
Project #: 045	Scale 1:125 000

EON WindElectric

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

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.

Watts Wind was formed in 2008 as a 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 twenty year power purchase agreement (PPA) for this endeavor 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 other opportunities for community wind energy projects under the COMFIT program.

The principals in Watts Wind have extensive experience in all facets of renewable energy project development, operation and management, having collectively installed more than 200 MWs of wind and hydro power projects, and raised in excess of fifty million dollars in public market equity and debt. Watts Wind 4 LP and its principals have been involved with several projects that required a provincial environment assessment, such as:

- Digby Wind Farm, Nova Scotia
- Amherst Wind Farm, Nova Scotia
- Fermeuse Wind Farm, Newfoundland
- McLellans Brook Wind Farm, Nova Scotia
- Barrington Wind Farm, Nova Scotia
- Porters Lake Wind Farm, Nova Scotia

The principals at 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 twenty years of engineering and project management experience in the provision of consulting engineering services to the renewable energy and engineering 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 200 MW 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.

The Harrietsfield Williamswood project (three wind turbines for a total of 4.6MW) was approved by Nova Scotia Department of Environment (NSDOE) as eligible for the COMFIT program on February 14, 2012. (Appendix 1).

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 harmful alteration, disruption or destruction of fish habitat or impact navigable waters. No work is proposed on Federal lands nor are Federal monies involved. Environment Canada (EC) / Canadian Wildlife Services (CWS) will be consulted with respect to migratory birds as appropriate.

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 Defense (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 4.6MW wind energy facility, it triggers a Provincial EA as per the Environmental Assessment Regulations. For any wind energy project with a capacity exceeding 2 MW, a Class 1 EA is required according to Schedule A of the Regulations.

The Proponent has identified wetlands on site and will implement the mitigation sequence of avoidance, minimization and compensation as per the Nova Scotia Wetland Conservation Policy (2011). Field work by certified delineators was completed in late August 2014 as a follow up on initial wetland identification in July 2014. Consultation with Nova Scotia Environment (NSE) and Nova Scotia Department of Natural Resources (NSDNR) will be completed as appropriate related to any necessary wetland impact to facilitate the requisite approval under the Activity Designation Regulations. At present, two wetlands cannot be avoided; however, the Project access road was carefully designed to minimize impacts with total alteration proposed to be under 300m^2. The wetlands are classified as a wooded swamp and a shrub-treed bog, both with low to intermediate functionality scores. All necessary approvals will be requested and received if required by NSE before any work to alter a wetland will commence. Work will be completed in compliance within the Proponent's Environmental Protection Plan (EPP); refer to Appendix 3 for the draft EPP.

There is one watercourse, Ocean Run, which requires spanning. An approval was granted by NSE to cross this watercourse to allow equipment to cross the watercourse for the purpose of installing one meteorological tower in 2014. All work was completed before September 30th and within the General Terms and Conditions set in place by NSE as part of the Watercourse Alteration Approval. A permanent crossing of Ocean Run will be required as part of the Project to allow access for turbine transport and operational activities. The Proponent will follow NSE's new regulations to design and develop this crossing. All necessary approvals will be requested and received before work will

commence if required by NSE. Work will be completed in compliance within the Proponent's Environmental Protection Plan (EPP).

As part of the proposed access road, a number of culverts could potentially be required to maintain the low flow and storm flow conditions. This work will be completed in a manner consistent with current applicable guidelines and standards and the culvert(s) will be installed between June 1 and September 30; no approval is expected to be required. 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, 2011).

As work will be completed off of Highway 306 on Fraser Road and interaction will occur with the access road and Fraser Road, a Working within Right-of-Way permit 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 HWWF from NSTIR or Service Nova Scotia Municipal Relations (SNSMR) and will be obtained 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 Halifax Regional Municipality, Planning District 5, and the development of wind energy facilities is guided by the corresponding Land Use By-Law, effective October 18, 2014 (Halifax Regional Municipality, 2014). The Proponent secured a development permit for the installation of a meteorological (MET) tower and the installation of three WTGs. The parcel of land being used for the facility is located in the Rural Wind Zone (RW-2), and the Project must adhere to the following guidelines implemented by HRM:

- A minimum distance of 1000m (3281 feet) from any habitable building on an adjacent property to any WTG;
- A required minimum distance of 1.0 times the tower height from any adjacent property boundary to the base of a WTG.

During the permit application process, documents such as site layouts and WTG descriptions were provided to aid with the application and provide definitive details to the HRM Development Officer. A commitment to consult with the community is also required as part of the development permit application process by notification with a mailout to landowners within a two kilometer radius of the Project site. The Municipal Development Permit can be found in Appendix 4.

1.3.4. Structure of Document

This report documents the assessment of the environmental effects of the proposed construction, operation and decommissioning of the HWWF. The EA has been completed based on potential for interaction of the proposed Project with the environmental and socio-economic settings. 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 Inc. and Verterra Group Environmental Strategies Ltd (Verterra). As an experienced environmental consultant with Verterra, Ms. Janis Rod has completed numerous Federal and Provincial EAs in various industries, including renewable energy. Her professional experience on scoping and reviewing the EA supported the expertise of Mr. Paul Pynn, President of EON WindElectric Inc., and Mr. Trent MacDonald, Project Engineer-In-Training with EON WindElectric Inc., 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.

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 in this section. 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 communities of Harrietsfield and Williamswood, 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 4 LP to follow up and monitor 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 report completed for the Project.

2. Project Description

2.1. Site Layout and Location

The Proponent plans to construct and operate a 3 WTG, 4.6MW wind farm near Harrietsfield, in HRM (Figure 2.1). The HWWF's 3 WTG's are located on private land at the following locations:

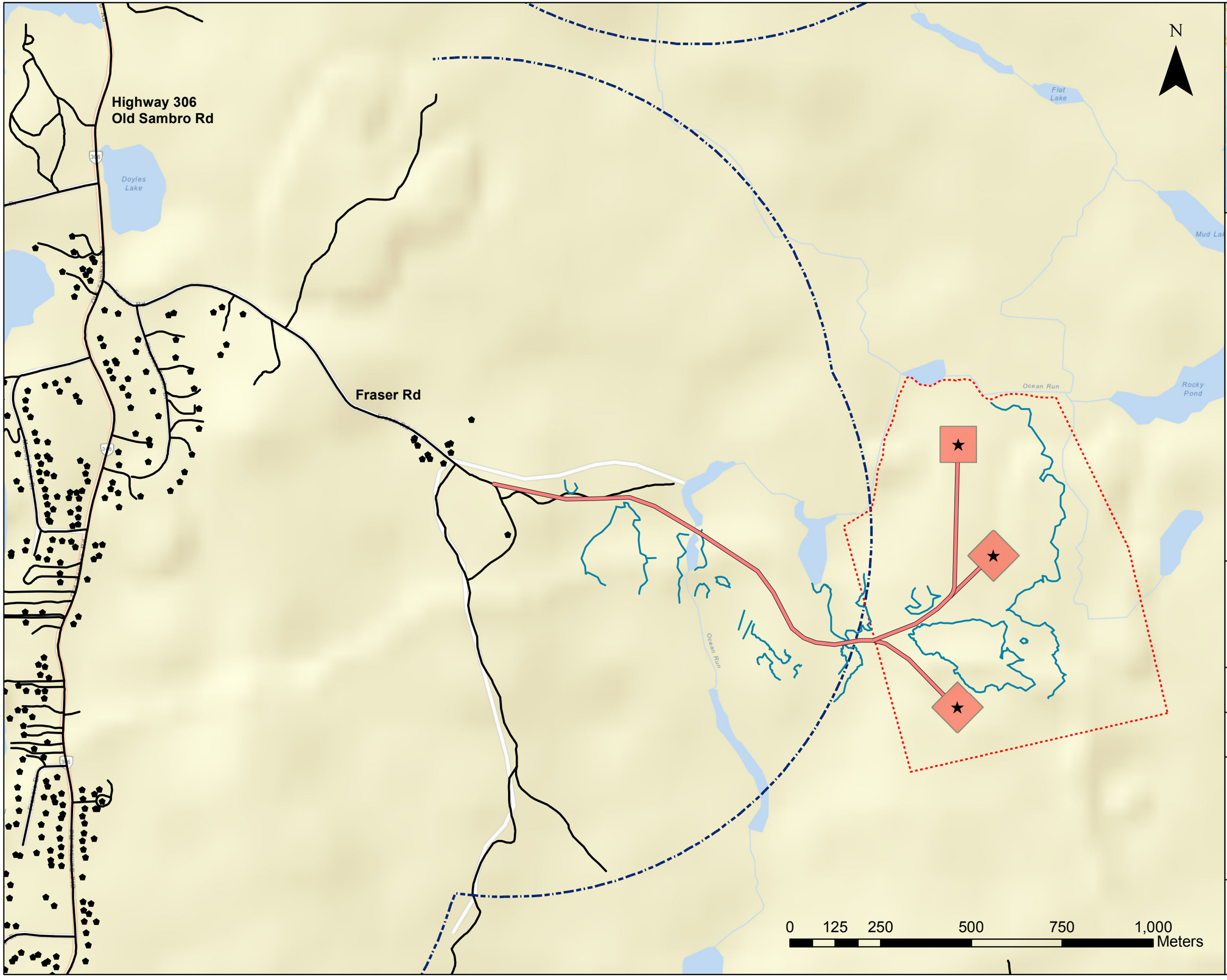
- WTG 1: 44° 32' 22.58" N, 63° 36' 40.41" W
- WTG 2: 44° 32' 12.69" N, 63° 36' 35.92" W
- WTG 3: 44° 31' 59.14" N, 63° 36' 40.28" W

The nearest communities surrounding the site are Williamswood (2.5km SW) and Harrietsfield (3.5km NW). Setback distances from the nearest receptors (i.e. residential dwellings) are greater than 1000m (specifically 1320m to the closest dwelling). The Project site is approximately 15km from the nearest Mi'kmaq community, i.e., IR30 Cole Harbour which is a satellite community of Millbrook First Nation. Beyond this, the Project site is about 23km away from IR14A Wallace Hills, a Sipekne'katik First Nation's satellite community.

The land under option agreement encompasses an area of 160 hectare (ha) with a mix of tree growth and windfalls (trees toppled over by wind in most cases). The immediate area where WTG laydown areas have been proposed contains dense windfalls presumed to be lasting effects of Hurricane Juan. The property is considered a Rural Wind Zone (RW-2) as per HRM's Land Use By-Law and allows for the installation of a Large Facility, having a total rated capacity of over 300 kilowatts (kW). The site is located approximately 4.5 kilometers north of the Atlantic Ocean.

Three Provincially Special Areas are found within a 5km radius of the HWWF as noted by the ACCDC Report (Appendix 9): Terence Bay Provincial Wilderness Area (PWA) (3km W), Bear Cove International Biological Program (IBP) (4.5km E) and Long Lake Provincial Park (4.9km NW). Terence Bay PWA is a diverse, rugged wilderness containing inland lakes, dense forests and coastal environments in an otherwise urbanized portion of HRM spanning 4450 Ha in total area (NSE, 2014). Bear Cove IBP is a small, sphagnum coastal bog supporting a rich diversity of floral life along the eastern sea board, selected as part of the IBP due to the high ecological value it displays (HRM, 2014). Long Lake Provincial Park has been designated under the Parks Act for thirty years and contains a relatively natural landscape in an urbanized area, threatened from urban sprawl and increased public use (HRM, 2008).

Wetlands and watercourses have been identified in the areas of the Project; one watercourse will be spanned with no impact to the river bed. A bridge design will be created for the 9.5m crossing and footings will remain outside of the watercourse. The majority of wetlands in the Project area are classified as wooded swamps, a predominant classification of wetland in Nova Scotia, and small shrub-treed bogs. Swamps are generally forested wetlands, often found near rivers or lakes and contain poorly drained, mineral soils (Nova Scotia Wetland Policy, 2011). Shrub-treed bogs receive



Legend

- Residential Dwelling
- Turbine Location
- WTG Setback Constraint
- Wetland Boundary
- Existing Road
- Developable Area
- New Access Road
- Laydown Area

Figure 2.1

HWWF Site Layout

Drawn by: TAM	Date: 2/21/2015
Project #: 045	Scale 1:10 000

EON WindElectric

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

little water input and rely on precipitation as their main source; soils are dominated by accumulating Sphagnum mosses as peat. Two small wetland areas proposed for alteration were minimized to the extent possible; these are 190m^2 of treed swamp near Ocean Run and 100m^2 of treed bog further along access road. At present, it is anticipated that only the latter will require a Wetland Alteration Approval from NSE as per the Wetland Conservation Policy.

The access road will be constructed off of Fraser Road building 2250m of new road, suitable for the delivery of WTG components, and appropriate permits will be obtained from NSTIR prior to construction. The transmission line will run alongside the new access road. The proposed area of disturbance, which refers to turbine laydown areas, turbine foundations and crane pad construction, will equate to approximately 0.8ha per turbine (Figure 2.2). Total area of disturbance is proposed to be less than 7 ha, which includes access roads and utility routing.

The HWWF will be connected to the distribution grid at the end of Fraser Road, which feeds the Spryfield substation via a 12.5 kilovolt (kV) distribution circuit emanating from the substation along Hwy-306. The Project components include the WTGs (nacelle, blades, and tower sections), access roads, laydown areas, concrete foundations, and pad mount transformers. The HWWF will not require the construction of a substation as it will connect to the pre-existing distribution substation (i.e., 20H in Spryfield).

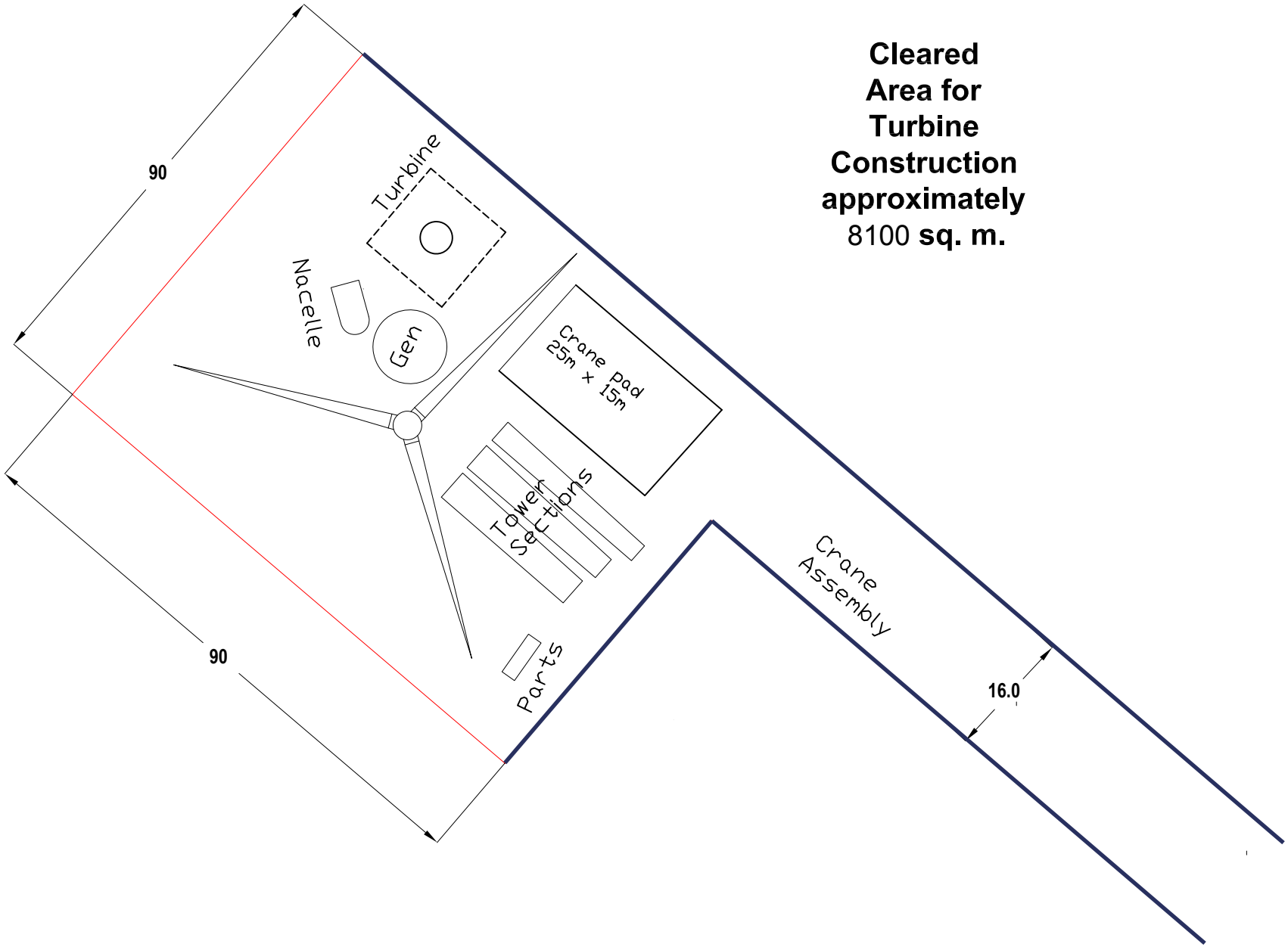
Beginning with the 2008 RFP contract award, the Proponent has gained extensive expertise in the prospecting and development of community-owned, distribution level wind energy projects across Nova Scotia. The COMFIT program allows community entities to connect projects with a total capacity less than 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 (i.e., property setbacks, regional park areas, etc.) and ecological concerns. Consideration of these key factors have led the Proponent to consider the HWWF 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:

- performance of the WTG with site wind regime;
- economic considerations;
- 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. A maximum of three WTG will be constructed at the HWWF, and tower heights will range from 80m to 100m. Total height (i.e. base to tip of turbine blade) will range from 120m to 165m. Lighting of wind turbines will conform to Transport Canada Standard 621. Correspondence



All dimensions in Meters

Figure 2.2
Watts Wind Farm
Typical Turbine Laydown

Project Manager	Owner
EON WindElectric	Watts Wind Energy

Date:	November, 2014
Scale:	Not to Scale
Revision:	1A
Drawing No:	1 of 1

on aviation approvals can be found in Appendix 2. Turbine color 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.

The Proponent will ensure final WTG selection and site layout will comply with Municipal setback regulations, and do not exceed 40 dBA sound power level (SPL) at the nearest dwellings from Project operation. While not regulated in Nova Scotia, 40 dBA 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 HWWF site commenced on December 5, 2014 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 that 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.

Further micrositing of WTGs could may following a detailed wind resource assessment; however, independent mapping and modelling has determined that the turbine locations are nearly optimal considering elevation and nearby weather stations. In the event the WTG locations change, all stakeholders will be notified as necessary.

2.4. Planning and Design

Many of the impacts associated with projects of this relatively small size (i.e., total altered area of approximately 6.5ha) can be avoided at the planning and design stage rather than relying only on mitigative measures implemented during construction and operational phases. In terms of the HWWF, the site itself is an excellent candidate to locate WTGs due to its excellent wind resource, distance from residents, suitability of electrical connection, and minimal 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 selection of locations considered the distance from residential dwellings and visual impact. The siting of the WTGs also strived to avoid wetland and watercourses, where possible. While studies have determined that avoidance of all wetlands is not feasible, the Proponent is committed to working with NSE and NSDNR to minimize impacts and compensate as required. These types of considerations were combined with current wind resource data to date to optimize the selected Project site.

Discussions between the Proponent and East Coast Aquatics on turbine micrositing initiated following the July 2, 2014 site visit containing preliminary wetland delineation. Specific challenges in site access, in particular access to WTG 3, were relayed to the Proponent. Changes to the HWWF site to reduce wetland impacts can be seen in Figure 2.3. The resulting wetland impact is noted in Table 2.1 below.

Table 2.1. Reduction of Wetland Impact

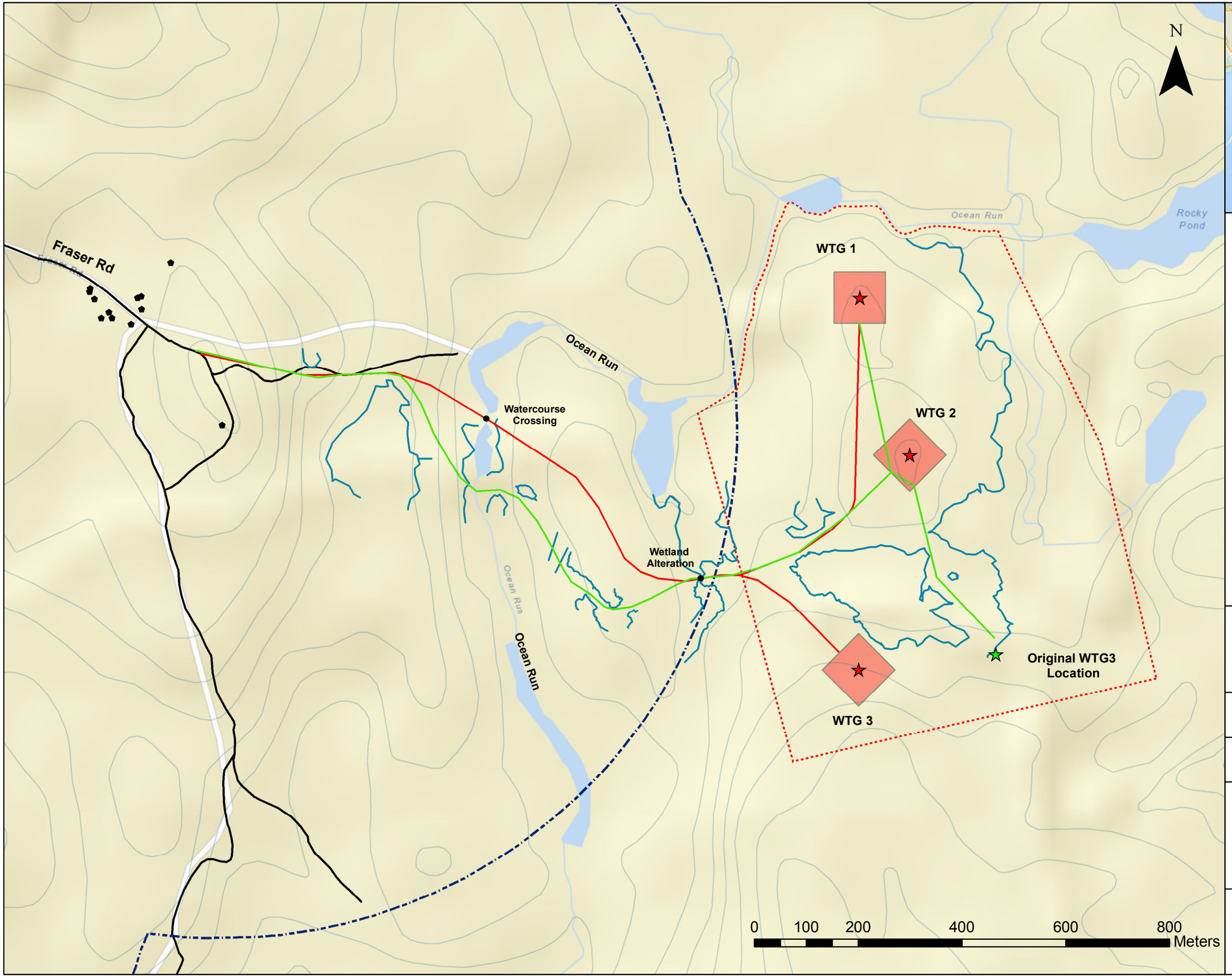
	Original Layout Impact to Wetland	**Revised Layout Impact to Wetland**	**Percent Reduction Impact to Wetland**
Access Road Route	> 640m^2	290m^2	54%
WTG 3 Location	> 1200m^2	0m^2	100%

By repositioning the access road and the WTG 3 location, greater than an 80% reduction of wetland impact was achieved. The resulting two proposed wetland alteration areas by the access road are:

- 190 m^2 in a treed swamp adjacent proposed spanning of Ocean Run; and
- 100 m^2 in a treed bog at most narrow location.

The 4.6MW wind energy capacity will provide approximately 50 000 gigajoules (GJ) of renewable energy that will satisfy the energy needs of approximately 1500 Nova Scotia homes, according to Statistics Canada data on electricity consumption (Statistics Canada, 2007). As a community energy project, it provides the renewable energy locally, i.e., via the distribution grid, which also reduces the losses of electricity that occurs in transmission lines. In addition, community members will be given the opportunity to share ownership of the Project as investors in the CEDIF.

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



Legend

- HWWF Turbine Location
- Original WTG 3 Location
- HWWF Access Road
- Contour Lines
- Original Access Road
- Laydown Area
- Residential Dwelling
- WTG Setback Constraint
- ECA Wetland Delineation
- Existing Road
- Developable Area

Figure 2.3

HWWF Turbine Micrositing

Drawn by: TAM	Date: 3/5/2015
Project #: 045	Scale 1:10 000

EON WindElectric

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

2.5. Construction

The construction phase has opportunities to mitigate potential environmental effects that could not be avoided during project planning and design. Table 2.2 outlines the proposed work schedule for the HWWF. The schedule is subject to change and proper notification will be given to the regulators and other stakeholders as appropriate. This schedule is based on EA approval and release from pre-construction conditions by second quarter of 2015. This includes the Proponent's commitment to the field reconnaissance as part of the archaeological study as soon as snow melt occurs.

Table 2.2 Construction Project Schedule

Site Activity	**Start Date (mm/yyyy)**	**Duration**
Archaeological Reconnaissance	04/2015	1 Week
Engineering Design and Procurement	05/2015	2 Months
Clearing and Grubbing	09/2015	1 Month
Civil/Electrical BOP Construction	09/2015	3 Months
Turbine Installation	11/2015	1 Month
Commissioning	12/2015	1 Month
Commercial Operation Date	01/2016	N/A
Follow-Up and Monitoring	02/2016	As Required

The site development phase incorporates the activities required to complete the design and tendering aspects of the HWWF, as well as additional field work and final design of the Project. Beyond the specific commitment for the completion of the archaeological reconnaissance, the major components of this phase include:

- completion of land surveys for placement of roads and foundation pads;
- completion of geotechnical and engineering studies for foundation;
- road and electrical design;
- implementation of sediment and erosion control; and
- Site clearing and grubbing.

The site development stage will require the use of light duty trucks, excavators and backhoes, forestry harvesting equipment and drill rigs.

The construction phase activities include new construction of access roads 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. The total Project footprint will be approximately 6.5ha in area.

Environmental protection is a key part of construction. A draft Environmental Protection Plan (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 regular comments, subsequent field work (archaeological reconnaissance) and final design of the Project. Desktop Archaeological research indicated that there is a low likelihood for the presence of pre-Contact or European artifacts on site; this will be confirmed with April 2015 field reconnaissance. 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 will be followed according to the current version of the Province of NS Erosion and Sediment Control Handbook for Construction Sites (1988). Standard hazardous material protocols will be followed during the project.

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).

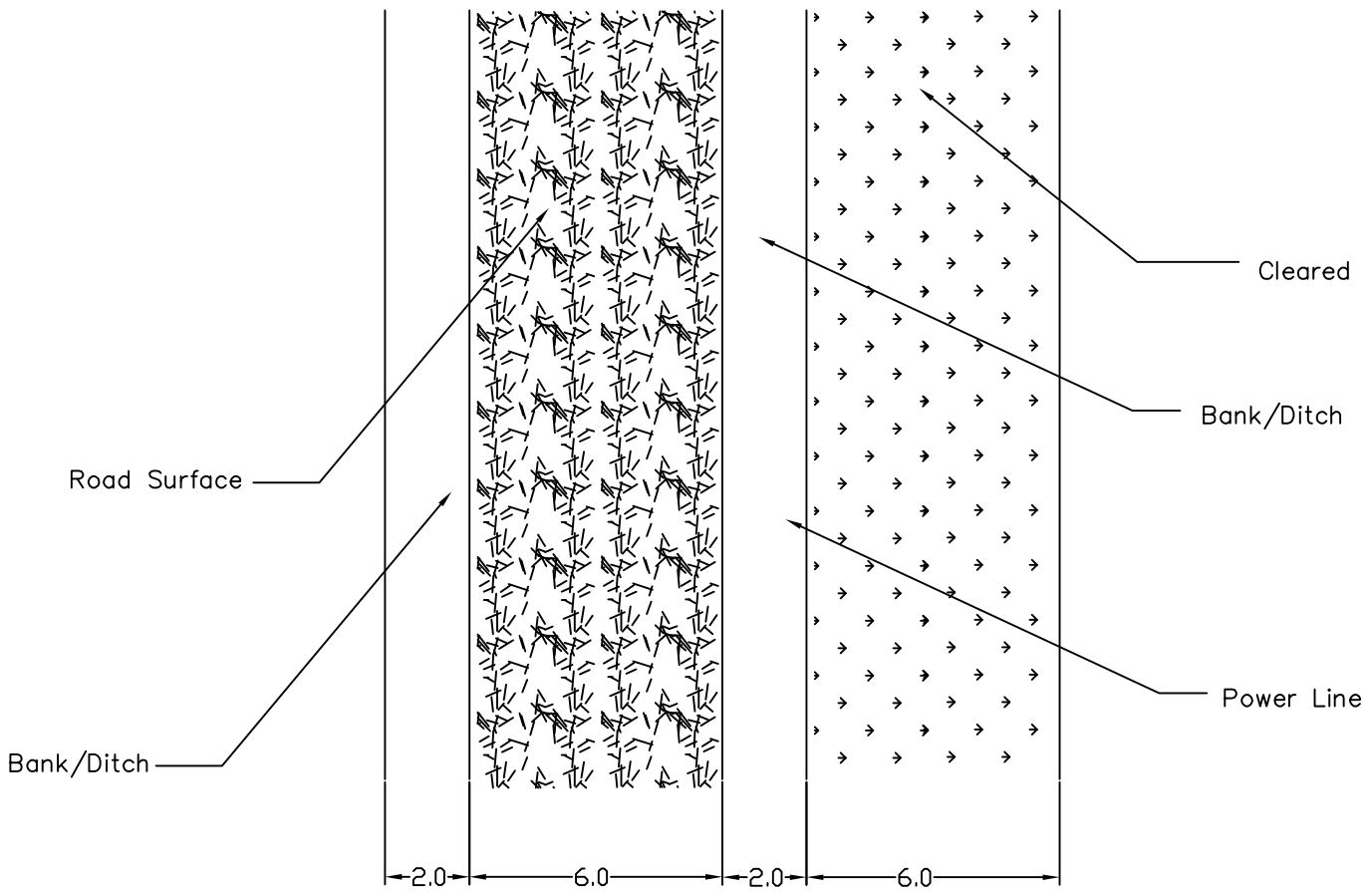
The access roads will be upgraded and built to accommodate the size requirements of the crane and the load specifications to support the delivery of approximately 45 flatbed truck loads of turbine and crane components. The roads will be approximately 6m to 8m wide with ditches and suitable culverts added where required to allow for proper drainage. Refer to Figure 2.4 for a typical road cross section drawing. At present, 2250m of new road is required to be constructed. A bridge will be required to span Ocean Run at its narrowest location (9.5m). The bridge will span less than 15m and the footings will remain outside of the watercourse. Preliminary designs will be completed during the engineering and procurement phase of project development. Road routing based on a three WTG layout is shown in Figure 2.1. Two wetland alterations are proposed long the access road (maximum combined area of 290m^2); all will be completed as per approvals necessary under the Activity Designation Regulations. Appropriate sedimentation and erosion control will be in place and culverts will be used as necessary to maintain existing drainage.

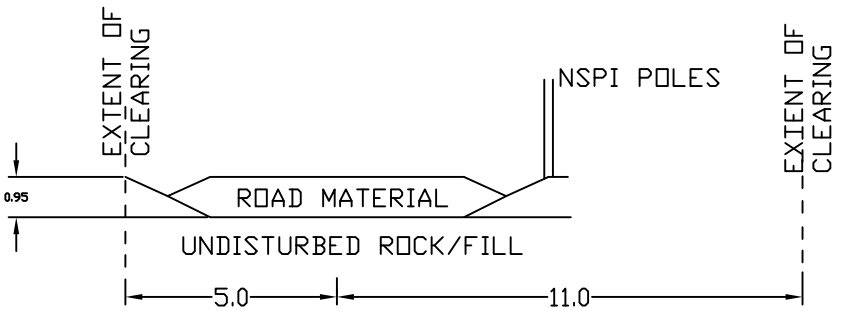
Following the completion of a wind resource assessment and geotechnical investigations (i.e., test pits or boreholes and core samples), turbine foundations will be designed and constructed. The activities associated with turbine foundation construction include: site clearing and grubbing, blasting of rock (if required), excavation of soils, building of forms and pouring of concrete pads, placement and compacting of backfill material to grade, and 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 300m^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:





Title:
Figure 2.4
Typical Road Design

Project:
Harrietsfield Williamswood Wind Farm

Client:
Watts Wind Energy Inc.

Date: **November, 2014**

Scale: **N/A**

Revision: **1A**

Drawing No: **1 of 1**

EON WindElectric

Electrical BOP construction will take place in conjunction with the civil BOP construction phase. The HWWF is a distribution-connected wind power project, connecting to the local distribution infrastructure. Three phase, 12.5kV power lines will be constructed along the access route. Substation construction will not be required for this project as it is connecting to the 12.5kV distribution system.

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 Old Sambro Road and Fraser Road. NSTIR imposed spring weight restrictions will be incorporated by the Proponent when coordinating delivery of large and heavy components to the project site. The Proponent is aware of these delivery constraints and will engage 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.

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. Operation and Maintenance

Operation and maintenance of the Harrietsfield Williamswood Wind Farm involves the following distinct 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;

- balance of plant (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 HWWF 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) conform to applicable legislation and best practices throughout the maintenance life of the HWWF. The Watts Wind 4 LP HWWF Environmental Protection Plan (EPP) outlines how the Proponent will deal with the hazardous material handling onsite.

2.7. Decommissioning

The design life of a wind turbine is typically 20 to 30 years; capital improvements and replacement programs can extend safe and efficient operations well beyond 40 years. Decommissioning of 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 and re-filled with local soils.

2.8. Accidents

Malfunctions and accidents that pose a risk to human health, 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, 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 contact 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 HWWF has been approved from the NS Department of Energy's COMFIT program for a total of 4.6MW. The Proponent does not have the ability to increase the number of turbines at the HWWF due to limitations on the local distribution network.

2.10. Other Projects in Area

At this time, only one known wind project is in operation or approved within a 25km radius of the proposed site, a three WTG, 7.2 MW project located in Terence Bay, which is 9km from the HWWF site. In addition to this, there are three known proposed wind facilities within approximately 30km of the HWWF, combining for a total of 21.2 MW: Pockwock (30km), North Beaverbank (30km) and Porters Lake (29km). No other wind energy projects are known of or in operation at this time.

A processing and recycling facility, designed to divert construction and demolition waste is located in Harrietsfield, 4km from the HWWF site. Community concerns and comparisons between the HWWF and the recycling facility arose at a community information session hosted by the Proponent. Discussion on the information session can be found in Section 5.1.

These developments are not expected to interact significantly with the HWWF; however, cumulative effects will be discussed in the EA in Section 6.

3. 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 impacts 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. Assessment of the environment is an iterative process. The scoping is continually refined and 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	Wetlands and 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 at risk and of concern	Vehicular traffic
		Landscape aesthetics
		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., 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 Fieldwork Completed

Ecological, social and geophysical desktop data was compiled and analyzed 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);
- Species at Risk Act (SARA);
- Committee of the Status of Endangered Wildlife in Canada (COSEWIC);
- Maritime Breeding Bird Atlas (MBBA); and
- Geobase, a database of Canadian GIS information.

Field programmes commenced in April, 2014 and are ongoing through March, 2015. 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 Programme**	**Major Consultant (Company)**
Archaeological Investigation	Archaeology Screening and Reconnaissance	Stephen Garcin (Boreas Heritage Consulting Inc.), in association with Shawn Duncan (Strum)
Avian Surveys	Spring & Fall migration counts and Summer breeding survey	Andrew Horn (Dalhousie University) and Emma McIntyre

Bat Monitoring	Acoustics and Anabat detection.	Dr. Hugh Broders (St. Mary's University)
Moose Survey	Moose Tracks and Pellet Group Inventory Surveys	Jody Hamper (Independent Consultant)
Shadow Flicker Survey	Desktop review of HWWF site	Strum Consulting
Noise Survey	Desktop review of HWWF site	Strum Consulting
Rare Plant, Wetland & Watercourse Surveys	Early & Late season rare plant survey, wetland identification and delineation, electrofishing.	Mike Parker & Andrew Sharpe (East Coast Aquatics Inc.)
Visual Impact Study	Three photomontages from locations around HWWF	Strum Consulting

Bird Surveys

Bird migration surveys, passage counts and breeding bird surveys were carried out by Andrew Horn and Emma McIntyre over the 2014 survey season. Andrew has extensive knowledge of the bird populations in and around Halifax Regional Municipality. The study was designed using Canadian Wildlife Services *Recommended Protocols for Monitoring Impacts on Wind Turbines on Birds* (Environment Canada, 2007a).

The site was visited eight times during the spring migration period from April 21 to June 9, 2014, meeting Environment Canada protocols (2007a) recommending 8-10 surveys during the main migration period. All visits included line transects, area searches and passage migration counts; the final visit included point counts on June 9. Transects were not standardized due to site access difficulties and the variance in habitat diversity on the site; however, the majority of transects and area searches followed the proposed access road, intersecting each of the turbine locations. Weather conditions were optimized during visitations; approaching lows and departing high pressure systems were targeted as these periods were likely to have heavy movements of migrants.

CWS protocols recommended several visits during the main breeding period for most bird species between late May and early July (Environment Canada, 2007a). Given that it had already been visited throughout May for the migration surveys, six additional visits were made spread across at least two weeks as recommended (Environment Canada, 2007a) between May 4 and July 14. Methods were as described above as well as 5-minute, unlimited radius, point counts that were conducted and evenly spaced along the survey transect. At five point count locations, playback of Black-capped Chickadees occurred; the locations were chosen to be well-spaced, diverse in habitat and near the proposed developed area for the Project.

N

Fraser Rd

Blue Felt Lichen

WTG 1

WTG 2

Wiegand's Sedge

WTG 3

0 100 200 400 600 800 Meters

Legend

- Turbine Location
- Access Road
- ECA Rare Flora
- Bat Detector
- Moose Transect
- Unmapped Wetland Boundary
- Watercourse
- ECA Wetland
- Waterbody
- Contour Lines
- Existing Road
- Property Boundary

Figure 3.1

Field Programmes

Drawn by: TAM	Date: 3/1/2015
Project #: 045	Scale 1:10 000

EON WindElectric

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

Due to the environment and habitat nature, the Project area was specifically searched for Rusty Blackbird (forest and forest edges), Olive-sided Flycatcher (boggy clearings) and Canada Warbler (wet forest with understory). The appropriate habitat for these species provoked area searches, as well as playback for each target species (30s at 80 dB).

The site was visited ten times during the autumn migration period from August 30th to November 4th, 2014. Seven visits consisted of passage migration watches from west or north of the site and four included transects and area searches for stopover migrants. Passage watches were conducted near dawn and later in the day, increasing the likelihood of identifying passerine and diurnal migrants, notably raptors. Variability of survey transects and migration watches was related to observations early in the HWWF surveys, as well as Andrew Horn's experience as an ornithologist.

Early Project monitoring consisted of 15 spring migration and breeding bird surveys conducted in Bear Cove, approximately 3km west of the HWWF site. The Bear Cove site was treated as having a Very High Site Sensitivity and Category 4, due to the uncertainties and knowledge of Andrew Horn. Transects, point counts and unstandardized area searches were carried out in the region. The Bear Cove Report is included as an appendix to the HWWF spring migration survey; it was completed for a former project location and due to its relative proximity, it was included to support the spring, summer and fall bird surveys completed on the Project site.

Location of transects and survey points varied from survey to survey, and conducted all over the Project area. For this reason, the bird studies were excluded from the field programme mapping in Figure 3.1. Final reporting and avian study mapping for the spring and fall migration surveys, as well as the summer breeding survey, can be found in Appendix 5.

Bat Monitoring

Bat monitoring was completed by Dr. Hugh Broders of St. Mary's University. His studies involved the use of 2 Wildlife Acoustics SM2 bat detectors and an Anabat detector. The ultrasonic acoustics recorders passively recorded echolocation calls of bat species at two separate locations on the Project site; the Anabat detector in a separate, third location. The seasonal timing of sampling corresponds to the end of summer residency period, movement of resident species to local hibernacula, and to fall migration by migratory species. Species were qualitatively identified from recorded echolocation call sequences by comparison with known sequences using frequency-time graphs in ANALOOK software. With the Proponents permission and at his request, Dr. Broders will have the opportunity to further study the HWWF results to aid the formulation of a broader, province-wide study on the wind farm impacts on bat populations. The results and analysis of the field program conducted by Dr. Broders can be found in Appendix 6.

Archaeological Investigation

Strum Consulting (Strum) was retained to undertake archaeological screening and reconnaissance of the proposed HWWF. The objective of the archaeological assessment was to evaluate

archaeological potential within the area that may be impacted by development of the wind farm. Strum Consulting, in association with Boreas Heritage Consulting Inc., developed a work plan that consisted of the following components: a background study including a review of previous archaeological research and data to identify areas of archaeological potential; archaeological reconnaissance of the areas that could be affected by development activities; and, a report summarizing the results of the background study and field reconnaissance, as well as providing cultural resource management recommendations.

Winter conditions and timing of the assessment precluded the completion of the reconnaissance stage of the study; however, a desktop archaeological screening of the Project site has been completed. An interim report has been completed and field reconnaissance will be completed by the Proponent immediately following snow melt. The interim report can be found in Appendix 7.

Rare Plant, Wetland and Watercourse Identification

Andrew Sharpe and Mike Parker (East Coast Aquatics Inc.; ECA) were procured to perform a rare plant inventory and wetland/watercourse identification at the HWWF site, as well as fish surveys. The surveys were designed based on knowledge of the specialists and the ACCDC report, found in Appendix 9. Three botanical field surveys were conducted on the Project site; an early season rare plant survey (July 2), late season rare plant survey (August 25), and a survey specific to Boreal Felt Lichen and indicators (March 3rd, 2015). The rare plant survey dates were selected to maximize opportunities to identify botanical species in accordance with the NSE Guide to Addressing Wildlife Species and Habitat in an EA Registered Document (NSDNR, 2009a). The site visits included the identification of all vascular plants and characterization of ecological habitats they were found, as well as initial mapping of wetland boundaries. One rare vascular plant species was observed during the surveys in a coniferous bog, Wiegand's Sedge (*Carex wiegandii*). One rare lichen, Blue Felt Lichen (*Degelia plumbea*), was observed in a wetland setting on a red maple and presence of this species indices a potential for a rich lichen diversity. Refer to locations of *Carex wiegandii* and *Degelia plumbea* which are both outside of the Project footprint on Figure 3.1.

The presence of Blue Felt Lichen triggered a specific search for Felt Lichen on March 3rd, 2015 by botanist Tom Neily and biologists Mike Parker and Andy Sharpe. Predictive mapping, layered with the proposed HWWF access road and WTG locations, directed East Coast Aquatics search to the highest potential areas that could be impacted by the Project. No Boreal Felt Lichen, indicator species of high probability habitat were observed within 100m of the proposed Project areas. East Coast Aquatics final reports on botanical finds can be found in ECAs report in Appendix 8.

Field surveys for wetland identification and delineation occurred on July 2, July 26 and August 28, with the surveys undertaken by ECAs qualified wetland delineators. The area of study was provided by the Proponent based on required setbacks in place by HRM, and exclusive areas due to property boundaries around site. The objectives of the field surveys were to:

- provide a general characterization of the vegetation communities within the wetlands;

- identify and delineate wetlands with intersect the proposed project infrastructure; and
- collect vegetation, soils and site details to facilitate subsequent wetland alteration applications for the Project.

The majority of the wetlands on site are classified as wooded swamps and shrub-treed bogs, linked by intermittent surface drainage channels; potential subsurface flows are expected in some cases. Two floral species at risk were identified in delineated wetlands and noted above; these are outside of the Project footprint. Through extensive wetland work by ECA and exchanges with the Proponent, wetland impact was greatly reduced. The complete delineation and final report of ECA on wetland identification can be found in Appendix 8.

Moose

Jody Hamper performed a Pellet Group Inventory (PGI) in the spring, 2014, and two Tracks surveys (Appendix 10) in the winter, 2015. Jody gained valuable experience completing the McLellans Brook and Barrington Wind Farm studies in 2012, and the Porters Lake Wind Farm in 2014. The survey transects used by the independent consultant around the Project site and the results of the survey can be seen in Appendix 10.

Ambient Sound

The Proponent procured the expertise of Strum to perform a sound impact study for the Project. An acoustic assessment was completed for the HWWF using the "Decibel" module in the wind farm planning and design software WindPro v. 2.8.

Using the ISO 9613-2 calculation model, conservative meteorological conditions are assumed for sound propagation and a conservative ground factor of 0.7 was applied to the model, even though the predominately porous ground and dense forested nature of the landscape could support a higher value. In addition, a considerable setback of over 1300m separates the nearest dwelling and any WTG. The Strum report, complete with tables and mapping, can be found in Appendix 13.

Ambient Light

The Proponent procured Strum to complete an ambient light impact study for the HWWF. Using the "Shadow" module in the design software WindPro v. 2.8, Strum assessed the worst case scenario conditions that could potentially occur at the HWWF. Based on the predictive modelling, shadow flicker levels caused by the rotating WTG blades will comply with the industry standard of no more than 30 minutes of shadow on the worst day and no more than 30 hours of shadow a year. The complete report can be found in Appendix 13.

Visual Impact Assessment

Strum was procured to complete the predicted visual impact of the Project by collecting representative photos from vantage points within the community. Photos were taken from three different locations with GPS waypoints to assist in the construction of a 3D view using Geographical Information System (GIS) software. The vantage points were selected based on locations where the HWWF could pose the greatest concern to aesthetics in the area. Strum's simulated results, as well as a complete report, can be found in Appendix 14.

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.