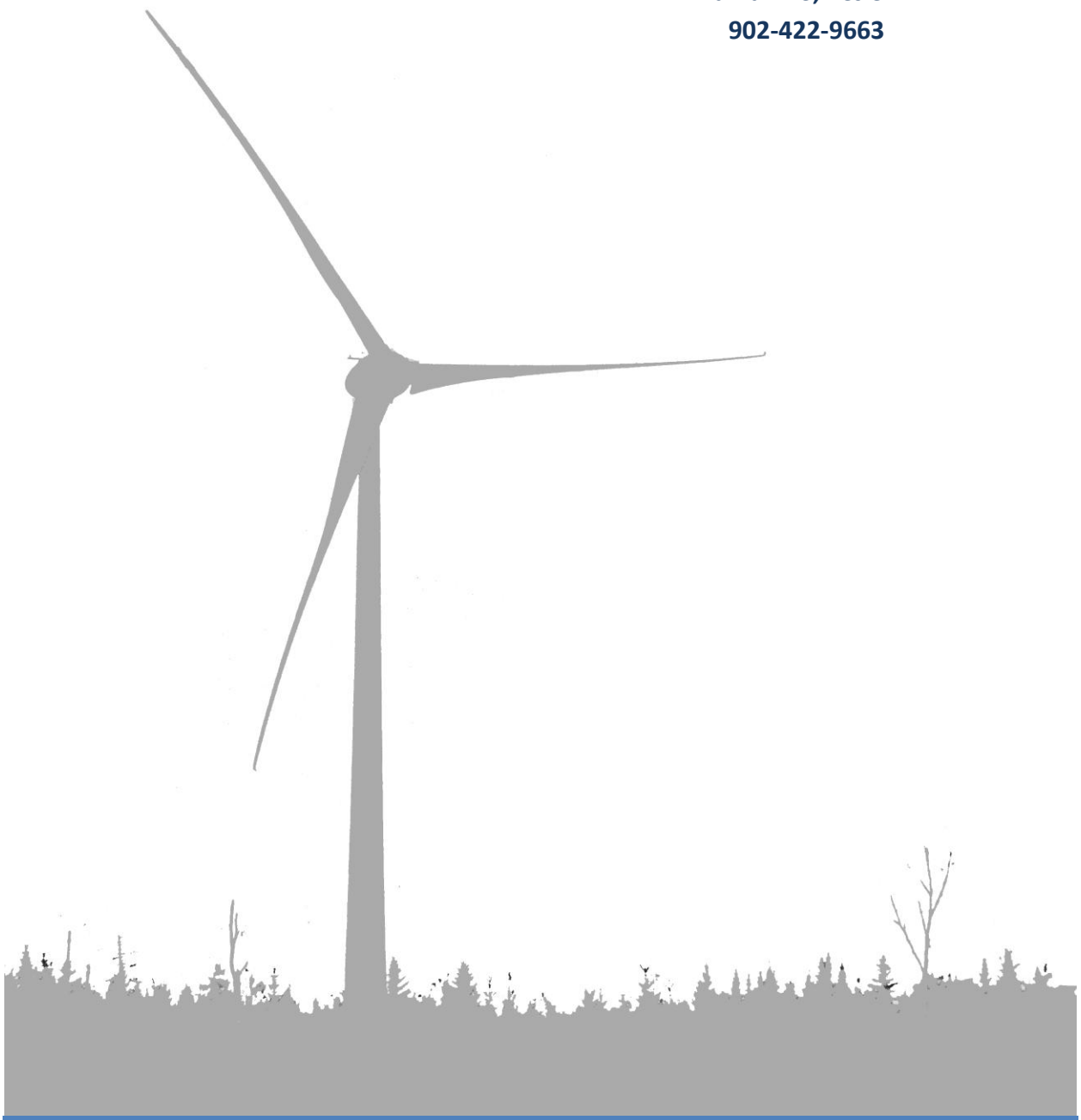
Mi'kmaq Wind4All Communities LP
1801 Hollis Street, Suite 1205
Halifax NS, B3J 3N4
902-422-9663



AMHERST COMMUNITY WIND FARM

ENVIRONMENTAL ASSESSMENT – DECEMBER 2014

Executive Summary

This Environmental Assessment has been prepared for the proposed Amherst Community Wind Farm by Natural Forces Wind Inc. on behalf of Mi'kmaq Wind4All Communities L.P. in accordance with the Nova Scotia Department of Environment guidelines entitled *A Proponents Guide to Environmental Assessment* (NSE, 2009) and the Nova Scotia Department of Environment guidelines entitled *Proponents Guide to Wind Power Projects: Guide for preparing an Environmental Assessment Registration Document* (NSE, 2012)

Work completed as part of this Environmental Assessment includes desktop and field studies to gather background information and to identify biophysical, physical and socio-economic valued environmental components; consultation with federal, provincial, municipal, local stakeholders and Mi'kmaq right–holders also took place as part of the assessment. The significance of residual effect due to project activities was studied for the Valued Environmental Components identified in the background studies based on potential impacts after employing the proposed mitigative measures. Finally, appropriate follow up measures were proposed based on the Valued Environmental Component analysis.

It has been determined from this Environmental Assessment that there are no significant residual environmental effects expected for the proposed Amherst Community Wind Farm on the Valued Environmental Components. This project promotes responsible renewable energy development in Nova Scotia and will help Nova Scotia meet the provincial requirement of 25% renewable energy by 2015 and the further target of 40% renewable energy by 2020 set by the Department of Energy.

This Page Was Intentionally Left Blank

Table of Contents

List of Figures

List of Tables

List of Appendices

List of Acronyms

ACCDC	Atlantic Canada Conservation Data Center
ACWF	Amherst Community Wind Farm
AMO	Abandoned Mine Openings
CEDIF	Community Economic Development Investment Fund
CLC	Community Liaison Committee
COMFIT	Community Feed In Tariff
COSEWIC	Committee of the Status of Endangered Wildlife in Canada
CWS	Canadian Wildlife Study
dB(A)	Decibel A-weighting
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
EMP	Environmental Management Plan
IPCC	Intergovernmental Panel for Climate Change
km	Kilometer
MEKS	Mi'kmaq Ecological Knowledge Study
MBBA	Maritime Breeding Bird Atlas
MGS	Membertou Geomatics Solutions
MoCC	Municipality of Cumberland County
MW	Megawatt
NSDNR	Nova Scotia's Department of Natural Resources
NSE	Nova Scotia Environment
NSPI	Nova Scotia Power Inc.
PGI	Pellet Group Inventories
PPA	Power Purchase Agreement
Project	Amherst Community Wind Farm
Proponent	Natural Forces Wind Inc.
SCADA	Supervisory Control and Data Acquisition
SODAR	Sonic Detection and Ranging
Strum	Strum Environmental
SPL	Sound Pressure Level
VEC	Valued Environmental Component
W4All	Wind4All Communities Inc.
WAM	Wet Area Mapping
WTG	Wind Turbine Generator

1.0 Introduction

1.1 Overview

The Amherst Community Wind Farm (Project or ACWF) as proposed is a 6.0 megawatt (MW) three wind turbine generator (WTG) project. The Project is located in the Municipality of Cumberland County (MoCC), near the town of Amherst, Nova Scotia.

Mi'kmaq Wind4All Communities LP (Proponent) is proposing to develop the Project under the Nova Scotia Department of Energy Community Feed in Tariff (COMFIT) program. The proposed WTG locations are situated on existing privately owned land located approximately 5.5 km east of Amherst town center. Currently, construction activities are expected to begin in the spring of 2015, and Project completion is expected in the fall of 2015. The Project will have an operational phase of 20 years.

A recent report by the Intergovernmental Panel on Climate Change (IPCC) reports that human influence on the climate system is clear and green house gas emissions have increased since the pre-industrial era, driven mainly by economic and population growth, and are now higher than ever. Continued emissions of green house gasses will amplify existing risks and create new risks for natural and human systems; the risk of abrupt of irreversible changes increase as the magnitude of warming increases. Mitigation measures must be used to reduce the greenhouse gas intensity; measures such as reducing energy usage and moving towards decarbonised energy supply should be taken to move towards achieving these goals. (IPCC, 2014)

The Nova Scotia *Renewable Electricity Plan* sets out clear legal requirements in regards to the source of electricity supplied. The purpose of Project is to help achieve provincially mandated targets outlined in the *Renewable Electricity Plan*. The province of Nova Scotia needs to achieve 25 percent energy from renewable sources by 2015 and a further target of 40 percent renewable by 2020. The Project will also enable local ownership in the wind farm and community economic development.

The COMFIT program is part of the Nova Scotia 2010 *Renewable Electricity* Plan and is designed to introduce locally-based renewable electricity projects that are partially owned by residents from communities throughout the province. The Proponent will use a Community Economic Development Investment Fund (CEDIF) to enable local investment and ownership in the Project.

The COMFIT program is integral to Nova Scotia's 2010 *Renewable Electricity Plan* and is designed to promote locally-based renewable electricity projects that are majority owned by one of six qualifying eligible entities. The following entities are eligible to participate in the COMFIT program:

- Community Economic Development Investment Funds;
- Co-operatives;
- Mi'kmaq band councils;

- Municipalities or their wholly-owned subsidiaries;
- Not-for-Profit Organizations; and
- Universities.

COMFIT approval for the proposed ACWF was initially awarded to the KMK, or the Kwilmu'kw Maw-klusuaqn. The KMK, also know, as the Mi'Kmaq Rights Initiative is the group that represents the negotiations on behalf of the Mi'kmaq of Nova Scotia, with the Province of Nova Scotia and the Government of Canada. The COMFIT approval was later assigned over to the Limited Partnership structured company, which continues to represent all Mi'kmaq Communities in the Province of Nova Scotia.

It typically takes approximately three years to develop and construct a wind farm. Although, the proposed ACWF is still in the development phase, public consultation has been ongoing in the Amherst area with two public information sessions being held in 2014.

The Proponent will not be using any source of public funding for the purpose of this project.

1.2 Proponent

The Proponent for the Amherst Community Wind Farm is Mi'kmaq Wind4All Communities LP. Mi'kmaq Wind4All Communities LP (the Proponent) is a partnership between Nova Scotia's thirteen Mi'Kmaq Communities; a Community Economic Development Corporation (to be established in 2015); and Natural Forces Wind Inc.

The Environmental Assessment (EA) has been prepared by Natural Forces Wind Inc. on behalf of the Mi'kmaq Wind4All Communities LP.

Natural Forces is a company that was established in 2001 based in Halifax, Nova Scotia. Composed of a small team, Natural Forces has over 45 years of local, national and international experience in the wind industry. Natural Forces Wind is a wind farm developer, constructor, operator and asset owner.

Natural Forces Wind has three operational wind farms in the Maritime Provinces; Kent Hills Wind Farm, Fairmont Wind Farm and Gaetz Brook Wind Farm. Kent Hills Wind Farm is a 150 MW wind farm in New Brunswick constructed in two phases beginning in 2008 and ending in 2010. The Fairmont Wind Farm is a 4.6 MW wind farm near Antigonish, Nova Scotia, which became energized at the end of 2012 and Gaetz Brook Wind Farm is a 2.3 MW wind farm on the Eastern Shore of Nova Scotia, energized in 2014.

Natural Forces Wind is currently working on developing and constructing projects in Nova Scotia and British Columbia.

In the next few years, the Natural Forces Wind Inc. aims to have five operational COMFIT wind farms in Nova Scotia with a total approximate capacity of 21 MW. The five proposed wind projects are detailed in Table 1-1.

Table 1-1: Proposed wind energy projects.

Project Name	Number of WTGs	Rated Capacity
Hillside Boularderie Wind Farm	2	4 MW
Gaetz Brook Wind Farm	1	2.3 MW
Barrachois Wind Farm	2	4 MW
Aulds Mountain Wind Farm	2	4.6 MW
Amherst Community Wind Farm	**3**	**6 MW**

1.3 Regulatory Framework

1.3.1 Federal

Federal environmental approvals are not required for the proposed project. The Project is not expected to require permitting through harmful alteration, disruption or destruction of fish habitat or have an impact to navigable waters.

Consultation with Federal authorities has been ongoing with Navigation Canada, Transport Canada, the Department of National Defence, and the Canadian Wildlife Service (CWS).

1.3.2 Provincial

The Environmental Assessment process, as required under the provincial *Environmental Assessment Act* is a Proponent-driven, self-assessment process. The Proponent is responsible for determining if the Environmental Assessment (EA) process applies to the Project, what category the Project belongs to and when the EA process should be initiated.

Under Section 49 of *the Environmental Assessment Act*, new electricity Projects or 'Undertakings' can be classified under one of two categories, Class 1 undertakings or Class 2 undertakings (EAR, 1995). Wind farms with a rated capacity of 2 MW or greater are considered Class 1 undertakings. It is anticipated that the rated capacity for the ACWF is 6.0 MW and therefore is a Class 1 undertaking.

Three guidance documents were used in the preparation of this EA for the ACWF Project, they are:

1. *A Proponent's Guide to Environmental Assessment*, published by the Environment Assessment Branch of the Nova Scotia Department of Environment (NSE, 2009);
2. *Proponent's Guide to Wind Power Projects: Guide for preparing an Environmental Assessment Registration Document*, also published by the Environment Assessment Branch of the Nova Scotia Department of Environment (NSE, 2012); and
3. *Guide to Addressing Wildlife Species and Habitat in an EA Registration Document,* published by the Environment Assessment Branch of the Nova Scotia Department of Environment (NSE, 2005).

1.3.3 Permitting

At the provincial level, a number of permits are required to progress the various stages of development and construction of a wind farm. A list of the required provincial permits is shown in Table 1-2, although additional permits may be required following continued stakeholder consultation.

Table 1-2: Federal and Provincial permitting requirements.

Permit Required	Permitting Authority	Status
Heritage Research Permit	NS Department of Tourism, Culture and Heritage	Issued
Special Move Permit	NS Transportation and Infrastructure Renewal	Not issued
Transportation Plan	NS Transportation and Infrastructure Renewal	Not issued
Environmental Assessment Approval	NS Environmental Assessment Branch	Under review
Work Within Highway Right-of-Way Permit	NS Transportation and Infrastructure Renewal	Not issued

Table 1-3 lists the municipal permits and authorizations required. Additional permits may be required following further consultation with municipal stakeholders.

Table 1-3: Municipal permitting requirements.

Permit Required	Permitting Authority	Status
Development Permit	Municipality of Cumberland County	Issued

1.4 Development and Structure of Document

This EA was prepared by Natural Forces Wind Inc. by Development Engineer – Chris Veinot, who compiled primary and secondary data sources to draft this EA document. The EA document will follow the structure as presented in Figure 1-1.

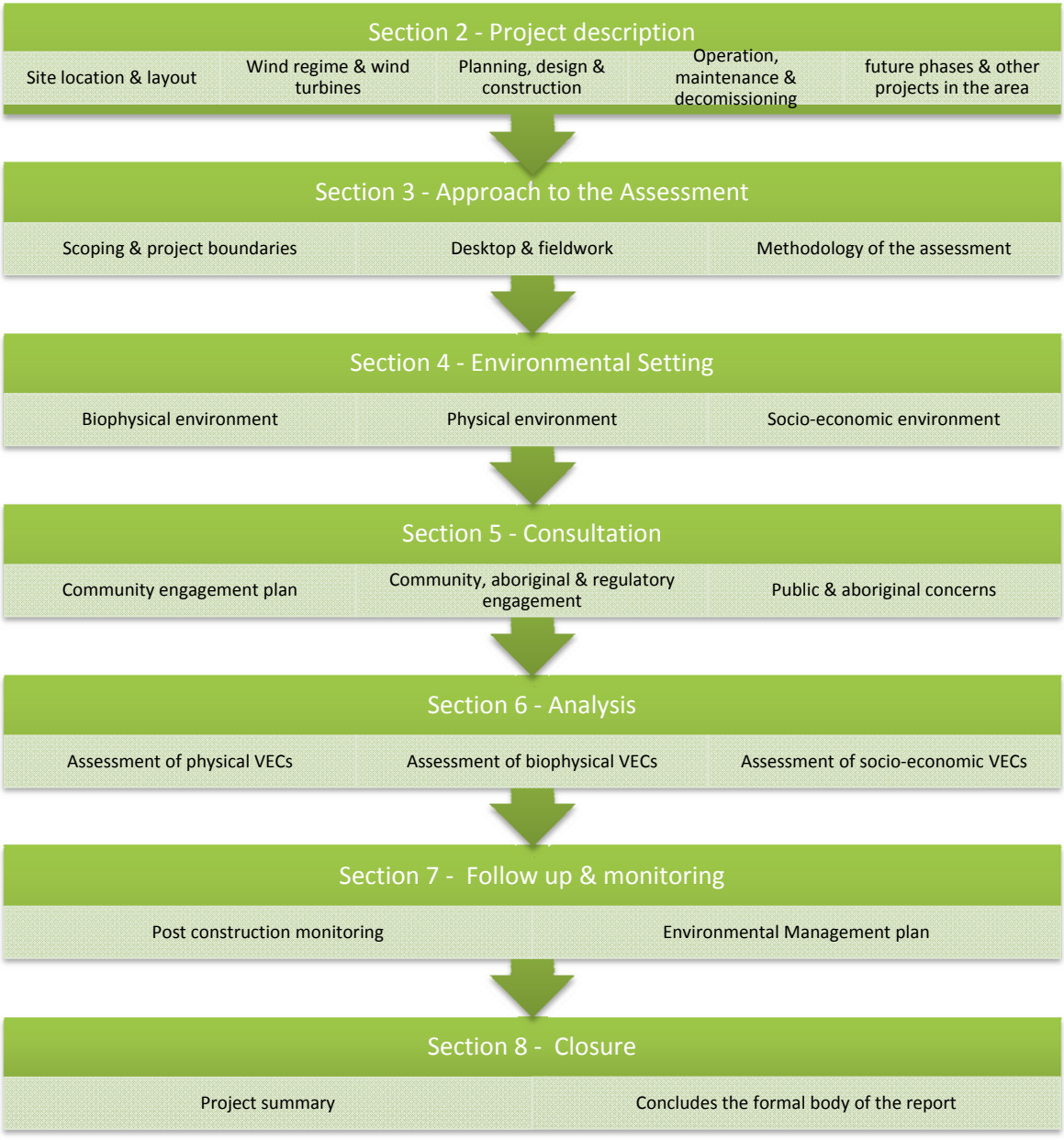


Figure 1-1: Structure of document.

This Page Was Intentionally Left Blank

2.0 Project Description

2.1 Site Location

The ACWF is located on privately owned land in the Municipality of Cumberland County, located approximately 5.5 km east of Amherst town center. The Proponent plans to construct and operate a 3 WTG, 6.0 MW wind farm; the proposed locations for the WTG 1, 2 & 3 can be seen in Figure 2-1, Figure 2-2 and Figure 3-3 respectively. Figure 2-44 shows a general overview of the project location. The WTG coordinates are shown below in Table 2-1.

Table 2-1: Turbine coordinates in UTM Zone 20.

	Easting	Northing
Wind Turbine 1	411,127 m E	5,076,367 m N
Wind Turbine 2	411,150 m E	5,075,827 m N
Wind Turbine 3	410,871 m E	5,075,939 m N

Figure 2-1: Proposed location for WTG 1.

Figure 2-2: Proposed location for WTG 2.

Figure 2-3: Proposed location for WTG 3.

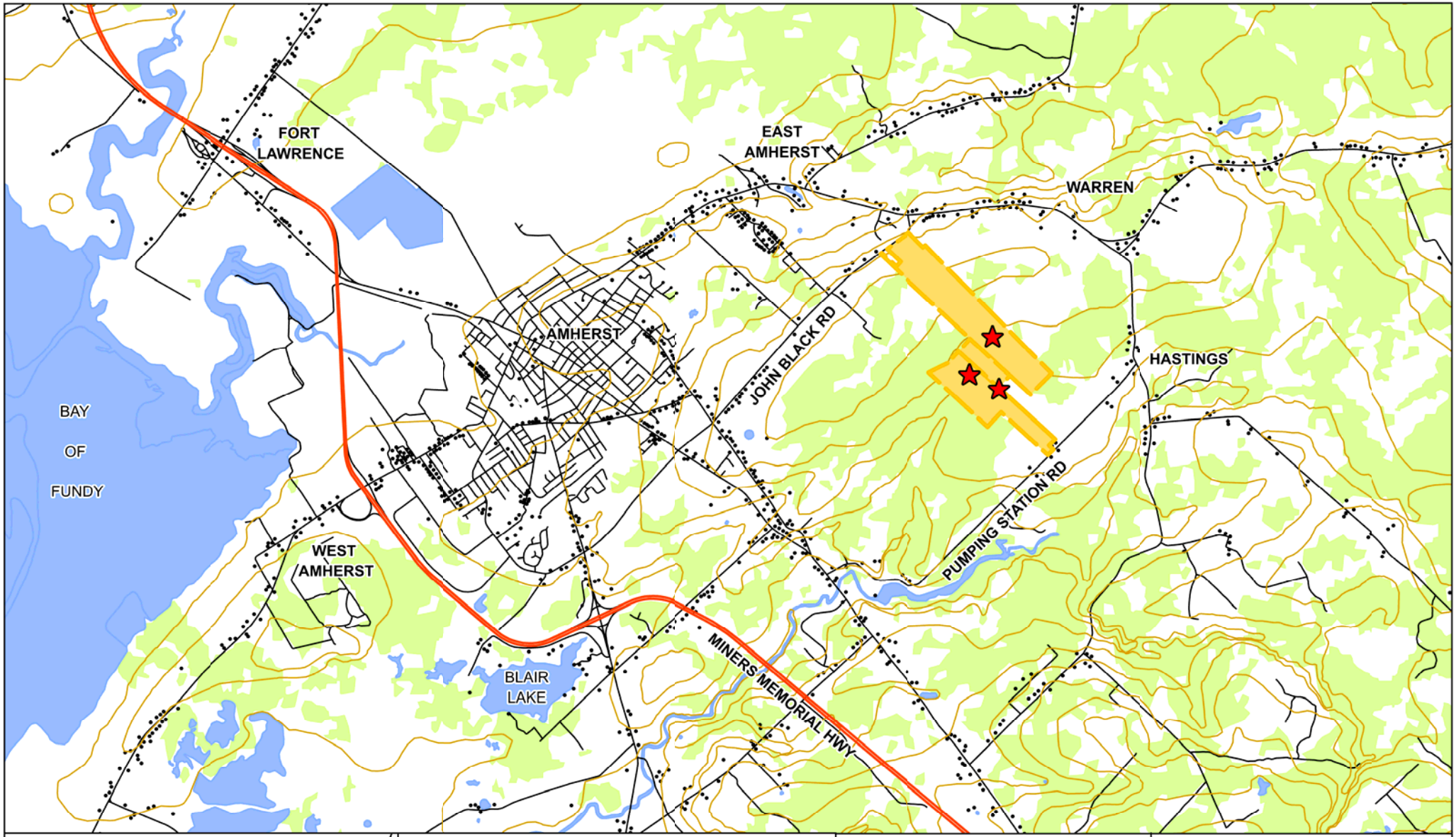
The ACWF will comply with the Municipality of Cumberland County by-law setbacks, maintaining a minimum distance of 600 m between residential dwellings and all WTGs.

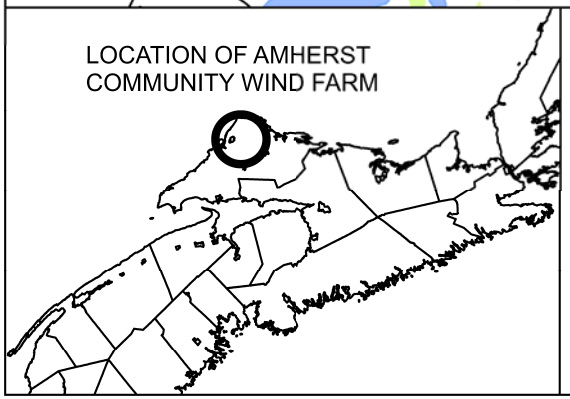
The ACWF will connect to the Nova Scotia Power Inc's (NSPI) distribution grid via 3-phase distribution line located on the John Black Road, which originates from the Church Street substation (22N) located approximately 3.5 km west of the Project site.

The lands under option consist of three privately owned land parcels; each land parcel will accommodate one WTG and associated infrastructure such as roads, crane pads and distribution lines. The overall project footprint will be approximately 4.0 hectares but will only require 1.7 hectares of clearing by making use of an existing road and previously cleared land.

The access road will be constructed by entering the Project site from John Black Road. The proposed access road will make use of an existing road that will be upgraded to accommodate the wind farm equipment; by using existing roads, the Proponent aims to minimize the overall environmental impact of the project.

The Proponent has extensive knowledge in site finding and development of community based wind farms. There are three main factors to consider during the site finding phase of the development of a wind farm. These factors include wind regime, local power grid infrastructure and environmental/ socio-economic concerns. Detailed assessment of these three factors have led the Proponent to determine that the location of the ACWF presents the best opportunity to capture the wind regime in an effort provide efficient renewable energy to the local community.





LEGEND

- Proposed Turbines
- Highway
- Project Area
- Elevation Contour
- Building
- Road
- Water
- Forest

SCALE: 1 : 60,000

FIGURE: Figure 2-4

TITLE: General Overview

1205 - 1801 HOLLIS STREET
HALIFAX, NOVA SCOTIA B3J 3N4
TEL: 902 422 9663
FAX 902 422 9780
WWW.NATURALFORCES.CA

November 19, 2014

naturalforces

2.2 Planning and Design

The site layout has been designed primarily based on constrains that have been identified during the development process.

The planning and design phases are crucial steps of the Project that can set the stage for following project activities and help avoid issues that may be encountered in future project phases. Specifically, the ACWF site is an attractive site due to the wind resource, distance from dwellings, proximity to and capacity of the distribution grid and minimal ecological concerns.

A variety of criteria has been considered in the site selection of the ACWF. The criteria include technical, environmental and land use consideration. The following is a list of the criteria considered and has been included in the design process that has produced the project layout as shown in Figure 2-5.

- Technical Considerations;
    - Sufficient wind resource;
    - Proximity to electrical distribution network;
    - Capacity of the local electrical distribution network (~3 km to substation); and
    - Proximity to communication links.
- Environmental Considerations;
    - Proximity to known wetlands;
    - Proximity to residential dwellings or other noise/shadow sensitive areas;
    - Sensitivity of flora & fauna; and
    - Proximity to provincial or national parks and nature reserves.
- Land use considerations;
    - Available access to the land and suitable ground conditions; and
    - Proximity to residential properties, communities and towns.
- Planning Considerations.
    - County or Municipal zoning by-law regulations.

Technical Considerations

The ACWF is located on the Isthmus of Chignecto, which connects New Brunswick and Nova Scotia. The isthmus is bounded by the Bay of Fundy with the Northumberland Straight. As a result of the project being in close proximity to the Bay of Fundy and ground elevation, stronger winds are found at the Project site providing an attractive wind resource for a wind farm with prevailing winds from the southwest.

A Distribution System Impact Study conducted by NSPI on behalf of the proponent indicates the Project can be connected to the nearby local electrical distribution system. Through an agreement with NSPI, the Project will be connected to the 22N-402 circuit of the Church Street substation, which provides electricity to Amherst and surrounding areas. The proximity of the ACWF to a high electrical load center

such as Amherst is a key determinate in securing a feasible grid connection to the existing NSPI distribution system. Projects located further from load centers and substations tend to be less feasible in terms of securing a successful grid connection.

Two existing license microwave radio links have been found near the Project site, 1,000 m and 3,000 m from the nearest turbine. Based on the results of an electromagnetic interference study the proposed turbines are not expected to significantly impact the existing radio systems in the area. Figure 2-6 presents two identified microwave radio links that have been assessed, this figure also shows how this constraint among others have been incorporated into identifying an area suitable for development.

Environmental Considerations

In consultation with Department of Natural Resources the Proponent has identified a requirement for a buffer between wetlands and wind turbines. The Proponent has applied a 30 m plus rotor radius (76 m) buffer from all wetlands and watercourses identified during the wetland delineation survey. This buffer will minimize the potential for impact to wetlands during the construction and operation phases of the project.

The ACWF is setback over 951 m from all residential dwellings. Sufficient setback has mitigated potential impact on dwellings from elevated noise or shadow flicker as a result of the turbines during operation.

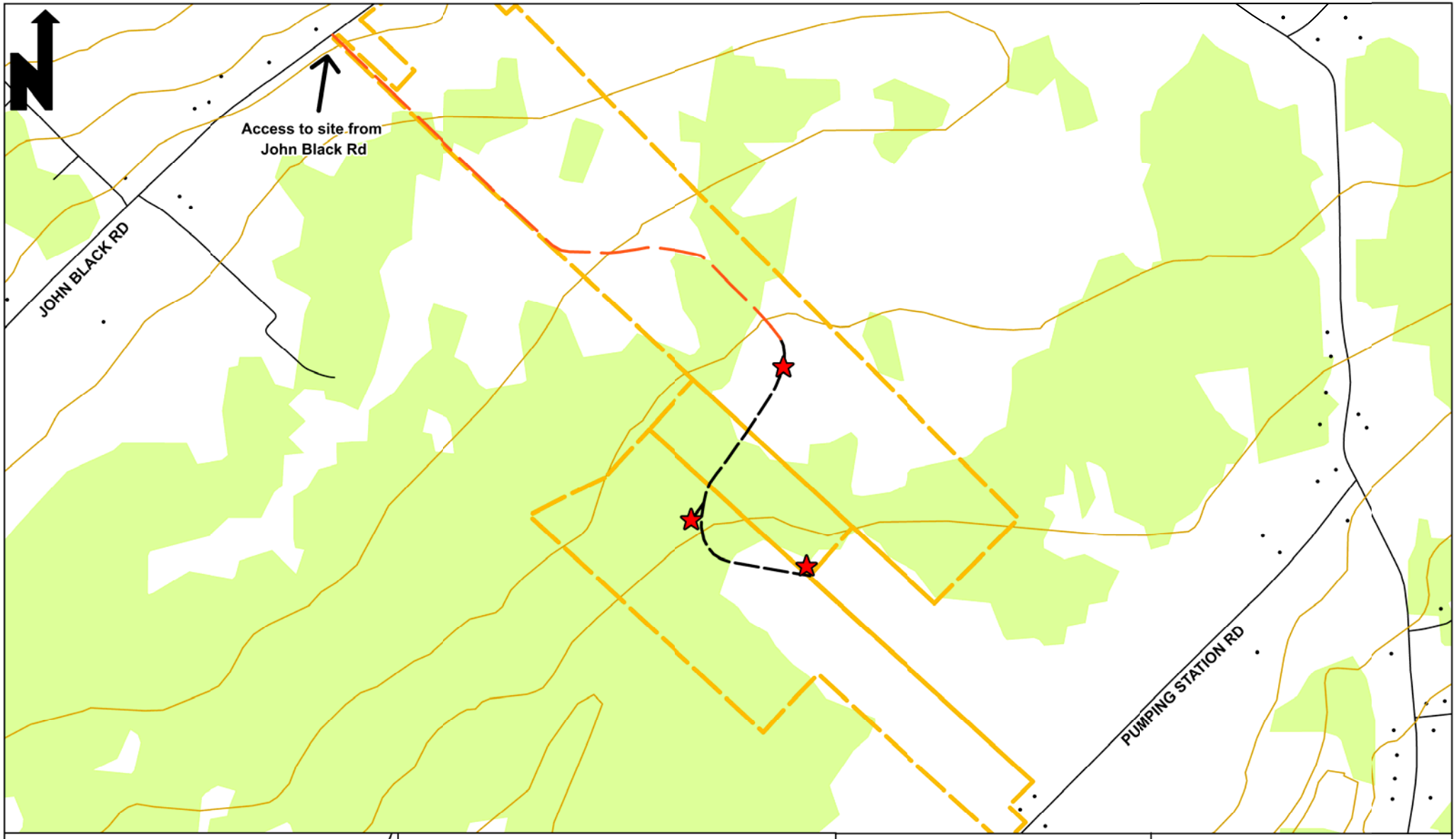
A thorough review of flora and fauna has been conducted to identify species at risk or of high importance that may be impacted by the proposed development. Results of the studies have not identified any species at risk or high importance that would be significantly impacted by the proposed development. Recommendations have been made by the scientific professionals who conducted the specific studies, which will be considered and incorporated in the final design and proposed mitigation measures.

Land Use Considerations

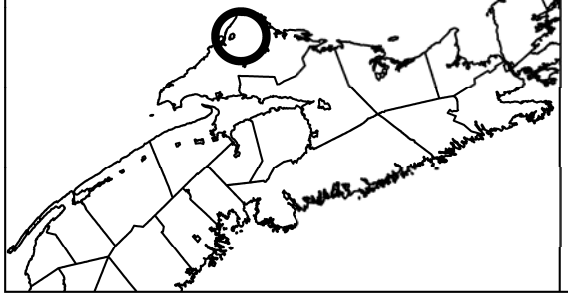
The three participating landowners have made their lands available for the installation of three WTGs and ancillary infrastructure. An existing access road will be upgraded and extended to gain access to the proposed WTG location. The existing access road is also very important when considering the overall impact of the Project footprint, by using the existing road a significant reduction in the amount of clearing will be noticed.

Planning Considerations

The Municipality of Cumberland County requires that all wind turbines be setback at least 600 m from dwellings. Further wind turbines must be setback turbine height plus 7.5 m from external property boundaries. Figure 2-6 presents these two constrains and also show how they have been incorporated in identifying a development area.



LOCATION OF AMHERST
COMMUNITY WIND FARM



LEGEND

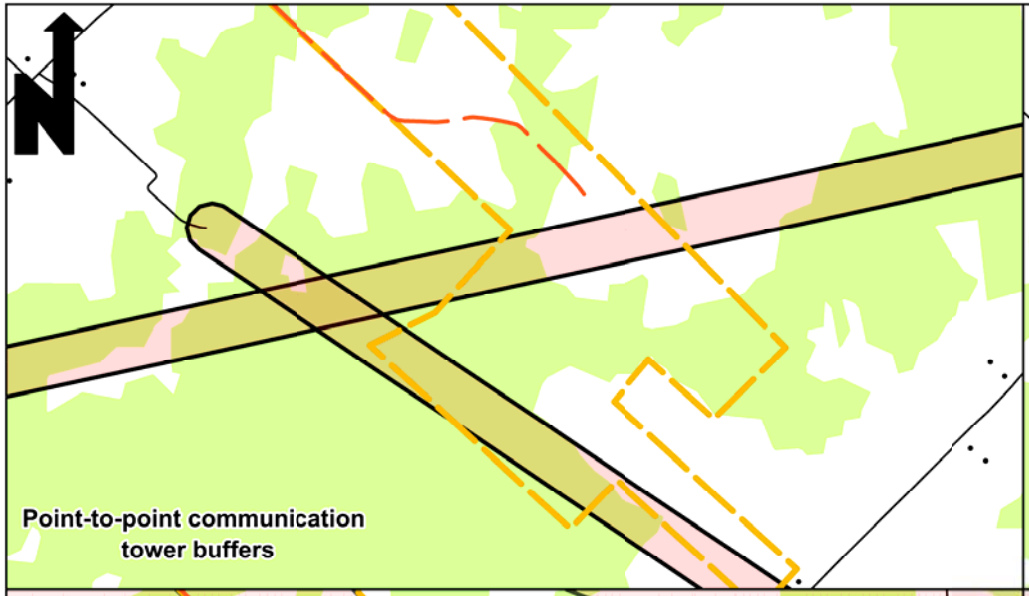
- Proposed Turbines
- Highway
- Project Area
- Elevation Contour
- Proposed Access
- Existing Access
- Road
- Water
- Forest
- Building

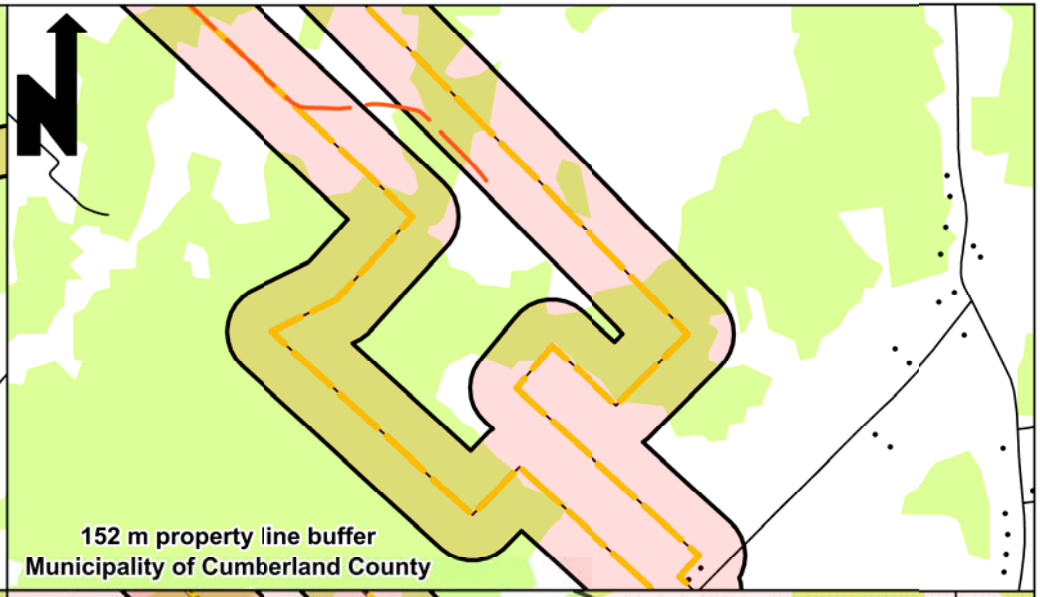
SCALE	1 : 15,000
FIGURE	Figure 2-5
TITLE	Project Layout

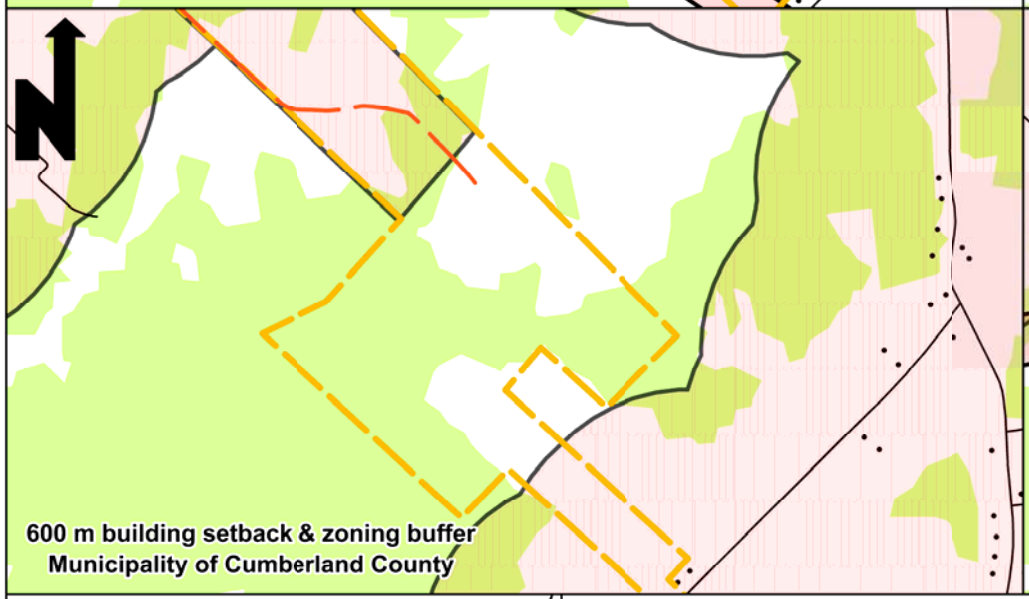
1205 - 1801 HOLLIS STREET
HALIFAX, NOVA SCOTIA B3J 3N4
TEL: 902 422 9663
FAX 902 422 9780
WWW.NATURALFORCES.CA

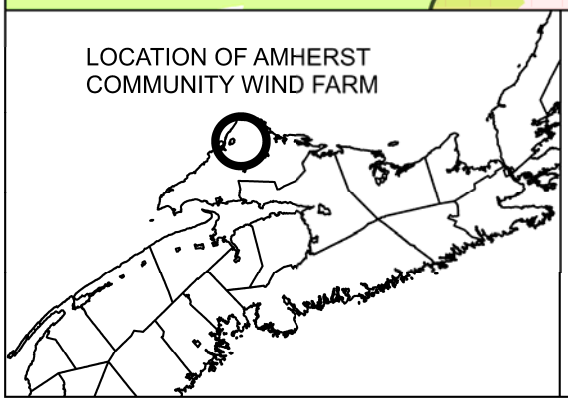
November 19, 2014

naturalforces









Suitable area for wind turbine

Existing access

Project area

Exclusion area

Building

Road

Forest

LEGEND

1 : 25,000

SCALE

Figure 2-6

FIGURE

Project Constraints

TITLE

1205 - 1801 HOLLIS STREET
HALIFAX, NOVA SCOTIA B3J 3N4
TEL: 902 422 9663
FAX 902 422 9780
WWW.NATURALFORCES.CA

November 19, 2014

naturalforces

2.3 Wind Turbine Generator

Three Enercon E92 WTGs will be used on site for the duration of the Project. The Enercon E92 has a total rated capacity of 2.0 MW, a turbine tower height range of 85 – 98 m and rotor blade diameter of approximately 92 m. From base to blade tip the WTG will have a maximum height of 144 m.

All Enercon WTGs are designed and certified according to the latest international standards. Currently the basis for design is the International Electrotechnical Commission (IEC) standards of the IEC-61400 series.

This IEC standard utilizes assumptions and conditions that are used to define the load cases that the WTGs have to endure. The safety system of the Enercon WTG features various control sensors that protect the turbine and its components from damage. This includes, among other things, high and low temperatures, vibrations, oscillations and strain. In the case that one or more of these sensors detect conditions outside the design limits, the main control of the WTGs will take the appropriate measures, which range from small power limitations to complete stop of the turbine (Enercon, 2012).

Ice may form on the rotor blades of the WTGs in specific weather conditions. The ice build-up poses the risk of ice fragments detaching, creating safety hazards to the surrounding area. The Enercon WTGs will be equipped with a reliable ice detection system. Once ice has been detected, the Enercon blade de-icing system will activate and effectively melt the ice on the WTG blade to reduce the risk of ice throw.

Additional WTG specifications are presented in Table 2-2 as well as in Appendix A.

Table 2-2: Enercon E92 specifications (Enercon, 2012).

Characteristic	Value
Rotor diameter	92 m
Swept area	6648 m^2
Rotations per minute	5 – 16 min^{-1}
Cut out wind speed	28 – 49 m/s (Enercon storm control)
Hub height	85 - 98 m
Max sound pressure level	105 dB(A)

2.4 Construction

Construction of the ACWF is proposed to take approximately six months and will include the following main construction activities:

- Clearing and grubbing of Project area;
- Construction of access road, lay down area and crane pads;
- Construction of turbine foundation;
- Construction of power pole, power lines and underground electrical;
- Turbine installation;

- Commissioning of the WTG; and
- Removal of all temporary works and restoration of the site.

The approximate proposed schedule for the construction activities is presented in Table 2-3. Construction scheduled for month 1 is expected to start in May 2015 with construction activities ending at the end of October 2015. Operation of the ACWF is expected to start approximately during the month of November 2015, following the completion of construction activities.

Table 2-3: Schedule of construction activities.

Construction Activity	Typical Distribution (months)					
	1	2	3	4	5	6
Surveying and siting activities	■					
Construction of access road and crane pad		■	■			
Construction of crane pad & turbine foundation			■	■		
Construction of electrical works				■	■	
Wind turbine assembly and installation				■	■	
Removal of temporary works and site restoration						■

2.4.1 Surveying, Siting and Logistic Activities

Prior to the commencement of access road, foundation construction and turbine installation, a number of enabling works need to be undertaken. These will include:

- Engineering site visits to evaluate the Project land and soils conditions;
- Boring of holes and/or excavation pits for geotechnical investigations;
- Improvement of land drainage as required to facilitate construction; and
- Widening and improvement of the site entrance for safe vehicle access.

The Proponent and the turbine manufacturer will coordinate transportation of the turbine components that will require overweight special move permits. Service Nova Scotia and Municipal Relations officers will be consulted to ensure any other potential permits (ie. over-dimensional and overweight vehicle permits) are obtained and transportation regulations are followed. Although the WTG transportation route has yet to be planned, the Proponent is aware of certain road weight restrictions. Roads used for the construction phase of the Project will comply with intermediate and maximum weight road restriction lists (Road designation, 2012).

2.4.2 Access Road

Access roads required for the development are typically 5 – 6 m wide with a maximum width of 12 m in certain areas to facilitate moving a fully assembled crane. The access road will be used to move workers and equipment about the site during construction, operation and decommissioning phases.

The upgrade and extension of the access road will involve the removal of soil to a depth of between 0.25 – 1.0 m (depending on the ground conditions encountered during the geotechnical investigations) and placing layers of crushed stone. The stone would be compacted, with a finished construction depth between 0.25 – 0.5 m, again dependent on the strength of the underlying road formation. The internal site road would be maintained in good condition during construction and throughout the lifetime of the Project to facilitate maintenance and on-going environmental studies.

The removed topsoil would be stored in accordance with best practice guidance, and later used for site restoration. Soils needed for backfill would be stored temporarily in bunds adjacent to the excavations until needed. Any remaining excavated material would be shaped into fill slopes in the road bed, or removed from site to an approved landfill. The proposed access road layout can be seen in Figure 2-5. This figure demonstrates where existing road will be used to help reduce the footprint of the project that will require clearing. The road shown in red is the existing road and therefore should not require further clearing. The road that is indicated by black has not been cleared or constructed. By making use of the existing road, the total footprint of the project requiring clearing is reduced from 4.0 hectares to 1.7 hectares.

Figure 2-7: Existing access road that will be used for site access.

2.4.3 Crane Pad & Turbine Foundation

Crane Pad

The installation of the Enercon E92 WTGs will require crane pads that will be approximately 80 m by 80 m. Its purpose is to safely accommodate the weight of the large crane necessary for turbine installation and maintenance. The exact arrangement of the crane pads would be designed to suit the specific requirement of the turbines and the surrounding topography of the Project site.

Construction of the main crane pads would involve the removal of soil to a depth of between 0.25 – 0.5 m, depending on the ground condition encountered during the geotechnical investigation. The subsoil would be covered by layers of graded crushed stone. Total construction depth is between 0.25 – 0.5 m, again dependent on the characteristics of the underlying soil formations.

The crane pads may be retained throughout the operation life of the wind farm to allow for periodic WTG maintenance, and to accommodate any crane necessary for the replacement of large components should they require replacement during the operation phase of the Project.

Turbine Foundations

A concrete foundation approximately 15 m in diameter will be required for each WTG. A detailed geotechnical investigation will be undertaken to establish the nature of the soil at each identified WTG location. A registered Civil Engineer will design the foundations to match the soil conditions. Foundations will most likely be a gravity (inverted "T") design, designed by Enercon.

The construction of the reinforced concrete foundation will include excavation to a depth of several meters, the placement of concrete forms and steel reinforcement, and the pouring of concrete within the forms. The upper surface of the base will lie approximately 1 m below ground level. Rock chipping may be required to facilitate excavation. The central support pedestal would extend 0.20 m above existing ground level to receive the bolted bottom tower section. Suitable excavated material would be compacted in layers on top of the concrete foundation to terminate in line with the existing ground level, leaving room to allow sufficient topsoil reinstatement for vegetation growth.

The soils removed would be stored in accordance with provincial regulations and best practice guidelines, and replaced during the restoration phase in consultation with the landowner. Soil material needed for backfill would be stored temporarily in a designated area adjacent to the excavations until needed. Any remaining excavated material will be recycled to another site needing clean fill material or removed from site and sent to an approved landfill.

2.4.4 Civil and Electrical Works

The electricity produced from the WTGs will be stepped up to 25 kV by a transformer located in the base of each of the WTGs. The electricity will then be conducted via insulated electrical cables through cable ducts cast into the WTG foundation routed out to new power poles on site, and then to the new point of connection to the existing NSPI distribution system.

A bare copper earthing (grounding) cable will be laid alongside the WTG foundation for lightning protection of the WTG; grounding will also be installed at other areas as determined by the electrical design.

The electrical, communications and grounding cable will leave the WTG foundations below grade via cable ducts cast into the WTG foundations. Where the cables are to cross the site roads and crane base, they may be located in cable ducts surrounded by 0.15 m of concrete to ensure the integrity of the cable is maintained independent of the vehicle site crossings above. The overhead cabling configuration will be similar to the standard 12 m wooden utility poles found throughout the surrounding area. Any buried electrical cable will likely be marked with permanent safety signs to warn of potential hazards from excavation. The size, type and location of the marker signs will be determined in consultation with the landowner and be in accordance with applicable safety standards.

2.4.5 Interconnection to Grid

The connection point to the NSPI electrical distribution system will be located on the Project site. The ACWF will connect to the NSPI's distribution grid via 3-phase distribution line originating from the Church Street substation (22N) located approximately 3 km east of the Project site. This connection will connect to an existing 3-phase distribution, which is part of circuit 22N-402. Figure 2-8 presents the approximate location of the interconnection to the NSPI grid.

Figure 2-8: Approximate location of interconnection to existing NSPI infrastructure

2.4.6 WTG assembly and installation

The main WTG components include the tower sections, nacelle, hub and blades. Towers are normally delivered in four sections if using steel towers or approximately 20 sections if using the pre-cast concrete variety. The overall erection process for the WTG will take approximately two to six days, depending on the wind conditions, and would not start until suitable wind conditions prevail.

Once delivered, the tower sections will be erected in sequence on the WTG foundations using a 150 tonne tailing crane and a large 800 – 1000 tonne main lift crane. The smaller crane will erect the base and lower-midsection of the towers and then assist the main crane with the erection of the upper-midsection, the tower top section, the nacelle and the rotor. The main erection crane also lifts heavy internal components such as the generators.

For the nacelle and blades, the assembly will involve the use of a small 135 tonne rough-terrain crane for vehicle off-loading, a 150 tonne tailing crane for preliminary assembly, and a main erection crane of approximately 800-1000 tonnes for the main lift.

The blades are attached to the hub on the ground. The hub and blades are then lifted as one unit, called the rotor. The tailing crane helps to control the orientation of the rotor during this lift, while the main crane lifts the weight.

2.4.7 Site Restoration

After construction, erection and commissioning are completed and the Project is in the operation phase, all temporary works will be removed and the land re-graded. The stored topsoil will be replaced and fine graded, and the site will be dressed to restore maximum tillable area and a pleasing appearance.

2.4.8 Other Site Activities

Entry to the Project site will be adjacent to John Black Road. This will be the entry point for all workers, construction equipment and WTG components for the duration of the construction phase. Minor, temporary road widening may be required along specific portions of the road. This road widening would be coordinated with Nova Scotia Transportation and Infrastructure Renewal and all necessary permits will be required before commencing work.

During construction of the access road and the WTG foundations, there will be an increase in truck traffic on the roads leading to and from the Project site. Increased dust is possible, although water trucks will dampen the roads and excavation area when necessary to control fugitive dust.

During delivery of the WTG components, delivery of oversized loads may slow traffic flow. Every effort will be made to ensure that oversized loads are delivered during times of lowest area traffic. Pilot vehicles and licensed flaggers will be provided to coordinate traffic flow and ensure public safety.

Delivery of materials and equipment will be phased throughout the construction period depending upon the specific construction activity. The vehicles likely to be involved include:

- Large trucks with trailers for delivery of materials, earth-moving equipment and cargo containers for storage of tools and parts;
- Dump trucks to deliver and/or move stone for constructing internal site roads;
- Concrete trucks for constructing WTG foundation;
- One 800-1000 tonne main lift crane;
- One 150 tonne tailing crane;
- One 135 tonne rough-terrain crane for assembling WTG;
- WTG component delivery vehicles; and
- Miscellaneous light vehicles including cars and pickup trucks.

Of these predicted vehicle movements, approximately 35 will be oversized loads associated with the delivery of WTGs component parts (towers, blades, and nacelles) and the cranes required for erection. These deliveries are anticipated within months 4 through 6 of the construction schedule and subject to movement orders as agreed upon with governing authorities.

2.5 Operation and Maintenance

2.5.1 Site Access and Traffic

Once the wind farm is operational, minimal vehicle activity will be required. The internal site roads will be used for periodic maintenance and safety checks. A comprehensive Supervisory Control and Data Acquisition (SCADA) system will be installed within the turbine for remote monitoring and control of the wind turbine, which will minimize the need for on-site personnel. The SCADA system ensures safe efficient operation of the turbine and of the overall Project site.

2.5.2 Project Safety Signs

A Project sign will be located at the entrance to the site. This sign will provide essential safety information such as emergency contacts and telephone numbers. As well, the sign will provide information about the wind farm and the companies involved in the Project. Safety signs and information will also be installed throughout the Project Site. These signs will be maintained throughout the operational life of the wind farm.

2.5.3 Maintenance Plans

Scheduled maintenance work will be carried out several times each year throughout the operational phase. Unscheduled maintenance is minimal, as the SCADA system provides 24-hour monitoring of the turbines. Maintenances procedures may require the use of small or large cranes for brief periods of time, for replacement of blades or other turbine components.

2.5.4 VEC Monitoring

Birds and bats will be monitored for a period of time during the first few years of the operational phase.

2.6 Decommissioning

The Amherst Community Wind Farm project will be in operation for approximately 20 years. The lifetime is based on the duration of the Power Purchase Agreement (PPA) signed between NSPI and the Proponent. This is also consistent with the length of the land lease that will be signed by participating land owners.

Decommissioning will commence within six months after the license has been terminated. The decommissioning phase will be completed within six months after its commencement.

The WTGs components will be dismantled and removed from the site. Similar traffic movements to those experienced during the delivery of the turbine components are anticipated. The decommissioning phase will require considerably lower vehicular support than during the construction phase. The following four steps are anticipated in the decommissioning phase:

1. The WTGs will be dismantled and removed from the site for scrap or resale. The bases will be removed to below plough depth, and the top soil will be reinstated so that the land may be returned to its former use.
2. The internal site roads and site entrance, if not required may be removed. After removal, the land will be reinstated to its former use.
3. The underground cables will be below plough depth and contain no harmful substances. They may be recovered if economically attractive or left in the ground. Terminal connections will be cut back below plough depth.
4. All other equipment will be dismantled and removed, and the land will be returned to its former use.

2.7 Future Phases of the Project

There are no future phases planned for the ACWF Project. There are three contributing factors that have been considered in determining the 20 year project duration.

1. The current land lease agreement details that the duration of the lease once the Project has been commissioned will be 20 years.
2. The Proponent has agreed upon a 20 year fixed rate PPA with NSPI.
3. The WTGs have a life expectancy of approximately 25 years.

Based on these three factors, at this time the has no further plans to develop this Project after the proposed 20 year Project life has elapsed.

2.8 Other Projects in Area

The Amherst Wind Farm is located 7.5 km west of the proposed Project site and consists of 15 Suzlon wind turbines. The project is currently owned and operated by Capstone Infrastructure and has been in operation since 2012 (NSPI, 2014)

There are no other operating, proposed or under construction wind farms within a 10 km radius of the ACWF.

This Page Was Intentionally Left Blank

3.0 Approach to the Assessment

3.1 Scoping and Bounding

The scoping process identifies the physical, biophysical and socio-economic Valued Environmental Components (VECs) that may be subject to impact given the works proposed as described previously in Section 2. The proposed work is composed of the construction, operation and maintenance phases of the Project conducted by the Proponent including any accidents and malfunctions that may occur. The decommissioning of the ACWF is also included as part of the assessment. The identification of the VECs is based on the potential interaction of the Project within the environmental and socio-economic settings described in Section 4. Additionally, any concerns from stakeholders and the general public as identified through the consultation process described in Section 5 are taken into great consideration when identifying the VECs to be assessed.

The scope of the assessment is formed by the potential interaction of the project activities with the VECs. The scoping was completed at a preliminary level to define the appropriate desktop and field studies that would be relevant to the Project. The scoping is continually refined as the Project progresses, the environmental setting is studied and consultations are held. While it is difficult to assess all of the potential effects of a project, properly defining a scope reduces the risk of overlooking an important project impact.

The Proponent has identified the physical, biophysical and socio-economic aspects that will be subject to assessment based on knowledge and experience, review of the regulatory requirements, as well as feedback from the community, First Nations, regulatory authorities and other stakeholders. This process has identified the physical, biophysical and socio-economic VECs to be evaluated for the Project; these VECs are listed in Table 3-1.

Table 3-1: Identified Valued Environmental Components.

Physical	Biophysical	Socio-economic
Ambient Air	Wetlands / Watercourses	Property Value & Land Use
Ground & Surface Water	Fish and Fish Habitat	Aboriginal Resources / Uses
Ambient Noise	Migratory and Breeding Birds	Archaeological Resources / Uses
Ambient Light	Flora	Vehicular Traffic
	Moose	Telecommunications and Radar
	Wood Turtle	Landscape Aesthetics
		Public Health and Safety
		Local Economy

Spatial and temporal boundaries must be determined in the assessment process to properly evaluate the Projects impacts on the aforementioned VECs. Spatial boundary is the physical bounds in which the Project facilities and activities are located as well as zones affected by project activities, i.e. discharge

and emissions. Temporal boundary is the time frame in which the activities within the spatial boundary overlap with the presence of identified VECs.

Based on the *Proponent's Guide to Wind Power Projects'* it has been determined that the Project site sensitivity is classed as very high , which classifies the ACWF as a category 4 on the level of concern category, this is primarily due to the fact that the site is located within 10 km to several Provincially and Nationally important bird areas. Projects in this category present a high level of risk to wild species and/or their habitat, and require comprehensive surveys, spread over a one year period, to obtain quantitative information on wild species and habitats on the site (NSE, 2012). The proponent has engaged the services of external consultants and University researches to conduct these surveys, which will be discussed throughout this EA.

The study area includes a spatial boundary that encompasses the footprint of all activities associated with the construction, operation and decommissioning of the proposed Project. Further, the study area also includes all areas that interactions between the project and environment could be reasonably expected to occur. The spatial boundary will be defined for each separate VEC assessment since it is not reasonably possible to define a single spatial boundary to encompass all project activities and VECs.

The temporal boundaries include, but are not limited to the timeline for short term construction activities, as a long term temporal boundary includes the 20 year operation of the project as well as its decommissioning. The temporal and spatial boundaries are identified in the VEC analysis in Section 6.

3.2 Desktop and Field Work Completed

3.2.1 Avian Survey

Avian studies consisted of two main components. The first component was an avian baseline study conducted by John F. Kearney & Associates from April through November 2014. The second component was a fall radar study conducted by Phil Taylor of Acadia University. In addition, a modest early 2014 winter survey was conducted by Strum Environmental. A control area was also used to better determine the relative avian activity on site.

The results of the Avian surveys were also compared to avian survey data from existing wind farms in operation around the province in order to show relative activity at the ACWF.

Avian Baseline Study

The avian baseline study conducted by John F. Kearny & Associates was initiated in spring 2014 and continued to November 2014. The study had three major objectives:

1. To provide information on birds to ensure that the Project complies with the federal *Migratory Bird Convention Act*, the *Species at Risk Act*, and associated laws and policies of the Province of Nova Scotia.

2. To provide durnal and nocturnal information to inform the siting, operation and monitoring of the proposed project in regard to the direct and indirect effects on birds.
3. To provide a quantitative baseline for measuring the impacts of the project in the short and long term and to contribute to a global understanding of wind energy projects on birds.

Six types of survey methodologies were used to meet the objectives of the study. All the surveys include quantities survey methodologies consisting of counts within the Project area and in the control area (the acoustic surveys are only in the Project area).

1. Migration stop-over transects

Two transects were used for the study of stop-over migration. These transects are shown in Appendix B – Figure 6. Transects were chosen to sample representative habitats in the study area, on in the Project area and one in the control area.

Each transect was surveyed one every weed during the migration period; April 15 – June 7, 2014 and August 31 – October 31, 2014. Transects were 1,500 m in length with all birds recorded within the following distance categories from the observer: <50 meters, 50-100 meters, >100 meters and flying overhead.

2. Early breeding survey

The spring stop-over transects also provide data on early breeding birds using the study area

3. Peak breeding survey point counts

Point counts were made throughout the study area during the months of June in both the Project and control area. The duration of a point count is ten minutes with birds recorded in the same distance categories as for transects and stop counts.

4. Directed searches for species of conservation interest during the early and peak breeding seasons

In addition to transects and point counts, it was necessary to search out habitats that may be the residences of species of conservation interest. This is especially true for the COSEWIC and Species at risk act listed species that could be found in the study area. Potential habitats for these species were surveyed through general area searches.

5. Diurnal Passage Observation

Two observation stations that gave a 180-360 degree view of the airspace over sections of the study area were chosen for the study of diurnal passage. These stations are shown in Appendix B – Figure 6 (Station #1 & #2). All birds flying through the airspace over sections of the study area were noted by species, flock size, altitude, direction of flight, and proximity to a proposed turbine. For woodpeckers

and passerines these observations were focused early in the morning hours, for raptors peak numbers were expected from mid-morning to early afternoon, as well as for many water birds and shorebirds according to the tides. Flying birds seen in apparent diurnal migration during stopover transects were also noted along with the flight heading. The diurnal passage study was conducted during the same weeks as the stop-over surveys in both spring and fall.

6. Acoustic monitoring of nocturnal passage

Acoustic monitoring of nocturnal passage provides data on the species of birds migrating through an area, their relative abundance, and migration timing. Two recording stations were set up and were located at stations #1 and #3 as shown in Appendix B - Figure 6. Recording took place every night from sunset to sunrise from mid-April to early June and early August to mid November 2014.

Fall Radar Study

A fall radar study was conducted by Phil Taylor of Acadia University and Holly Lightfoot in an effort to characterize the migration activity near the proposed ACWF.

Two modified marine radars were set up in late summer 2014. The radar antennas made a complete 360 degree revolution every 2.4 seconds. The radar locations can be found in Appendix B – Figure 1. Data was collected from mid August to late October 2014 to help describe the volume, direction and altitude of migration of presumed bird targets, and the relationships between those variables and the weather. The focus of the study was nocturnal migrants, data collected between sunset and sunrise was primarily analyzed. However, some assessment of diurnal movements has been assessed during times identified through stopover surveys.

Further, to provide additional information about species specific passage rates, radar data has been correlated with data collected from acoustic sensors as described the study conducted by John F. Kearny & Associates.

Finally, the data was interpreted and a view on relative risk of the proposed Project on bird migration was provided.

3.2.1 Bats

The Proponent has engaged the expertise of Hugh Broders from the Department of Biology at Saint Mary's University to provide a characterization of the magnitude of bat activity at the Project site.

The objectives of this characterization were to:

(1) Provide information on the occurrence and relative magnitude of bat activity in the proposed development area, based on analysis of echolocation survey results;

(2) Provide relevant information on the resource requirements of local bat species that may be useful for the decision-making process on the proposed development; and

(3) Make relevant recommendations based on the results of this project and recent developments in the field of bats and wind energy.

Ultrasonic Surveys

Four automated bat detectors were used to sample at four locations within the Project development area. One detector was placed on the edge of the forest near the entrance of the site (Site 1:Figure 3-1) and a second was placed at the meteorological tower (Site 2: Figure 3-1) with microphones recording at 2 m and approximately 33 m above ground level. The third and fourth detectors were placed on forest edges (Site 3 and 4: Figure 3-1). The seasonal timing of sampling likely corresponded to the end of the summer residency period, through to the autumn movements of resident species to local hibernacula, and autumn migration my migratory species. The bat detectors were deployed on July 21, 2014 and retrieved November 4, 2014. Each bat detector was programmed to turn on ½ hour before sunset and to turn off ½ after sunrise and were reprogrammed throughout the season to adjust for increasing night length.

Table 3-2 provides detail on the type of bat detector, location and site description.

Table 3-2: Description of bat detectors and locations. (NAD83 UTM Zone 20)

Site	Detector type	Coordinates		Description
1	Anabat	410882 m E	5076671 m N	Forest edge, microphone oriented into a clearing at ground level
2	SM2Bat+	411009 m E	5076486 m N	Detector at met tower with one microphone at 2 m and the other at approx. 33 m
3	SM2Bat+	410975 m E	5076369 m N	Forest edge, microphone oriented into a clearing 2 m above ground level
4	SM2Bat+	410958 m E	5076025 m N	Forest edge, microphone oriented into a clearing 2 m above ground level

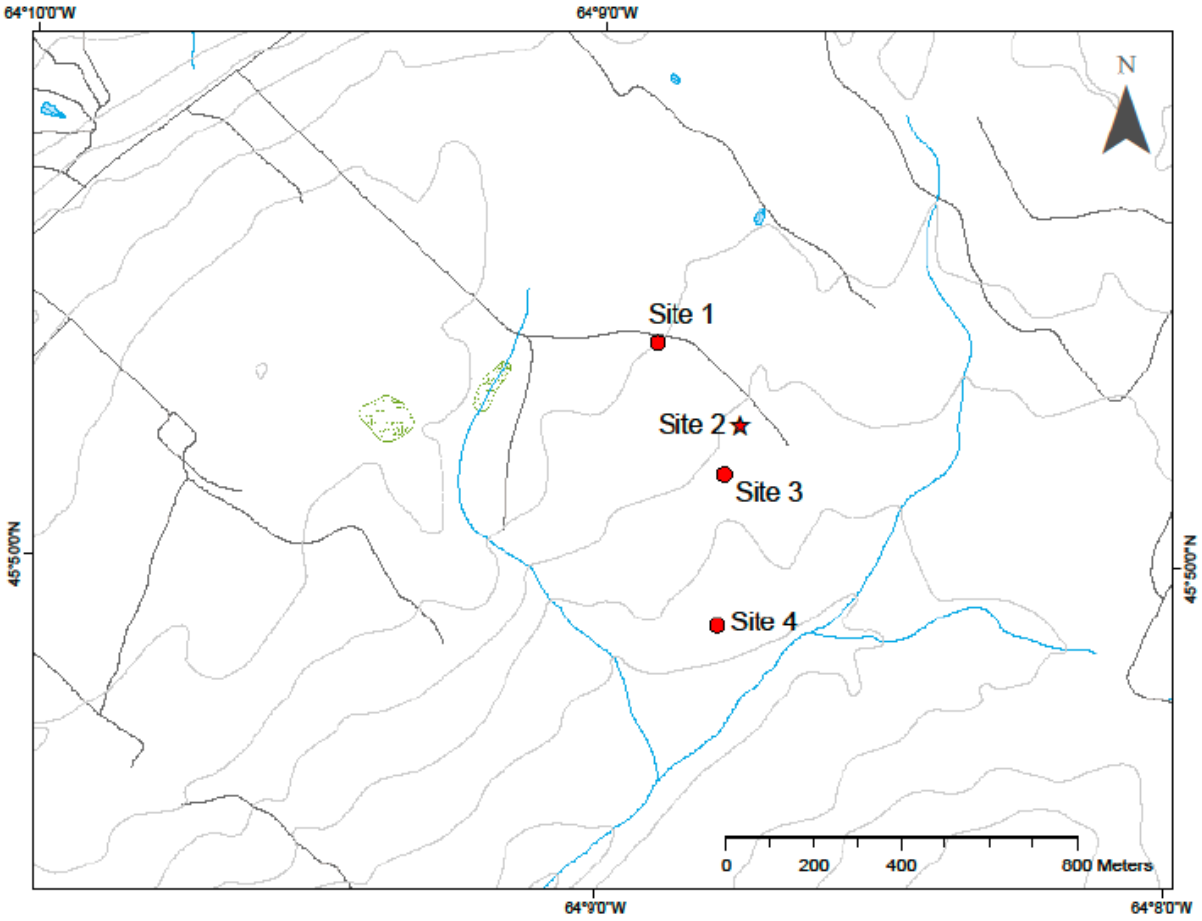


Figure 3-1: Location of automated bat detectors.

Assessment of Potential for Hibernacula

To assess the potential for hibernacula in proximity to the Project area, we examined the available literature and the Nova Scotia Abandoned Mine Openings (AMO) Database. To assess the AMO database, location and attribute data were imported into a Geographic Information System. A 25 km buffer surrounding the ACWF was applied to locate potential for hibernacula.

3.2.2 Wetland and Watercourse

The wetland and watercourse assessment consisted of a desktop review of available data for the Project area. The desktop review was then used to identify areas with a high potential for wetland habitat and incorporate that into developing a field survey strategy.

Desktop Review

A desktop review of the general project area was conducted to identify location and extent of potential wetlands. Information was reviewed from the following sources:

- Nova Scotia Wet Areas Mapping database (WAM);
- Aerial imagery;
- NS Significant Species and Habitats database;
- Topographical maps; and
- Site constrains: property boundary setback, radio wave link setbacks.

This information was used to identify areas with a high potential for wetland habitat. All high potential areas were incorporated into developing a field survey strategy.

Field Survey

The field survey was completed in August 2014 and was designed to focus on assessing land associated with the proposed turbine locations. Through Natural Forces' previous experience with the provincial environmental assessment process it is understood that WTGs must be setback 30 meters + blade length from wetlands and watercourses; the field assessment has been conducted in a conservative manner to aid in micro-siting to maintain this setback.

The wetland assessment followed the methodology outlined in the US Corps of Engineers Wetland Delineation Manual (1987). The following three criteria were used to determine wetland habitat:

1. Presence of hydrophytic vegetation;
2. Presence of hyrologic conditions; and
3. Presence of hydric soils.

Wetland boundaries were defined by walking strategic transects based on the proposed WTG locations. Frequent soil pits were dug to assess the presence of hydric soils and the presence/absence of hydrology. Vegetation surveys were conducted to confirm the presence of hydrophytic vegetation for indentified wetlands.

Watercourses within the assessment area were recorded; general notes were taken regarding the watercourses such as direction of flow, depth and connectivity with assessed wetlands.

Coordinates of wetlands extents and watercourses were captured by using a GPS approximately every 5 meters along the wetland boundary.

3.2.3 Flora

The proponent has engaged the services of Atlantic Canada Conservation Data Center's (ACCDC) botanists Sean Blaney and David Mazerolle to conduct a vascular plan survey at the ACWF project site.

Field Survey

ACCDC botanists Sean Blaney and David Mazerolle conducted a filed assessment of vascular plant species at the project site on June 9, 2014 and July 2, 2014. Collectively, the two botanists covered a walking distance of 17.6 kilometers; a GPS track of the site coverage can be found in Appendix E – Figure 1.

A full list of vascular plant species was compiled from field observations with locations documented for the first observation of each species. In addition, Sean Blaney documented plant communities present within the approximate turbine construction footprints, by photograph and by recording dominant species in the canopy, sapling, low shrub/tree seedlings and herbaceous strata.

3.2.4 Moose

In consultation with Nova Scotia Department of Natural Resources (NSDNR), mainland moose *Alces alces americana* were identified as a species at risk that may be inhabiting near the general Project area. The Chignecto Isthmus is an important corridor for Moose which move between the Provincial boundaries.

Since 2003 the native moose population in Nova Scotia has been listed as endangered and is limited to approximately 1000 individuals in isolated sub-populations across the province. The decline is not fully understood but involves multiple threats such as over harvesting, illegal hunting, climate change, parasitic brainworm, increased road access to moose habitat, spread of white - tailed deer, high levels of cadmium, deficiencies in cobalt and potentially unknown viral disease (NSDNR, 2013).

Mainland moose surveys were conducted during the winter/spring 2014 as a result of the provincial status of mainland moose and though consultation with NSDNR. The surveys consisted of 3 winter track surveys and two pellet group inventory (PGI) surveys.

Each winter track survey consisted of walking 7 defined transects spanning the Project site and surrounding areas to search for moose tracks or supporting evidence of moose. Each transect ranged from 1,400 meters to 2,300 meters.

Winter track surveys were completed on March 14, March 26 and April 6. PGI surveys were completed on April 29 and May 12.

The Proponent has also consulted with the regional Department of Natural Resources biologist to gain local knowledge of the presence of mainland moose near the Project site.

3.2.5 Wood Turtle

Through consultation with Nova Scotia Department of Natural Resources and through a review of the Nova Scotia Significant Species and Habitats database, potential Wood Turtle (*Glyptemys insculpta*) habitat was identified just over 2 km south of the Project site along Nappan River.

In addition to discussions with wildlife regional biologists, the Proponent has used the Special Management Practices document published by NSDNR for guidance in assessing the potential impacts and mitigation measures for wood turtles.

3.3 Socio-economic Desktop and Field Work Methods

3.3.1 Archaeological Resource Impact Assessment

An archaeological resource impact assessment was conducted by Davis MacIntyre & Associates Limited in June 2014. Historical maps, manuscripts and published literature were consulted as well as previous archaeological assessments in the general vicinity. The Maritime Archaeological Resource Inventory, a database of known archaeological resources in the Maritime region, was searched to understand prior archaeological research and known archaeological resources neighbouring the study area. Finally, a field reconnaissance was conducted in order to further evaluate the potential for archaeological resources. An initial reconnaissance was conducted in June 2014 of the preliminary access road and turbine layout. A reconnaissance of an updated layout was conducted in November 2014. (Davis MacIntyre Associates, 2014 –Appendix D)

3.3.2 Mi'kmaq Ecological Knowledge Study

The proponent has engaged the services of Membertou Geomatics Solutions (MGS) to provide a Mi'kmaq Ecological Knowledge Study (MEKS). The MEKS mandate is to consider land and water areas that the proposed Project will utilize, and to identify what Mi'kmaq traditional use activities have occurred, or are currently occurring within, and what Mi'kmaq ecological knowledge presently exists in regards to the area. The MEKS consisted of two major components:

1. Mi'kmaq traditional land and resource use activities, both past and present; and
2. A Mi'kmaq significant species analysis, considering the resources that are important to Mi'kmaq use.

The MEKS focuses on the Project site, defined by the land parcels associated with the Project. The study area consisted of areas that fall within a 5 kilometer radius of the Project site. The Project site and study area are shown in Figure 3-2.

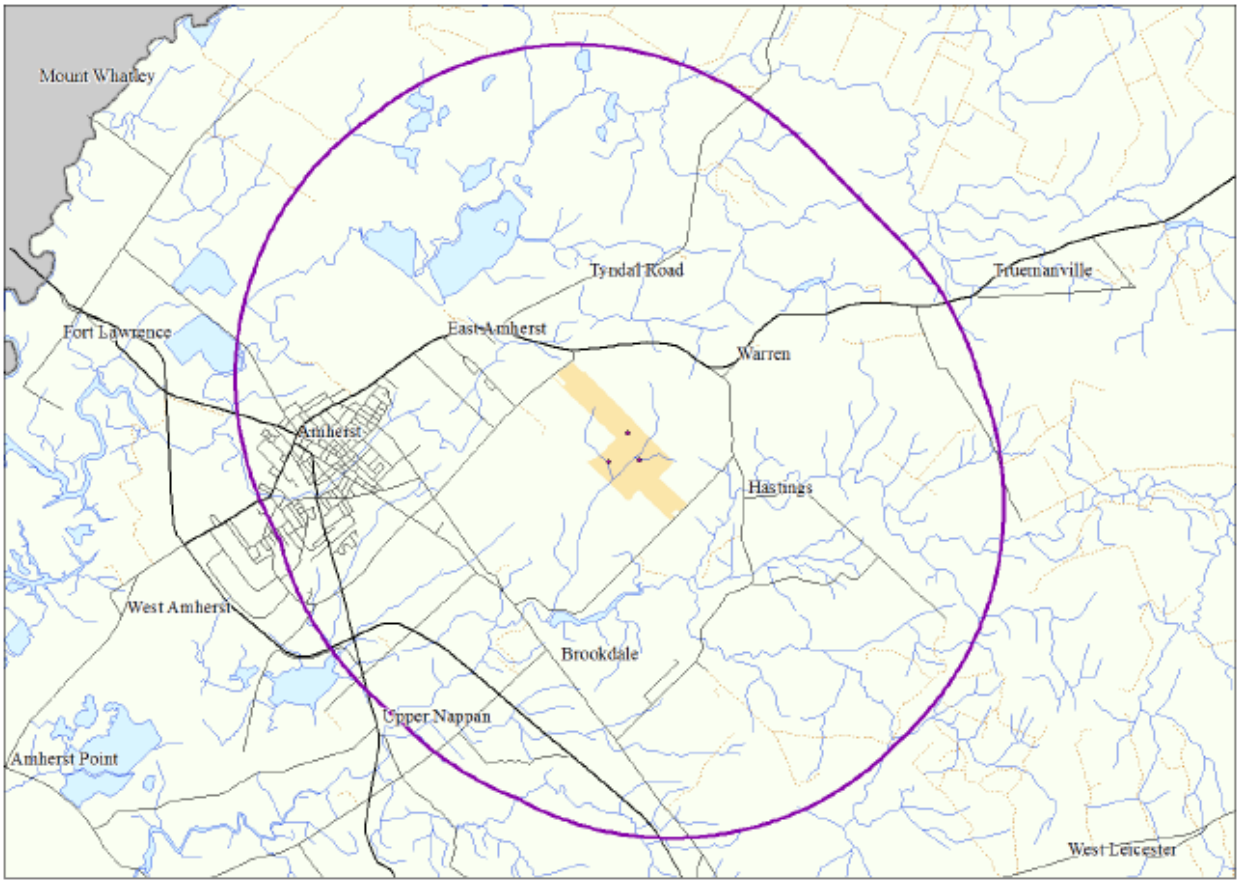


Figure 3-2: MEKS Project area in orange and study area inside purple oval.

Interviews

As a first step to gathering traditional use data, the MEKS team initiated dialogue and correspondence with Mi'kmaq communities in close proximity of the Project site: Sipekne'katik (Shubenacadie), Millbrook, Paq'tnkek, and Pictou Landing. Discussions occurred to identify individuals who undertake traditional land use activities or those who are knowledgeable of the land and resources. An initial list of key people was then developed by the team. These individuals were the contacted by the MEKS team members and interviews were scheduled.

Twenty four (24) individuals provided information in regards to past and present traditional use activities. Interviewees resided within or were from the communities of Sipekne'katik (Shubenacadie), Millbrook, Paq'tnkek, and Pictou Landing. All of the interviews followed the procedures identified within the Mi'kmaq Ecological Knowledge Protocol (MEKP) document. Prior to each interview, interviewees were provided information about the MEKS, including the purpose and use of the MEKS, the non-disclosure of their personal information in any reports, and the future use of the traditional use information they provided.

Interviewees were asked to sign a consent form, providing permission for MGS to use their interview information within the MEKS. During each interview, individuals were provided maps of the Project site and study area and were asked various questions regarding Mi'kmaq use activities, including where they undertook their activities or where they knew of activities by others, when such activities were undertaken, and how that type of resource was used. When required, interviews were conducted in the Mi'kmaq language.

Literature and Archival Research

With regards to this MEKS, various archival documents, maps, oral histories and published works were reviewed in order to obtain accurate information regarding the past and present Mi'kmaq use or occupation relevant to the Project site and study area. A complete listing of the documents that were referenced is outlined within the *Sources* section of Appendix E.

Field Sampling

Site visits to the Project site took place in September, 2014 by MGS staff members, guided by a Mi'kmaq ecological knowledge holder over a period of three days. A member of Mi'kmaq Wind4All Communities Steering Committee also joined MGS staff members on one day during the site visit.

The site visits consisted of a site reconnaissance and walkthroughs of the Project site, noting and identifying any particular species in the area, plant and animal habitats or other land/water features or areas that would be of importance to the Mi'kmaq. MGS staff and the Mi'kmaq ecological knowledge holder would either take notes of observations points at set, and at irregular intervals, or whenever a species or observation was worth noting.

Mi'kmaq Significant Species Process

In order to identify possible project activities that may be of significance to the Mi'kmaq with regards to traditional use of the Study Area, the project team undertakes a number of steps in order to properly consider the Mi'maq ecological knowledge data. This involves three main components: Type of Use, Availability and Importance.

(1) Type of Use

The first component of analysis is the "Type of Use" of the resource, which involves the categorization of the resource. All resources are placed into various general categories regarding the type of use. The categories are:

- Medicinal/ceremonial;
- Food/sustenance; and
- Tool/art.

These general headings are used so as to ensure further confidentiality with respect to the resources and the area where they are harvested. As well, the total number of instances where a resource harvest has been documented by the study is quantified as well.

(2) Availability

After the data is considered by the type of use, it is considered in accordance with its availability; this involves considering whether the resource is abundant in the Study Area or whether it is rare or scarce. Based on the information that is provided to the team from the ecological knowledge holders and/or written literature sources, the availability of the resource is then measured in regards to other water or land areas that are outside of the Study Area. This measurement is primarily done in the context of the areas adjacent to the Study Area, and if required, other areas throughout the province. By proceeding in this manner, the study can provide an opinion on whether that resource may be rare, common or abundant.

- Rare: only known to be found in a minimum of areas, may also be on the species at risk or endangered plants list;
- Common: known to be available in a number of areas; and
- Abundant: easily found throughout the Study Area or in other areas in the vicinity.

This allows the study team to identify the potential impact of a resource being impacted by the Project.

(3) Importance

The final factor the MEKS team considers when identifying the significance of a resource to Mi'kmaq use is whether the resource is of major importance to Mi'kmaq traditional use activities. This can be a subjective process, as any traditional resource use will be of importance to the individual who is acquiring it, regardless if its use is rare, common or abundant. However, to further identify the importance, the MEKS team also considers the frequency of its use by the Mi'kmaq; whether the resource is commonly used by more than one individual, the perceived importance to the Mi'kmaq in the area, and finally the actual use itself.

These factors support the broad analysis of many issues in formulating an opinion on significance and supports identifying whether the loss of a resource will be a significant issue to future Mi'kmaq traditional use, if it is impacted by the Project.

3.3.3 Noise Impact Assessment

A noise impact assessment was conducted by Natural Forces Wind to assess the impact of wind turbine generated noise on houses and dwellings near the project site. The noise impact assessment uses WindPRO software that is designed to predict noise levels at specific geographic locations from sound emitted by turbines.

The MoCC does not have any noise guidelines or by-laws pertaining to maximum noise levels from wind turbines, for this reason, Ontario Provincial guidelines were used as these are widely accepted as the industry standard in Nova Scotia. Ontario guidelines recommend that noise experienced by a receptor (home or dwelling) should not exceed 40 db(A). For the purpose of the noise assessment study, all receptors within 2,500 m of a turbine were assessed to predict the maximum noise level that could be expected.

The model uses conservative assumptions to produce a maximum expected noise level, or a worst case scenario. Details on input parameters can be found in the full noise impact assessment in Appendix I.

3.3.4 Shadow Impact Assessment

A shadow flicker impact assessment was conducted by Natural Forces Wind to assess the impact of wind turbine generated shadow flicker on houses and dwellings near the project site. The shadow flicker impact assessment uses WindPRO software that is designed to predict shadow flicker that may occur at specific geographic locations from turbine blades impeding the line of sight between the sun and a receptor.

The MoCC does not have any noise guidelines or by-laws pertaining to shadow flicker, for this reason, German shadow flicker guidelines were used as these are widely accepted as the industry standard in Nova Scotia. Ontario guidelines recommend the following acceptable levels of shadow flicker at a receptor:

- No more than 30 hours per year of astronomical maximum shadow flicker; and
- No more than 30 minutes on the worst day of astronomical maximum shadow flicker.

For the purpose of the shadow flicker impact assessment, all receptors within 2,500 m of a turbine were assessed to predict the maximum shadow flicker exposure that could be expected.

The model uses conservative assumptions to produce a maximum expected duration of shadow flicker, or a worst case scenario. Details on input parameters can be found in the full shadow flicker impact assessment in Appendix J.

3.3.5 Electromagnetic Interference Study

The Proponent has engaged the services of MACNEIL Telecom Inc. to provide an impact assessment of the proposed ACWF on the performance of existing microwave radio links. The desktop and field study was initiated by completing a search of the Industry Canada database to identify all licensed radio systems within 35 km of the proposed Project. All applicable radio links were plotted on a map to identify their proximity to the proposed WTGs of the ACWF. Once plotted a desktop review and a field review was conducted to verify the location and existence of the radio link antennas.

Based on radio links that were identified and confirmed, an assessment of the potential impact was then completed by calculating the recommended required clearance between radio links. A recommended

clearance buffer was applied to any radio link that crossed through the Project site, to determine whether or not a proposed turbine was within this buffer.

Following the analysis, recommendations were made to the Proponent as to where turbines could be located so they would not impede or interfere with existing radio links.

3.4 Methodology of Assessment

The assessment focuses on the evaluation of potential interactions between the VECs and socio-economic aspects with the various Project activities as described in Section 2.

As defined in the Nova Scotia Environment Act:

"Environment" means the components of the earth and includes

(i) air, land and water;
(ii) the layers of the atmosphere; organic and inorganic matter and living organisms;
(iii) the interacting systems that include components referred to in sub clause (i) to (iii); and
(iv) for the purpose of Part IV, the socio-economic, environmental health, cultural and other items referred to in the definition of environmental effect.

"*Environmental Effect" means in respect of an undertaking*

(i) any change, whether positive or negative, that the undertaking may cause in the environment, including any effect on socio-economic conditions, 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 cause by the environment, whether that change occurs inside or outside the Province.

The assessment is designed to focus on the evaluation of the potential interactions between the VECs and the various Project activities that have been previously outlined in Section 2. The residual environmental effects are those that remain after mitigation and control measures have been applied. The prediction of residual environmental effects follows three general steps.

- Determining whether an environmental effect is adverse;
- Determining whether an adverse environmental effect is significant; and
- Determining whether a significant adverse environmental effect is likely to occur.

The analysis evaluates the interactions between the Project activities and the VECs, and determines the significance of any residual adverse environmental effects, i.e., effects that may persist after all

mitigation strategies have been implemented. To determine and appreciate the relevance of residual effects following mitigation, the following definitions of impact have been adhered to:

- *Significant:* Potential impact could threaten sustainability of the resource in the study area and should be considered a management concern;
- *Minor:* Potential impact may result in a small decline of the quality of the resource in the study area during the life of the Project – research, monitoring and/ or recovery initiatives should be considered;
- *Negligible:* Potential impact may result in a very slight decline of the quality of the resource in the study area during the life of the Project – research; monitoring and/ or recovery initiatives would not normally be required;
- *No impact:* the consequences of the Project activity have no effect on the specific VEC; and
- *Beneficial impact:* the consequence of a Project activity enhances the specific VEC.

Further, a review of the effect of the environment on the Project is included in the assessment. This includes climate impact and extreme events.

This Page Was Intentionally Left Blank

4.0 Environmental Setting

4.1 Biophysical

4.1.1 Geophysical

Amherst is located in the Northumberland Strait sub-Unit of the Northumberland Plain theme region. This region covers the area from Cumberland Basin to Pictou and contains an anticline that runs from Pugwash Harbour to Nappan and Amherst Point. The area contains fine red sandstones. The soil ranges from sandy loam to sandy clay loam and is derived from sandstone and shales, which underlie the entire area. The subsoil tends to be compacted and impermeable and the soils are usually imperfectly drained. (Davis MacIntyre & Associates, 2014 – Appendix D)

4.1.2 Atmospheric

Historic climate data was taken from an Environment Canada weather station located in Nappan, near Amherst, Nova Scotia located approximately 10 km from the Project site. The data collected from Environment Canada representing climate averages and extremes are shown in Table 4-1.

Table 4-1: Nappan, Nova Scotia Atmospheric Conditions (Environment Canada, 2012).

Parameter	Time Period	Data Source	Value
Average Daily Temperature (°C)	Yearly Average (1971-2000)	Environment Canada	6.0
Extreme Maximum Temperature (°C)	August 18, 1935	Environment Canada	34.4
Extreme Minimum Temperature (°C)	February 18, 1922	Environment Canada	-37.2
Average Total Rainfall (mm)	Yearly Average (1981-2010)	Environment Canada	886.0
Maximum Daily Rainfall (mm)	September 22, 1942	Environment Canada	153.7
Average Annual Snowfall (cm)	Yearly Average (1981-2010)	Environment Canada	254.0
Maximum Snow Depth (cm)	February 20, 2004	Environment Canada	128

Visibility & Fog

The presence and frequency of fog events at a wind farm site can have a detrimental effect on migratory birds due to collisions during adverse weather conditions. Artificial lighting, particularly work lights inadvertently left on by turbine maintenance crews are also known to have an adverse effect on migratory birds (Kearney, 2012) During adverse weather events, sporadic artificial lighting during dawn and dusk at a wind farms may attract migrating birds, signaling a potential safe area of refuse.

The Project setting is considered rural, with little to no presence of artificial lighting. Light pollution from Amherst can be considered the only significant sources of artificial light.

According to the internationally-accepted definition of fog, it consists of suspended water droplets or ice crystals near the Earth's surface that lead to a reduction of horizontal visibility to below 1 km (NOAA, 1995). Environment Canada's database of Canadian Climate Normals 1971-2000 was consulted to provide baseline fog data relevant to the Project site. A weather station in Moncton, New Brunswick was selected (Environment Canada, 2012). Based on this data presented in Table 4-2, fog can be expected to occur 2.0% of the time throughout the duration of an average year.

This data will provide background site information for the assessment of the significance of adverse affect on the environment in the VEC analysis section.

Table 4-2: Moncton, New Brunswick fog data average from 1971 – 2000 (Environment Canada, 2012).

Month	Hours with visibility less than 1 km	% of foggy weather*
January	18	2.4
February	19.5	2.9
March	24.2	3.3
April	18.4	2.6
May	12.5	1.7
June	10.4	1.4
July	11.3	1.5
August	9.5	1.3
September	9.8	1.4
October	9.7	1.3
November	12.6	1.8
December	15.7	2.1
Annual	**171.8**	**2.0 %**

* Based on days/month x 24 hr/day.

4.1.3 Wind Resource

The Nova Scotia wind atlas was used in preliminary site finding and indicates an approximate wind speed of 6.0 – 7.0 m/s at 80 m (NS Wind Atlas, 2013).

A detailed wind resource assessment program at the ACWF site was initiated in May 2014 with the installation of a 60 m meteorological mast (met mast) containing anemometers at 40 m, 50 m and 60 m above ground level. The instrumentation on the meteorological mast measures wind direction, wind speed, temperature, relative humidity and atmospheric pressure. A collective assessment of these parameters will be used to determine the feasibility of harnessing the wind regime. A long-term wind resource assessment is currently being conducted with the data collected from the meteorological mast and Triton Sodar unit.

Based on Natural Forces' independent Wind Resource Assessment a wind rose found in Figure 4-1 indicates the prevailing wind at the Project site location is southwest.

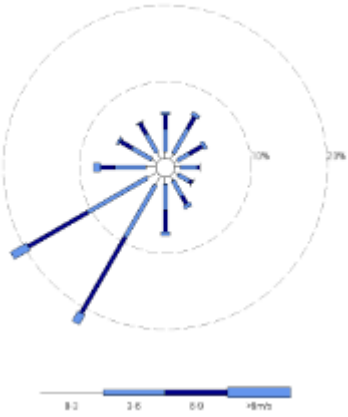


Figure 4-1: Wind rose showing prevailing southwest wind direction taken from meteorological mast.

4.1.1 Avian Survey

Baseline Avian Survey

The following is a summary of the results from the baseline avian study that the Proponent found would be of most interest to the reader. A considerable amount of data was collected and analysed through Radar and Nocturnal acoustic sampling, in addition to traditional avian transect surveys. Full results can be found in Appendix B.

1. ***Spring Migration nocturnal & daytime transects***

The spring migration surveys reveal nocturnal and diurnal passage over the study area was light. During the spring migration survey portion of the baseline study the most abundant migratory species present along the stop-over transects were; American robin, White-throated sparrow and Palm warbler. Figure 4-2 shows the twenty most abundant species present during the spring migratory stop-over transects. Further, Figure 4-3 presents the total birds observed on each transect at both the Project area and control area.

Species	Max. per Transect	Total
American Robin	25	220
White-throated Sparrow	24	197
Palm Warbler	13	69
Black-capped Chickadee	12	62
Blue Jay	10	58
Common Yellowthroat	17	57
Hermit Thrush	7	51
Yellow-rumped Warbler	13	48
Dark-eyed Junco	10	47
Purple Finch	7	43
Magnolia Warbler	10	40
Savannah Sparrow	9	40
Song Sparrow	7	30
Northern Flicker	5	25
Northern Parula	5	24
Black-and-White Warbler	4	24
Ruby-crowned Kinglet	5	23
Nashville Warbler	3	16
Black-throated Green Warbler	6	15
Blue-headed Vireo	3	12

Figure 4-2: Twenty most abundant migratory species during stop-over transects.

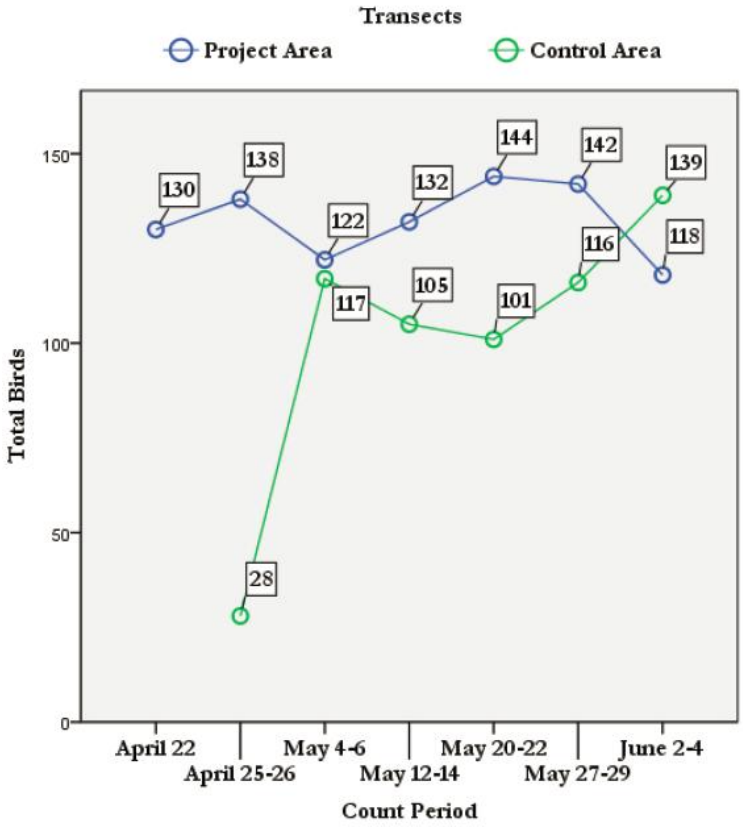


Figure 4-3: Total number of birds per count period during the spring.

The nocturnal acoustic monitoring during the spring migration period revealed a high frequency of night flight calls from sparrows and warblers. Compared to seven other existing or proposed wind farms in Nova Scotia as shown in Figure 4-4, the Amherst site ranked 4/7 in terms of total high frequency night calls.

Location	Year	Total
Glasgow Head, Guysborough Co.	2013	596
Brown's Mountain, Antigonish Co.	2012	404
Spinney Gully, Guysborough Co.	2013	361
Loganville, Pictou Co.	2012	355
Weaver Mountain, Pictou County	2012	352
Amherst, Cumberland Co.	2014	323
Digby Neck, Digby Co.	2012	321
Nuttby Mountain, Colchester Co.	2012	263
Total		2,975

Figure 4-4: Total high frequency night flight calls recorded during the spring in Nova Scotia.

Figure 4-5 presents the mean total number of birds observed at six wind farms in Nova Scotia during spring migration transects. Results at the Amherst Project site are the second highest of the six sites with Digby Neck wind farm being the highest. These relatively high counts at the Amherst Project site are likely due to the presence of birds that prefer edge and disturbed habitats. This could also be due to the movement of birds from the nearby marsh to inland habitat near the site.

Site	Years	Transects	Repetitions	Mean
Digby	2012	2	16	128.50
Amherst	2014	2	13	117.85
Glen Dhu	2008-2012	5	75	102.99
Canso	2013	4	21	88.76
Fairmont	2013	1	6	87.00
Nuttby	2011-2012	4	33	79.67

Figure 4-5: Mean number of birds counted on spring transects at six wind farm sites in Nova Scotia.

2. Breeding Season

A number of species breed early in the spring and are thus not as actively engaged in courtship and breeding activities by the time the peak season arrives in June. The three most common birds observed in the early season were American black duck, Mallard and Ruffed grouse; Figure 4-6 presents the ten most abundant early season breeding birds that were observed in the study area.

Species	Number
American Black Duck	15
Mallard	13
Ruffed Grouse	16
Spruce Grouse	1
Downy Woodpecker	1
Hairy Woodpecker	4
Pileated Woodpecker	1
Gray Jay	4
Common Raven	28
Common Grackle	20

Figure 4-6: Early season breeding birds observed in the study area.

During the peak season for breeding birds, starting in June, the most abundant birds were both forest birds and those associated with agricultural lands. The most common bird, American robin is one that benefits equally from forested and agricultural lands. The second and third most abundant birds are American crows and Ring-necked pheasant, two largely agriculturally dependent species. Figure 4-7 presents the ten most abundant birds observed during peak migration season in numbers of total observations, mean observations and frequency of observation.

Species	Total	Mean	Frequency
American Robin	74	3.08	83.33%
American Crow	52	2.17	79.17%
Ring-necked Pheasant	27	1.13	66.67%
Red-eyed Vireo	23	0.96	62.50%
White-throated Sparrow	40	1.67	45.83%
Hermit Thrush	14	0.58	45.83%
Common Yellowthroat	17	0.71	41.67%
Dark-eyed Junco	16	0.67	41.67%
Song Sparrow	21	0.88	37.50%
Magnolia Warbler	11	0.46	37.50%

Figure 4-7: Peak season breeding birds observed in the study area.

3. Fall Migration

The total birds on both the control area and the Project area are presented in Figure 4-8. The two transects follow corresponding patterns with migration peaks during mid-September and mid-October, with the higher number of observations occurring along the control area transect.

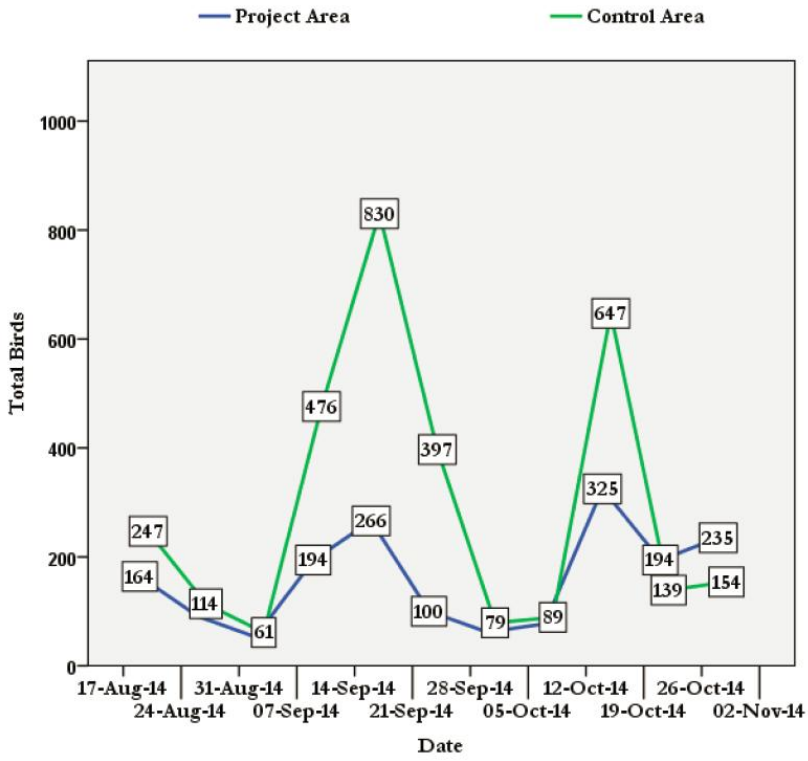


Figure 4-8: Total birds per transect by date in the fall.

The most common species observed during the fall migration study was the Common grackle followed by the American robin and the Double-crested cormorant. The American robin, Blue jay and Black-capped chickadee were also observed in the ten most abundant species during the spring migration surveys.

Species	Total
Common Grackle	1943
American Robin	483
Double-crested Cormorant	393
Blue Jay	277
Red-winged Blackbird	245
American Crow	236
Ring-billed Gull	168
White-throated Sparrow	136
European Starling	117
Black-capped Chickadee	110

Figure 4-9: Ten most abundant species during fall transects.

The most abundant family of birds observed during the night from the acoustic detectors were warblers, followed by sparrows and thrushes. Figure 4-10 presents the number of night calls detected from every family during the fall acoustic monitoring surveys. In total, 74 calls from water fowl were detected and three shorebird calls were detected.

Family	Calls
Warblers	4,296
Sparrows	1,184
Thrushes	982
Sandpipers	113
Unknown	94
Ducks & Geese	74
Sandpipers	44
Kinglets	42
Buntings	13
Blackbirds	11
Chickadees	3
Flycatchers	3
Herons	2
Gulls	1
Total	**6,862**

Figure 4-10: Number of night flight calls recorded by acoustic detectors by family in the fall.

In contrast to spring migration surveys, the number of birds observed during the fall migration surveys was high. Figure 4-11 compares stop-over counts and nocturnal passage recordings at eight existing or proposed wind farm sites in Nova Scotia. The stop-over counts in Amherst approached the high counts at Digby Neck in mean total birds and were on par with that location for the percentage of birds that were in flight in the morning. For nocturnal migration, Amherst was in the middle range of total and mean number of high frequency night flight calls.

The large number of birds in the air over the Amherst site in the first two hours of the day consisted of three components; true diurnal migrants, re-orienting nocturnal migrants and non-migratory movements to local feeding areas. The inappropriate direction of the nocturnal migrants in the early morning is consistent with the similar reports and supports the view of re-orientation over the study area. The American Robin was dominant in this group. The non-migratory movements were primarily large flocks of Common Grackles and Red-winged Blackbirds. Some of these flocks could also have been engaged in diurnal passage. Most diurnal migration was represented by Double-crested Cormorants, Blue Jays, and winter finches.

Location	County	Distance from Coast	Stop-over Transects			Acoustic Recordings		
			Mean Birds/Day	% Flying	Year	Calls/ Season	Mean/ night*	Year
Gulliver's Cove	Digby	<1 km	286	65	2012	10,002	213	2011
Amherst	Cumberland	7 km	227	65	2014	5,504	85	2014
Glasgow Head	Guysborough	<1 km	107	34	2013	2,016	94	2013
Spinney Gully	Guysborough	<1 km				1,383	21	2013
Browns Mountain-Weaver Mountain	Antigonish-Pictou	12-16 km	79	21	2008	7,899	152	2011
Browns Mountain	Antigonish	12 km	54	11	2011-2012	4,529	-	2011
Nuttby Mountain	Colchester	20 km	48	14	2011-2012	1,271	-	2011
Loganville Ridge	Pictou	14 km	-	-	2011	2,095	-	2011
* September 2 to October 15								

Figure 4-11: Comparison of stop-over counts and high frequency night flight call counts at eight sites in Nova Scotia.

Fall Radar Study

As previously mentioned in Section 3.2, two modified marine radars were set up near the site in late summer 2014. The radar antennas made a complete 360 degree revolution every 2.4 seconds. The radar locations can be found in Appendix B – Figure 1. Data was collected from mid August to late October 2014 to help describe the volume, direction and altitude of migration of presumed bird targets, and the relationships between those variables and the weather.

The following is just a snapshot of some of the results from the fall radar study that the Proponent found would be of most interest to the reader. This is not a full presentation of the results, for full results please see Appendix B.

The bulk of fall migration activity occurred between September 27 and October 3, 2014 at both radar sites. There also was a smaller peak in early September and mid-October. Furthermore, approximately 50% of the total number of targets detected occurred on only 8 nights (or 17% of the nights at house 1 and 16% of the nights at house 2).Figure 4-12 presents the number of tracks detected at both radar stations over the fall season.

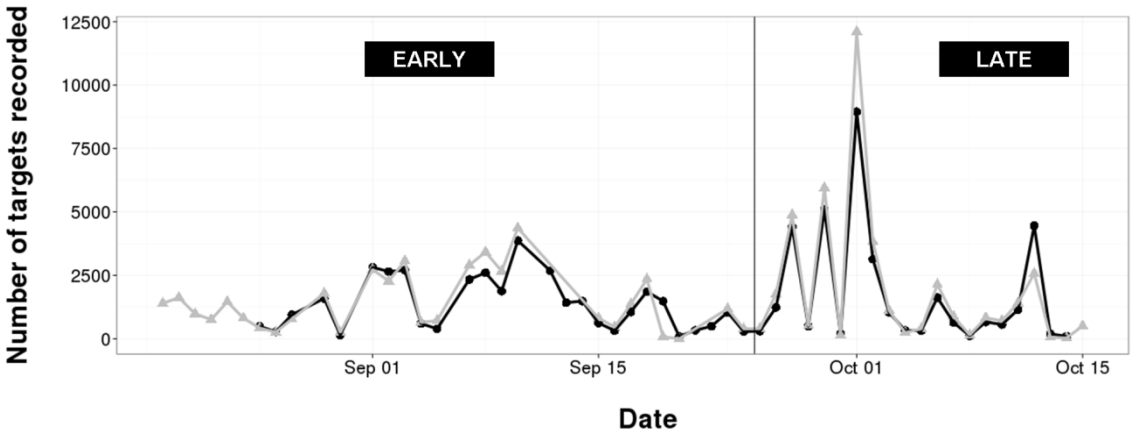


Figure 4-12: number of tracks detected over fall migration season (grey = house 2, black = house 1).

Direction of movement and variability

There was approximately the same number of targets detected through radar in the early and late seasons at both radar locations. Figure 4-13 below is a snap shot of four different nightly data sets from both radar locations early and late in the fall season. The mean direction of tracks was similar at both sites in the early season (220° and 215°) and shifted to the west in the late season (252° and 254°) The variance in headings differed considerably between seasons, with a large decrease in heading variance in the later season (0.37 and 0.36 vs. 0.62 and 0.60;). The large variance early in the season shows that many targets are moving in all directions, with modal directions to the SW and to the SE.

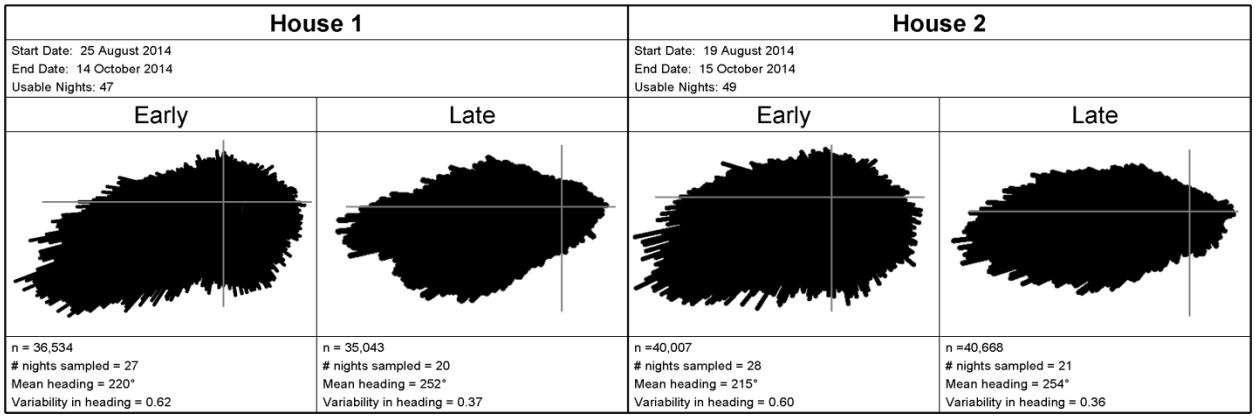


Figure 4-13: Circular heading plot of mean heading and variability in heading of tracks across the fall migration season.

Further insight into the patterns of movement can be obtained by examining particular nights with relatively high amounts of migratory activity, as shown in Error! Reference source not found..

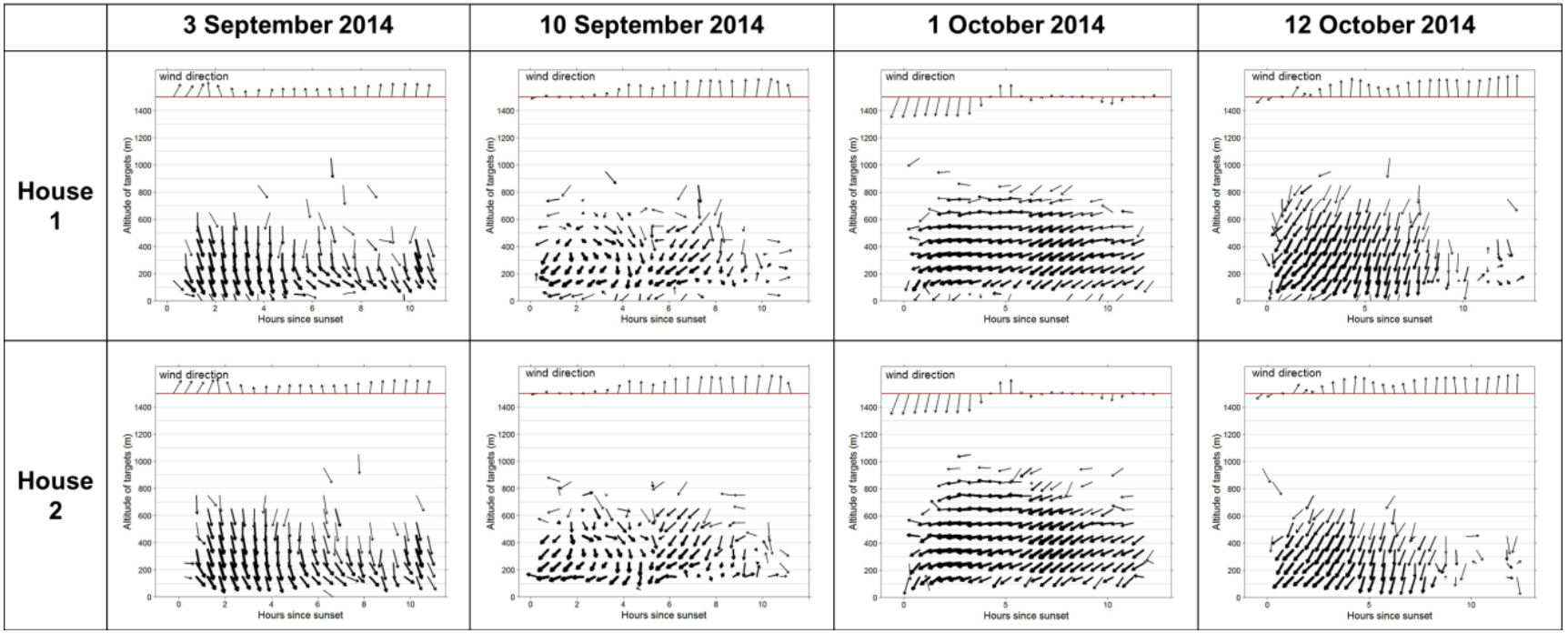


Figure 4-14: Arrow plots showing nights of high activity during fall migration. Plots show the number of targets (darkness of arrow), mean direction (direction of arrow) and variability in direction (shorter arrows are more variable). Y axis is Altitude of target in 100m increments and X axis is hours since sunset in 2 hour increments.

Correlation between Radar & Acoustic data

Finally, data correlations were examined between radar data and acoustic monitoring, the results are presented in Figure 4-15. The volume of migration detected by the radar and the acoustic microphone do not appear to be highly correlated. In general, the peaks in the radar do not necessarily correspond with the peaks in acoustic data, and vice versa. However, it is still likely that the suite of species detected on the acoustic microphone represents at least partially, the suite of species detected by the radar.

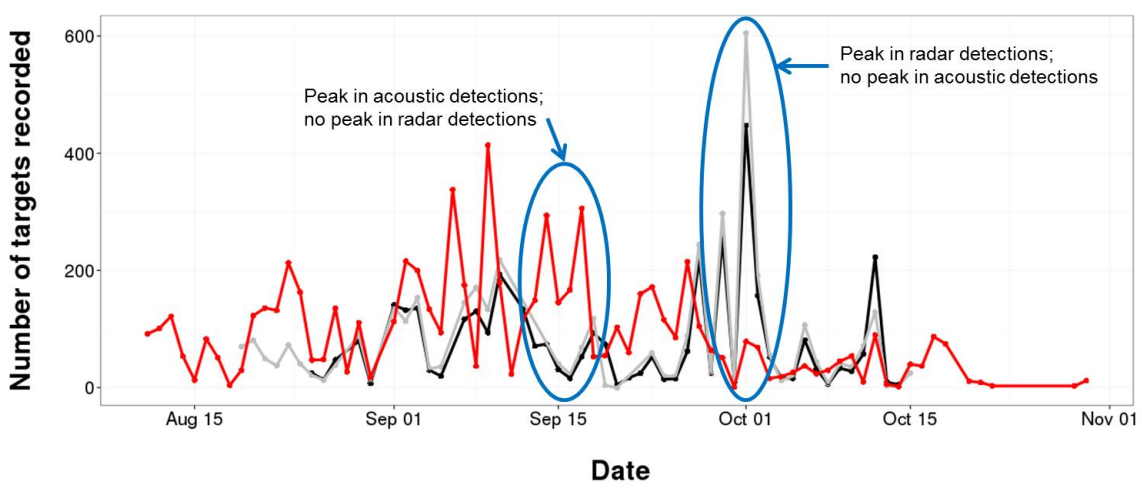


Figure 4-15: Radar data and acoustic monitoring data (black = house 1, grey = house 2 & red = acoustic microphone).

Although the correlation is weak, these results point to the importance of combining the two observational methods. Ground-based surveys are picking up movements at lower altitudes, because radar surveys are not able to detect low-altitude movements.

A more detailed analysis and discussion on the fall migration radar data can be found in Appendix B.

Furthermore, the proponent is committing to continue the Radar and Acoustic monitoring programs into the 2015 spring migration season in order to add to the existing data set which will better characterise the movement of avian migratory species over the site. This is further discussed in Section 7 Follow up and Monitoring.

4.1.1 Bats

Results

In total at the Project site 2047 acoustic files were recorded at the 4 detector locations over a period of 106 nights. After evaluation, 1028 were classified as bat-generated ultrasound files and the remaining were classified as extraneous noise. Table 4-3 provides a general summary of the number of bat echolocation calls that were detected at each detector location over the duration of the acoustic sampling period.

Table 4-3: Summary of number of echolocation calls at each detector location. (Burns & Broders 2014)

Site ID	Total # of echolocation sequences
1	16
2 lower microphone	58
2 upper microphone	80
3	27
4	847
Total	**1028**

The majority of call sequences identified during the study have been identified as hoary bats with the second most abundant species being *Myotis* species. No attempt was made to identify what species of *Myotis* was identified. Other species detected were silver-haired bats and red bats.

Hoary bats are a type of migratory tree bat which have been shown to be the most susceptible to deaths caused by wind turbines. Due to the higher number of hoary bats detected early in the season, the proponent is committing to further 2015 field surveys in order to better characterise hoary bat movement throughout the site. This is further discussed in section 7.2.1.

Table 4-4: Quantification of bat species detected during the study. (Burns & Broders, 2014)

Species of bat detected	Number of echolocation sequences detected	Percentage of abundance
Hoary bat	955	92.9 %
Myotis	48	4.7 %
Silver-haired bat	18	1.7 %
Red bat	7	0.7 %

The average number of recorded bat call sequences per night averaged over all detectors at all four sites together) in the proposed development area was 2.16 (SD = 21.2) during the sampling period.

Detailed results of the echolocation sequence calls that were recorded are presented in Table 4-5. Where:

- LAB = *Lasiurus borealis* (Eastern red bat)
- LAC = *Lasiurus cinereus* (Hoary Bat)
- MYO = *Myotis* species (Northern long-eared and little brown bat)
- LAN = *Lasionycteris noctivagans* (Silver-haired bat)

According to the Nova Scotia AMO database, there are 366 underground abandoned mine opening records in the vicinity of the ACWF project within 25 km. Following the exclusion analysis, 56 of the AMO records remain that could potentially act as bat hibernacula, where to the knowledge of the study team have never been surveyed for bats before.

The information provided in the main text of this environmental assessment is a summary of the data gathered during the bat survey conducted by Lynn Burns and Hugh Broders. Full results and discussion can be found in Appendix C.

Table 4-5: Number of echolocation bat call sequence files recorded per night for the 2014 ACWF study.

Night of	Site 1			Site 2 low mic				Site 2 high mic				Site 3			Site 4				Total
	LAB	LAC	MYO	LAB	LAC	LAN	MYO	LAB	LAC	LAN	MYO	LAC	LAN	MYO	LAB	LAC	LAN	MYO	
21-Jul-14	0	0	0	1	3	3	3	0	7	0	0	2	0	1	0	122	0	0	142
22-Jul-14	0	0	0	0	2	0	0	0	4	0	0	1	0	0	0	263	0	0	270
23-Jul-14	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	357	0	0	360
24-Jul-14	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	6	0	0	10
25-Jul-14	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	25	0	0	28
26-Jul-14	0	2	0	0	1	0	0	0	1	0	0	0	0	0	0	4	0	1	9
27-Jul-14	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	8
28-Jul-14	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	15	0	1	19
29-Jul-14	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	8	0	1	10
30-Jul-14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	2
31-Jul-14	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	0	1	5
1-Aug-14	0	0	1	1	0	0	12	0	0	0	0	0	0	1	0	0	0	2	17
2-Aug-14	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
3-Aug-14	0	1	0	0	2	0	0	0	5	0	0	1	0	1	0	2	0	0	12
4-Aug-14	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3
5-Aug-14	0	0	0	0	21	0	0	0	28	0	0	1	0	0	1	0	0	0	51
6-Aug-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7-Aug-14	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4
8-Aug-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9-Aug-14	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	3
10-Aug-14	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11-Aug-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12-Aug-14	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	3

Night of	Site 1			Site 2 low mic				Site 2 high mic				Site 3			Site 4				Total
	LAB	LAC	MYO	LAB	LAC	LAN	MYO	LAB	LAC	LAN	MYO	LAC	LAN	MYO	LAB	LAC	LAN	MYO	
13-Aug-14	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
14-Aug-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-Aug-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-Aug-14	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	2
17-Aug-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-Aug-14	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
19-Aug-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-Aug-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-Aug-14	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
22-Aug-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23-Aug-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
24-Aug-14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
25-Aug-14	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	1	4
26-Aug-14	0	0	0	0	0	0	1	0	1	0	0	1	1	0	0	1	0	0	5
27-Aug-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
28-Aug-14	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	2
29-Aug-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-Aug-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1	0	10
31-Aug-14	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
1-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-Sep-14	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2
3-Sep-14	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
4-Sep-14	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	6	2	0	11
5-Sep-14	0	0	0	0	0	1	0	0	1	1	0	3	0	1	0	1	2	0	10
6-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Night of	Site 1			Site 2 low mic				Site 2 high mic				Site 3			Site 4				Total
	LAB	LAC	MYO	LAB	LAC	LAN	MYO	LAB	LAC	LAN	MYO	LAC	LAN	MYO	LAB	LAC	LAN	MYO	
7-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
8-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
10-Sep-14	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	3
11-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12-Sep-14	0	0	0	0	0	0	0	1	0	0	1	0	0	1	-	-	-	-	3
13-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
14-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	2	-	-	-	-	2
15-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
16-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
17-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
18-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
19-Sep-14	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	-	-	-	1
20-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
21-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
22-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
23-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
24-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
25-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
26-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
27-Sep-14	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	-	-	-	1
28-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
29-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
30-Sep-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
1-Oct-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0

Night of	Site 1			Site 2 low mic				Site 2 high mic				Site 3			Site 4				Total
	LAB	LAC	MYO	LAB	LAC	LAN	MYO	LAB	LAC	LAN	MYO	LAC	LAN	MYO	LAB	LAC	LAN	MYO	
2-Oct-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	0
3-Oct-14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	-	-	-	1
Data not shown from 5-Oct-14 to 03-Nov-14 when no bat call sequences were recorded																			

4.1.2 Wetlands and Watercourses

A detailed wetland field assessment was undertaken as part of this EA to identify areas of wetland habitat and watercourses coinciding with Project infrastructure. Multiple areas of wetland habitat, primarily treed swamp and clear cut swamp, were identified during the field assessment.

Consultation with NSNDR has led the Proponent to apply a 30 m plus WTG blade length buffer from wetlands and watercourses, this equates to a 76 m buffer. Figure 4-17 presents the proposed WTG locations along with a 76 m radius buffer (46 m blade length + 30 m) with no impedance on wetlands or watercourses. The WTG locations have been optimized such that they follow NSDNR recommendations to maintain a minimum 30 m buffer from the WTG blade tip, and therefore reducing the potential impacts to species living within and adjacent to wetland and watercourse ecosystems.

The proposed access road layout has been designed to minimize disturbance to existing conditions, primarily by making use of the existing access road that is used for agriculture. It is anticipated that one wetland alteration and one watercourse alteration will be required for the construction of the access road. Figure 4-16 shows the wetland that the Proponent is proposing to alter to allow access to WTG 2 & 3. This degraded wetland has been clear cut in the past few years and has been highly disturbed by skidder tracks and felled trees. Expansions and modifications of the existing access road where necessary will avoid wetland habitat in an effort to reduce the overall ecological impact of the Project.

The Proponent is aware of the Nova Scotia Wetland Alteration Approval process and has successfully navigated this process in the past in close consultation with the Department of Environment. The process defines the following four activities as wetland alteration:

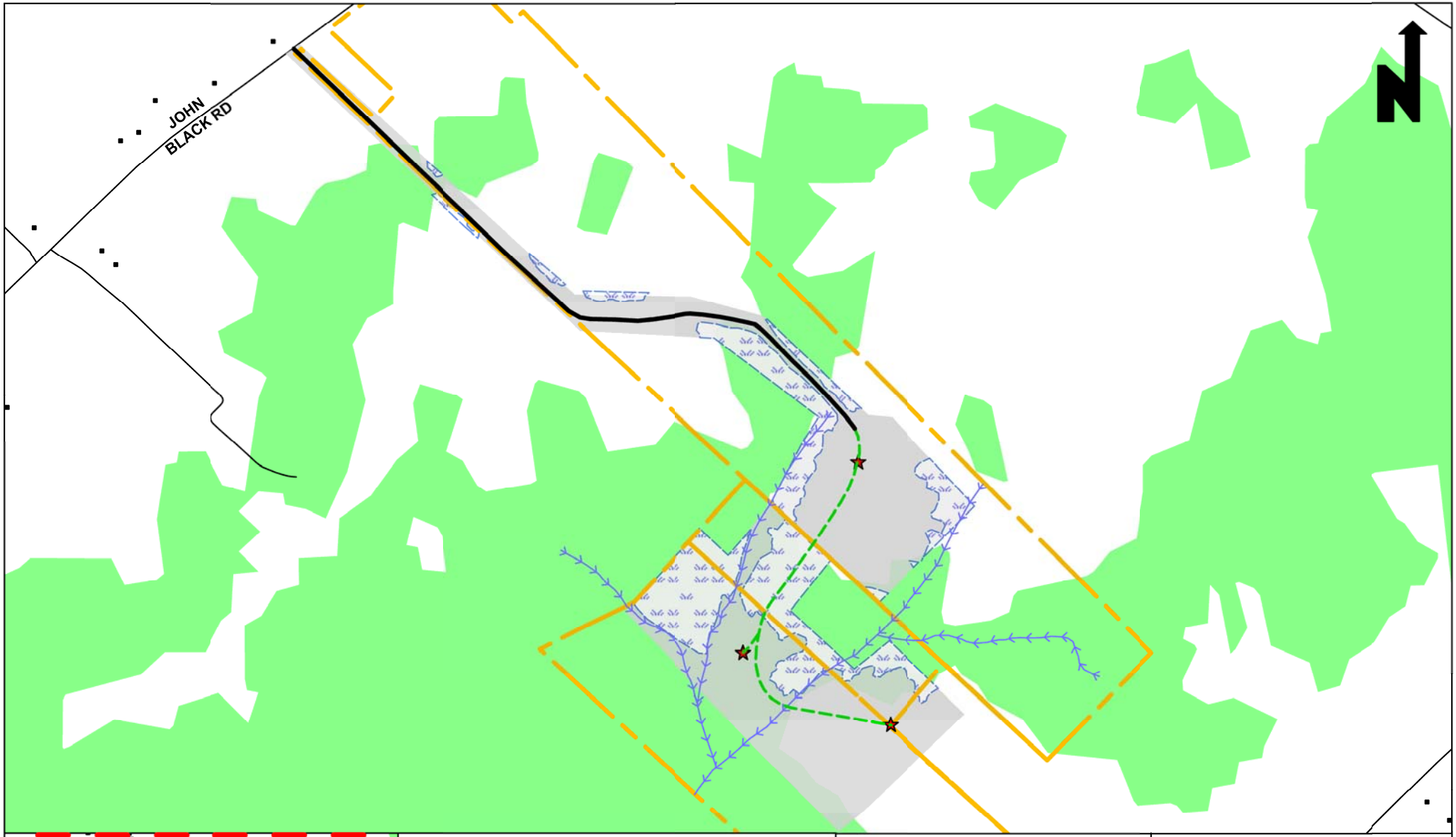
1. Filling;
2. Draining;
3. Flooding; and
4. Excavating.

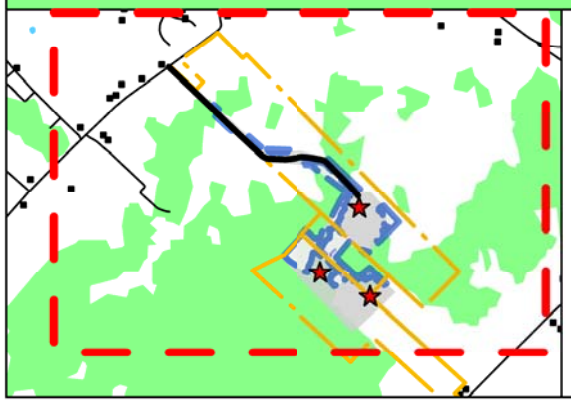
The wetland alteration is anticipated to be 0.2 hectares; the Proponent will be required to complete a simplified/standard wetland alteration application. For the purpose of this wetland alteration application, it is anticipated that a certified third party consulting will be conducting a functional assessment and will be engaged to conduct the alteration process.

The watercourse crossing would be required to complete the access road where the proposed access road design crosses two creeks to gain access to WTG 2 & 3.

Figure 4-4 provides a closer view of all three turbine locations demonstrating that the WTGS have been located to maintain a 30 m setback plus blade length from all wetlands and watercourses.

Figure 4-16: Proposed access route through highly disturbed field identified wetland.





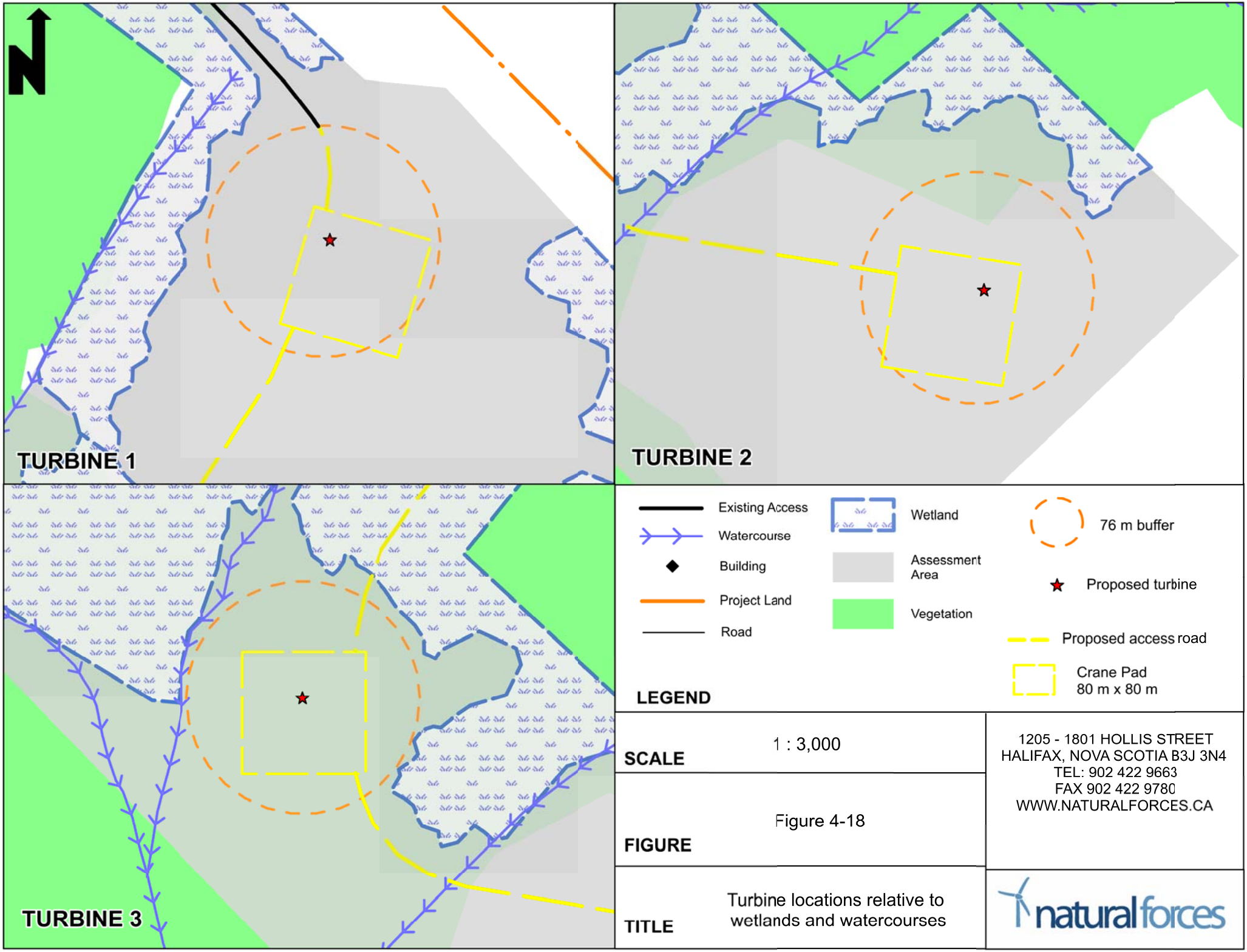
LEGEND

- Existing Access
- Watercourse
- Building
- Project Land
- Road
- Proposed Access
- Wetland
- Assessment Area
- Vegetation

SCALE	1 : 12,000
FIGURE	Figure 4-17
TITLE	Field Identified Wetlands

1205 - 1801 HOLLIS STREET
HALIFAX, NOVA SCOTIA B3J 3N4
TEL: 902 422 9663
FAX 902 422 9780
WWW.NATURALFORCES.CA

naturalforces



SCALE	1 : 3,000
FIGURE	Figure 4-18
TITLE	Turbine locations relative to wetlands and watercourses

1205 - 1801 HOLLIS STREET
HALIFAX, NOVA SCOTIA B3J 3N4
TEL: 902 422 9663
FAX 902 422 9780
WWW.NATURALFORCES.CA

naturalforces

4.1.3 Fish and Fish Habitat

Based on the wetland and watercourse assessment, the wetlands have been identified as treed swamps. These swamps and marshes do not provide an adequate environment for fish to use as habitat.

4.1.4 Flora

A total of 263 vascular plant taxa were recorded during the field surveys (211 native and 52 exotic), two of which are of some conservation significance.

Halberd-Leaved Tearthumb (*Polygonum arifolium*) is a species of wet deciduous forest and thickets, known from 17 locations in Nova Scotia between Yarmouth and Cumberland Counties, but with the greatest concentration of records being from Cumberland County. This species is classified as S2 – sensitive (ACCDC, 2012).

Weigand's Sedge (*Carex weigandii*) is uncommon sedge of wet, generally acidic swamps and bog margins. It is similar to more common sedges (ie. *Carex atlantica* and *Carex echinatazia*), as a result, Weigand's sedge has been poorly documented up until 10 years ago. Weigand's sedge has been found to be fairly common in peat land margins of the Cape Breton Highlands.

None of the plant communities documented within the WTG or road construction footprint area are considered provincially rare (ACCDC data, S. Blaney, pers. obs). Relatively little of the proposed project footprint falls within forest older than 40 years, as a large proportion of the footprint area is either very recent clear cut (within the last three years), or is regenerating forest under 20 years old. The WTG 3 site is within a mature forest and on somewhat richer soil than the remainder of the site, supporting Sugar Maple (*Acer sccharum*), Eastern Hemlock (*Tsuga Canadensis*) and Ostrich Fern (*Matteuccia struthiopteris*) among other species not found elsewhere at the project site. The gently sloping ground to the north of the stream has groundwater seepage mixed with forested swamp, again with a slightly richer soil than is present over most of the project area. A full list of plant species observed during the survey can be found in Appendix E – Table 1.

4.1.5 Moose

Winter Track and Pellet Grain Inventory Field Surveys

The Chignecto Isthmus plays an important role in allowing Moose to move between provinces. The North-East area of the Isthmus has been generally accepted as a corridor to protect from development activities which could hinder inter-provincial moose movement. Organisations such as the Nature Conservancy of Canada are protecting large tracks of land on the northeastern side of the isthmus. The proposed project is located in the south west region of the Isthmus near highly developed lands (Town of Amherst) and is therefore in a less sensitive area of the Isthmus.

In consultation with NSDNR it was determined necessary to conduct both winter track and PGI surveys to identify potential moose habitat in the Project area. Surveys were conducted by Forest Technician, Jody Hamper and consisted of three winter track surveys and two PGI surveys. The moose survey results are shown in **Error! Not a valid bookmark self-reference.**. Results of the moose surveys have identified one pellet group inventory over 3 km east of the nearest turbine.

Table 4-6: Summary of moose surveys.

Survey Date	Survey Type	Observations (UTM zone 20)
March 14, 2014	Winter track	No moose tracks observed. Three deer tracks were observed. Deer Track 1: 412,478 m E 5,078,101 m N Deer Track 2: 411,602 m E 5,076,643 m N Deer Track 3: 412,000 m E 5,074,382 m N
March 26, 2014	Winter track	No moose tracks observed. Three deer tracks were observed. Deer Track 1: 412,391 m E 5,079,153 m N Deer Track 2: 410,356 m E 5,075,740 m N Deer Track 3: 412,225 m E 5,074,488 m N
April 6, 2014	Winter track	No moose tracks observed. Four deer tracks were observed. Deer Track 1: 412,450 m E 5,078,436 m N Deer Track 2: 411,640 m E 5,076,685 m N Deer Track 3: 413,231 m E 5,075,958 m N Deer Track 4: 411,107 m E 5,073,960 m N
April 29, 2014	PGI	No moose scat observed. Three deer scat observed. Deer Scat 1: 409,523 m E 5,075,492 m N Deer Scat 2: 409,523 m E 5,075,492 m N Deer Scat 3: 414,234 m E 5,076,043 m N
May 12, 2014	PGI	1 Moose scat observed. Three deer scat observed. **Moose Scat 1: 414,383 m E 5,076,056 m N** Deer Scat 1: 412,492 m E 5,077,942 m N Deer Scat 2: 409,523 m E 5,075,492 m N Deer Scat 3: 412,093 m E 5,074,426 m N

The Proponent has also relied on both the Mainland Moose Recovery Plan and the Special management Practices documents published by NSDNR in order to better assess and attempt to mitigate the potential impact the project may have on mainland moose population in the surrounding area. Full survey results including maps can be found in Appendix H.

Nova Scotia Department of Natural Resources Database

Through consultation with the regional NSDNR biologist a list of moose sightings near the Project site has been compiled. The list is comprised of public sightings that have been reported to the Department of Natural Resources for their database. The results of this desktop screening can be found in Appendix H.

4.1.6 Wood Turtle

Through consultation with NSDNR, and a thorough review of the Nova Scotia Significant Species and Habitats database (NSDNR, 2012a); potential Wood Turtle (*Glyptemys insculpta*) habitat was identified just over 2 km south of the Project site along Nappan River.

Wood turtles are considered a "species at risk" throughout their range. They are listed nationally as "threatened" (COSEWIC, 2007) and provincially as "vulnerable" (NSDNR, 2000) because of their susceptibility to human activities and land use practices. (NSDNR, 2012b) Since project infrastructure is not proposed in close proximity to the identified wood turtle habitat it is not expected that the Project will have a significant impact on wood turtles or wood turtle habitat.

General mitigation and avoidance measures will be proposed in the VEC assessment in Section 6.

4.2 Socio-economic

4.2.1 Community

The 2011 Stats Canada census identified the population of Amherst, Nova Scotia was 9,717 with an average growth over 5 years of 2.2 %. In 2011, the town Amherst was composed of 4,403 private dwellings occupied by residents. Amherst residents have a median age of 45.9. (Stats Canada, 2011)

While Amherst is the main community within the proximity of the Project site, many smaller communities are within the area. Brookdale, Hastings, Warren and East Amherst are all within 3 km of the Project site. Furthermore, West Amherst, Amherst Point, Nappan, Salem, Stanley, West Leicester, Truemanville and Aulac are all within a 10 km radius of the project site. The proponent has focused their public consultation program to include these communities throughout the development of the site.

4.2.2 Archaeological Resource Impact Assessment

Based on the archaeological resource impact assessment conducted by Davis MacIntyre & Associates, there is no evidence of historic cultural activity in the impact areas of the proposed access roads and proposed turbine locations. The only indications of cultural activity were found to be fairly modern, consisting of modern logging activity such as skidder trails, clear-cut, logging roads and cut stumps, modern agricultural activity and a natural gas pipeline.

Although there was historical activity in the general vicinity of Amherst, historic maps and documents indicated that there was little historic cultural activity in the study area. The potential for First Nations archaeological resources in the impact area is low. The only noted watercourse is small and non-navigable. First Nations peoples are known to have been in the general vicinity and may have taken advantage of the area for hunting and/or gathering. However there is little reason for them to have settled here. Activity such as short-term forays into the area for hunting and/or gather is unlikely to leave an archaeological footprint.

Recommendations

Avoidance is the preferred method of mitigation in all instances where archaeological resources are present. The results of the historic background study and archaeological reconnaissance indicate that the study area is of low potential for First Nations archaeological resources. Furthermore, no historic period archaeological resources were encountered during the reconnaissance. The only identified cultural activity consisted of modern logging and agricultural activity.

In the unlikely event that archaeological features are encountered during ground disturbance activities, all activities will cease and the Coordinator of Special Places will be contacted immediately.

4.2.3 Mi'kmaq Ecological Knowledge Study

Historical Review Findings

There is a wide distribution of pre-contact and post-contact archaeological sites in this portion of Cumberland County but no such sites are known within the Study Area.

Acadians began to settle the area and reclaimed the tidal marshes in the 1660's and they named the high ground on the marsh the *isle de Indiens* where the Mi'kmaq had an encampment. The encampment location is the present site of the CBC radio towers.

Father Abbe' LeLoutre had a strong influence over the Acadians, Mi'kmaq and the French commanders during his stay in Acadia at the Mission in Shubenacadie and later at Chignecto. He incited the Mi'kmaq against the British at Halifax and later recruited the Mi'kmaq and displaced Acadians for his land reclamation and fortification projects. He is also responsible for the burning of Beaubassin.

The British defeat of the French at Chignecto and the surrender of the forts in the area marked the first British victory in a campaign to remove the French from North America.

After the treaties of the 1760's, the Mi'kmaq had to adapt to a *Mi'kma'ki* under British rule.

There were some stumbling starts to setting aside the required 1000 acres for the Mi'kmaq within the area of Cumberland County of today. Land set aside for the Mi'kmaq in Pugwash was lost due to a questionable transaction and later lands at Shimmicas Bridge were lost due to subdivision of the parcel and granting to settlers. Franklin Manor I. R. 22 is the only reserve in Cumberland County and is not currently occupied.

A review of the Aboriginal Affairs and Northern Development Canada, Status Report on Specific Claims does not show any specific claims that would directly impact the Project site.

Traditional Use Findings

The traditional use data gathered for this MEKS was drawn from one primary source: the Mi'kmaq individuals who reside in the surrounding communities and those who are familiar with or undertake these types of activities. This data was acquired through interviews with informants that allowed the study team to identify the various traditional use activities, resources and areas that are currently or have been used by the Mi'kmaq, and any information that was gathered in previous MEKS in the area. Interviewees were asked to identify areas within the Study Area and Project Site where they knew of traditional use that had taken place, or currently in use. These interviews took place in September 2014.

To easily identify the traditional use data findings of this study, the analysis has been categorized into two (2) geographic areas. The first is the Project Site area and the second is the Study Area.

Based on the data that was gathered by the study team, it appears there are some Mi'kmaq traditional use activities that have occurred, or are occurring, within the Study Area.

Project Site

The Project Site, as well as locations in the immediate vicinity (<50 meters) of the Project Site were considered when analyzing traditional use activities.

There was no fishing or hunting areas identified within the Project Site by informants.

The northwest area of the Project Site was identified as an area to gather apples, blueberries, cow lilies, flag root, ground juniper, and princess pine with one area recorded for each species. This area can be found in Figure 4-21.

Study Area

As mentioned previously, the MEKS data is also drawn from the Study Area, which encompasses areas within 5 kilometers of the Project Site. The purpose of this portion of the study is to portray other land use activities that may have been missed in the Project Site analysis data.

From the data gathered, the study found that trout (including lake, brook and sea) and bass (including stripped and small mouth) were the species reportedly caught in the highest frequency in the Study Area. Fifteen trout and eight bass fishing areas were reported by informants and can be found in Figure 4-19. Other species reportedly fished in the Study Area were salmon, clams, perch, eel and smelt.

Deer and rabbit were found to be the most hunted species within the Study Area; these areas can be found in Figure 4-20. Other species reportedly hunted in the Study Area are partridge, pheasant, beaver, fox, muskrat and raccoon.

Blueberries and apples were reported as the most gathered plants in the Study Area; these areas can be found in Figure 4-21. Other species reportedly gathered were cranberries, ash trees, cow lily, crab-apple, firewood, flag root, ground juniper, mushrooms and princess pine.

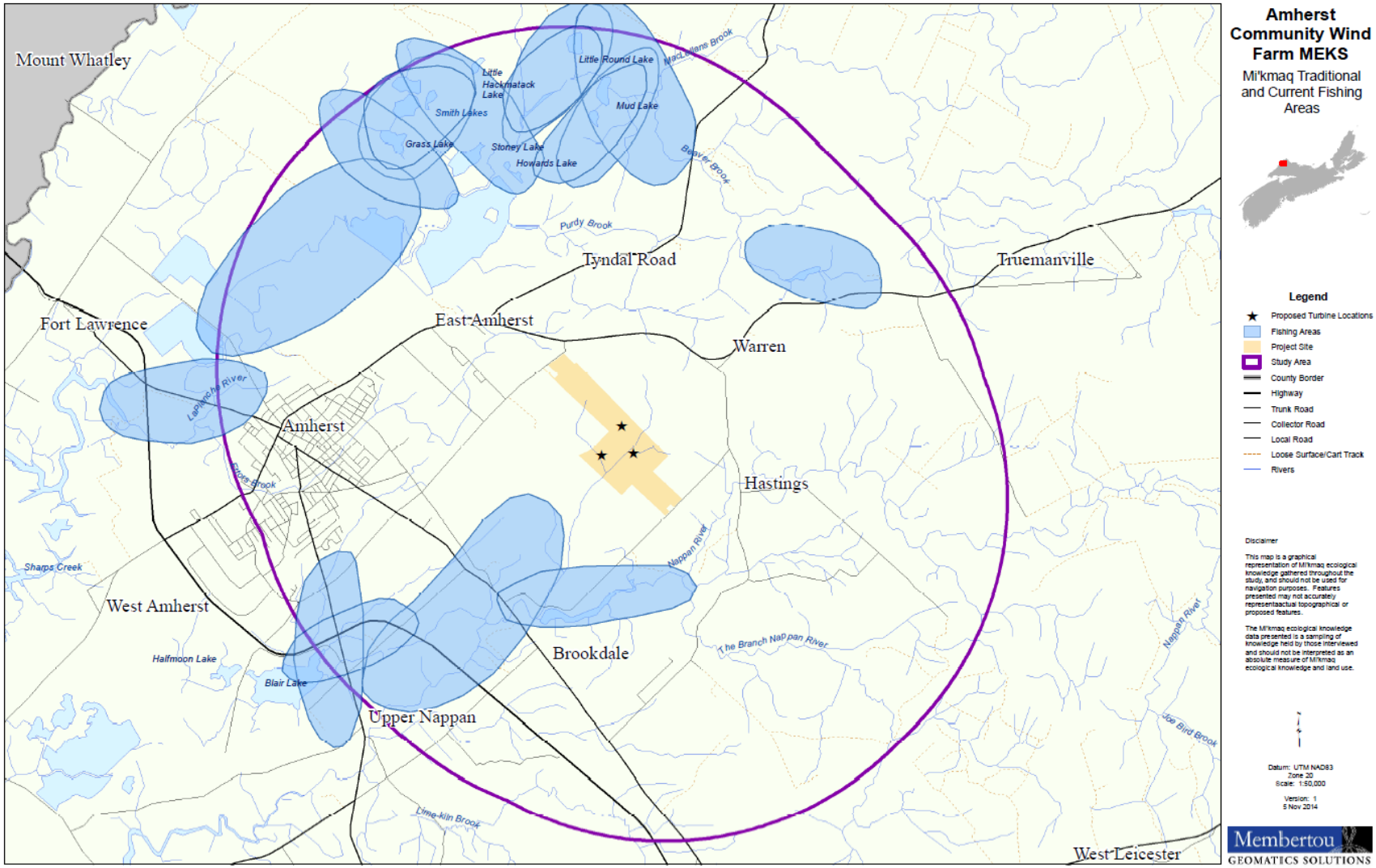


Figure 4-19: Fishing areas in the Study Area.

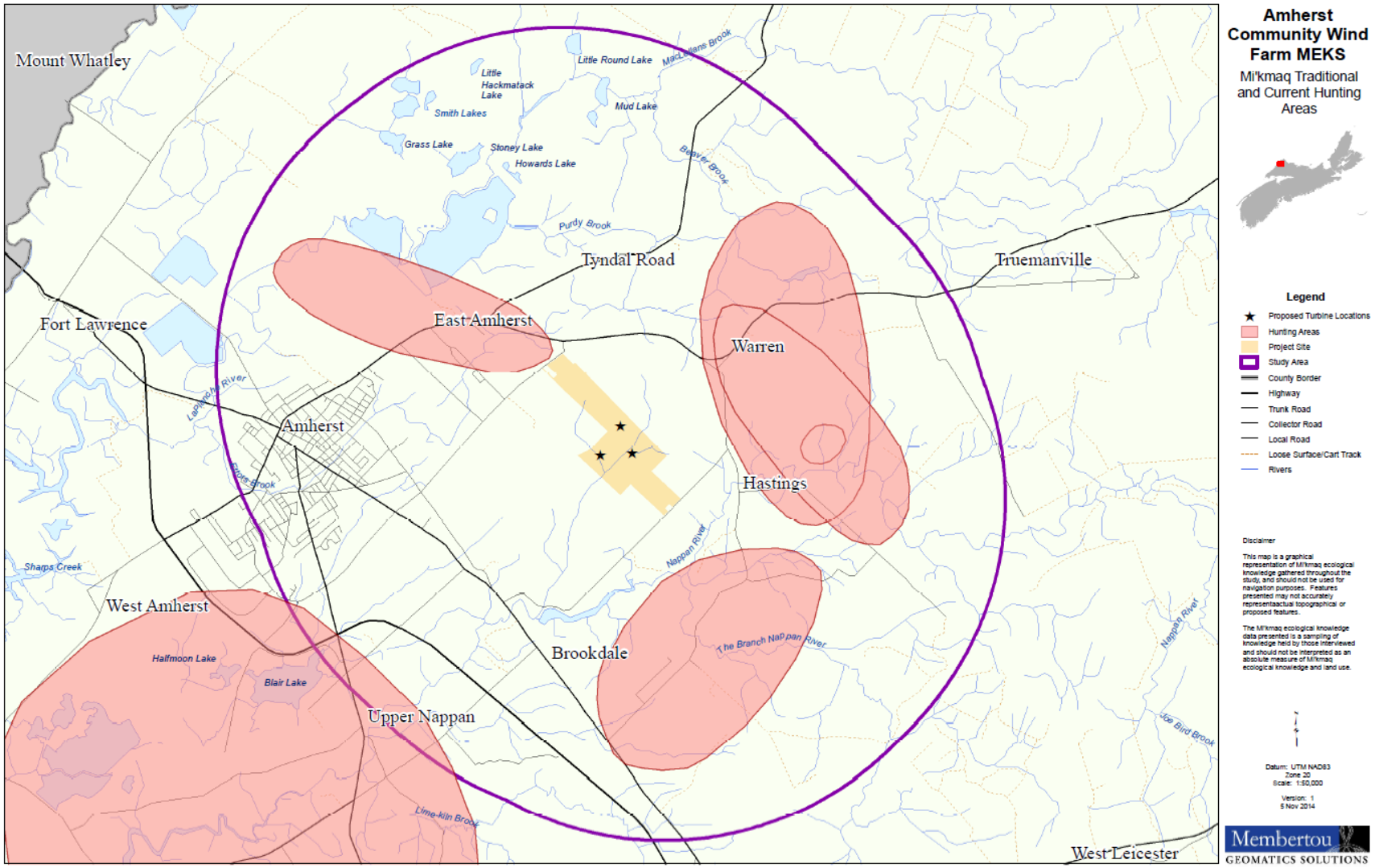


Figure 4-20: Hunting areas in the Study Area.

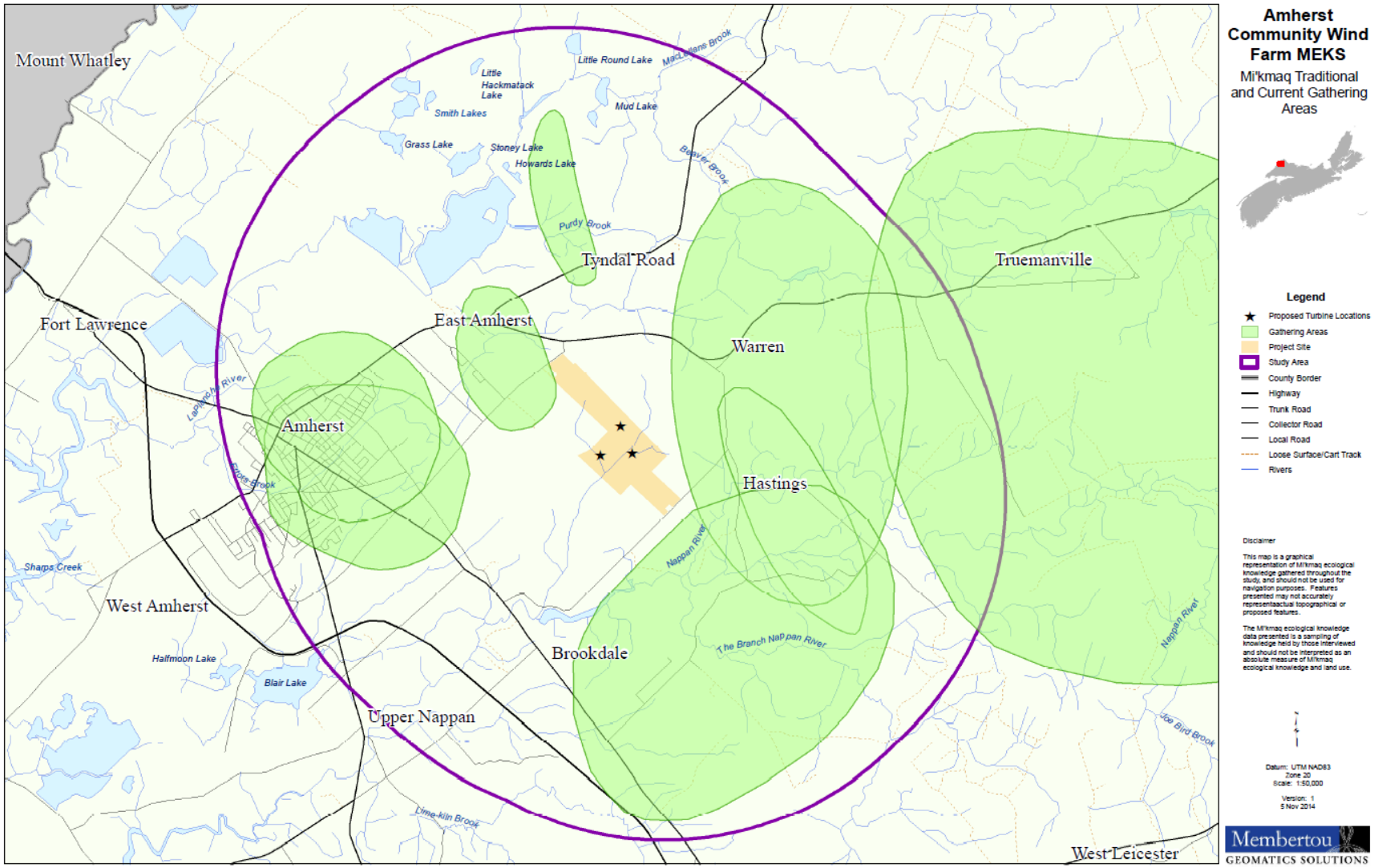


Figure 4-21: Gathering areas in the Study Area.

Significant Species Findings

The MEKS identified resource and land/water use areas within the Project Site and Study Area that continue to be used by the Mi'kmaq people to varying degrees. The MEKS identified the following:

Table 4-7: Mi'kmaq Significant species findings.

Type of Use	Number of Areas	Number of Species
Food / Sustenance	70	28
Medicinal / Ceremonial	21	10
Tools / Art	2	2

During the information gathering for the Study Area, informants had mentioned fishing for salmon. The Atlantic salmon is considered an endangered species in Canada. No other rare or endangered species were identified by informants.

While stated above, it is worth noting again that assigning an importance designation for any activity done by Mi'kmaq can be a subjective process, and that all activities are considered ways of preserving Mi'kmaq way of life, in some shape or form.

Recommendations

Amherst Community Wind Farm MEKS has identified a small amount of Mi'kmaq Traditional Use Activities occurring in the Project Site, as well as additional activities within the Study Area that have occurred in the past, as well as the present. Based on the information gathered and presented in this report, there is some potential this project could affect some Mi'kmaq traditional use, specifically trout and bass fishing, deer and rabbit hunting, and some blueberry and apple gathering identified in the Study Area. Although the possible effects from the project could be minimal, it is recommended that the proponent communicate with the Assembly of Nova Scotia Mi'kmaq Chiefs to discuss further steps, if required, with regards to Mi'kmaq use in the area.

4.2.4 Noise

Sound pressure level (SPL) is defined as the force of sound on a surface area. This is measured in dB(A); dB or decibels is a logarithmic unit that is used to measure SPL and (A) is the weighting applied to denote, as perceived by humans. Nova Scotia does not currently have any regulations pertaining to maximum SPL required at receptor locations near wind farms; further, the Municipality of Cumberland County land use by-laws do not specify any restrictions pertaining to SPLs relating to WTG activities. As a best practice effort, the Proponent has followed the *Ontario Noise Guidelines for Wind Farms* as a guideline regarding acceptable noise emission from the ACWF. The Ontario guidelines present a 40 dB(A) SPL as the maximum exposure level for a noise receptor (Ministry of the Environment, 2008).

A noise assessment was completed for the ACWF using WindPRO software; the software uses ISO 9613-2: Acoustics – Attenuation of sound during propagation outdoors standards. By assuming conservative estimates of factors contributing the SPLs of the WTGs, the model yields results that represent a worst case scenario. A WTG hub height of 98 m was used with a SPL of 105 dB(A) being produced from the turbine nacelle, located at the hub height.

A total of 314 receptor points were used to represent 314 dwellings within a 2,500 m range of the proposed turbine locations. The model was run using two turbines with no added vegetation layer and continuous downwind propagation for conservative results. The closest receptor is located 951 m from a turbine, this receptor was subjected to a maximum SPL of 37.3 dB(A). Full results for the noise impact assessment at each specific receptor location can be found in Appendix I.

Low Frequency Sound and Infrasound

Low frequency sound is defined as sound with a frequency less than 200 Hertz (Hz) or cycles per second. Infrasound, also referred to as low-frequency sound, is sound that is not audible to humans, which is typically below a frequency of 20 Hz (HGC Engineering 2006).

Infrasound levels created by wind turbines are often comparable to the ambient levels prevalent in the natural environment, such as wind. In terms of health, at sufficiently high levels, infrasound can be dangerous; however, it is grossly inaccurate to conclude that infrasound, at any level, causes health risk (HGC Engineering 2006).

A recent study conducted by Massachusetts Institute of Technology found that infrasound near wind turbines does not exceed audibility thresholds. Epidemiological studies have shown a relationship between living near turbines and annoyance. Infrasound and low-frequency sound do not present unique health risks; however, annoyance seems strongly related to individual characteristics rather than noise from turbines (McCunney et. At., 2012).

4.2.5 Visual

ReSoft Ltd WindFarm software was used to create a photomontage of the ACWF. The following two locations were chosen to present a predicted view of the wind farm using a 98 m hub height. Figure 4-228 shows the photomontage taken from John Black Road looking east at the Project site. Figure 4-238 shows the photomontage taken from Pumping Station road looking north at the Project site.

Figure 4-22: Photomontage from John Black Road.

Figure 4-23: Photomontage from Pumping Station Road.

4.2.6 Shadow Flicker

The Proponent has undertaken a shadow flicker impact assessment for the ACWF to assess the potential impact of shadow flicker on the surrounding dwellings within a 2,500 m radius. Shadow flicker is the change in light received by a receptor due to a WTG blade impeding the light path between the sun and the receptor. As there are few federal, provincial or municipal guidelines or policies for governing or quantifying what is an acceptable amount of shadow flicker, the German standards, *Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windenergianlagen* have been adopted for the purpose of this study and are generally used within the wind energy industry as standard guidelines. These guidelines, based on astronomic worst case scenario suggest that acceptable levels at each shadow receptors are:

- No more than 30 hours per year of astronomical maximum shadow (worst case); and
- No more than 30 minutes on the worst day of astronomical maximum shadow (worst case).

The guidelines also specify two factors that limit the shadow flicker effect, due to optic conditions in the atmosphere:

1. The angle of the sun over the horizon, which must be at least 3 degrees; and
2. The blades of the WTG must cover at least 20 % of the sun.

Receptors exposed to less than 30 minutes per day on the worst affected day or a total of 30 hours per year from all WTGs are considered unlikely to require technical mitigation.

Receptors used in the shadow flicker assessment are at the same locations used for the noise assessment; this being a total of 314 receptors representing 314 dwellings. The model was run with WindPRO software to predict astronomical worst case shadow flicker at each receptor in terms of total hours per year, days per year, and maximum minutes per day. Table 4-8 presents a summary of the results for the shadow flicker assessment at the 12 receptors that may experience some shadow flicker. Of the 12 receptors listed below, some may not experience any shadow flicker at all as the model uses conservative assumptions, which is described in detail in the full shadow flicker impact assessment in Appendix J.

Table 4-8: Predicted maximum worst case shadow flicker results summary.

Receptor ID	Shadow hours per year (h/year)	Shadow days per year (days/year)	Max shadow hours per day (h/day)
BI	12:44	42	0:26
AA	11:13	64	0:18
KL	8:17	48	0:16
BK	8:16	48	0:14
CW	7:45	52	0:14
KM	7:44	44	0:16
HV	6:57	36	0:14
AE	6:55	41	0:15
DW	6:44	41	0:15
KT	6:34	40	0:19
DX	6:12	38	0:15
LA	5:26	36	0:14
AY	5:22	37	0:13
DY	5:21	36	0:14
CX	5:06	37	0:13
DH	5:06	35	0:14
BT	4:31	33	0:13
M	4:13	24	0:12
AT	4:12	32	0:13
HO	4:02	33	0:12
HQ	3:59	34	0:12
AP	3:58	33	0:12

Receptor ID	Shadow hours per year (h/year)	Shadow days per year (days/year)	Max shadow hours per day (h/day)
CA	3:55	33	0:12
BJ	2:48	21	0:10
DT	2:40	18	0:13
KN	2:38	18	0:13
DV	2:35	18	0:13
AD	2:28	19	0:12
KK	2:13	16	0:12
HN	2:11	17	0:12
HT	2:08	16	0:12
HM	2:06	17	0:11
JU	2:05	16	0:12
DB	2:00	16	0:11
HL	2:00	16	0:11
HJ	1:52	17	0:10
HH	1:50	17	0:11

5.0 Consultation

5.1 Community Engagement

Open, transparent and comprehensive community engagement is crucial to the success of any development. Community engagement forms an integral part of the proposed ACWF development and consists of various engagement activities the Proponent will undertake throughout the development, construction, and operation of the wind farm. The Proponent is committed to addressing, to the best of their abilities, all concerns pertaining to this proposed development raised by local residents and community members.

The engagement activities described in the following section have provided an opportunity to facilitate meaningful dialogue between various stakeholders and the Project Proponent; and to provide accurate information pertaining to the Project in an open and transparent fashion. A comprehensive stakeholder engagement list has been formed, and will be kept up to date as further stakeholders express their interest in the Project throughout the lifetime of the Project.

5.2 Community

First Public Meeting

An open house was held on July 10, 2014 at the Super 8 Motel in Amherst from 5 pm to 8 pm. The meeting was advertised via Canada Post Admail, a service offered that facilitates the distribution of invitations/ flyers to a defined geographic location, as well as in the Amherst News. The first open house attracted 28 members of the Amherst community who signed in to ask questions and voice concerns about the proposed Project.

The Proponent handed out questionnaires to attendees at the first public meeting that were designed to gather contact information so interested persons could be provided with up to date information, to learn about the public's interest in having a wind farm in their community and provide an opportunity for the public to express any concerns they had regarding the ACWF Project. The open house format was held as an open discussion where posters providing Project relevant information were displayed with Proponent representatives present to answer questions and discuss concerns the public had.

Following the meeting, the proponent addressed any questions/concerns that were submitted via the questionnaires by addressing some questions through telephone and personal meetings including the concerns on the FAQ section of the Project website.

Community Meeting – Attended by Natural Forces Wind Inc.

Several community members living near the proposed project site held a meeting to discuss general concerns that were apparent within the community regarding the proposed Amherst Community Wind Farm. Two members of the Natural Forces team were present at the meeting to gain insight on the

community's sentiment towards the proposed Project. Natural Forces team members were there to observe and listen and did talk to many community members at the end of the meeting.

As a result of attending the meeting, the Proponent decided to hold a second public meeting to provide an opportunity to further discuss the project with Natural Forces in an open forum.

Second Public Meeting

The meeting was advertised via Canada Post Admail, a service offered that facilitates the distribution of invitations/ flyers to a defined geographic location, and was also advertised in the Amherst News. The second open house attracted 53 members of the Amherst community who attended to ask questions and voice concerns about the proposed Project.

Again, the proponent handed out questionnaires as described above in an effort to collect valuable public feedback. The open house was held as an open discussion with Proponent representatives engaging in conversation with the attendees to address any issues or concern.

Following the public meeting questions and concerns brought up in questionnaires were addressed by email, personal letters and phone calls. Every question was also publicly addressed on the ACWF website.

The meeting was also attended by Eric Christmas of Beaubassin Mi'kmaq Wind LP who held discussion with many concerned community members and as a result decided to conduct a round table with community members at a later date.

Beaubassin Mi'kmaq Round Table with Local Residents

On November 4, 2014 two members of Beaubassin Mi'kmaq Wind held round table discussions with local residents at the Wandlyn Hotel in Amherst from 6:30 – 9 pm.

The meeting was very cordial with Beaubassin leading off the discussions with a presentation. The presentation was to inform the residents as to how the Project site was chosen as well as to correct misinformation that had been portrayed in the media.

The discussions were also very important in informing the residents as to why this Project is important to the Mi'kmaq communities and how it has led to the creation of a partnership between the 13 First Nations of Nova Scotia.

The discussion ended with the local residents expressing their specific concerns regarding the Project. The most important concern raised by the residents was the impact the Project may have on property values and their ability to utilize their property for future endeavours. These concerns have been addressed in Table 5-2.

Website

The Proponent has set up a Project website for the ACWF. The website: www.amherstcommunitywindfarm.ca is updated periodically and used to inform the general public right-holders and stakeholders about all aspects of the proposed development. Website content and updates will include some or all of the following items:

- FAQ (Frequently Asked Questions) section that addressed concerns indentified during consultation activities.
- Contact information for the Project Proponent and Natural Forces;
- Notices for public information sessions;
- Photos of the Project location and turbine types;
- Progress reports on the Environmental Assessment;
- Environmental Assessment;
- Construction activity notifications;
- Online questionnaire and comment form (Have Your Say); and
- Media and PR related material; and

Newsletters

Previous wind farms developed by the Proponent included newsletters as a key engagement tool to update and inform the local community on recent Project activities. The Proponent may circulate newsletters via email, website and Canada Post to the community throughout the 2015 and 2016 calendar years.

Newspaper Advertisements

Two advertisements were placed in the Amherst News to offer information to residents regarding the Project. The advertisement also detailed benefits of the Project as well as contact info for the Proponent. The advertisements were published on August 5, 2014 and September 5, 2014.

Issues Resolution

The Proponent has drafted a Complaint Resolution Plan, which covers what community members should do and whom to contact should there be negative impacts affecting the community members or the environment caused by the ACWF development. The Complaint Resolution Plan can be found in Appendix K.

5.3 Aboriginal Peoples

The proposed Amherst Community Wind Farm is being developed in partnership with Mi'kmaq Beaubassin Wind, an entity that represents the 13 First Nation bands in Nova Scotia. Throughout the

development process the Nova Scotia First Nations community has been consulted numerous times through meetings, presentations, personal mailings and phone calls.

Table 5-1: Summary of First Nations consultation activities.

Date	Person Contacted	Band/Organization	Method of Communication	Content
December 2011	KMK Representative	KMK	Meeting	Amherst project introduction
September 2012	KMK Assembly	KMK	Presentation	Project introduction & partnership opportunity
September 2012	Members of Membertou	Membertou	Presentation	Proponent introduction
October 2012	Chief & Council	Chapel Island	Meeting	Project introduction & partnership opportunity
October 2012	Chief & Council	Paq'tnkek	Meeting	Project introduction & partnership opportunity
November 2012	Chief & Council	MIllbrook	Meeting	Project introduction & partnership opportunity
November 2012	Chief & Council	Bear River	Meeting	Project introduction & partnership opportunity
November 2012	Chief & Council	Pictou Landing	Meeting	Project introduction & partnership opportunity
April 2013	KMK Representative	KMK	Meeting	Amherst site details presentation
December 2014	Office of Aboriginal Affairs Representative	Office of Aboriginal Affairs	Letter	Update on Environmental Assessment
December 2014	KMK Representative	KMK	Letter	Update on Environmental Assessment

Date	Person Contacted	Band/Organization	Method of Communication	Content
December 2014	Chief and President Grace Conrad	Native Council of Nova Scotia	Email	Update on Project and Environmental Assessment

5.4 Regulatory

The Proponent has engaged in consultation with Municipal, Provincial and Federal Government bodies regarding the proposed ACWF Project.

Municipal Consultation

The Proponent has engaged members of the MoCC planning department to discuss the planning regime such as permitting requirements on numerous occasions. Consultation provided the Proponent with detail regarding regional by-laws, land use and other policies within the MoCC that would relate to the proposed development of the ACWF.

Appendix L presents a log of communication between the Proponent and members of the MoCC and council member throughout the duration of the Project thus far.

As a continuous effort, the Proponent will continue to liaise with Council and Staff throughout the development and construction of the ACWF.

Provincial Consultation

The Proponent has met with various provincial organizations regarding the development of the ACWF.

The scoping of this Environmental Assessment document was designed in consultation with the Nova Scotia Department of Environment – Environmental Assessment branch (EA branch) and the Wildlife Divison within NSDNR.

Consultation topics with the EA Branch and NSDNR included:

- Scoping and guidance of Wildlife surveys and studies to conduct as part of the ACWF Environmental Assessment;
- Ideal dates to conduct effective bat monitoring surveys; Potential for bat hibernacula in the region;
- Presence of mainland moose in the area through inventory reports;
- Presence of wood turtles in the area;
- Provide insight on proper course of action to take in effectively avoiding wetlands, mitigating impacts on wetlands and compensation that is required when direct wetland alteration is required;

- Species at risk in general, and approach to assessment in EA.

As a continuous effort, the Proponent will continue constant consultation with the appropriate provincial departments throughout the duration of the Project.

Federal Consultation

The Proponent has consulted with various Federal Government entities regarding the construction of the ACWF. Environment Canada, NAV Canada, Transport Canada and the Department of National Defence were all contacted regarding the development of the ACWF. Like their provincial counterparts, they have assisted in the preparation of this EA, Project planning and design.

The Proponent will continue to engage Federal regulators when required throughout the development, construction and operation of the ACWF as appropriate.

5.5 Public and Aboriginal Concern

Based on the public meeting questionnaires, individual discussions, and aboriginal consultation, local residents and other stakeholders have raised concerns relating to the Project and project activities. The majority of these concerns have been addressed in this EA, while others were addressed directly at public meetings, through telephone conversations, and one on one meetings. The most frequently raised issues have been identified in Table 5-2; included in this table is the section(s) in which the public and aboriginal issues have been addressed. As previously mentioned in Section 5.1 the Proponent is committed to addressing, to the best of their abilities, all concerns pertaining to this proposed development raised by local residents and community members.

Table 5-2: Summary of frequently raised questions and concerns.

Issues Raised	Section(s)
Are moose affected by the turbines?	4.1.5 & 6.2
What are the setbacks for this project?	2.1, 2.2, Figure 2-6, 4.1.2, Figure 4-18
Why does Natural Forces look at studies from other provinces or countries for health and property value issues?	5.5
How do wind farms affect human health?	Noise: 4.2.4, 6.1 Shadow: 4.2.6, 6.1 Other: 6.3, 6.4, 7.2.2
Will the wind farm affect property values?	6.4
What is the risk of oil or lubricant spill from the turbines?	6.1, 6.2, 6.3
Why does your Noise Impact Assessment report not address infrasound from turbines?	4.2.4
Will there be a risk of Ice being thrown from the turbine blades?	6.4

Issues Raised	Section(s)
How many birds are these turbines going to kill?	6.1

During the development process the Proponent has compiled a table of every comment or question the community has had with the Project. Table 5-3 presents these comments and questions and provides detail on how the Proponent responded.

Table 5-3: A table of all questions and concerns received and how they were addressed.

Comment or question made pertaining to this subject	How it was addressed
Voicing concerns or objections	• At public meetings • In discussions concerning interest in the formation of a Community Liaison Committee • Take home information sheets from public meeting concerning the Community Liaison Committee • On the project website • Through emails
Community input in the Environmental Assessment	• At public meetings • In an article in the local newspaper • On the project website • Through emails
Set back distances	• At public meetings • On the project website • In a newsletter sent via admail • Through email • In letter
Specific project location	• At public meetings • On the project website • In the Environmental Assessment • Through emails • In letter

Comment or question made pertaining to this subject	How it was addressed
Property value	• At public meetings • Take home information sheets from public meetings • In a newsletter sent via admail • On the project website • Through email
Guarantee that property values won't decrease	• At public meetings
Payment for decrease in property value	• At public meetings
Noise impact	• At public meetings • Take home information sheets from public meetings • In an article in the local newspaper • In a newsletter sent via admail • On the project website • Though email
Shadow flicker impact	• At public meetings • Take home information from public meetings • In an article in the local newspaper • In a newsletter sent via admail • On the project website
Bird mortality	• At public meetings • In a newsletter sent via admail • On the project website • In the Environmental Assessment
Bat mortality	• At public meetings • On the project website • In the Environmental Assessment
Health issues	• At public meetings • Take home information sheets from public meetings • In a newsletter sent via admail • On the project website • In emails

Comment or question made pertaining to this subject	How it was addressed
Moose and deer	• At public meetings • On the project website • In the Environmental Assessment • In letter
Community entity	• At public meetings • On the project website • In the Environmental Assessment • In emails
How this project is a community project	• At public meetings • On the project website • In the Environmental Assessment
Power distribution	• At public meetings • On the project website • In letter
Community input not listened to	• At public meetings • In discussions concerning interest in the formation of a Community Liaison Committee • Take home information sheets from public meeting concerning the Community Liaison Committee • On the project website
Withholding information	• At public meetings • In discussions concerning interest in the formation of a Community Liaison Committee • Take home information sheets from public meeting concerning the Community Liaison Committee • On the project website • In the Environmental Assessment

Comment or question made pertaining to this subject	How it was addressed
Health studies conducted by third parties	• At public meetings • Take home information sheets from public meeting • On the project website • In a newsletter sent via admail
Health studies conducted in other provinces	• At public meetings • Take home information sheets from public meeting • On the project website • In a newsletter sent via admail • In letter
Why studies used are from sources from outside Nova Scotia	• At public meetings • On the project website
Distance from turbines to other properties	• At public meeting
Specific landowners for the project area and land area	• At public meeting • In the Environmental Assessment
ComFIT eligibility	• At public meetings • On the project website • In the Environmental Assessment • In letter
Do Natural Forces team members live in Amherst	• At public meetings
Project construction and operation period	• At public meetings • On the project website • In the Environmental Assessment • In an article in the local newspaper • In a newsletter sent via admail

Comment or question made pertaining to this subject	How it was addressed
Investors in the project	• At public meetings • On the project website • In the Environmental Assessment • In emails • In an article in the local newspaper • In a newsletter sent via admail • In an ad placed in the local newspaper
Size of the turbines	• At public meetings • On the project website • In the Environmental Assessment • In a newsletter sent via admail • In an ad placed in the local newspaper
Number or turbines	• At public meetings • On the project website • In the Environmental Assessment • In an article in the local newspaper • In a newsletter sent via admail • In an ad placed in the local newspaper • Through email
Benefits to residents	• At public meetings • On the project website • In an ad in the local newspaper • In the Environmental Assessment • Take home information sheets from public meeting • Through emails • In letter
Is the project part of the ComFIT program	• At public meetings • On the project website • In an ad in the local newspaper • In the Environmental Assessment • Take home information sheets from public meeting

Comment or question made pertaining to this subject	How it was addressed
Is this project the same as the project previously proposed in the area	• At public meetings • In emails • In a newsletter sent via admail
Will there be a new substation	• At public meetings • On the project website
Payment of the project	• At public meetings • On the project website
Environmental Assessment process and next steps once approved	• At public meeting • In email • On project website • In a newsletter sent via admail • Through emails • In letter
Studies included in the Environmental Assessment	• At public meeting • In email • On project website • In a newsletter sent via admail • Through emails
Payment of Environmental Assessment	• Through email
Who will write the Environmental Assessment	• In a letter
Number of residents living near project	• In an email
Support for the project based on questionnaires filled at public meeting and follow-up in newsletter	• In email
Community Liaison Committee involvement	• In email
Interest in having a wind farm on their land	• In email • At public meetings • Through phone calls
Representatives from the County and Province at information session	• In email

Comment or question made pertaining to this subject	How it was addressed
Reduction of power rates	• At public meetings • In email
Monetary benefits to residents	• At public meetings • In emails
Turbine company stating 2km setback safe distance	• In email

This Page Was Intentionally Left Blank

6.0 Analysis

The construction, operation and decommissioning phases of the ACWF Project have the potential to affect physical, biophysical, and socio-economic environment. Identifying the Valued Environmental Components (VECs) is an important part of the EA process. Following the presentation of the Project's activities in Section 2, the Environmental Setting in Section 4 and the review of issues identified from consultation in Section 5, the interaction of the Project activities with the VECs can be completed.

An interaction matrix in Table 6-1 presents the potential interactions between Project activities and each identified VEC. These VECs are presented in the following sub-sections in terms of potential environmental effects of Project activities including accidents and malfunctions, as well as proposed mitigation strategy, cumulative effects and finally, the level of significance of the residual effects. This VEC assessment is completed as outlined in the methodology as presented in Section 3.

Table 6-1: Potential Linkages of Project and the Environment.

	Site Preparation and Construction								Operation and Maintenance			Decommissioning		
	Clearing and Grubbing	Access Road and Laydown Area	Turbine Foundation	Power Pole and Line & U/G Electrical	Crane Pad Construction	Turbine Installation	Commissioning	Accidents and Malfunctions	Turbine Operation	Inspection and Maintenance	Accidents and Malfunctions	Infrastructure Demolition	Site Reclamation	Accidents and Malfunctions
Physical VECs														
Ambient air	•	•			•			•				•		•
Ground and Surface Water	•	•	•	•				•			•	•	•	•
Ambient noise	•	•	•	•	•		•		•			•	•	
Ambient light						•			•					
Biophysical VECs														
Wetlands / Watercourses	•	•			•			•	•					•
Fish and Fish Habitat	•	•						•			•			•
Migratory and breeding birds	•	•			•	•			•				•	

	Site Preparation and Construction								Operation and Maintenance			Decommissioning		
	Clearing and Grubbing	Access Road and Laydown Area	Turbine Foundation	Power Pole and Line & U/G Electrical	Crane Pad Construction	Turbine Installation	Commissioning	Accidents and Malfunctions	Turbine Operation	Inspection and Maintenance	Accidents and Malfunctions	Infrastructure Demolition	Site Reclamation	Accidents and Malfunctions
Bats									•					
Flora	•	•			•								•	
Wood Turtle	•	•			•				•		•		•	
Mainland Moose	•	•			•						•		•	
Socio-economic VECs														
Property Value & Land use	•	•				•			•		•			
Aboriginal resources / uses	•	•	•	•									•	
Archaeological resources / uses	•	•	•	•									•	
Vehicular traffic			•	•	•	•					•			
Telecommunications & Radar Communications									•					
Landscape aesthetics									•					
Public Health and safety								•			•			•
Local economy	•	•	•	•	•	•	•		•	•		•	•	

6.1 Assessment of Physical VECs

Ambient Air

Control and monitoring of ambient air quality is important in maintaining a healthy work, recreation and living environment. Based on the nature of activities that will take place at the Project site, ambient air quality has been identified as a VEC.

A significant environmental effect would result if a significant increase in contaminant concentration was determined a result of Project activities.

Boundaries – Spatial boundaries include the Project site for over all vehicular emissions but also focusing on gravel access roads up to the WTGs for fugitive dust. The temporal boundary focuses on the Project construction and decommissioning phases during high vehicular traffic activities from machinery and trucks.

Table 6-2: Potential impacts and proposed mitigative measures for ambient air.

Potential Impacts on Ambient Air	Proposed Mitigative Measures
Local air quality may be affected through fugitive dust from access roads during construction and decommissioning	• Fugitive dust during dry weather conditions may be controlled with the application of water.
Local air quality may be affected through tailpipe emissions from construction vehicles and machinery	• All vehicles and machinery will comply with current emission standards and will be used efficiently, minimizing distances travelled whenever possible.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to ambient air.

Significance of Residual Effects – A decrease in ambient air quality is determined to be negligible; fugitive dust will be eliminated through mitigative measures and vehicle emissions will comply with current emission standards. Therefore, the significance of residual effects on ambient air is to be considered negligible.

Ground and Surface Water

Management of ground and surface water quality is important as they are an integral aspect of a diverse ecosystem and functional ecology. Some dwellings in this area rely on well water; therefore ground and surface water are also directly related to human health for this Project. Wetlands and watercourses have been identified at the Project site and are assessed in detail in Section 6.2 under wetlands and watercourses. As a result, ground and surface water quality and quantity have been identified as a VEC.

A significant environmental effect would result if a considerable change to ground or surface water quantity or quality is identified as a result of project activities.

Boundaries – Spatial boundaries include the ground and surface water at the Project site as well as any water bodies and watercourses that are supplied by the ground and surface water. Temporal boundaries are focused on the construction and decommissioning phases but include all phases of the Project in the unlikely event of an unplanned release.

Table 6-3: Potential impacts and proposed mitigative measures for ground and surface water.

Potential Impacts on Ground and Surface Water	Proposed Mitigative Measures
Vegetation clearing, grubbing, ground stripping, excavation and machinery traffic during the construction of the WTG pads and access road might induce a change in hydrology or sediment input into ground and surface water.	• A minimum setback distance will be adhered to of 30m + blade length (76m) between the wind turbine and all wetlands • Efforts will be made to design the access road such that it does not interfere with a watercourse, water body or drainage channel; • Where possible, clearing shall take place in the winter months on frozen ground; • Erosion control strategies (ie. Straw bales and geo-textiles) will be outlined in the Erosion and Sedimentation Control Plan hopes to maintain baseline water quality conditions in the watercourses and wetlands at the site; and • Where water must be pumped out of excavation pits, there will not be a discharge into a wetland, watercourse or defined channel. If pumped water contains total suspended solids (TSS) the water will be pumped to vegetated land with gentle slope to allow sediment to filter, or filtered before release with a filter bag.
Exposure or accidental spillage of hazardous materials such as fuel, oils and hydraulic fluids has potential to contaminate ground water supplies during construction, operation and decommissioning phases.	• Equipment shall be in good working order and maintained so as to reduce risk of spill/leaks and avoid water contamination; • Spill response kits will be provided on site to ensure immediate response to a potential waste release; and • Routine maintenance, refuelling and inspection of machinery will be performed off-site whenever possible.

Potential Impacts on Ground and Surface Water	Proposed Mitigative Measures
Vehicular traffic during decommissioning might induce a change in hydrology or sediment input into ground and surface water.	• Efforts will be made such that the access road does not interfere with a watercourse, water body or drainage channel; • Erosion control strategies (ie. Straw bales and geo-textiles) will be outlined in the Erosion and Sedimentation Control Plan hopes to maintain baseline water quality conditions in the watercourses and wetlands at the site; and • Used oil filters, grease cartridge containers and other products associated with equipment maintenance shall be collected and disposed of in accordance with regulatory guidelines.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to ground and surface water.

Significance of Residual Effects – After employing the proposed mitigative strategy, should any sedimentation and/or erosion occur it will be temporary, of small magnitude and contained. While any direct release into ground or surface water would be a negative effect, it will be of small magnitude, of short duration and local. The significance of residual effects on ground and surface water is to be considered negligible.

Ambient Noise

Noise is defined as a sound, especially one that is loud, unpleasant or that causes disturbance. The Project poses two issues with noise pollution, which could affect local residents. Noise from the construction and decommissioning phase, as well as noise from the WTG operation is to be expected. As a result, ambient noise has been identified as a VEC.

A significant environmental effect would result if a considerable change in the ambient noise was found to be the result of project activities.

Boundaries – The spatial boundary is the area in which the noise impact study was conducted; this being a 3,500 m radius from the WTG location. The temporal boundary includes all Project activities from site preparation, construction, and operation to decommissioning.

Table 6-4: Potential impacts and proposed mitigative measures for ambient noise.

Potential Impacts on Ambient Noise	Proposed Mitigative Measures
During construction and decommissioning phases the ambient noise sound pressure levels will be affected as a result of the use of equipment and machinery such as excavators, dump trucks and bulldozers. Elevated noise levels can disturb fauna and local residents.	• Noise impact will be limited by restricting construction and decommissioning activities to daytime hours when feasible; • Health Canada recommends the long-term average day-night sound level (Ldn) be below 57 db(A) at the closest residence. An Ldn of 57 db(A) is expected to be within the threshold for widespread complaints for construction noise. (USEPA, 1974).
Elevated sound pressure levels will be observed during operation from the nacelle, which is 98 m above ground level.	• A noise impact assessment has been conducted to predict a 'worst case scenario' sound pressure level that can be expected at the surrounding dwellings; • The turbine locations have been sited in order to exceed Provincial wind turbine noise guidelines • The wind turbines chosen for the project incorporate advanced noise reduction technologies in order to mitigate noise generated by the moving blades. • By minimizing grubbing and clearing, flora on the Project site will aid in attenuation of noise produced from the WTG as perceived by local receptors.
Infrasound from wind turbines.	• Infrasound from wind turbines is not a concern given the distance the wind turbines are located in relation to homes and dwellings.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to ambient noise. The Ontario noise guidelines for wind farms require an adjacent wind farm within 5 km of the proposed wind farm to be included in the noise assessment. The Amherst Wind Farm located on the marsh is 7.5 km from the Project site it was not included in the noise assessment. (Ontario, 2008)

Significance of Residual Effects – Elevated SPLs caused by construction and decommissioning phases will be temporary, during the day and short term. Noise production from the WTG during operation has been mitigated by setback distances and confirmed by a noise impact assessment. The Project is not anticipated to have any significant residual environmental effect on the ambient noise levels. While any

effect on ambient noise will be negative, the significance of residual effects on ambient noise is to be considered negligible.

Ambient Light

There are three attributes associated with the Project that have potential to cause an impact on ambient lighting; lighting during night time construction activities, WTG lighting, and shadow flicker are expected to contribute to ambient lighting. By employing the proposed mitigation strategy, the effect of the Project on ambient lighting can be considered minor.

A significant environmental effect would result if a considerable change in the ambient light was found to be the result of project activities.

Boundaries – The spatial boundary is the area in which the noise impact study was conducted; this being a 3,500 m radius from the WTG location. The temporal boundary is focused on the operation phase of the WTG but also includes the turbine installation phase of construction.

Table 6-5: Potential impacts and proposed mitigative measures for ambient light.

Potential Impacts on Ambient Light	Proposed Mitigative Measures
During the night time, lighting will be seen atop some of the WTG, depending on the WTG layout.	• LED lighting will be used to minimize light throw; • Only the minimum amount of pilot warning and obstruction avoidance lighting will be used; • Only lights with short flash durations and the ability to emit no light during the 'off phase' of the flash (i.e. as allowed by strobes and modern LED lights) will be installed on WTG structures; and • Lights will operate at the minimum intensity and minimum number of flashes per minute (longest duration between flashes) allowable by Transport Canada.
Shadow flicker may occur during certain weather conditions and times of the year.	• The potential negative effect of shadow flicker has been mitigated at the design stage through responsible turbine siting; and • Compliance with industry standard guidelines on shadow flicker. All dwellings will, in a worst case scenario experience less than 30 hours of shadow flicker per year and 30 minutes of shadow flicker on the worst day.

Potential Impacts on Ambient Light	Proposed Mitigative Measures
Lighting during night time construction activities such as turbine installation.	• Construction activities will be limited to the day time when possible. The turbine may be erected during the evening as the activity must be completed when the wind is less than 4 m/s. These conditions are commonly seen in the early evening.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to ambient light.

Significance of Residual Effects – Annoyance during project construction from work lighting, if necessary, will be temporary and of short duration. Lighting concerns from residents during operations such as shadow flicker and WTG lighting is expected to be limited, as mitigation measures were employed during site design. Therefore, while any effect on ambient light will be negative, the significance of residual effects on ambient light is predicted to be negligible.

6.2 Assessment of Biophysical VECs

Wetlands / Watercourses

Management of wetlands and watercourses is an important and integral aspect of maintaining a diverse ecosystem. The Projects impact on ground and surface water quality and quantity as assessed in Section 6.1 was predicted to be minor in terms of significance of environmental effect. While the quality and quantity of ground and surface water is important in terms of ecological functionality of wetlands and watercourses the Project may also interact with wetlands and watercourses in terms of direct alteration.

As discussed in Section 4.1.3, the WTGs have been re-located a minimum of 30 m plus blade length (76 m total) from the identified wetlands and watercourse. As a result of the wetland and watercourse surveys identifying numerous water features at the Project site, wetlands and watercourses have been identified as a VEC. The mitigation sequence of avoidance, minimization of impact and compensation as detailed by NSE's Wetland Conservation Policy will be followed (NSE, 2011).

A significant environmental effect would result if a considerable change to wetlands and watercourses was the result of project activities.

Boundaries – Spatial boundaries are limited to works associated with the Project focusing on the access road and WTG locations. The temporal boundary focuses on Project construction but also includes operation and decommissioning for the unlikely event of an accident or malfunction.

Table 6-6: Potential impacts and proposed mitigative measures for wetlands / watercourses.

Potential Impacts on Wetlands / Watercourses	Proposed Mitigative Measures
During the construction phase, possible impacts to wetlands may arise from clearing, grubbing, infilling and excavation of the soil needed for constructing the access road. Such activities might induce silt run-off, alter flow into the wetlands or see them become repositories of significantly increased water flow, nutrients or sediments.	• Avoidance of all wetlands and locating turbines at least 76m from delineated wetlands; • Two wetland and watercourse field surveys have been completed to date to ensure wetlands have not been missed; • In wetlands associated with sensitive water crossings, grubbing shall be minimized by the placement of geo-textile; • Construction of the access road will attempt to create a buffer surrounding the wetland; • NSE will be continually consulted throughout the wetland and watercourse alteration process; and • The Environmental Management Plan will include all Provincial and Municipal regulations as well as all conditions determined by the Nova Scotia Wetland Alteration approval.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to wetlands and watercourses.

Significance of Residual Effects – The Project will be continually optimized around the access road design constraints to avoid direct alteration of wetlands and watercourses. The WTGs have been located such that a minimum 76 m buffer (blade length + 30 m) exists between each WTG and any wetland. NSE will be provided with additional detail and all work will be completed as per Provincial requirements. Direct alteration is expected and will follow NSE's Wetland Conservation Policy (NSE, 2011). Compensation will be completed as required under the Nova Scotia Wetland Conservation Policy. The significance of residual effects on wetlands and watercourse is predicted to be minor.

Fish and Fish Habitat

Alteration of freshwater environments such as the potential watercourse alteration proposed for the proposed access road may be required; however it is not expected to impede any fish habitat on the Project site. The wetlands and watercourse survey identified all wetlands on the Project site as swamps or marshes, therefore not providing a suitable environment for fish habitat. The Proponent expects the significance of residual effects on fish and fish habitat to be negligible.

Migratory and Breeding Birds

Throughout the construction, operation and decommissioning of a wind farm the potential negative impacts can be classified into four categories: collision, displacement due to disturbance, barrier effects, and habitat loss. As a result, migratory and breeding birds have been identified as a VEC. The Proponent will comply with the *Migratory Bird Convention Act* at all times and for all Project related activities.

A significant environmental effect would result if a considerable change to migratory and breeding birds was the result of project activities.

Boundaries – The spatial boundaries include the area in that the WTG will be located, also including pathways and locations that are frequented by birds. The temporal boundary is all phases of the Project.

Table 6-7: Potential impacts and proposed mitigative measures for migratory and breeding birds.

Potential Impacts on Migratory and Breeding Birds	Proposed Mitigative Measures
During construction (clearing/grubbing) some vegetation might be cleared that may be habitat to some migratory birds.	• The Proponent will endeavor to conduct construction activities such as clearing and grubbing during a time period that does not coincide with the time period in which migratory birds would possibly be in the area.
During operation there is a possibility that migrating birds could collide with the WTG.	• A follow up avian mortality survey will be conducted after the WTG commissioning and appropriate actions will be taken in consultation with NSDNR and CWS should there be a significant negative impact to migration flyways; and • 1 – 2 bird mortalities per year, per turbine at Natural Forces other wind farms have been observed.
Birds may alter their migration flyways and/or local flight paths to avoid WTG.	• A follow up avian mortality survey will be conducted after the WTG commissioning and appropriate actions will be taken in consultation with NSDNR and CWS should there be a significant negative impact to migration flyways.

Potential Impacts on Migratory and Breeding Birds	Proposed Mitigative Measures
Fog events can impair avian visibility, increasing the likelihood of mortality from collision with WTG.	• Environment Canada climate database has been consulted to predict the rate of fog occurrence; • An annual average of 2 % fog is observed at a weather station in close proximity to Project site; and • Instructions will be given to wind farm maintenance staff to ensure all work lights are turned off upon leaving the site particularly during foul weather events.
The Project footprint will cause a loss of habitat for breeding and migratory birds.	• Desktop and field studies conducted suggest that no more than 1.7 hectares will be considered a loss of habitat. This is considered to have no negative impact on migratory and breeding birds.
Lighting on turbines can result in adverse impacts on birds. The Proponent recognizes that nocturnal migrant and night-flying seabirds are the birds most at risk of attraction to lights.	• Only the minimum amount of pilot warning and obstruction avoidance lighting will be used; • Only lights with short flash durations and the ability to emit no light during the 'off phase' of the flash (i.e. as allowed by strobes and modern LED lights) will be installed on tall structures; • Lights will operate at the minimum intensity and minimum number of flashes per minute (longest duration between flashes) allowable by Transport Canada; • Instruction will be given to wind farm maintenance staff to ensure all work lights are turned off upon leaving the site particularly during foul weather events; and • A follow up avian mortality survey will be conducted after the wind farm commissioning, and appropriate actions will be taken in consultation with NSDNR and CWS should there be a significant negative impact to night migrants.
There will be an increase in habitat when the Project site is reclaimed at the end of the 20 year project lifetime.	• N/A – no mitigation measures necessary for a positive potential impact.

Potential Impacts on Migratory and Breeding Birds	Proposed Mitigative Measures
When the WTG are removed there will no longer be the potential barrier effect impeding flyways or local flight paths.	• N/A – no mitigation measures necessary for a positive potential impact.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to migratory and breeding birds.

Significance of Residual Effects – Disturbance of bird habitat during construction will be unlikely to occur by employing the proposed mitigation measures. It is expected that the mortality rate of birds from collision or habitat loss during Project operation, if at all, will be low. Monitoring for bird mortality during operation will verify the effect the Project has on migratory and breeding birds. While not all phases of the Project are negative, construction and operation phases pose potential for negative impact. With the proposed mitigation measures employed, the significance of residual effects on migratory and breeding birds is predicted to be minor.

Bats

Throughout the construction, operation and decommissioning of a wind farm the potential negative impacts can be classified into two categories: collision and habitat disturbance. As a result, bats have been identified as a VEC.

A significant environmental effect would result if a considerable change to bats was the result of project activities.

Boundaries – The spatial boundaries include the area in that the WTG will be located. The temporal boundary is all phases of the Project.

Table 6-8: Potential impacts and proposed mitigative measures for migratory and breeding birds.

Bats	Proposed Mitigative Measures
Clearing and construction activities have the potential to cause disturbance to bat habitat.	• The project site has been designed to make use of previously cleared land. This reduces the ecological impact of the project footprint and minimizes the potential impact to bat habitat.

Bats	Proposed Mitigative Measures
During operation there is a possibility that migrating birds could collide with the WTG.	• A follow up bat mortality survey will be conducted after the WTG commissioning and appropriate actions will be taken in consultation with NSDNR and CWS should there be a significant negative impact to bats; and • A mitigation scenario for this site may involve increasing the rotor cut-in speed from 2 m/s to 5 m/s on all three turbines, from half hour before sunset to half hour after sunrise.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to bats.

Significance of Residual Effects – Disturbance of bat habitat during construction will be unlikely to occur by employing the proposed mitigation measures. It is expected that the mortality rate of bats from collision or habitat loss during Project operation, if at all, will be low. Monitoring for bat mortality during operation will verify the effect the Project has on bats. The proposed curtailment scenario may be implemented if a significant amount of bat mortality is observed. While not all phases of the Project are negative, construction and operation phases pose potential for negative impact. With the proposed mitigation measures employed, the significance of residual effects on bats is predicted to be negligible.

Flora

Information collected during a desktop review and a field survey to ensure that all habitat types were surveyed. The field survey revealed four major habitat types: regenerating forest, mature forest, clear-cut and wetlands. In an effort to preserve local flora species and to ensure flora species of conservation interest remain unharmed, flora has been identified as a VEC.

A significant environmental effect would result if a considerable change to flora was the result of Project activities.

Boundaries – The spatial boundary is the entire Project site. The temporal boundary includes the construction phase focusing on clearing, grubbing and building the access road, WTG crane pads and foundations, as well as the decommissioning phase focusing on site reclamation.

Table 6-9: Potential impacts and proposed mitigative measures for flora.

Potential Impacts on Flora	Proposed Mitigative Measures
Clearing and grubbing will result in the disturbance of flora.	• There will be an approximate land/habitat loss of 1.7 Hectares attributable to the construction phase as determined by desktop and field studies. By using existing roads this area has been reduced from 4.0 hectares. This will minimize the impact on flora and fauna; • The access road have been optimized to make use of existing roads at the Project site to reduce the amount of flora to be cleared; and • Location of the access road will be optimized to reduce footprint and to avoid sensitive areas where feasible.
There is a risk of introducing invasive species through plant matter attached to construction equipment	• Construction equipment will be cleaned prior to transportation and use to ensure that no plant matter is attached to the machinery.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to flora.

Significance of Residual Effects – The Project will decrease the flora footprint approximately 1.7 hectares. While the construction phase presents potential for negative impact, once the decommissioning phase has started, land reclamation will restore the Project site to its previous state. With the proposed mitigation measures employed, the significance of residual effects on flora is predicted to be minor.

Wood Turtle

Through consultation with NSDNR the Wood Turtle *(Glyptemys insculpta)* was identified to potentially reside in suitable habitat approximately 2km south of the Project site. As the wood turtle is considered a Species at Risk, a significant environmental effect would result if a considerable change to wood turtle population or wood turtle habitat was the result of Project activities.

Boundaries – The Project boundary is the entire Project site. The temporal boundary includes the construction and operation phases.

Table 6-10: Potential impacts and proposed mitigative measures for Wood Turtle.

Potential Impacts on Wood Turtle	Proposed Mitigative Measures
Wood Turtle habitat loss, fragmentation and disturbance maybe occur as a result of the Project.	• Apply Special Management Practices when relevant to site activities as outlined in NSDNR Wood Turtle SMP publication; • Minimizing the total project footprint by utilizing existing access roads ;Avoidance of areas of high quality and important habitat; and • SMP recommendations will be included in the Project's environmental management plan.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to the wood turtle.

Significance of Residual Effects – Thorough desktop and field studies have been conducted to identify fauna that may be present at the Project site. Presence of wood turtle at the Project site is low to nonexistent; combined with the detailed mitigative measures, the significance of residual effects on fauna is predicted to be negligible.

Moose

Through consultation with NSDNR the mainland moose was identified as a species of interest. As the wood turtle is considered a Species at Risk, a significant environmental effect would result if a considerable change to moose population or habitat was the result of Project activities.

Boundaries – The Project boundary is the entire Project site. The temporal boundary includes the construction and operation phases.

Table 6-11: Potential impacts and proposed mitigative measures for Moose.

Potential Impacts on Moose	Proposed Mitigative Measures
Mainland moose habitat loss, fragmentation and disturbance maybe occur as a result of the Project.	• Apply Special Management Practices when relevant to site activities as outlined in NSDNR mainland moose SMP publication; • Minimizing the total project footprint by utilizing existing access roads ;Avoidance of areas of high quality and important habitat; and • SMP recommendations will be included in the Project's environmental management plan.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to mainland moose.

Significance of Residual Effects – Thorough desktop and field studies have been conducted to identify fauna that may be present at the Project site. Presence of moose on the Project site is low; combined with the detailed mitigative measures, the significance of residual effects on moose is predicted to be negligible.

6.3 Assessment of Socio-economic VECs

Property Value & Land Use

The proposed ACWF makes use of three land parcels outside of Amherst, in the Municipality of Cumberland County. The lands are privately owned and have been leased to the Proponent for the purpose of developing the proposed ACWF. Lands surrounding the Project land parcels are rural residential and agricultural properties that consist of year round and seasonal homes. There are 314 dwellings within 2,500 m of the Project. As a result land use has been identified as a VEC

A significant environmental effect would result if a considerable change to land use, or property devaluation was the result of project activities.

Boundaries – The spatial boundaries proposed WTG locations. The temporal boundary includes all phases of the Project including construction, operation and decommissioning.

Table 6-12: Potential impacts and proposed mitigative measures for property value & land use.

Potential Impacts on Property Value & Land Use	Proposed Mitigative Measures
Public concern that property value may decrease as a result of the Project	• Recent real estate value studies have consistently determined no correlation between proximity to wind farms and property devaluation (Canning et. al., 2010); and • Education through public consultation can be effective in providing factual, relevant information to alleviate the concerns of local residents.

In 2010 a study in the Municipality of Chatham-Kent, Ontario was prepared to assess the effects of wind energy on real estate values. This report was prepared in accordance with the *Canadian Uniform Standards of Professional Appraisal Practice* for the APPRAISAL INSTITUTE OF CANADA (Canning et al., 2010). The report is widely recognized in the wind industry as a thorough study and demonstrates what many other studies also indicate. The study found that it was highly unlikely that a relationship exists between wind farms and the market values of rural residential real estate. (Canning et. al., 2010)

A recent study by the University of Guelph analyzed more than 7,000 home and farm sales that occurred between 2002 and 2010 in Melancthon Township, Ontario, which saw 133 turbines erected between 2005 and 2008. Melancthon Township is of comparable landscape to that of the proposed Project site, being mainly residential and farm properties. Of the 7,000 homes and farms, 1,000 were sold once, and some multiple times. Co-authors, Richard Vyn and Ryan McCullough conclude that the turbines in question have not impacted the value of the surrounding properties. Further, the nature of the results, which indicate a lack of significant effect, is similar across both rural residential properties and farm properties Vyn & McCullough, 2014).

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to property value and land use.

Significance of Residual Effects – The significance of residual effects on property value and land use is expected to be negligible.

Aboriginal Resources / Uses

Desktop and field studies have been completed as part of a Mi'kmaq Ecological Knowledge Study to promote a strong relationship between the Proponent and the Mi'kmaq population. Focusing on vegetation and fauna the study identified any species that has significant importance for use of traditional medicine, food, clothing or other living necessities.

A significant environmental effect would result if a considerable change to Aboriginal resources / uses was the result of Project activities.

Boundaries – The spatial boundary includes all areas of the Project site and an area spanning 10 km radius from the Project site. The temporal boundary focuses on the early construction phases of the Project when clearing and grubbing, access road construction and turbine pad construction will take place.

Table 6-13: Potential impacts and proposed mitigative measures for aboriginal resources / uses.

Potential Impacts Aboriginal Resources / Uses	Proposed Mitigative Measures
Potential impact on culturally significant plant species and general habitats.	• Mi'kmaq ecological knowledge study was conducted to identify potential for valued aboriginal resources; • Through roundtable discussions with Mi'kmaq right holders it was determined that the Projects impact on culturally significant flora and fauna species is negligible; • The Proponent will maintain communications with the local Mi'kmaq communities; and • Location of the access roads may be optimized to reduce footprint and to avoid areas of cultural significance.
Direct impact to Mi'kmaq artifacts during construction activities, such as blasting and excavation.	• If an artifact or object of potential Aboriginal significance is thought to have significance is discovered during project activities the KMK will be contacted immediately along with other appropriate individuals and organizations to determine a suitable method of mitigation.
The Project is being developed in partnership with the 13 First Nations of Nova Scotia	• The 13 First Nations in Nova Scotia will see an economic benefit from revenues of selling the energy produced by the wind farm to NSPI.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to wetlands and watercourses.

Significance of Residual Effects – The significance of residual effects on land use is expected to be negligible. In the unlikely case that an artifact with potential interest/value to Mi'kmaq heritage is discovered appropriate individuals/ organizations will be contacted immediately.

Archaeological Resources / Uses

The results of the archaeological resource impact assessment indicated that the lack of navigable waterways and a landscape unsuitable to agriculture and settlement significantly diminish the likelihood of archaeological resources at the Project site. As a result, it is not expected that a significant adverse environmental effect is to occur.

A significant environmental effect would result if a considerable change to archaeological resources was the result of project activities.

Boundaries – The spatial boundary for this VEC is the entire Project site. The temporal boundary is the construction phase where ground disturbance is likely to occur.

Table 6-14: Potential impacts and proposed mitigative measures for archaeological resources.

Potential Impacts on Archaeological Resources	Proposed Mitigative Measures
Direct impact to cultural resources during construction activities, such as blasting and excavation.	• The Archaeological resource impact study concludes the Project site is of low potential for significant archaeological resources for First Nations and Euro-Canadians; • Avoidance is the preferred method of mitigation in all instances where archaeological resources are present; and • Should archeological resources be encountered, all activities are to stop and the Coordinator of Special Places will be contacted immediately to determine a suitable method of mitigation.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to archaeological resources.

Significance of Residual Effects – The significance of residual effects on archaeological resources is expected to be negligible.

Vehicular Traffic

The Project will be accessed via John Black Road. During construction of the access road and WTG foundations, there will be an increase in truck traffic on the roads leading to and from the Project site. During delivery of the WTG components, delivery of oversized loads may slow traffic flow.

Of these predicted vehicle movements, approximately 35 will be oversized loads associated with the delivery of WTG component parts (towers, blades, and nacelles) and the cranes required for erection. These deliveries are anticipated within months 4 through 6 of the project construction schedule and subject to movement orders as agreed upon with governing authorities.

Boundaries – The spatial boundaries are all roads that will be used through the construction phase of the Project and the Project site. The temporal boundaries are those associated with the construction phase of the Project.

Table 6-15: Potential impacts and proposed mitigative measures for vehicular traffic.

Potential Impacts on Vehicular Traffic	Proposed Mitigative Measures
Vehicular traffic may increase as a result of construction activities and transportation of WTG components to the Project site.	• Every effort will be made to ensure that oversized loads are delivered during times of lowest traffic to mitigate traffic jams.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to vehicular traffic.

Significance of Residual Effects – The time frame in which an impact to traffic may occur will be temporary, and combined with the proposed mitigative measure of avoiding high traffic times; the significance of residual effects on vehicular traffic is expected to be negligible.

Telecommunication and Radar Communications

With the installation of WTGs there is the possibility that the turbine rotor may interfere with the transmission and receiving of telecommunication signals. The Proponent has consulted with NavCanada, Department of Nation Defence and Transport Canada to mitigate potential negative impacts on telecommunications and radar communications. A desktop study for electromagnetic interference was conducted to identify potential of impact on microwave link communication. A third party consultant was engaged to verify the desktop study and to conduct a field study to confirm desktop findings. As a result, telecommunication and radar communication has been identified as a VEC.

A significant environmental effect would result if a considerable change to telecommunication and radar communications was the result of project activities.

Boundaries – The spatial boundary consists of the local area including the proposed WTG and neighbouring communication infrastructure. Temporal boundaries include the operation phase of the Project.

Table 6-16: Potential impacts and proposed mitigative measures for telecommunications and radar communications.

Potential Impacts on Telecommunications	Proposed Mitigative Measures
WTG operation may interfere with telecommunication and/or radar communication infrastructure	• Consultation was completed as recommended by CanWEA and Radio Advisory Board of Canada's guidance document – *Technical Information and Guidelines on the Assessment of the Potential Impact of Wind Turbines, on Radio Communications, Radar and Seismoacoustic Systems*; • A third party consultant was engaged by the Proponent to conduct and desktop and field study assessment of the potential for electromagnetic interference from the Project. This was used in micro siting WTGs and as a result no impacts are expected; • A desktop EMI assessment was conducted by the proponent in line with the Radio Advisory Board of Canada guidelines. The results of the assessment showed that the turbine will not interfere with the telecommunication links of nearby towers; • Application process with NAV Canada's Land Use Proposal Submission Form to ensure that the Project does not pose any hazard to the navigational systems of NAV Canada; and • Transport Canada and Department of National Defence has also been consulted.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to telecommunications and radar communications.

Significance of Residual Effects – Based on consultation and the third party study with the appropriate authorities, no impedance on communication infrastructure is to be expected. As a result, the significance of residual effects on telecommunication and radar communication is expected to be negligible.

Landscape Aesthetics

The proposed WTGs are located outside of the town of Amherst amongst agricultural land; turbine pad elevations are approximate, 50, 51 and 57 m above sea level. A visual impact assessment was completed by collecting photographs from high-traffic areas around the Project site. Photomontages were created at two high traffic areas using WindFarm software. The photomontages on John Black Road and Pumping Station Road produce a realistic projection of what the WTG will look like superimposed on the Project landscape. Since the Project site is a rural, scenic area landscape aesthetics has been identified as a VEC.

A significant environmental effect would result if a considerable change to landscape aesthetics was the result of project activities.

Boundaries – The spatial boundary is defined as the areas surrounding the Project site in which the WTGs are visible. The temporal boundary is the Project operation phase.

Table 6-17: Potential impacts and proposed mitigative measures for landscape aesthetics.

Potential Impacts on Landscape Aesthetics	Proposed Mitigative Measures
Community members may have a negative reaction towards the aesthetics of the WTGs.	• The Proponent considered landscape aesthetics when deciding on specific siting of the WTGs; • The paint on the WTGs will be selected so that they do not contrast sharply with the environment; and • By-Laws regarding responsible siting of WTG were followed to minimize the potential impact on the landscape aesthetics during WTG siting;

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to visual landscape.

Significance of Residual Effects – The perception of landscape aesthetics is a subjective matter. The Proponent recognizes the development of the proposed WTGs may have a negative effect in the perception of the community. It is possible that the negative reaction may be a result of a change in the landscape and may diminish over time. While landscape aesthetics will be altered with the

development of the ACWF, the significance of residual effects on landscape aesthetics is expected to be negligible.

Public Health and Safety

Public health and safety are of the greatest concern in the development of a Project such as the ACWF. During the construction, operation and decommissioning phase the protection of workers and the public's health and safety is protected under the provincial Occupational, Health and Safety Act (OHS). It is best practice to consider a 'worst case scenario' when developing a health and safety policy / plan, as a result, health and safety has been identified as a VEC.

A significant environmental effect would result if a considerable change to health and safety was the result of project activities.

Boundaries – The spatial boundary includes the Project site and for the sake of ambient noise and ambient light, a 2.5 km radius from the WTG. The temporal boundaries include all phases of the Project.

Table 6-18: Potential impacts and proposed mitigative measures for health and safety.

Potential Impacts on Public Health and Safety	Proposed Mitigative Measures
During extreme cold weather events there is the potential for ice to build up and throw ice from the WTG blades.	• WTGs are equipped with ice-detection systems on each blade; • WTGs are designed to shut down in the case of ice-buildup; and • When ice is detected the blade has a heating element that will effectively melt the ice to mitigate ice-throw; and • Personal Protection Equipment (ie. hard-hats) will be worn when near the WTGs.
During extreme weather events, there is the potential for electrical fires within the turbine nacelle through lightning strikes.	• WTGs are equipped with lightning protection that, in the unlikely event of a lightning strike, will dissipate the lightning current to the ground.
Potential aviation hazard to low flying aircraft.	• Application process with NAV Canada's Land Use Proposal Submission Form to ensure that the Project does not pose any hazard to the navigational systems of NAV Canada.
Increase in vehicular traffic may have the potential to affect public safety.	• Every effort will be made to ensure that oversized loads are delivered during times of lowest traffic to mitigate road traffic.
Shadow flicker may affect human health.	• This potential impact has been addressed in the Ambient Light Section 6.1.

Potential Impacts on Public Health and Safety	Proposed Mitigative Measures
Noise impact may affect human health.	• This potential impact has been addressed in the Ambient Noise Section 6.1.
Potential for accidents and malfunctions pose a risk to workers and the public's health and safety;	• The OHS Act will be followed.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. No cumulative effects are expected to occur with respect to health and safety.

Significance of Residual Effects – Based on Project planning and design, the top priority has been health and safety. This is to make every reasonably possible effort to eliminate any negative potential impacts the Project may have on the public's health and safety. By following the proposed mitigative measures as well as regulatory guidelines pertaining to health and safety, the significance of residual effects on health and safety is expected to be negligible.

Local Economy

During the Project phases, there will be a significant amount of money spent within the town of Amherst, Cumberland County and Nova Scotia. During the development, the need for contractors and trades will be required and the Proponent will make every effort to utilize local companies to promote the local economy.

The COMFIT program will guarantee a "feed-in-tariff" that is a rate per kilowatt hour that the community owned Project is guaranteed for the 20 year power purchase agreement.

A significant effect would result if a considerable change to local economy was the result of project activities.

Boundaries – The spatial boundary is any area, business and individual that may observe a financial impact from the Project. The temporal boundary includes all phases of the Project.

Potential Impacts and Proposed Mitigative Measures – Potential positive impacts during the development phase of the Project include:

- Hiring local consultants; and
- Use of local services such as accommodations, restaurants and fuel.

Potential positive impacts during the construction and decommissioning phase of the Project include:

- Contracting construction work to local businesses;
- Use of local services such as accommodations, restaurant and fuel; and

- Municipal taxes being paid to the MoCC.

Potential positive impacts during the operation phase of the Project include:

- Use of local services such as accommodations, restaurant and fuel;
- Involvement of Nova Scotia residents in the CEDIF to invest in the Project;
- Municipal taxes being paid to the MoCC; and
- Long term contracts may be used in the operation and maintenance of the Project.

Cumulative Effects – As described in Section 2.9 the only other wind farm in the area is the Amherst Wind Farm located on the Tantramar Marsh 7.5 km northwest of the Project. Together the two wind farms will provide clean, renewable energy to regions within the Municipality of Cumberland County.

Significance of Residual Effects – The Proponent will, when appropriate make every effort to utilize local services and products, this promotes local economy, which is in line with the Proponents ideology of community based projects. The predicted effects of this Project on the local economy are positive and as a result of the municipal taxes, CEDIF and economic spinoff, the significance of residual effects on local economy is expected to be beneficial.

6.4 Effect of Environment on Project

Extreme Weather

Severe weather events could potentially damage WTG due to conditions exceeding the operational design of the WTGs. High winds, extreme temperatures and icing on blades all have the potential to shut down the WTGs. Extreme weather events that could occur in Cumberland County region, Nova Scotia region are listed in Table 6-19.

Table 6-19: Extreme events, associated effects and mitigation.

Weather Event	Effect	Mitigation
Extreme wind	Damage to blades	Automated control system would initiate shut down
Hail	Damage to blades	Appropriate WTG maintenance
Heavy rain and flooding	None anticipated	None
Heavy snow	Damage to WTG components	Automated control system would initiate shut down
Ice storms	Icing on blades resulting in potential ice throw	Automated control system would initiate shut down and heating system
Lightning	Potential for fires within nacelle of WTGs	Lightning protection system would conduct electrical surge away from nacelle
Seismic activity	None anticipated	None
Severe drought	None anticipated	None

Turbine Icing

Ice accumulation on WTG blades can occur during the winter months when the appropriate conditions of temperature and humidity exist, or during certain extreme weather conditions, such as freezing rain (Seifert et al., 2003). In the event that ice builds up on the WTG blades, there are two types of risks possible: the first is ice throw from an operating WTG, and the second is ice fall from a WTG that is not in operation.

When a WTG is in operation, it is assumed that ice may collect on the leading edge of the rotor blade and detaches regularly due to aerodynamic and centrifugal forces (Seifert et al., 2003). The distance that the ice will be thrown from the moving WTG blade will vary depending on the wind speed, the rotor azimuth and speed, the position of the ice in relation to the tip of the blade, as well as characteristics of the ice fragment.

In a Canadian study titled *Recommendations for Risk Assessments of Ice Throw and Rotor Blade Failure in Ontario* (LeBlanc et al., 2007) ice throw was investigated to determine the individual risk probability for an individual to be struck by ice thrown from an operating WTG. The following parameters and assumptions were used:

- Rotor diameter of 80 m;
- Hub height of 80 m;
- Fixed rotor speed of 15 RPM;
- Ice fragment is equally likely to detach at any blade azimuth angle and 3 times more likely from the blade tip than the rotor;
- Ice fragments have a mass of 1 kg and frontal area 0.01 square ms;
- All wind directions are equally likely; and
- Ever-present individual between 50 m and 300 m (dounut shaped buffer around WTG), individual equally likely in any given 1 square m within that area.

The statistical analysis found that individual risk probability for an individual is 0.000000007 strikes per year or, 1 strike in 137,500,000 years. For an individual to be ever-present in the defined area, this assumes that the individual would be outside during the unpleasant weather necessary for icing conditions. This analysis does not take into account the presence of trees that could provide shelter from potential ice throw (Seifert, H. Et al., 2003). The Enercon E92 has slightly different specifications than used in this example; however this should be used as general example to understand the risk probability of an individual being struck by ice throw.

As with trees, power lines masts and buildings, ice can accumulate on a stationary WTG, and will be eventually be released and fall to the ground. Depending on the rotor position of the stationary rotor, different fall distances along the current prevailing wind will occur (Seifert, H. Et al., 2003).

Potential Surface Water Impacts

Activities associated with the Project that can impact surface water resources include the development of gravel pits, road construction, stream crossings, concrete use and disposal, and petroleum products from WTGs and heavy ground moving. To mitigate such impacts, a Spill Contingency Plan will be enforced, as well as the Environmental Management Plan.

6.5 Summary of Impacts

Based on the completed VEC analysis, it has been determined that the Project activities are only expected to have minor negative effects on wetlands/watercourses, ambient noise, bats and migratory and breeding birds, while the local economy will see a beneficial impact. All other VECs are predicted to observe a negligible residual effect from the Project. Where a minor effect is predicted, monitoring and follow up initiatives should be considered. A summary of the VEC assessment is presented in Table 6-20, in terms of the following assessment criteria:

- Nature – positive (+), negative (-), or No impact where no impact is predicted;
- Magnitude – order of magnitude of the potential impact: small, moderate, large;
- Reversibility – reversible (REV) or irreversible (IRR);
- Timing – duration of impact, short for construction or decommissioning and long for Project operation or longer;
- Extent – spatial extent of the impact, local, municipal, provincial etc.; and
- Residual Effect – negligible, minor, significant, and beneficial or no impact as described in Section 3.4.

	Nature	Magnitude	Reversibility	Timing	Extent	Residual Effect
Ambient Air	-	small	REV	Short	Local	Negligible
Ground and Surface Water	-	small	REV	Short	Local	Negligible
Ambient Noise	-	small	REV	Long	Local	Negligible
Ambient Light	-	small	REV	Long	Local	Negligible
Wetlands / Watercourses	-	small	REV	Short	Local	Minor
Fish and Fish Habitat	-	small	REV	Short	Local	No Impact
Migratory and Breeding Birds	-	small	REV	Long	Local	Minor
Bats	-	small	REV	Long	Local	Negligible

	Nature	Magnitude	Reversibility	Timing	Extent	Residual Effect
Flora	-	small	REV	Short	Local	Minor
Wood Turtle	-	small	IRR	Long	Local	Negligible
Mainland Moose	-	small	IRR	Long	Local	Negligible
Property Value & Land Use	-	small	REV	Long	Local	Negligible
Aboriginal Resources / uses	-	small	IRR	Long	Local	Negligible
Archaeological Resource / uses	-	small	IRR	Short	Local	Negligible
Vehicular Traffic	-	small	REV	Short	Local	Negligible
Telecommunications & Radar Communications	-	small	REV	Short	Local	Negligible
Landscape Aesthetics	-	small	REV	Long	Local	Negligible
Public Health and Safety	-	small	IRR	Long	Local	Negligible
Local Economy	+	moderate	REV	Long	Provincial	Beneficial

Table 6-20: Summary of identified VECs.

7.0 Follow Up and Monitoring

The purpose of this section is to describe the follow-up ecological field surveys, management plans and consultation, which the proponent is committing to during the construction, operation and decommissioning phases of the Project.

7.1 Pre-construction/Construction

7.1.1 Avian

2015 Avian Radar & Acoustic monitoring

Throughout the remainder of the Development phase which is expected to run into late spring the proponent has committed to continue the radar and nocturnal acoustic avian monitoring program.

Further processing of autumns 2014 radar & acoustic data will be undertaken early next year and be incorporated into a revised report, which will be available on the project website. Spring 2015 radar and acoustic migration surveys will begin April 1st and continue through to early June. The spring migration data will be analysed and incorporated into a final report which will also be available to the public on the project website.

The proponent believes that furthering research into alternative avian survey methods such as Radar and Acoustic monitoring will not only lead to a greater understanding of site specific avian behavior, but also will lead to a more accurate prediction of migration pathways used by avian species throughout the Maritimes. This in turn will help the wind industry in siting wind farms away from known sensitive areas.

7.1.2 Bats

2015 early season monitoring

Field monitoring of the 2014 bat research program started on July 21st and continued until Oct 4th, well inside the prime seasonal bat activity window as recommended by NSDNR. Although the data captured during the 2014 season was a complete dataset and sufficiently characterized bat activity throughout the site, there may be value in continuing a monitoring program into 2015.

The results of the 2014 monitoring program indicated high activity of Hoary bats in the first few days of monitoring, specifically July 21st to 23rd. Due to this high activity early in the season it was recommended by Dr. Broders who conducted the survey to initiate further monitoring earlier in the 2015 season outside of the usual monitoring window.

The proponent is committing to conduct this further monitoring which will likely begin in early to mid-June 2015. The proponent will liaise with Dr. Borders and NSDNR in order to design the 2015 monitoring program in order capture the potential early season Hoary bat activity.

7.2 Post-Construction Monitoring

7.2.1 Avian

A post-construction monitoring plan will be developed and implemented in consultation with NSDNR, NSE and CWS. The avian plan will be constructed to understand the impacts on habitat and its suitability for birds for not less than two years from the time turbines become operational. This plan will typically involve point count surveys at various locations around the site as well as a mortality study.

Acoustic nocturnal monitoring

The proponent is investigating the use of further acoustic nocturnal migration surveys in conjunction with the mortality surveys. The purpose of using the acoustic monitoring is estimate bird and bat densities, and when combined with meteorological data, can help predict mortality caused by collisions with the wind turbines. In one paper by Korner-Nievergelt et al. (2013), it was shown that these predictions were found to be as accurate as or better than by using a carcass search method.

7.2.1 Bats

Turbine curtailment

Active turbine mitigation at wind farms can lead to a significant decrease in bat fatalities. The mitigation involves increasing the turbine rotor 'cut-in' speed, essentially preventing the rotor from spinning at low wind speeds when bats are most active.

A mitigation scenario for this site may involve increasing the rotor cut-in speed from 2 m/s to 5 m/s on all three turbines, from half hour before sunset to half hour after sunrise, during the months which showed high hoary bat migration activity in the 2014 and 2015 baseline surveys.

The Proponent will commit to active mitigation should the post construction carcass searches reveal higher than normal mortality levels of Hoary or other migratory tree bats on site. Currently, it is industry standard to conduct post construction carcass searches for at least two years at wind farms operating within the Province, and to forward on the results of those surveys to NSDNR and the Department of Environment. This practice is also most often mandated through conditions associated with Environmental Assessment approvals.

As there is already a mechanism in place to conduct post construction carcass monitoring, the Proponent will use this mechanism to review and assess the results of the post construction surveys. Should it be determined, in consultation with NSDNR and other bat researchers that in fact the wind farm is producing higher than normal bat fatalities, the Proponent, in collaboration with NSDNR and NSE will be open to adopt an active mitigation program, the ultimate aim of which is to reduce bat fatalities on site.

7.2.2 Ambient Noise

Referring to the VEC assessment in Section 6.2 the Project was assessed as having a minor significance of residual effects on ambient noise. As a result, a public input mechanism will be established to resolve issues pertaining to ambient noise levels.

7.3 Management Plan

Throughout the life of the Project, various management and contingency plans, as listed below, may be required to aid in the responsible development, construction and operation of the Project. These plans will be developed and implemented prior to construction of the ACWF and will explicitly outline the steps taken for different Project concerns.

It is anticipated that some or all of the following management plans will be required as the Project development matures.

Management Plan Requirements

- Environmental Management Plan;
- Erosion and Sedimentation Control Plan;
- Spill Contingency Plan;
- Decommissioning and Site Reclamation Plan; and
- Public Complaint Procedure.

A number of permits will be required during pre-construction, all of which are listed in Section 1.3.

7.4 Continuing Consultation

Consultation will continue throughout the life of the Project, during pre-construction, construction and post construction activities. During the registration and public review period of this Environmental Assessment document, the Proponent will be available within the community to answer questions and explain the content to community members. The Proponent will notify the community newspaper ads, admail invites, on the Project website and through personal invitations.

Website – www.amherstcommunitywindfarm.ca

Websites have proven to be an excellent vehicle for making project information available for the general public to access to stay up to date and informed on the progress of wind farm developments. The Proponent will continue to maintain the Project website and will post up to date information regarding the development, construction, operation and ongoing consultation activities.

The Project website also contains a "Have Your Say" page, which can be used to submit comments, questions and concerns directly to the Natural Forces.

Newsletters

Natural Forces has, and currently uses newsletters as a way of informing community members about project activities. Newsletters are sent periodically to provide residents and businesses in the area surrounding the project with an update of development, construction and operation updates.

Community Liaison Committee (CLC)

A CLC acts as an advisory body to a project proponent by providing input on existing or potential concerns the community may have with respect to the Project. CLCs have been used successfully to facilitate communication between the community and a project proponent.

A CLC typically consists of a few members of the community who have been nominated by the community to act as representatives on the CLC. Other members of the CLC may include First Nations, economic development organizations, municipal councillors and members of other community groups.

During previous public open houses and discussions with local community groups the Proponent has presented the opportunity to create a CLC. The Proponent will facilitate the formation of a CLC if interest is expressed by the community.

8.0 Closure

The Proponent wishes to develop the proposed Amherst Community Wind Farm with the intent of helping Nova Scotia meet its renewable energy regulations and targets.

Many adaptation and mitigation options can help address climate change; no single option is sufficient by itself. Substantial emissions reductions over the next few decades and a near zero emissions of carbon dioxide and other long-lived green house gasses by the end of the 21st century would be required to limit warming to below 2°C relative to pre-industrial levels. (IPCC, 2014) The Amherst Community Wind Farm represents an integral part of a global effort to reach these reduction targets.

This Environmental Assessment has been prepared in accordance with the guidelines set out by the Environmental Assessment and Approval Branch of the Nova Scotia Department of Environment. The scope of the EA was discussed in advance with Nova Scotia Department of Environment Environmental Assessment branch. Consequently, it is anticipated that this EA meets all criteria outlined by the Nova Scotia Environmental Assessment Act.

A thorough analysis of the Project components and activities has been carried out for the construction, operation and decommissioning phases of the Project. Baseline environmental characteristics of the region have been documented and Valued Environmental Components have been identified. Consultation has been undertaken with a wide variety of local stakeholders, right-holders, and government stakeholders to gauge the full range of impacts and concerns with regards to the Project. The impact of the Project on the local environment has been evaluated based on all of these criteria. Mitigative measures have been presented and adopted in an effort to reduce the significance of residual impact as a result of the Project's activities. Cumulative effects of the Project on the environment due to other regional Projects and activities have also been identified and assessed.

The following benefits would result due to the Amherst Community Wind Farm and are considered as advantages of the Project, these include:

- Production of emission-free energy, which will displace energy produced from dirty fossil fuels in Nova Scotia;
- Help Nova Scotia meet its renewable energy regulations and targets for 2015 and 2020.
- Help decrease anthropogenic induced climate change, which has been proven beyond a doubt to be putting our entire human civilization at risk.
- Increased revenue for the Municipality of Cumberland County through payment of annual property taxes by the Project Proponent;
- Increased revenue for local businesses due to activities surrounding the construction, operation and decommissioning phases of the Project;
- Creation of supplementary income and income diversity for local landowner;
- Creation of additional employment in the region during the entire Project life;

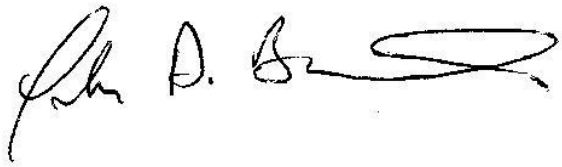
In conclusion, it is anticipated that through proposed mitigative measures the Amherst Community Wind Farm will have no significant residual effects on the physical, biophysical and socio-economic environment.

This Page Was Intentionally Left Blank

9.0 Company Signature

Table 9-1 below defines the concluding signature of this Environmental Assessment for Natural Forces Wind Inc.

Table 9-1: Signature Declaration

EA CONDUCTED BY:	Chris Veinot, Natural Forces Wind Inc. on behalf of: Mi'kmaq Wind4All Communities L.P.
PROPONENT:	Mi'kmaq Wind4All Communities L.P.
PROPONENT SIGNATURE:	 John Brereton, Director - Mi'kmaq Wind4All Communities L.P.
DATE:	December 10, 2014
CONTACT DETAILS	Chris Veinot cveinot@naturalforces.ca 1205 – 1801 Hollis Street Halifax, Nova Scotia B3J 3N4 Phone: 902 422 9663

This Page Was Intentionally Left Blank

10.0 Works Cited

ACCDC, Species at risk. (2012, November 22). Retrieved from http://www.accdc.com/SAR/maritime.htm

Arnette, Gruver, Hein. (March 2013a) Relating pre-construction bat activity and post-construction bat fatality to predict risk at wind energy facilities: a synthesis. Prepared for: The National Renewable Energy Laboratory.

Arnette, Hohnson, Erickson and Hein (March 2013b) A synthesis of operational mitigation studies to reduce bat fatalities at wind energy facilities in North America. Prepared for: The National Renewable Energy Laboratory.

Canning, Simmons, AACI, FRI, CMR, PLE (February 2010). Wind Energy Study – Effect on Real Estate Values in the Municipality of Chatham-Kent, Ontario.

CWS (Canadian Wildlife Service). 2007. Recommended protocols for monitoring impacts of wind turbines on birds. 33 pp.

Department of Natural Resources, (2009). *Mainland moose frequently asked questions*. Retrieved from website: http://www.gov.ns.ca/natr/wildlife/large-mammals/mmoosefaq.asp

DFO (Fisheries and Oceans Canada). 2010. *Blasting – Fish and Fish Habitat Protection.* Retrieved from: http://www.nfl.dfo-mpo.gc.ca/e0005469

Enercon, (2012). Design Basis E-92. Retrieved from website: http://www.enercon.de/en-en/

Environment act. *1994-95, c. 1, s. 1*.. (1994). Retrieved from Office of the Legislative Counsel, Nova Scotia House of Assembly, and © 2013 Crown in right of Nova Scotia website: http://nslegislature.ca/legc/statutes/envromnt.htm

Environment Canada, (2012). *National climate data and information archive: Canadian climate normals 1971-2000*. Retrieved from website: http://www.climate.weatheroffice.gc.ca/climate_normals/results_e.html?stnID=6486&autofwd=1

Environmental Assessment Regulations, (1995). Retrieved from: http://www.gov.ns.ca/just/regulations, REGS/envassmt.htm

HGC Engineering, 2006. Wind turbines and infrasound. Submitted to CanWEA. Retrieved from:

http://www.prowind.ca/downloads/Resources/CanWEA_Infrasound_Study_Final.pdf

IPCC, 2014: Summary for Policymakers. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

Kearney, John. (2012, November). Interview by Andy MacCallum [Personal Interview]. Lighting effects on migratory birds.

LeBlanc, Marc, Garrad Hassan. June 2007. Recommendations For Risk Assessments of Ice Throw and Rotor Blade Failure in Ontario; CanWEA Municipal issues and wind energy workshop.

MBBA (Maritime Breeding Bird Atlas). 2006. A guide to addressing wildlife species and habitats in an EA registration document. 8 pp.

McCunney et. Al., 2012. Wind Turbines and Health. *A critical review of the scientific literature.* From the Department of Biological Engineering (Dr. McCunney), Massachusetts Institute of Technology.

Ministry of the Environment, (2008). *Noise guidelines for wind farms*. Retrieved from Queen's Printer for Ontario website: http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/std01_079435.pdf

NOAA [National Oceanic and Atmospheric Administration], 1995: Surface weather observations and reports, Federal Meteorological Handbook No. 1, 94 p. [Available from Department of Commerce, NOAA, Office of the Federal Coordinator for Meteorological Services and Supporting Research, 8455 Colesville Road, Suite 1500, Silver Spring, MD, 20910.

NRCan, (2003). Environmental Impact Statement Guidelines for Screenings of Inland Wind Farms Under the Canadian Environmental Assessment Act.

NSDNR (Nova Scotia Department of Natural Resources). 2007. Recovery Plan for the Canada Lynx (Lynx Canadensis) in Nova Scotia. Retrieved from: http://www.gov.ns.ca/natr/wildlife/biodiversity/pdf/recoveryplans/LynxRecoveryPlan2007.pdf

NSDNR (Nova Scotia Department of Natural Resources). 2013. Nova Scotia Abandoned Mine Openings (AMO) Database: http://gov.ns.ca/natr/meb/links/amolinks.asp.

NSDNR (Nova Scotia Department of Natural Resources). 2012a. Nova Scotia Significant Species and Habitats Database: http://gov.ns.ca/natr/wildlife/habitats/hab-data/.

NSDNR, (Nova Scotia Department of Natural Resources). 2012b. Vulnerable Wood Turtle (*Glyptemys insculpta*) Special Management Practices. Retrieved from: http://www.novascotia.ca/natr/wildlife/habitats/terrestrial/pdf/SMP_Wood_Turtles.pdf

NSDNR (Nova Scotia Department of Natural Resources). 2012b. Wet Areas Mapping and Flow Accumulation Channels. Retrieved from http://novascotia.ca/natr/forestry/gis/wamdownload.asp.

NSDNR (Nova Scotia Department of Natural Resources). 2012c. Endangered Canada Lynx Special Management Practices. Retrieved from: http://novascotia.ca/natr/wildlife/habitats/terrestrial/pdf/SMP_Canada_Lynx.pdf

NSDNR (Nova Scotia Department of Natural Resources). 2012d. Endangered American Marten Special Management Practices. Retrieved from: http://novascotia.ca/natr/wildlife/habitats/terrestrial/pdf/SMP_American_Marten.pdf

NSDNR (Nova Scotia Department of Natural Resources). 2013. Species at Risk Overview. Retrieved from: http://novascotia.ca/natr/wildlife/biodiversity/species-list.asp

NSDNR (Nova Scotia Department of Natural Resources). 2013. Ecological Land Classification Data Layer. Retrieved from: http://gis4.natr.gov.ns.ca/website/nselcmap/viewer.htm

NSDNR (Nova Scotia Department of Natural Resources). 2013b. Wildlife & Birds of Nova Scotia Retrieved from: http://novascotia.ca/natr/wildlife/wns/wns7f.asp

NSDoE (Nova Scotia Department of Energy) Approved ComFIT Projects. Accessed June 2013: http://nsrenewables.ca/approved-comfit-projects-0

Nova Scotia Environment(2005) Guide to Addressing Wildlife Species and Habitat in an EA Registration Document. Retrieved from: http://www.gov.ns.ca/nse/ea/docs/EA.Guide-AddressingWildSpecies.pdf

NSE, (2009). A Proponents Guide to Environmental Assessment.

NSE, (2011). *Nova scotia wetland conservation policy*. Protected Areas and Wetlands Branch. Retrieved from website: http://www.gov.ns.ca/nse/wetland/docs/Nova.Scotia.Wetland.Conservation.Policy.pdf

NSE, (2012) *Vulnerable Wood Turtle (Glyptemys insculpta) Special Management Practices.* Retrieved from : http://novascotia.ca/natr/wildlife/habitats/terrestrial/pdf/SMP_Wood_Turtles.pdf

NSE,(2012). Proponents guide to wind power Projects: Guide for preparing an environmental assessment registration document.

NSPI,(2014) Wind Farm Directory. Retrieved from: https://www.nspower.ca/en/home/about-us/how-we-make-electricity/renewable-electricity/wind-farm-directory.aspx

NS Wind Atlas (2013). [Web Map]. Retrieved from http://www.nswindatlas.ca/

Ministry of the Environment (2008). *Noise guidelines for wind farms*. Ontario.

Road designation. (2012). Retrieved from http://novascotia.ca/tran/trucking/roaddesignation.asp

Statistics Canada, (2011). *2011 Census of Amherst, Nova Scotia*. Retrieved from website: http://www12.statcan.gc.ca/census-recensement/2011/as-sa/fogs-spg/Facts-csd-eng.cfm?LANG=Eng&GK=CSD&GC=1211011

Seifert, H., Richert, F. 6-9 Oct. 1997. Aerodynamics of Iced Airfoils and Their Influence on Loads and Power Production Presentation at the EWEC '97, Dublin, Ireland.

Seifert, H. Et al. April 9-11, 2003. Technical Requirements for Rotor Blades Operating in Cold Climate; BOREAS VI, Phya, Finland.

Vyn & McCullough, 2014. The effect of wind turbines on property values in Ontario: Does public perception match empirical evidence? *Canadian Journal of Agricultural Economics.* Volume 62, Issue 3, pages 365-392.

WEA-Schattenwurf-Hinweise (2002). *Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windenergianlagen (Notes on the identification and assessment of the optical pollutions of Wind Turbines).*