VOLUME 1
(Main Text)

July 2011

FAIRMONT WIND FARM PROPOSAL ENVIRONMENTAL ASSESSMENT

NAMEPLATE CAPACITY:
4.6 MW

LOCATION:
THE COUNTY OF ANTIGONISH, NOVA SCOTIA.

PREPARED BY:
WIND PROSPECT INC.
1791 BARRINGTON STREET SUITE 1030
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1 EXECUTIVE SUMMARY

1.1.1 This Environmental Assessment has been prepared in accordance with both the Canadian Environmental Assessment Agency guidelines entitled *Environmental Impact Statement Guidelines for Screenings of Inland Wind Farms under the Canadian Environmental Assessment Act* (Natural Resource Canada, 2003), the Nova Scotia Department of Environment guidelines entitled *A Proponents Guide to Environmental Assessmen*t (Nova Scotia Department of Environment, 2001 rev. 2009) and the Nova Scotia Department of Environment guidelines entitled *Proponents Guide to Wind Power Projects: Guide for preparing an Environmental Assessment Registration Document* (Nova Scotia Department of Environment, 2007 rev. 2009).

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2 PROJECT SUMMARY

2.1 INTRODUCTION

2.1.1 This section of the Environmental Impact Statement (EIS)/Environmental Assessment (EA) provides a brief overview of the project proponent, the location and scale of the project, the anticipated construction schedule and a table which describes how information is organized in this report (Volumes 1, 2 and 3). This section also lists the provincial and federal agencies involved in the project.

2.2 PROJECT PROPONENT

2.2.1 The proponent for the project is Wind Prospect Inc. The proponents contact name and contact details are:

Andy MacCallum, Development Manager
Wind Prospect Inc.
1791 Barrington Street Suite 1030
Halifax Nova Scotia B3J 3L1
Telephone: 902 422 9663 ext. 214
Fax: 902 425 7840
Contact email: andy.maccallum@windprospect.com
Project website: http://fairmontwindfarm.ca

2.2.2 More details on the proponent are presented in **SECTION 5.2** of this volume.

2.3 TITLE OF PROJECT

2.3.1 The name of the project is the Fairmont Wind Farm. Throughout this EIS/EA, the terms "Project", "Project Site", and "Fairmont Wind Farm" are used interchangeably, referring to the Project and Project location.

2.4 PROJECT LOCATION

2.4.1 The location of the Project is shown in its regional context in **FIGURE 1, VOLUME 2**.

2.4.2 The Fairmont Wind Farm is located in the Municipality of the County of Antigonish, Nova Scotia. The Project Site is approximately 6 kilometers due north of the town of Antigonish. The site is bounded by the Fairmont Road to the east, Cloverville Road to the west and Walsh Post Road to the north.

2.4.3 Throughout this EIS/EA, different descriptive regions are referenced such as "Project Area", "Project Land", "Study Area" and "Greater Study Area". The definition of Project Area is given below, and the other terms are defined in **SECTION 6.6.**

2.4.4 The four corners of the Project Area and geographical centre are defined by the coordinates given below, and are clearly marked in **FIGURE 1, VOLUME 2**

North:	45° 41' 21"N, 61° 59' 25"W
South:	45° 40' 24"N, 61° 58' 59"W
East:	45° 40' 52"N, 61° 58' 47"W
West:	45° 40' 59"N, 61° 00' 03"W
Centroid:	45° 40' 54"N, 61° 59' 13"W

2.5 NAMEPLATE CAPACITY OF WIND FARM

2.5.1 The total rated capacity of the project is 4.6 MW. The project will consist of two Enercon E82 wind turbines. Each turbine has a rated capacity of 2.3 MW.

2.6 CONSTRUCTION SCHEDULE

2.6.1 A complete description of the construction, operation, maintenance, and decommissioning activities are provided in **SECTION 5** of this volume. The associated environmental impacts, mitigation measures, and residual effects of the project on the environment can be found in **SECTION 8**. A brief timeline of the construction schedule is as follows:

- Pre-construction activities: Fall/Winter 2011
- Construction: Winter 2011/Spring 2012
- Commissioning: Spring/Summer 2012

2.7 INVOLVEMENT OF FEDERAL AND PROVINCIAL AGENCIES

2.7.1 The Project is classified as a 'Class 1' undertaking under the Nova Scotia Environmental Assessment Regulations under Section 49 of the *Environment Act*. As such, the Project is subject to the provincial Environmental Assessment Process as outlined in the document *A Proponent's Guide to Environmental Assessment* (Nova Scotia Department of Environment, 2001 rev. 2009).

2.7.2 A draft version of the EA document was sent out, by Nova Scotia Department of Environment (NSE), on May 2011, to all relevant provincial and federal government departments. A summary of comments provided by the latter participants and the location of where they have been addressed in the EA document can be found in the Table of Concordance in **APPENDIX O, VOLUME 3.**

2.7.3 All government consultation conducted throughout the development of the Project is discussed in **SECTION 11** and contained in **APPENDIX O, VOLUME 3.** A listing of the relevant agencies is as follows:

Federal Consultation

- Canadian Broadcasting Corporation (CBC/Société Radio-Canada Services)
- Canadian Environmental Assessment Agency
- Department of National Defence

- Environment Canada
- Geological Survey of Canada
- Indian and Northern Affairs Canada
- Natural Resources Canada
- NAV CANADA
- Royal Canadian Mounted Police
- Transport Canada
-

Provincial Consultation

- Confederacy of Mainland Mi'kmaq
- Nova Scotia Department of Energy
- Nova Scotia Department of Natural Resources
- Nova Scotia Department of the Environment
- Nova Scotia Office of Aboriginal Affairs
- Nova Scotia Department of Transportation and Infrastructure Renewal
-

Municipal and Conservation Authority Consultation

- Municipality of the County of Antigonish
- Eastern District Planning Commission

2.8 APPROACH TO THE ENVIRONMENTAL SCREENING

2.8.1 Wind Prospect Inc. has developed the Project after considering various environmental and site specific issues. The issues identified are a result of close work with its consultants, and in response to discussions with the local municipality, the local community, and other relevant stakeholders. These issues and environmental considerations have been incorporated into the Project design and throughout the development process.

2.8.2 This EIS/EA has been prepared in accordance with the Canadian Environmental Assessment Agency (CEAA), NSE *A Proponent's Guide to Environmental Assessment*, and the NSE's *Proponents Guide to Wind Power Projects: Guide for preparing an Environmental Assessment Registration Document*. The scope was also discussed with the local planning authority. It is therefore anticipated that this report will meet all criteria outlined by the CEAA, the NSE, and the Municipality.

2.8.3 This EIS/EA has been subdivided into three volumes. The content of each volume is detailed below in **Table 2.1**

Table 2.1: EIS/EA Structure and Content

Volume	Content
Volume 1: EIS/EA	Volume 1, the main text of the EIS/EA offers a detailed description of the proposal. It evaluates the existing environment, and identifies and

Volume	Content
	assesses the potential environmental impacts of the project. This volume outlines the design procedures and environmental considerations of the project, in hopes to prevent, reduce, or offset the identified environmental impacts.
Volume 2: Figures	Volume 2 contains all the illustrative material referred to in Volume 1, including regional and local maps, site design details, photomontages, photographs and technical diagrams.
Volume 3: Appendices	Volume 3 consists of consultant reports, assessment data, technical details, and other supporting information referred to in Volume 1.

Consultancy

2.8.4 Environmental considerations defined by both the CEAA and the NSE have been built into the design process, and, where necessary, environmental consultancy services have been used. **Table 2.2** lists the key consultancies involved in preparing this EIS/EA. **APPENDIX A, VOLUME 3** provides full contact details and background information on the majority of the consultancy firms used within the creation of this EIS/EA.

Table 2.2: Consultants and their Defined Roles

Organization	Primary Role	Contact Name
Jody Hamper	Mainland Moose Survey	Jody Hamper
Dillon Consulting	Avian Survey	Andrea Youssef
Wind Prospect Inc.	EIS/EA Author	Andy MacCallum
Wind Prospect Pty. Ltd.	Noise Impact Assessment	Anna Saunders
Wind Prospect Pty. Ltd.	Shadow Flicker Assessment	Anna Saunders
AMEC Earth & Environmental	Bat Impact Assessment	Chris Milley
Oldham Engineers Inc.	Communication Systems Assessment	Keith MacNeil
Davis Macintyre & Associates	Archaeological Assessment	Laura A. De Boer
Independent Consultant	Vascular Plant Survey	Sean Blaney
Confederacy of Mainland Mi'kmaq	Mi'kmaq Ecology Knowledge Study	Sidney Peters

3 THE NEED FOR THIS DEVELOPMENT

3.1 INTRODUCTION

3.1.1 Canada's and Nova Scotia's recent energy policy encourages renewable energy generation. The latter governments both agree that a renewable energy policy is necessary to limit the negative consequences of fossil fuel usage, to reduce green house gasses and to meet the future energy demands.

3.1.2 This section examines the environmental impacts of fossil fuel energy generation and the provincial and federal commitments made to reduce such negative impacts. Together, these underpin the need for the Fairmont Wind Farm.

3.2 GLOBAL CLIMATE CHANGE AND ENERGY FROM FOSSIL FUELS

3.2.1 For decades global climate change has been the subject of extensive research. As computational models have improved, so has the understanding of the processes which bring about global climate change, and its likely consequences.

3.2.2 Scientists worldwide hypothesize that global warming is occurring at an unprecedented rate, and that greenhouse gas emissions, especially from non-renewable power generation, are a major contributor. The Intergovernmental Panel on Climate Change (IPCC), an internationally recognized scientific body on climate change, concluded in its Fourth Assessment Report that climate change is unequivocally occurring and is due in large part to human activity (IPCC, 2007).

3.2.3 In 2004, an international study on the effects of climate change showed that well over a million species could be potentially threatened with extinction (Thomas et al., 2004). The study clearly stated that climate change is the biggest threat to many endangered species (ibid). This underlies the critical importance of renewable energy development to reduce greenhouse gas emissions and mitigate against climate change.

3.2.4 In Canada, the Arctic region is of particular concern as it is one of the most vulnerable regions to climate change. Canada's Fourth National Report on Climate Change states (Government of Canada, 2006):

"The climate change will not be uniform and the north's climate may rise by nearly 3°C to 4°C in winter months over the next 50 years. This could lead to melting of the glaciers and sea ice, rising sea levels, and endangered wildlife. The north provides an early indication of the environmental, social and economic significance of global warming."

In light of this important issue, it demands that Canada and its communities pursue and support sustainable project initiatives.

3.3 INTERNATIONAL AND FEDERAL INITIATIVES

3.3.1 In response to rising levels of global warming and pollution, the United Nations Framework Convention on Climate Change (UNFCCC) "Earth Summit", held in Rio de Janeiro in 1992, first established the need for sustainable development and greenhouse gas reduction. In December 1992, Canada supported sustainable development by ratifying its commitment under the UNFCCC, which took effect in March 1994.

3.3.2 At the Kyoto Climate Change Conference in December 1997, 174 international actors gathered to address the issue of climate change. In an historic agreement, a new protocol was drawn up. This protocol aimed to reduce the overall emissions of the six principle man-made greenhouse gases produced by developed countries to 5.2% below the 1990 levels over the period from 2008 to 2012. Canada signed the Kyoto Protocol in 1998, which became legally binding in February 2005.

3.3.3 The first phase of the Kyoto Protocol expires in 2013. In December 2007, 187 countries met in Bali and began negotiations on an agreement that will supersede the Kyoto Protocol. Key issues negotiated were: action for adapting to the negative consequences of climate change such as droughts and floods; ways on reducing greenhouse gas emissions; promoting sustainable energy technologies, and financing adaptation and mitigation measures. Negotiations continue during numerous other UN Climate Change convention, the most recent being in Copenhagen 2010 and in Cancun 2011.

3.3.4 On October 2006, the Clean Air Act was introduced, alongside a number of initiatives under the ecoENERGY program (Government of Canada, 2006). The ecoENERGY program will invest $1.5 billion over 14 years to encourage the production of 14.3 terawatt-hours of electricity from low impact renewable energy sources.

3.4 NOVA SCOTIA INITIATIVES

3.4.1 On April 2010, the Nova Scotia Government announced its Renewable Electricity Plan (NSREP). The Plan legally commits the province to a target of having 25% of its electricity come from renewable energy production by 2015. By that date, Nova Scotia's total renewable electricity content will have more than doubled from 2009 levels—and the equivalent of more than 300,000 homes will be powered by clean, local sources (NSREP, 2010).

3.4.2 The Plan also sets a goal of 40% renewable generation by 2020, this goal means more than 500,000 homes will be running on renewable power - more than enough energy for every residential customer in Nova Scotia (NSREP, 2010).

3.5 PURPOSE OF THE PROJECT

3.5.1 The objective of the Fairmont Wind Farm is to contribute towards Nova Scotia's target for renewable energy generation, in addition to Canada's requirement to reduce greenhouse gas emissions which contribute toward global climate change.

3.6 ECONOMIC BENEFITS OF THE PROJECT

3.6.1 The project will have a significant impact on the regional economy. Landowners participating in the project will receive lease payments, and whenever possible materials and labour will be sourced locally. The Municipality of the County of Antigonish will also receive revenue through the payment of annual property taxes by Wind Prospect.

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4 PLANNING THE DEVELOPMENT

4.1 INTRODUCTION

4.1.1 This section of the EIS/EA describes the planning and design procedures of the Fairmont Wind Farm. The development of the Project has involved site finding and desk-based analysis, pre-planning, site design, and stakeholder consultation work at two distinct levels:

- Broad strategic site selection: In order to identify an appropriate Study Area where the project could be developed, an analysis was conducted using an extensive technical and environmental criterion.
- Detailed site design of the wind farm: In order to best respond to various technical, operational and environmental constraints of the identified Study Area, the site layout, access arrangements, type and finish of the wind turbines, and all ancillary structures were designed accordingly.

4.2 STRATEGIC SITE SELECTION

4.2.1 A variety of criteria have been considered in the site selection of the Fairmont wind farm. The criteria include technical, environmental, and land use considerations. The following is a comprehensive list of the criteria considered:

- Technical Considerations
  - Sufficient wind resource
  - Capacity of the local electrical distribution network
- Environmental Considerations
  - Proximity to provincial or national parks, wetlands, and other ecologically significant wilderness areas
- Land Use Considerations
  - Available access to the land and suitable ground conditions
  - Other nearby land uses in the area
  - Proximity to residential properties, communities, and towns
- Planning Considerations
  - County or Municipal zoning by-law regulations

Technical Considerations

4.2.2 The Municipality of the County of Antigonish contains gently undulating to rolling low-lying areas and is boarding the Northumberland Straight and St Georges Bay to the north and east respectively. The Fairmont site is located on the eastern edge of the Pictou-Antigonish Highlands with elevations generally 210-245m above sea level (ELCNS, 2003). As a consequence of these factors, some areas in the County have a commercially viable wind resource. Further supporting this, the Nova Scotia Wind Atlas, a resource provided in part by the Nova Scotia Department of Energy, has

shown that the Pictou-Antigonish Highlands sustains one of the best wind regimes in mainland Nova Scotia.

4.2.3 Studies showed that the Project could be connected to the local electrical distribution system. Through an agreement with Nova Scotia Power Inc. the Project would be connected to the 4C-424 feeder of Lochabar Road sub-station, a 14.4 kV distribution line adjacent to the Project Land along Fairmont Road.

Environmental Considerations

4.2.4 The landscape of the Fairmont Wind Farm project site lies in a partially forested woodlot. The history of active forestry operations in the immediate vicinity of the site area suggests low ecological sensitivity.

4.2.5 The Project Area is situated approximately 9 kilometers east of the Eigg Mountain James River Wilderness Area and 6 kilometers to the south near the mouth of Rights River.

Land Use Considerations

4.2.6 The closest local communities are Fairmont, located 1 kilometer to the north of the project site, and Cloverville, located 2.5 kilometers south-west of the Project Area. The Trans-Canada Highway is a major highway 6 kilometers to the south and would provide good site access. Fairmont Road, the nearest road to the Project Area is sparsely populated and the turbines would be set back approximately 1 kilometer from the residential dwellings along this road.

4.2.7 Landowners have made land available for the possibility of installing wind turbines and ancillary infrastructure on their land. The existing access roads from previous forestry operations on site could be largely utilized, reducing the need for creation of new roads.

Planning Considerations

4.2.8 The Project is located within the Municipality of the County of Antigonish, a single–tier municipal government. Zoning By-law Amendments from a General Resource Zone (GR-1) to a Wind Resource Zone (WR-1) are required from the Municipality for the Project.

4.2.9 The Municipal Planning Strategy for the County of Antigonish concerning the regulation of wind turbine development was adopted in 2009. The Plan encourages the development of wind energy for electricity production and requires proponents to undertake appropriate studies to mitigate potential negative impacts on the environment. More specific requirements for wind farm developments are written into the Zoning By-Laws for the county of Antigonish (Land Use By-Law, 2009).

Listed below is a summary of wind turbine development By-Laws for projects rated greater than 2MW:

a) Minimum setback from all residences, except residences located on the same lot as the wind turbine, shall be 600 metres (1969 feet). There is no setback requirement from residences located on the same lot;
b) Minimum setback for larger turbines or wind farms requiring environmental assessment from all residences, except residences located on the same lot as the wind turbine, shall be 1000 metres (3280 feet). There is no setback requirement from residences located on the same lot;
c) The minimum separation distance between turbines shall be equal to the height of the tallest turbine;
d) Minimum setback from all property lines shall be 10 metres (32.8 feet) plus one times the height of the rotor;
e) There are no setback requirements for new residences constructed subsequent to a utility scale wind turbine development;
f) Minimum setbacks from watercourses and public highways shall be 60 metres or two times the height of the turbine, whichever amount is greater;
g) Minimum setback from all coastlines shall be 100 metres;
h) The mean value of sound pressure level from a wind turbine shall not exceed 40dBA or above the existing background noise, whichever is greater, at the nearest residence;
i) There shall be no signs, advertisements or objects attached to or added to the turbine(s).

4.3 DETAILED SITE DESIGN

Operational Requirements

- Wind turbines: Require sufficient buffering from each other in order to prevent reduction of potential energy yield. The turbines also need to be sited to minimize the overall land use and preserve as much land as possible. Finally, the turbine model should be selected such that it will be able to make a maximum contribution to the generation of electricity in the present wind regime.
- Switchgear panel with optional enclosure: Located adjacent to the point of export of electricity from the site to the electricity distribution system.
- Site access: Should utilize existing woodlot roads where possible. The access point should be approximately 5 metres wide with an appropriate entrance (where required) in order to accommodate turbine deliveries and site construction vehicles.
- Internal site roads: Must interlink each turbine, be approximately 5 metres in width, and be constructed to a grade suitable for use by heavy equipment.

Design Iterations

4.3.1 All of the site design criteria discussed in **SECTION 4.2** were utilized in the development of the Project. Throughout the site design process, several layout iterations have been performed in order to meet new constraints as identified during the Environmental Assessment Process.

4.3.2 On a macro scale, design iterations were performed during the early site selection stage in order to determine suitable locations for a small project in the order of 4-5 MW. Land use was considered early on; sites in close proximity to higher population densities were avoided. Proximity to environmental features such as provincially or nationally significant parks or wetlands; recreational, or recognized natural areas; and shorelines were avoided.

4.3.3 On a micro scale, technical considerations of the site design, including maximizing energy yield for the local wind resource, were a major factor. Wind turbines require adequate spacing from one another, as well as distance from forested areas with exceptionally tall trees to prevent a reduction in energy yield.

4.3.4 Various turbine layouts have been tested; however, both planning and environmental considerations limited the layout options. Consultation with government agencies, and stakeholders in the region helped establish additional environmental considerations, including setbacks from houses and streams, and communication towers and links.

4.3.5 Due to the small size of the Project and the land available for turbine siting, differences in turbine locations for each layout were not significant, and did not vary by more than a couple hundred meters; thus maps of these preliminary layouts are not presented in this EIS/EA.

4.4 PROJECT CHRONOLOGY

4.4.1 Preliminary development of the project began in January 2009. **Table 4.1** outlines the chronology of the major project milestones to date.

Table 4.1: Project Milestones

Date	Milestones
Jan-09	Commenced site selection and identification.
Feb-09	Submitted Grid Information Request Nova Scotia Power Inc.
Mar-09	Began discussions with key stakeholders
Jul-09	Land secured through option to lease agreements.
Jul-09	Response to RFP submitted to Nova Scotia Power Inc.
Jan-10	Power Purchase Agreement signed with Nova Scotia Power Inc.
Mar-10	Project presented to County of Antigonish
Apr-10	Public Meeting #1 held in Antigonish

Date	Milestones
Jun-10	Avian surveys initiated
Aug-10	Bat surveys initiated
Sep-10	Temporary anemometry mast installed
Oct-10	Vascular plant survey initiated
Oct-10	Bat surveys completed
Oct-10	Archaeology study initiated
Oct-10	Mi'kmaq ecological knowledge study initiated
Oct-10	Communication systems assessment initiated
Nov-10	Archaeology study completed
May-11	Draft EIS/EA submitted to Government agencies for review
May-11	Public Meeting #2 to be held in Antigonish
June-11	Avian surveys completed
June- 11	Vascular plant survey completed
June-11	Mi'kmaq ecological knowledge study completed
June- 11	Archaeological study updated and completed
June-11	Moose Study completed
June-11	Receive feedback from government departments
June-11	Address comments
July-11	Final EIS/EA submission to regulator
Sept-11	Final EIS/EA approval from regulator (proposed)

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5 PROJECT DESCRIPTION

5.1 INTRODUCTION

5.1.1 This section of the EIS/EA summarizes the Fairmont Wind Farm proposal and provides a detailed description of all project components and activities throughout the development, construction, operation, and decommissioning phases of the project.

5.1.2 The terms Project Land, Project Area, and Study Area are used throughout this section. These terms are defined in **SECTION 6.4** of this volume.

5.2 PROJECT PROPONENT

5.2.1 Wind Prospect Inc. is part of the Wind Prospect Group, a successful and leading developer, constructor, and operator of wind farms around the world. The company has 19 years of experience and has been involved in over 2,100 MW of installed wind capacity globally. Contact details for the proponent are presented in **SECTION 2.2** of this volume.

5.3 SUMMARY OF PROJECT

General Site Overview and Current Land Use

5.3.1 The Project Site is located on privately owned, partially forested land totalling approximately 406 acres.

5.3.2 **SECTION 7.6** of this volume describes the details relating to rural industry, land use, and associated statistics of the Municipality of the County of Antigonish.

Main Project Components

- Wind turbines
- Wind turbine foundations
- Crane pads
- Internal site roads and site entrance
- Temporary construction compound
- Overhead and/or Underground cable network
- Electrical switchgear panel and optional enclosure

Wind Turbine Type and Capacity

5.3.3 For the Fairmont Wind Farm project, two Enercon E82 wind turbines will be used on site. Each turbine has a rated capacity of 2.3 MW, thereby providing a total capacity of 4.6 MW. The turbine towers will have a maximum height of approximately 98m, and the rotor blade diameter will be approximately 82 meters. Each installed turbine

will have a maximum height of approximately 139 meters from base to blade tip. Specifications of the Enercon E82 can be found in **APPENDIX M, VOLUME 3.**

Grid Connection

5.3.4 The electricity produced from the turbines will be transformed up to the distribution voltage of 25 kV by a transformer located adjacent to each turbine base or within the turbine itself. The electricity will be conducted to a turbine switchgear panel where it would be metered and then conducted to the connection point with the existing distribution system. It is possible that the final electrical design may include a switchgear enclosure.

5.3.5 The cables connecting the turbines and the switchgear may be above ground or below ground. If the overhead cabling configuration is chosen it will be similar to the standard power poles found throughout residential neighbourhoods in the province, wooden poles approximately 40ft in height.

5.3.6 Should the underground cable configuration be chosen, then the cables and earthing (grounding) will be buried between the wind turbines and optional switchgear enclosure in cable trenches. The trenches will be positioned adjacent to the internal access roads and the cables would access the wind turbines below ground via conduits cast into the wind turbine foundations.

5.4 LOCATION OF PROJECT

Project Layout

5.4.1 The following sections detail the siting considerations for each of the components listed in **SECTION 5.5** of this volume, in addition to the associated activities required for each.

5.4.2 **FIGURE 1, VOLUME 2** identifies the location of the Project within its regional context. Several site photographs have been taken at various locations around the Project Site, and can be seen in **FIGURE 2, VOLUME 2.**

5.4.3 The Fairmont Wind Farm is located in the Municipality of the County of Antigonish, in northeast Nova Scotia. The Project Site is approximately 6 kilometers north of the Town of Antigonish. The site is bounded by the Fairmont road to the east, Cloverville Road to the west, and Walsh Post Road to the north.

5.4.4 The locations of project components were sited following an iterative design process based on all considerations detailed within **SECTION 4.2**.

Indicative Turbine Locations

5.4.5 A total of two wind turbines will be installed on site. The indicative turbine coordinates (given in NAD83 zone 20 datum) are listed in **Table 5.1.**

Table 5.1: Indicative Turbine Coordinates

#	UTM (m)		Latitude				Longitude			
	X	Y								
1	578,560	5,059,266	45°	40′	57″	N	61°	59′	28″	W
2	578,793	5,058,987	45°	40′	48″	N	61°	59′	18″	W

Proximity to Environmental and Cultural Sites

5.4.6 **FIGURE 4, VOLUME 2** defines the location of the Project within its environmental context, including the location all forested areas, waterways, water bodies, and natural areas within the region. **SECTION 7** of this volume describes all baseline environmental components in detail.

5.4.7 The closest provincially recognized area of ecological significance is the Antigonish Provincial Wildlife Management Area located approximately 6 kilometers to the south near the mouth of Rights River. The Eigg Mountain James River Wilderness Area is located approximately 9 km west of the site.

5.4.8 The closest Provincial Park is the Pomquet Beach Provincial Park located 14km south east of the site.

5.4.9 Detailed environmental characteristics of the region and the associated figures are described in **SECTION 7** of this volume.

Proximity to First Nation Reserves

5.4.10 There is no First Nation Reserve Land or First Nation specific land claim within the Project Area. Further details of First Nations Reserve land and land claims within Nova Scotia are presented in **SECTION 7.6.**

5.5 SUMMARY OF PROJECT ACTIVITIES – CONSTRUCTION PHASE

- Surveying and wind turbine siting activities
- Construction of temporary staging area, parking lot and site entrance
- Construction of stream crossings
- Construction of new site roads, improvement of existing roads
- Construction of crane pads and turbine foundations
- Construction of civil and electrical works
- Interconnection of switchgear to electrical distribution system
- Wind turbine assembly and installation
- Removal of all temporary works and restoration of the site
-

5.5.1 The entire construction of the Fairmont Wind Farm will follow an activity schedule similar to that defined in **Table 5.2.**

Table 5.2: General Wind Farm Construction Schedule

Construction Activity	Typical Distribution (months)					
	1	2	3	4	5	6
Surveying and siting activities	■					
Construction of temporary compound and parking lot	■					
Construction of stream crossing		■				
Construction of internal site roads		■	■			
Construction of crane pads & turbine foundations			■	■		
Construction of civil & electrical works					■	
Interconnection to the electrical distribution system					■	
Wind turbine assembly and installation					■	■
Removal of temporary works and site restoration						■

Surveying and Siting Activities

5.5.2 Prior to the commencement of roads, foundations and turbine erection, 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;
- Widening and improvement of the site entrance for safe vehicle access

5.5.3 **Table 5.3** represents the frequency, duration and type of vehicle activity expected during this process, in addition to the approximate number of personnel required throughout this construction stage.

Table 5.3: Surveying and Siting Activities

Construction Activity	Month(s) Activity Performed and Number of Personnel Required					
	1	2	3	4	5	6
Light Trucks	✓					
Drill Rig	✓					
Personnel (approximate)	2					

Transportation Considerations

5.5.4 Provincially owned roads used during the construction, operating and decommissioning phases (refer to on the staging areas and site entrances) will be in compliance with the 2009 Nova Scotia Temporary Workplace Traffic Control Manual.

5.5.5 Any potential modifications to intersections for access to the Project Area will heed appropriate traffic controls, and permitting.

5.5.6 Access roads will be designed to accommodate an appropriate turning radius of the over-weight and over-dimensional vehicles used during the transportation and construction of the wind farm.

5.5.7 It is our intention to obtain and adhere to a 'Breaking Soils permit' replaced recently by the 'Work Within Highway Right-of-Way permit' required for the construction of a new access road. The local Area Manager of the Nova Scotia Department of Transportation and Infrastructure Renewal has been consulted to ensure requirements for such permits are met.

5.5.8 We are aware that the transportation of large-scale wind turbines will require overweight special moves permit. 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.

5.5.9 Although a wind-turbine transportation route has yet to be planned, Wind Prospect 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 (provided online on the Nova Scotia *Roads Designation* website).

5.5.10 Moreover, any trucks passing under any bridge structures will abide to height restrictions. If deemed necessary, a Transportation plan will be provided to the Nova Scotia Department of Transportation.

Construction of Temporary Compound and Parking Lot

5.5.11 The temporary construction compound and associated parking lot would be used for the staging of materials and equipment. It also serves as a gathering point for safety talks and may house office facilities for the staff involved in constructing the Project.

5.5.12 The construction staging and parking area would be approximately 30 meters by 50 meters. The intended location of the construction compound is illustrated in **FIGURE 3, VOLUME 2**

5.5.13 No municipal services will be used, and sewage from portable toilets and other waste generated will be removed by the contractor and disposed of at an appropriate site. This facility will be consistent with the servicing policies outlined in the Land Use By-Laws (LUB) of the Municipality of the County of Antigonish.

5.5.14 **Table 5.4** represents the frequency, duration, and type of vehicle activity expected during this process, in addition to the approximate number of personnel required throughout this construction activity.

Table 5.4: Construction of Temporary Compound and Parking Lot

Construction Activity	Month(s) Activity Performed and

	Number of Personnel Required					
	1	2	3	4	5	6
Dump Trucks	✓					
Light Trucks	✓					
Grader and bull dozer	✓					
Personnel (approximate)	2					

Construction of Stream Crossings

5.5.15 One stream crossing will be required to access the Project Land. The location of this stream crossing is shown in **FIGURE 3, VOLUME 2.**

5.5.16 The stream crossing and culvert will be constructed in accordance with the relevant Land Use By-Laws (LUB) of the Municipality of the County of Antigonish. Moreover, the terms and agreement of the provincial Water Course Alteration approval will be followed.

5.5.17 To maintain water quality and reduce impacts to the water course, mitigation strategies were produced, along with Erosion and Sedimentation Control and Spill Contingency plans. For greater detail about such mitigation strategies and plans, please refer to **SECTIONS 2, 4, and 6; APPENDIX B, VOLUME 3. Table 5.5** represents the frequency, duration and type of vehicle activity expected during this process, in addition to the approximate number of personnel required throughout this activity.

Table 5.5: Construction of Stream Crossings

Construction Activity	Month(s) Activity Performed and Number of Personnel Required					
	1	2	3	4	5	6
Dump Trucks		✓				
Concrete delivery vehicles		✓				
Light trucks		✓				
Excavator		✓				
Personnel (approximate)		2				

Construction of Internal Site Roads

5.5.18 Internal site roads required for the development are typically 5 meters wide with a maximum width of approximately 10m in certain areas during the construction phase only. These would be used to move workers and equipment about the site during the mobilization, construction, operation and decommissioning phases. A schematic illustrating a cross-section view of a typical internal site road is shown in **FIGURE 5, VOLUME 2.**

5.5.19 A total of approximately 900 meters of internal site roads will be required for the Project. Most of the new road will follow existing lanes maintained by the landowners. The new roads have been sited to minimize as much land clearing as possible. Rock chipping may be required to facilitate road widening on site. The locations of these internal site roads are shown in **FIGURE 3, VOLUME 2.**

5.5.20 The construction of new roads would involve the removal of soil to a depth of between 0.25 - 0.50 meters (depending on the ground conditions encountered during the geotechnical investigations), laying down one or two layers of a geotextile fabric and placing layers of crushed stone. The stone would be compacted, with a finished construction depth of between 0.25 - 0.50 meters, again dependent on the strength of the underlying road formation. The internal site roads would be maintained in good condition during construction and throughout the lifetime of the Project.

5.5.21 The topsoil removed would be stored in accordance with municipal regulations and 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 recycled to a local site needing clean fill material, or removed from site to an approved landfill.

5.5.22 **Table 5.6** represents the frequency, duration and type of vehicle activity expected during this process, in addition to the approximate number of personnel required throughout this construction activity.

Table 5.6: Construction of Internal Site Roads

Construction Activity	Month(s) Activity Performed and Number of Personnel Required					
	1	2	3	4	5	6
Dump Trucks			✓			
Light Trucks		✓	✓			
Small bull dozer, Pans grader		✓	✓			
Personnel (approximate)		2	4			

Construction of Crane Pads & Turbine Foundations

5.5.23 Dependent upon the turbine type and the crane selected for erection, a crane pad of approximately 50 meters by 25 meters may be required adjacent to each turbine location. 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 requirements of each turbine and the surrounding topography of the Project Land. Typical crane pad arrangements during and after turbine erection are illustrated in **FIGURE 7, VOLUME 2.**

5.5.24 Construction of the main crane pads would involve the removal of soil to a depth of between 0.25 - 0.50 meters, depending on the ground conditions encountered during the geotechnical investigations. The subsoil would be covered with one or two layers of a geo-grid membrane layer, followed by layers of graded crushed stone. Total construction depth is between 0.25 - 0.50 meters, again dependent on the characteristics of the underlying soil formations.

5.5.25 The crane pads may be retained throughout the operational life of the wind farm to allow for periodic wind turbine maintenance, and to accommodate any crane necessary for the replacement of large components should they fail during the operational phase of the development.

5.5.26 A concrete foundation approximately 20 meters in diameter would be required for each wind turbine.

5.5.27 A detailed geotechnical investigation would be undertaken to establish the nature of the soils at each identified turbine location. A registered Civil Engineer would design foundations for each turbine to match the soil conditions at each turbine location. Foundations would probably be a gravity or 'Inverted T' design. A schematic of a typical gravity foundation design can be found in **FIGURE 6, VOLUME 2.**

5.5.28 For the reinforced concrete foundations, the construction would 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 each base would lie approximately 1 meter below ground level. Rock chipping may be required to facilitate excavation. The central support pedestal would extend 0.20 meters 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 flush with the existing ground level, leaving room to allow sufficient topsoil reinstatement for vegetation growth.

5.5.29 Any wash water from the cleaning of the cement truck drums will be disposed of in a sewage facility designed for such purposes and would comply with Provincial and Municipal regulations.

5.5.30 No concrete batch plant is planned for the Project.

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

5.5.32 **Table 5.7** represents the frequency, duration and type of vehicle activity expected during this process, in addition to the approximate number of personnel required throughout this activity. It is expected that the two turbine foundations will be completed over a 4 week period.

Table 5.7: Construction of Crane Pads & Turbine Foundations

Construction Activity	Month(s) Activity Performed and Number of Personnel Required					
	1	2	3	4	5	6
Excavator			✓	✓		
Dump trucks			✓	✓		
Concrete delivery vehicles			✓	✓		
Light cranes			✓	✓		
Light trucks			✓	✓		
Personnel (approximate)			4	4		

Construction of Civil & Electrical works

5.5.33 A small electrical switchgear enclosure approximately 3 meters by 5 meters, with a maximum height of 3 meters may be constructed on the site. The main purpose of the switchgear is to condition and meter electricity generated by the wind turbines.

5.5.34 Should a switchgear enclosure be required, it will be located onsite, slightly setback from Fairmont Road. The approximate location of the switchgear enclosure should it be required is illustrated in **FIGURE 3, VOLUME 2.**

5.5.35 The electricity produced from the turbines would be transformed up to 25 kV by a pad-mounted transformer located adjacent to each turbine base or within each turbine. The electricity would then be conducted to the switchgear enclosure via overhead or underground collection cables, and then routed to the connection the point with the existing distribution system.

5.5.36 A bare copper earthing (grounding) cable would be laid alongside the turbine foundations for lightning protection of the turbines, and would be installed at other areas as determined by the electrical design.

5.5.37 The electrical, communications and earthing (grounding) cables would leave the turbine foundations below grade via cable ducts cast into the turbine foundations. Where the cables are to cross the site roads and crane bases, they may be located in cable ducts surrounded by 0.15 meters of concrete to ensure the integrity of the cables is maintained independent of the vehicle site crossings above.

5.5.38 The cables connecting the turbines and the switchgear may be above ground or below ground. The overhead cabling configuration would be similar to the standard

utility poles found throughout residential neighbourhoods in the province, wooden poles approximately 40ft in height.

5.5.39 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 landowners.

5.5.40 **Table 5.8** represents the frequency, duration, and type of vehicle activity expected during this process, in addition to the approximate number of personnel required throughout this construction activity.

Table 5.8: Construction of Civil & Electrical works

Construction Activity	Month(s) Activity Performed and Number of Personnel Required					
	1	2	3	4	5	6
Dump trucks					✓	
Concrete delivery vehicles					✓	
Light trucks					✓	
Graders, bulldozers and excavator					✓	
Personnel (approximate)					6	

Interconnection to Electrical Distribution System

5.5.41 Electricity generated by the wind turbines would be conducted from the switchgear along a public road on Project Land, both underground and above ground, to the connection point as per the Distribution System Impact Assessment with the local distribution company, Nova Scotia Power Inc. The Point of Common Coupling is indicated on the map in **FIGURE 3, VOLUME 2**.

5.5.42 **Table 5.9** represents the frequency, duration, and type of vehicle activity expected during this process, in addition to the approximate number of personnel required throughout this construction activity.

Table 5.9: Interconnection to Electrical Distribution System

Construction Activity	Month(s) Activity Performed and Number of Personnel Required					
	1	2	3	4	5	6
Dump Trucks					✓	
Light trucks					✓	
Excavator					✓	
Personnel (approximate)					4	

Wind Turbine Assembly and Installation

5.5.43 The main turbine components include the tower sections, nacelle, hub and blades. Towers are normally delivered in 3 sections. The overall erection process for each turbine would take approximately 2 to 5 days, depending on the wind conditions, and would not start until suitable wind conditions prevailed.

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

5.5.45 For the nacelle and blades, the construction would 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, or 'pick'.

5.5.46 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.

5.5.47 **Table 5.10** represents the frequency, duration, and type of vehicle activity expected during this process, in addition to the approximate number of personnel required throughout this construction activity.

Table 5.10: Wind Turbine Assemble and Installation

Construction Activity	Month(s) Activity Performed and Number of Personnel Required					
	1	2	3	4	5	6
Light trucks					✓	✓
Cranes					✓	✓
Personnel (approximate)					6	6

Removal of Temporary Works and Site Restoration

5.5.48 After construction, erection, and commissioning are completed and the Project is in the start-up phase, all temporary works will be removed and the land re-graded. Excess soil and gravel will be recycled to a site needing clean fill, or disposed of at an approved landfill. The stored topsoil will be replaced and fine graded, and the site will be dressed to restore maximum tillable area and a pleasing appearance.

5.5.49 **Table 5.11** represents the frequency, duration, and type of vehicle activity expected during this process, in addition to the approximate number of personnel required throughout this construction activity.

Table 5.11: Removal of Temporary Works and Site Restoration

Construction Activity	Month(s) Activity Performed and Number of Personnel Required					
	1	2	3	4	5	6
Flat bed trucks						✓
Light trucks						✓
Excavator						✓
Personnel (approximate)						2

Comments on Delivery of Equipment and Vehicle Movements

5.5.50 Entry to the Project Land will be from Fairmont Road. This will be the entry point for all workers, construction equipment and turbine components for the duration of the construction phase. Minor, temporary road widening may be required along specific portions of the road. The location of the site entry point is shown in **FIGURE 3, VOLUME 2.**

5.5.51 During construction of the internal site roads and turbine foundations, there would be an increase in truck traffic on roads leading to and from the Project Site. Increased dust is possible, although water trucks will continually dampen the roads and excavation areas in order to control dust should this be required.

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

5.5.53 Delivery of materials and equipment would 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 move stone for building internal site roads
- Concrete trucks for constructing wind turbine foundations
- One 800 - 1000 tonne main lift crane
- One 150 tonne tailing crane
- One 135 tonne rough-terrain crane for assembling wind turbines
- Turbine component delivery vehicles
- Miscellaneous light vehicles including cars and pickup trucks

5.5.54 Of these predicted vehicles movements, approximately 25 will be oversize loads associated with the delivery of turbine component parts (towers, blades, and nacelles) and the cranes required for erection. These deliveries are anticipated within months 4 through 6 and subject to movement orders as agreed upon with governing authorities.

5.6 SUMMARY OF PROJECT ACTIVITIES – OPERATIONAL PHASE

Site Access and Traffic

5.6.1 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 each turbine for remote monitoring and control of each wind turbine, which will minimize the need for on-site personnel. The SCADA system ensures safe efficient operation of each turbine and of the overall Project Site.

Project Safety Signs

5.6.2 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, such as speed limit and safety information, would also be installed throughout the Project Site. These signs will be maintained throughout the operational life of the wind farm.

Maintenance Plans

5.6.3 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. Maintenance procedures may require the use of small or large cranes for brief periods of time, for replacement of blades or other turbine components.

5.6.4 Waste materials such as lubricating oils will be removed from site and will be recycled or disposed of following provincial and federal waste management regulations.

VEC Monitoring

5.6.5 During the operational phase, the following Valued Ecological Components (VEC) will be monitored for the first two years of operation:

- Bats
- Moose
- Birds

5.7 SUMMARY OF PROJECT ACTIVITIES – DECOMMISSIONING PHASE

Re-commissioning Plan

5.7.1 There are no plans foreseen at this time to re-commission the turbines.

Expected Lifespan and Decommissioning Plan

5.7.2 The Fairmont Wind Farm will be operational for 20 years. This lifetime is based on the duration of the Power Purchase Agreement (PPA) signed between Nova Scotia Power and Wind Prospect. This is also consistent with the length of the land leases that will be signed by participating landowners.

5.7.3 Decommissioning will commence within 6 months after the license has been terminated. Decommissioning shall be completed within 6 months after its commencement.

5.7.4 The wind turbine components will be dismantled and removed from the site. Similar traffic movements to those experienced during the delivery of the turbine components are anticipated. It is expected that the decommissioning will experience considerably lower vehicle volumes than during construction. The following 4 steps are anticipated in the decommissioning phase:

1. The wind turbines 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 for forestry purposes, may be removed. This operation will be straightforward as the roads are constructed on a geo-textile layer. 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 to below plough depth.
4. The switchgear enclosure and equipment will be dismantled and removed, and the land will be returned to its former use.

5.7.5 Consultation with participating landowners during decommissioning will help to ensure accurate land reclamation to the pre-construction state.

5.7.6 For greater detail about the decommissioning plans refer to **SECTION 8, APPENDIX B, VOLUME 3.**

5.8 SUMMARY OF PROJECT ACTIVITIES – FUTURE PHASES OF THE PROJECT

5.8.1 There are no future phases planned for the Project.

6 SCOPE OF THE ASSESSMENT

6.1 INTRODUCTION

6.1.1 This section describes the scope of this EIS/EA in the context of the requirements outlined by the Environment Assessment Branch of the Nova Scotia Department of Environment (NSDNR) and Natural Resources Canada (NRCan) for environmental screening. This section also defines the geographical extent of the area of impact to be considered for specific environmental components near the project. The Valued Ecosystem Components (VECs) associated with the project are also identified and the methodology used to assess each VEC is presented.

6.2 FEDERAL

6.2.1 Although the Fairmont Wind Farm is not eligible for federal funding under the Eco-Energy for Renewable Power Program, it is the intention that this report satisfies both the federal and provincial environmental assessment requirements.

6.3 PROVINCIAL

6.3.1 The Environmental Assessment Process, as required under the provincial Environmental Act is a proponent-driven, self-assessment process. The proponent is responsible for determining if the Process applies to the Project, what category undertaking the Project is, and when this Process should be started.

6.3.2 Under Section 49 of the Environment 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 Class 1 undertakings. Class 2 electricity generation undertakings are not applicable to wind farm projects. It is anticipated that the Fairmont Wind Farm rated capacity is 4.6 MW and is therefore a Class 1 undertaking.

6.3.3 Three guidance documents were used in the preparation of this EIS/EA for the Fairmont Wind Farm project, they are:

1. *A Proponent's Guide to Environment Assessment*, published by the Environment Assessment Branch of the Nova Scotia Department of Environment (NSE, 2001 rev. 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, 2007 rev. 2009)
3. *Environmental Impact Statement Guidelines for Screenings of Inland Wind Farms under the Canadian Environmental Assessment Act,* published by Natural Resources Canada (NRCan, 2003)

6.4 PERMITTING

6.4.1 At the provincial level, a number of permits are required to progress the various stages of development and construction of the wind farm. A list of the required provincial permits is shown in **Table 6.1** although additional permits may be required following continued stakeholder consultation.

Table 6.1: Provincial and Federal Permitting Requirements

Permit Required	Permitting Authority
Heritage Research Permit	Nova Scotia Department of Tourism, Culture and Heritage
Work Within Highway 'Right-of-way' Permit	NS Transportation and Infrastructure Renewal
Special Move Permit	NS Transportation and Infrastructure Renewal
Transportation Plan	NS Transportation and Infrastructure Renewal
Water Alteration Permit	NS Department of Environment
Environmental Assessment Approval	NS Environmental Assessment Branch

6.4.2 Additional municipal permits and authorizations are required. **Table 6.2** lists the municipal permits and authorizations required. Again, additional permits may be required following further consultation.

Table 6.2: Municipal Permitting Requirements

Permit Required	Permitting Authority
Development Approval	Municipality of the County of Antigonish
Building Permit	Municipality of the County of Antigonish

6.5 TEMPORAL

6.5.1 The Temporal scope of this EIS/EA is approximately 22 years in length. It begins at the preconstruction phase of the project, continues through the construction and commissioning phase, through to the 20 year operational phase, and finishes upon the decommissioning phase.

6.6 GEOGRAPHIC SCOPE

6.6.1 There are a number of factors and criteria defining the geographic scope for the Project. As such, the following definitions and associated criteria have been used throughout this EIS/EA.

6.6.2 The Project Land is defined as all privately owned land secured through Option to Lease agreements for the present project. The Project Land includes approximately 407 acres in total and is shown in **FIGURE 1, VOLUME 2**.

6.6.3 The Study Area is defined as the total region extending approximately 2 kilometers from the turbine locations. The Study Area is used to encapsulate all receptors for the noise and shadow flicker assessments, the environmental characteristics assessment, and other significant environmental feature identification. The Study Area for this Project covers approximately 3,300 acres and is shown in **FIGURE 1, VOLUME 2**.

6.6.4 The Greater Study Area is defined as the total region extending 10 kilometers from the wind turbine locations. The Greater Study Area is used as the boundary of the area of interest for natural areas and rare species, as well as the cumulative impact of other wind farm projects and other developments near the Project Site.

6.6.5 These three areas have been defined within their geographical context within **FIGURE 1, VOLUME 2**.

6.7 CUMULATIVE IMPACT

6.7.1 Based on the Canadian Environmental Assessment Agency's (CEAA) reference guide Addressing Cumulative Environmental Effects, cumulative environmental effect is defined (CEAA, 2004):

6.7.2 "The effect on the environment which results from effects of a project when combined with those of other past, existing and imminent projects and activities. These may occur over a certain period of time and distance"

6.7.3 The statement "imminent projects and activities…over a certain period of time and distance" is not clearly defined and open to some interpretation.

6.7.4 For this assessment, the projects or activities within the Greater Study Area are considered for cumulative impact with the Fairmont Wind Farm. The following projects and activities are considered:

- Other wind power projects
- The construction and upgrade of infrastructure
- The expansion of local communities

6.7.5 The only other wind power project located within the Greater Study Area is the Maryvale Wind Farm, developed by Maryvale Wind LP, with a nameplate capacity of 6 MW. The Maryvale Wind farm is located 8 kilometers from the Fairmont installation.

6.7.6 As of June 2011, there are no proposed wind power projects in the Greater Study Area.

6.7.7 Wind Prospect Inc. is aware of other proposed wind farms outside the Greater Study Area and throughout the adjacent Counties. It has been concluded that because of the large distance between the Project and those outside the Greater Study Area,

detrimental environmental effects through cumulative impacts will not likely be significant. The cumulative impact of other wind farms, infrastructure projects and activities, and community expansion are considered in detail in **SECTION 9.**

6.8 PROCESS METHODOLOGY

6.8.1 The methodology used for carrying out the environmental assessment has been developed in line with the Environmental Assessment Branch EA Guidelines of the NSDNR and NRCan's EIS Guidelines. The screening process identifies the interactions between all project components and the environment throughout all phases of the project life. A summary of the methodology used in this EIS/EA is as follows:

1. Site identification in terms of environmental factors and considerations.
2. Consultation with stakeholders and government agencies regarding the environmental screening process.
3. Identification of the VECs.
4. Application of the screening criteria to the project in order to determine and isolate the impact, if any, on the VECs.
5. Identification and assessment of possible mitigation measures.
6. Identification and assessment of residual effects, following the mitigation measures.
7. Determination of the significance of the residual effects, following the mitigation measures.
8. Development and incorporation of this information into the EIS/EA

6.9 COMPONENT METHODOLOGY – VEC's

Valued Ecosystem Components

6.9.1 **Table 6.3** lists the VECs defined by Wind Prospect Inc. which have been used as a basis for the assessment of environmental impacts of the Project within **SECTION 8** of this volume.

Table 6.3: VECs Identified within the Study

VEC	Category	Method of Analysis/Scope	Details
Air Quality	Atmospheric Environment	Research and data collection.	Section 7.2and 8
Surface and Groundwater	Hydrological Environment	Research and data collection. Consultation with the NSDNR Regional Biologist.	Section 7.3 and 8
Avian	Terrestrial Environment	Consultation with Environment Canada/ Canadian Wildlife Service.	Section 7.5 and 8
		Execution of a project specific Avian Survey	
Bats		Execution of a project specific Bat Impact Assessment	Section 7.5 and 8
Fauna (Non-Avian)		Research and data collection.	Section 7.5
Vascular Plants and Protected Areas		Research and data collection.	Section 7.5
Archaeology and Cultural Heritage	Socio-Economic Environment	Execution of an Archaeological Resource Impact Assessment.	Section 7.6 and 8
Land and Resources used for Traditional Purposes by Aboriginal Persons		Execution of a Mi'kmaq Ecological Knowledge Study	Section 12
		Consultation with First Nations Communities.	
Land Use		Research and data collection.	Section 7.6 and 8
Local Economy		Research and data collection.	Section 7.6
Local Traffic	Socio-Economic Environment (cont.)	Research and data collection.	Section 7.6 and 8
Noise		Execution of project specific noise assessment.	Section 7.6 and 8
Public Health and Safety		Research and data collection	Section 7.6 and 8

VEC	Category	Method of Analysis/Scope	Details
Recreation (Including tourism)		Research and data collection.	Section 7.6
Radiocommunications, Radar, Internet, and Seismoacoustic Systems		Execution of project specific communication systems assessment and consultation with numerous companies and agencies.	Section 7.6 and 8
Visual Landscape		Execution of project specific shadow flicker assessment. Creation of photomontages.	Section 7.6 and 8

Projected 'Level of Concern' Rating

6.9.2 The publication Wind Turbines and Birds: A Guidance Document for Environmental Assessment (Canadian Wildlife Services, 2007) in conjunction with the publication Proponent's Guide to Wind Power Projects: Guide for preparing an Environmental Assessment Registration Document, was used to determine the project's 'level of concern' ranking and the appropriate mitigation measures.

6.9.3 These publications categorize projects within one of four Levels of Concern based on the facility size and the site sensitivity. The Project Site was assessed as one of low Environmental Sensitivity (ten or fewer turbines). Due to its geographical location within the Municipality of the County of Antigonish, the Level of Concern for the site was determined to be Category 1 (the lowest Category of Concern). Sites in this category normally represent low levels of potential risk to avian populations and require only basic pre-construction and post-construction surveys.

6.9.4 However, upon consulting avian specialist and the local Department of Natural Resource (DNR) biologist, the distance of the species sighting and habitat, along with mitigation efforts, the Level of Concern was determined as a Category 2 which is defined as follows:

6.9.5 **Category 2.** Projects in this category present a moderate level of potential risk to wild species and/or their habitat(s), and require basic surveys, usually spread over a one year period, to obtain quantitative information on wild species and habitats on the site and to identify any potential mitigation measures to minimize environmental impacts during construction. Depending on the species and numbers detected, some follow-up surveys may be required to assess impacts. These follow-up surveys may not need to commence until one year after construction is completed. Carcass searches for bats and birds will usually be required after the project is approved to document unexpected mortality events.

6.9.6 Given that the Project consists of:

- A low concentration of bird species that might be vulnerable to the presence of turbines,
- A low potential for fragmentation of habitat loss, and;
- Consists of two turbines.

6.9.7 It is unlikely that the project merits a ranking of a Category 4, defined as follows:

6.9.8 **Category 4.** Projects in this category present the highest level of potential risk to wildlife, and/or their habitat(s) and will require the highest level of effort for environmental assessment. As with category 3 projects, comprehensive baseline surveys will be required. The proponent must apply standards and protocols for bird monitoring specified for "Category 4" projects as defined by Environment Canada and the Canadian Wildlife Service. Proponents are strongly encouraged to design and initiate baseline surveys as far in advance as possible, so that delays in data gathering do not affect EA approval of the project. If the project is approved, detailed follow-up will normally be required as a condition of the approval. Post-construction follow-up surveys, spread over at least two years and sometimes more, are required to determine changes in wildlife use of the area associated with construction of the turbines. If the site contains concentrations of birds, or species thought to be particularly vulnerable to colliding with turbines, or that have potential to be negatively affected by the presence of turbines, then more detailed studies may be required. Regular carcass searches around turbines over at least 2 years will likely be required during seasons when there is an elevated collision risk (e.g., when concentrations of birds are present, or during the migration season). Data gathering for more than two years would normally be targeted to answer very specific questions or conservation concerns. Long-term monitoring extended over five years or more, for example, may in some cases be required to document potential negative effects of functional habitat loss. **Given the potential for fragmenting habitat and the resulting loss of connectivity, by large (41-100 turbines)** and very large (101) projects, these sites will require consideration and analysis of potential landscape scaled impacts.

6.9.9 Despite the fact that two threatened species, the Canada Warbler and the Bobolink, were identified away from the immediate location of the turbines and the construction area, Wind Prospect Inc. is committed to following its Environmental Management Plan (refer to **APPENDIX C, VOLUME 3, Section 5.2**). The Environmental Management Plan outlines the nature of potential environmental impacts on the birds, and identifies measures to mitigate or minimize such impacts.

Avian Assessment and Monitoring

6.9.10 The publication *Wind Turbines and Birds: A Guidance Document for Environmental Assessment* (Canadian Wildlife Services, 2007) in conjunction with the publication Proponent's Guide to Wind Power Projects: Guide for preparing an Environmental Assessment Registration Document, was used to determine the project sensitivity to birds and the corresponding avian survey requirements.

6.9.11 A three-season avian monitoring protocol was developed following consultation with Environment Canada and recommendations from Dillon Consulting Ltd. The avian studies were conducted during peak breeding season (June-July 2010), early and late fall migration season (August-December 2010), and early and late spring (March- June 2011).

6.9.12 The methodology used in the avian survey, identified 15 point count locations in the Project Area during scoping exercises. Greater detail regarding the methodology and location of the bird sightings is provided in **APPENDIX C, VOLUME 3.**

6.9.13 Initial findings from this survey identified several species of concern in the Project Area. These findings resulted in increasing the 'Category of Concern' from a Level 1, Low Sensitivity to a Level 2, Medium Sensitivity. A fourth season was added to the monitoring program, which results in a full year of survey.

6.9.14 The site survey program covered the spring migration, spring & summer breeding season, autumn migration season, and wintering season. The results of these surveys are presented in detail in **SECTION 7.5** and the full Avian survey report can be found in **APPENDIX C, VOLUME 3.**

6.9.15 Follow-up post-construction avian assessments will be conducted for the next two years as well as mitigation strategies for any potential impacts on birds. The post-construction avian surveys will be carried out under close consultation with the Nova Scotia Department of Natural Resources (NSDNR) and Canadian Wildlife Service (CWS). For more information regarding the post construction avian survey, please refer to **APPENDIX B, VOLUME 3**.

Bat Assessment and Monitoring

6.9.16 The NSDNR and the CWS has defined standards on how proponents should develop and implement bird and bat monitoring programs.

6.9.17 Wind Prospect Inc. retained bat and avian consultant AMEC Earth and Environmental to prepare a bat monitoring plan, and carry out the impact analysis. AMEC consulted with NSDNR and a reputable bat researcher to structure a monitoring plan that exceeds the NSDNR standards. A summary of the bat monitoring program is shown below:

- Installation of grand based and pole mounted (10m) ANABAT detectors.

- Pole based detection period from Sept 10- Oct 14 2010.
- 3 ground based detection periods from Aug 30-Sept 12, Sept 21-23, and Oct 3-14 2010.
- Detectors programmed to record all ultrasonic sounds between 7pm and 7am.
- ANABAT date format and analysis interpreted via AnalookW software using zero-crossing analysis.

6.9.18 The results of these surveys are presented in **SECTION 7.5**, and the full Survey Report can be found in **APPENDIX D, VOLUME 3**.

Noise Assessment and Modeling

6.9.19 Prescriptive Noise Guidelines for the regulation of wind farm noise do not exist at the Provincial level, although there is a provincial requirement for proponents to address wind farm noise levels in their EA.

6.9.20 The environmental assessment guidelines state this should be accomplished by the preparation of a Noise Impact Assessment. The proponent should include information on existing background noise levels in the Project Area, discuss the predicted effects and extent of noise on nearby receptors, and discuss mitigation measures and future noise monitoring for the life of the development (NSE, 2001 rev. 2009).

6.9.21 At the municipal level, land use by-laws regulating the development of wind turbines for the County of Antigonish mandate prescriptive noise limits. The by-law, published by the Eastern District Planning Commission (EDPC) states the mean sound pressure level from a wind turbine shall not exceed 40dBA or above the existing background noise, whichever is greater, at the nearest residence (LUB, 2009).

6.9.22 In the Noise Impact Assessment and Shadow-Flicker Assessment 'participatory-receptors' were not included because the landowners do not reside on the Project Land.

6.9.23 The impact of turbine noise on local receptors was modeled in compliance with the above mentioned EDPC regulations using the commercial software package WindPRO, version 2.7. The noise emissions from turbines are modeled using the WindPRO Decibel module, which uses the ISO 9613-2 calculation model "Attenuation of sound during propagation outdoors, Part 2: A general method of calculation." The noise modeling requirements, methodology used, and results are fully discussed in the Noise Impact Assessment Report presented in **APPENDIX H , VOLUME 3.**

Telecommunication, Radar, Seismoacoustic, and Internet Systems

6.9.24 A radio communications systems impact assessment has been carried out and the report prepared by Oldham Engineers Inc.

6.9.25 The report includes an assessment of nearby communication systems that may be impacted by the Project, mitigation measures, as well as consultation carried out by Wind Prospect Inc. with system owners and operators.

6.9.26 The full Electromagnectic Impact Assessment prepared by the consultant can be found in **APPENDIX L, VOLUME 3.**

Visual Impacts (Shadow Flicker)

6.9.27 Shadow flicker occurs when the wind turbine blades pass between the line of sight of an observer and the sun. The blade crossing the sunlight causes intermittent shadows to be cast which an observer may perceive to be an annoyance.

6.9.28 Currently, there are no federal or provincial guidelines or policies for governing what is considered to be an acceptable amount of shadow flicker per year. However, recommendations on shadow flicker exposure exist elsewhere in jurisdictions where wind farm development guidelines have matured such as Germany and other regions throughout Europe.

6.9.29 The German guidelines mandate no more than 30 hours per year of shadow flicker exposure, as well as a maximum of 30 minutes of turbine induced shadow flicker per day for any one dwelling based on the 'astronomical worst-case scenario'.

6.9.30 The shadow flicker exposure for receptors is modeled using the industry software package WindPRO, version 2.7. The astronomical worst-case scenario makes the following assumptions:

- The sky is cloudless between sunrise and sunset.
- The wind turbines are always in operation.
- The wind direction is always such that the rotor plane is continuously perpendicular to the incident sun rays.

6.9.31 To provide a more realistic prediction of the shadow flicker exposure, three parameters can be adjusted, including: operational hours of wind turbines based on the expected wind speed distribution, wind direction, and bright sunshine probabilities.

6.9.32 The shadow flicker analysis was conducted using the Shadow module of the software package WindPRO version 2.7. Predictions based on both scenarios have been considered and are detailed in the Shadow Flicker Report found in **APPENDIX I, VOLUME 3.**

Visual Impact (Photomontages)

6.9.33 The impact of the Project on the visual landscape is predicted through the production of photomontages. Photomontages are created from panoramic photographs with the inclusion of computer generated wind turbines. The commercial software package WindFarm, version 4.0.2.4, was used to create the images.

6.9.34 Two photomontages have been generated for the Project using the turbine locations. The viewpoints chosen are typical landscape views close to the Project Area. The photomontages are representative of the final appearance of the wind farm and are listed in **Table 6.4** and represented in **FIGURES 8-9, VOLUME 2**.

Table 6.4: Photomontage Viewpoints and Orientations

Photomontage #	Viewpoint Location	Orientation
Photomontage 1	Triton Brook Road	Southwest
Photomontage 2	Highway 245	East

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7 DESCRIPTION OF EXISTING ENVIRONMENT

7.1 INTRODUCTION

7.1.1 This section of the EIS/EA describes all baseline environmental characteristics as prescribed by Natural Resource Canada (NRCan, 2003). It describes these characteristics at a regional level, in addition to the identification of such characteristics within the Study Area. Baseline environmental characteristics in this case are the characteristics prior to the Project being introduced into the environment.

7.2 ATMOSPHERIC ENVIRONMENT

Climate

7.2.1 The Project Site is located within the eastern section of the Pictou-Antigonish Highlands Eco-district. The climate is broadly defined by late, cool springs, cold winters, and the lowest mean annual temperature in Nova Scotia (5.4°C) (Webb and Marshall, 1999).

7.2.2 The eco-district experiences about 1409 mm of precipitation annually and receives about 505mm of rain between May and September, and has a relatively short growing season of 192 days (Webb and Marshall, 1999).

7.2.3 The Environment Canada (EC) Port Hood meteorological station is the closest station to the Project Site and is approximately 48 kilometres to the northeast. Monthly average climatic data gathered at this meteorological station between 1971 and 2000 is shown in **Table 7.1.**

Table 7.1: Annual Climatic Data, Port Hood Meteorological Station (EC, 2006)

Climatic Parameter	Climate Normals											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily Avg. (°C)	-5.7	-6.3	-2.5	2.8	8	13.7	18.5	18.2	13.8	8.9	3.7	-1.8
Daily Max. (°C)	-1.6	-2.2	1.6	6.6	12.4	18.3	22.9	22.3	17.7	12.4	6.6	1.8
Daily Min. (°C)	-9.7	-10	-6.5	-1	3.6	9	14.2	14	9.9	5.4	0.7	-5.3
Rainfall (mm)	47.3	36.4	49.5	81.3	86.5	95.2	94.6	118	116	134	110	87.9
Snowfall (cm)	62.4	54.4	45.6	20.1	1.3	0	0	0	0	0.6	10.5	47.4
Precipitation (mm)	110	90.8	95.1	101	87.8	95.2	94.6	118	116	134	121	135

Air Quality

7.2.4 Nova Scotia Environment monitors the outdoor air quality at six sites across the province (Government of Nova Scotia, 2010). The Air Quality Health Index (AQHI) is based on the measurement of three key air pollutants: ground-level ozone, nitrogen dioxide, and particulate matter. The associated health risk is represented by the AQHI scale, which ranges from 1 to 10+. AQHI index values are also grouped into health risk categories, ranging from Low (AQHI 1-3) to Very High (AQHI 10+).

7.2.5 The closest AQHI monitoring site is located in Port Hawkesbury, Nova Scotia, approximately 50 kilometres east-southeast of the Project Site. The AQHI is generally rated low during the winter months, and low throughout the summer months (EC, 2011).

7.3 AQUATIC ENVIRONMENT

Aquatic Habitats

7.3.1 The nearest marine environment is Antigonish Harbour approximately 5.5 km southeast of the Project Area. There are no lakes located within the Project Area.

7.3.2 There is one small intermittent stream that runs southeast through the Project Land and drains into Rights River located adjacent to the 245 highway. As previously mentioned, the construction of a new site access road will be required and will cross this stream. It is recognized that the well field located near the Rights River is the municipal water supply for the Town of Antigonish, and as such needs to be protected.

7.3.3 The water uses for the on-site intermittent stream and the Rights River is presumably habitat for fish and other aquatic species, and a possible municipal water supply source.

7.3.4 Details of the proposed stream crossing and the regional aquatic environment are shown in **FIGURE 3, VOLUME 2.**

7.3.5 Any potential impacts on the intermittent stream and aquatic habitat are outlined in the Environment Management Plan (refer to **APPENDIX B, VOLUME 2**). In addition, the plan also establishes mitigation and protection strategies for aquatic habitat and water quality.

Wetlands

7.3.6 A wetland has been identified near an intermittent stream through field assessments and consultation with Nova Scotia Environment. Using methods stipulated by the *U.S. Army Corp of Engineers (1987) wetland delineation manual*, the wetland identified is a seasonal wooded and shrub swamp area and consist of an area less than 100m^2 (Refer to **FIGURE 13, VOLUME 2**).

7.3.7 According to the Wildlife Division Geographic Information System of the NSDNR wetland inventory and wet areas mapping tools, the wetland identified is not classified as an *Ecologically Significant Wetland* (Nova Scotia Department of Environment, 2009).

7.3.8 Through consultation with Dillon Consulting and research in the NSDNR's wetland inventory and wet areas mapping tools, the wetland area has not been found to be a significant habitat to rare and special native plants or a significant habitat to wildlife species identified in the *Atlantic Canada Conservation Data*. The avian study conducted by Dillon Consulting can be found in **APPENDIX C**.

7.3.9 The access road to be constructed will be less then 60m long and 10m wide and will be constructed away from the wetland area. **FIGURE 13, VOLUME 2** shows the planned access road. The construction of the road will be conducted as to avoid any potential impacts on the nearby wetland. In light of this, according to *Nova Scotia's Wetland Conservation Policy* indicates that a Wetland Alteration Approval will not be necessary.

7.3.10 For further information about wetland mitigation efforts and protection, please refer to the Environment Management Plan , **SECTION 4, APPENDIX B, VOLUME 3.**

Aquatic Flora and Fauna

7.3.11 There is no aquatic flora or fauna rare species, or federally designated species at risk located within the Study Area. Further details on aquatic flora and fauna can be found in the two Vascular Plant Survey reports conducted on October 2011 and June 2011 in **APPENDIX E, VOLUME 3.**

Surface Water Quality

7.3.12 The Project Land is one of the highest points of elevation in the area. The water in the stream located on the Project Land is of good quality. Construction phases of the project may have some impacts on water quality. More specific details on activities that might affect water quality and the ways in which such possible impacts can be mitigated, is located in the Environment Management Plan in **SECTION 4, APPENDIX B, VOLUME.** All efforts will be made that no pollutants will infiltrate the stream in the project area.

7.3.13 Rivers and streams within the Pictou-Antigonish Highlands Eco-district have average conductivity levels between 28 and 54 micromhos/cm and average pH levels of 6.4.

7.4 GEOPHYSICAL ENVIRONMENT

Bedrock Geology and Paleontology

7.4.1 The Project Area is slightly North West of the Antigonish Basin and East of the Antigonish Highlands. The Project Area is located on the Devonian-Carboniferous strata from the Horton/Windsor group and the Pre-Cambrian Georgeville group. **FIGURE 12, VOLUME 2** shows the bedrock geology of the Greater Study Area. The undivided paleozoic rocks around this area are from the Chisholm Brook and Keppoch formations. Both formations include Devonian-Caboniferous and Hadrynian-Devonian stratas, which are made up of metasedimentary rock and calc-alkaline volcanic rock. Such rocks predominately consist of conglomerates, siltstone, shale and sandstone.

7.4.2 The project is not near the fossiliferous formations of the Araig, MacAras, Gays River formations nor the sparsely fossiliferous Macumber and Port hood formation. Therefore, it is not expected that fossils of great natural historic significance will be present in the Project Area.

7.4.3 There were no rocks identified in this area containing iron-sulphur minerals pyrite (FeS_2) and pyrrhotite (FeS) that is often found in the Meguma super-group. Therefore it is unlikely that the project will cause acid rock drainage, which is environmentally damaging.

7.4.4 Studies indicate that geohazards to be aware of in the Antigonish region are slope erosion and Karst terrain over gypsum or limestone, which may cause active sink holes (DeMont et al., 2009; Boehner et al., 1982. However, geological maps and surveys indicate that there are no geohazards identified where the sites are to be placed .

Surficial Geology, Soil Quality

7.4.5 Based on the geological map of the Antigonish Basin and the LiARD geological surveys undertaken by NSDNR, Mineral Resources Branch (DeMont et al.; 2009), the Fairmont wind turbines will be in a shaly-loam till plain. From geological studies, it is presupposed that such tills were derived from undivided Hadrynian-Devonian and Devon-Carboniferous sandstones, shale and slate. Therefore, the majority of rocks and soils in the Project Area are not expected to be easily eroded, nor permeable. Because of the elevation and low evapotranspiration, these soils tend to have accumulated substantial levels of organic matter in the surface layers.

Seismicity

7.4.6 Eastern Canada is located in a stable continental region within the North American Plate and, as a consequence, has a relatively low rate of earthquake activity. However, earthquakes can and do occur throughout most of eastern Canada.

Instrumental recordings have identified certain clusters of earthquake activity (NRCan, 2010). The Project is located outside of the identified clusters.

7.4.7 North-eastern Nova Scotia is outside the nearby Northern Appalachians Seismic Zone which includes most of New Brunswick and extends into New England down to Boston. The historical data on from NRCan indicates that there are no records of earthquakes occurring in the Project Area, nor the County of Antigonish.

Topography

7.4.8 The Pictou-Antigonish Highlands Ecodistrict is a wedge shaped elevated block of resistant bedrock. The Project Area is located near the South-eastern corner of this block. The margins of the plateau fall abruptly, with little dissection by streams or valleys (Webb and Marshall, 1999).

7.4.9 The eco-district is predominantly a rolling till plain and has a level plateau surface, with an average elevation of about 173m rising to a maximum of 304m above sea level (Webb and Marshall, 1999). The maximum height within the Project Area is approximately 210m.

7.5 TERRESTRIAL ENVIRONMENT

Flora

7.5.1 The Project Area is located within a forest region characterized by sugar maple and beech trees, with widely dispersed white pine, white spruce, and balsam fir. Stands of red maple, wire birch, and aspen are also present in the Project Area, but not abundant (Webb and Marshall, 1999).

7.5.2 Large portions of the forest located on Project Land have been harvested by the landowners in the past decade. The majority of the existing forest has regenerated from clear-cutting in the past 20-40 years. The extent of tree harvesting can be seen in photographs taken on site in **FIGURE 2, VOLUME 2**. It can also be observed in the aerial map in **FIGURE 11, VOLUME 2**.

7.5.3 A vascular plant survey was conducted on site in October of 2010 by a qualified botanist. The areas covered in the survey include the immediate surroundings adjacent to the two proposed turbine locations, the existing access roads and the proposed new access roads, as well as areas adjacent to the stream bed downstream of where the proposed new access road will cross the stream.

7.5.4 Results of the survey show that almost all of the development footprint area has been heavily altered by human activities (Blaney, 2010).

7.5.5 Corresponding with government suggestions of undertaking second vascular plant survey was conducted in June of 2011 to identify summer-fruiting plant species and

other plants present during spring ephemerals. Results from the June survey are included in **APPENDIX E, VOLUME 3.**

7.5.6 In total, 171 native or potentially native plants and 46 exotics were identified. None of the observed vascular plants were of concern under the NSDNR General Status ranks.

7.5.7 The observed species Early Coralroot (*Corallorhiza trifida*) is of concern based on the Atlantic Canada Conservation Data Center (AC-CDC) status ranks, with a marginally 'rare' ranking of S3 and a provincial General Status rank of Secure (Blaney, 2010). This species was observed at two locations in seepy and mossy micro-sites within floodplain forest along the stream in the southwest corner of the property, away from proposed construction impacts.

7.5.8 The complete vascular plant survey can be found **APPENDIX E, VOLUME 3**.

Fauna

7.5.9 The proponent conducted searches of two species databases. The NSDNR Significant Species and Habitat database and the Atlantic Canada Conservation Data Centre database (AC-CDC). The search radius used was 100km from the site center.

7.5.10 The AC-CDC database search resulted in 61 vertebrate and 68 invertebrate fauna known to occur within the 100km radius search area.

7.5.11 The legally protected taxa listed below in **Table 7.2** were pulled from the results of the database search and are linked to the Study Area by predictive range maps upon expert estimates of distribution. Ranks range from 1 indicating possible occurrence, to 3 decreasing in probability (AC-CDC, 2010).

Table 7.2: Legally protected taxa – ACCDC search results

Scientific name	Common name	Provincial legally protected Status	*COSEWIC	Range rank
Bucephala islandica	Barrow's Goldeneye (Eastern pop.)	n/a	SC	2
Symphyotrichum subulatum (Bathurst pop)	Bathurst Saltmarsh Aster	n/a	SC	1
Lechea maritima var. subcylindrica	Beach Pinweed	n/a	SC	2
Symphyotrichum laurentianum	Gulf of St. Lawrence Aster	n/a	T	1
Alces alces (NS mainland)	Moose	Endangered	n/a	1
Eriocaulon parkeri	Parker's Pipewort	n/a	NAR	2
Isoetes prototypus	Prototype Quillwort	Vulnerable	SC	1

Listera australis	Southern Twayblade	n/a		1
Glyptemys insculpta	Wood Turtle	Vulnerable	T	1

*Terms: COSEWIC=Committee on the Status of Endangered Wildlife in Canada; T=Threatened; END=Endangered; NAR-Not at Risk; SC=Special Concern; n/a=not applicable

7.5.12 The DNR Significant Species and Habitat database search resulted in 58 fauna known to occur within 100km of the Project Area. Listed below in **Table 7.3** are high priority species with either a COSEWIC rank or a Provincial Status of Yellow or Red.

Table 7.3: DNR significant habitat database search results

Scientific name	Common name	*Provincial Status	**COSEWIC
Martes americana	American Marten	Red	T
Sterna paradisaea	Arctic Tern	Yellow	n/a
Haliaeetus leucocephalus	Bald Eagle	n/a	NAR
Hirundo rustica	Barn Swallow	Yellow	n/a
Ursus americanus	Black Bear	n/a	NAR
Alasmidonta varicosa	Brook Floater	n/a	SC
Chaetura pelagica	Chimney Swift	Yellow	T
Gavia immer	Common Loon	yellow	NAR
Sterna hirundo	Common Tern	yellow	NAR
Phalacrocorax auritus	Double-crested Cormorant	n/a	NAR
Martes pennanti	Fisher	yellow	n/a
Sorex gaspensis	Gaspe Shrew	yellow	NAR
Bucephala sp.	Goldeneye (unclassified)	yellow	SC
Histrionicus histrionicus	Harlequin Duck	yellow	SC
Myotis lucifugus	Little Brown Bat	yellow	n/a
Accipiter gentilis	Northern Goshawk	Yellow	NAR
Charadrius melodus	Piping Plover	Red	E
Alca torda	Razorbill	Yellow	n/a
Buteo jamaicensis	Red-tailed Hawk	n/a	NAR
Sterna dougallii	Roseate Tern	Red	E
Ammodramus nelsoni	Sharp-tailed Sparrow	n/a	NAR
Chelydra serpentina	Snapping Turtle	n/a	SC

Scientific name	Common name	*Provincial Status	**COSEWIC
Clemmys insculpta	Wood Turtle	n/a	T

*Provincial Status : Red=known to be, or that is thought to be at risk, Yellow=Sensitive to human activities. **Terms: COSEWIC=Committee on the Status of Endangered Wildlife in Canada; T=Threatened; E=Endangered; NAR-Not at Risk; SC=Special Concern; n/a=not applicable

7.5.13 For a complete listing of database search results please refer to **APPENDIX F, VOLUME 3.**

Birds

7.5.14 The nearest Important Bird Area (IBA) is the Pomquet Beach IBA (NS009), located 6.5 km East of the project along the shores of St George's Bay. The Pomquet Beach IBA has been used for years by breeding Piping Plovers shorebirds, and has one of the most stable Piping Plover populations in Nova Scotia.

7.5.15 The Proponent commissioned Dillon Consulting Ltd to conduct a three season avian monitoring program that was developed in consultation with the Canadian Wildlife Service and the NSDNR.

7.5.16 Dillon has established 11 point count locations within and immediately adjacent to the Project Area. These locations were used to carry out the June to December 2010 survey. The results from this survey indicate that there are several species of concern utilizing the Project Area, these include the Bobolink, Boreal Chickadee, Canadian Warbler, Gray Jay, and the Savannah Sparrow.

7.5.17 As a result of the presence of these species and other general site characteristics, further surveys were conducted. A winter survey was undertaken from January to March 2011. Results of the winter survey have shown the presence of Gray Jays and Boreal Chickadees that had previously been identified in the Fall survey.

7.5.18 Peak spring migration avian survey was conducted in June 2011 and has been incorporated into the EA.

7.5.19 A post construction avian survey will be conducted for at least two years. These will include regular carcass searches to document unexpected mortality events. The post construction survey will be developed in accordance with the CWS and the NSDNR recommended avian monitoring protocols.

7.5.20 Further details of all the avian surveys are located in **APPENDIX C, VOLUME 3.**

Bats

7.5.21 There are no known bat hibernacula near the Project Area or within the Greater Study Area. Bats may still be present in the region, and may roost in abandoned structures such as barns or mine openings. The species which have been identified

within Nova Scotia are listed in **Table 7.4**, along with their global (G-rank), national (N-rank) and provincial/state (S-rank) ranking.

Table 7.4: Bat Species in Nova Scotia

Scientific name	Common name	*Ranking			**Provincial Status
		GRANK	NRANK	SRANK	
Eptesicus fuscus	Big Brown Bat	G5	N5	SR	Undetermined
Lasiurus borealis	Eastern Red Bat	G5	N4N5	S2	Undetermined
Lasiurus cinereus	Hoary Bat	G5	N5	S2	Undetermined
Myotis lucifugus	Little Brown Bat	G5	N5	S4	Yellow
Myotis septentrionalis	Northern Long-eared Bat	G4	N4	S2	Yellow
Lasionycteris noctivagans	Silver-haired Bat	G5	N5	S1	Undetermined
Pipistrellus subflavus	Tricoloured Bat	G5	N4N5	S1	Yellow

7.5.22 From the bats listed above, none are known to forage around the site. Nevertheless, Wind Prospect Inc. recognizes that foraging bats locate their prey primarily through echolocation (Simmons et al. 1979) and may possibly be affected by wind turbine noise.

7.5.23 Data concerning the sound generated by E82 turbines at 4- 8 kHz were provided by Enercon and is outlined in the Noise Impact Assessment (refer to **APPENDIX H, VOLUME 3**). Enercon was unable to provide octave band data for critical frequencies of 20-60 kHz. However, the data provided in the assessment illustrates a down-ward trend of sound generation produced by the turbines after 1 kHz. For this reason, it is predicted that sinificant noise generation by the wind turbines will not reach a frequency range of 20-60 kHz. The bat survey conducted by AMEC, **APPENDIX D, VOLUME 3**, states that the impacts to bats in the vicinity of the Project are not expected to be significant.

7.5.24 Studies show that migrating bats may navigate without use of echolocation (Van Gelder 1956, Griffin 1970, Crawford and Baker 1981, Timm 1989). Therefore it is anticipated that sound from the wind turbines at the Fairmont Wind Farm would not have significant impacts on migrating bats.

7.5.25 AMEC Earth and Environmental carried out on-site bat monitoring from August to October 2010 to determine the presence and usage of the Study Area by bats (please refer to **SECTION 6.9** for further monitoring plan details). Of the 7 species potentially present in the Study Area (listed in

7.5.26 **Table** 7.4), three were identified; these included: the Northern Long-eared Bat, Little Brown Bat, and the Hoary Bat. None of the species potentially present in the Study

Area are listed federally as Species at Risk on Schedule 1 of the Species at Risk Act or provincially under the Endangered Species Act. However, the first two species mentioned in the list above have a provincially listed status of Yellow, characterized as sensitive to human activity by the NSDNR.

7.5.27 The vast majority (>99.3%) of the bat echolocation sequences detected with the ground and aerial detectors at the proposed wind turbine site are attributable to the two Myotis species widespread in Nova Scotia, Little Brown Bat and Northern Long-Eared Bat (AMEC, 2010).

7.5.28 A single sequence appears to be from a Hoary Bat, which is a migratory tree bat species, which in Nova Scotia is considered to be at the northern limits of its range (Broders et al. 2003).

7.5.29 AMEC has characterized the Fairmont Wind Farm as posing a low risk to bats. Follow up post construction bat monitoring is planned for at least two years. A monitoring plan will be developed in consultation with CWS and the NSDNR

7.5.30 For full details of the monitoring plan, methodology, results, and references please refer to **APPENDIX D, VOLUME 3**

Species of Concern

7.5.31 Results of database searches provided in **Table 7.2** and **Table 7.3** show several species of concern that may be present in the Project Area. Further discussions with DNR wildlife biologists have resulted in the proponent to focus on two species of particular concern, the provincially endangered Mainland Moose *Alces alces*, and the provincially venerable Wood Turtle *Clemmys insculpta.*

7.5.32 Mainland Moose are known to reside the Pictou-Antigonish Highlands Eco-district. The NSDNR has supplied the Proponent with a map indicating moose sightings or signs of activity recorded in the region. The map indicates an absence of moose sightings within 3 km of the Project Area and shows only a few sightings recorded within a 5 km radius or the Project Area.

7.5.33 The project landowners have not sighted any moose in the Project Area in the past 40 years.

7.5.34 A Moose Pellet Group Inventory survey was conducted on April 30-May 1, 2011 to ensure that the wind farm development in Fairmont, Antigonish will not threaten the mainland moose population in the area. For more details on the Moose Study conducted refer to **APPENDIX G, VOLUME 3**.

7.5.35 The survey results identified the presence of moose 1.5 km away from the Project Area. Wind Prospect has consulted with the regional DNR biologist on the survey

results. Both the DNR biologist and the moose specialist assessed that the project will not impact the mainland moose.

7.5.36 The provincially vulnerable Wood Turtle has been known to frequent the Rights River area approximately 4 km southwest of the Project Area. There is tributary within the Project Area that flows into a northern branch of Rights River. Discussions with DNR wildlife biologists have suggested there is little likelihood of encountering Wood Turtles on site.

Parks and Natural Areas

7.5.37 The closest provincially recognized area of ecological significance is the Antigonish Provincial Wildlife Management Area located approximately 6 kilometers south of the Project Area near the mouth of Rights River.

7.5.38 The Eigg Mountain James River Wilderness Area is located approximately 9 km west of the Project Area. This wilderness area represents the largest remaining area of contiguous forest in North-eastern Nova Scotia. The central part of the wilderness area is on lands owned by the Town of Antigonish, and is being managed as part of the town's drinking water supply (GNS, 2010).

7.5.39 The closest provincial park is the Pomquet Beach Provincial Park on the Northumberland shore located 14km southeast of the Project Area.

7.5.40 Please refer to **FIGURE 4, VOLUME 2** for further details on the geographic location of Parks and Natural Areas.

7.6 SOCIO-ECONOMIC CONDITIONS

Ambient Noise

7.6.1 There is no dominant ambient noise within the Study Area and is generally considered rural in nature. More specifically, ambient noise near the Project Site is caused by:

- Vehicular traffic along Fairmont Road
- Noise generated by Forestry activities.
- Noise generated by domestic and recreational activities.

Archaeology and Cultural Heritage

7.6.2 An Archaeological Resource Impact Assessment was conducted by Davis MacIntyre & Associates Ltd. The purpose of the assessment was to determine the potential for archaeological resources within the Project Area and to provide recommendations for further mitigation if required.

7.6.3 Two assessments (A2011NS45 and A2010NS104) were conducted under Category C Heritage Research Permit issued by the Nova Scotia Heritage Division. The reports

conform to the standards required by the Provincial Heritage Division under the Special Places programs.

7.6.4 Historical records from approximately 1879 show a few structures, likely homesteads, located on the Project Land adjacent to Fairmont road.

7.6.5 Two field reconnaissances were conducted in June 2011 and October 2010 which consisted of a walkover of portions of the Project Land with specific focus on the proposed turbine locations. No evidence of historical or precontact cultural activity could be found near the turbine locations during both assessments.

7.6.6 Although historical resources are known within the Project Area, archaeological research and reconnaissance has yielded no evidence of archaeological resources within the surveyed area. The consultant has concluded that so long as construction plans remain unchanged, no further archaeological mitigation is recommended.

7.6.7 For full details of the Archaeological Resource Impact Assessment please refer to **APPENDIX J, VOLUME 3**

Cultural and Municipal Resources

7.6.8 There are no known museums, galleries or theatres within the Study Area. The majority of schools in the Greater Study Area are located in the town of Antigonish approximately 6km south of the Study Area. H.M Elementary School (P-6) is located in the Community of Maryvale, approximately 7km northwest of the Project Area.

Safety Issues

7.6.9 There are no safety issues, such as steep cliffs or large waterways located on the Project Land.

Economy

7.6.10 The Statistics Canada 2006 census divides County and Municipal datasets into smaller subsections or Subdivisions. Approximately 35% of the Antigonish Subdivision A labour force is found within the trades, and sales and services sectors. Education, government service and business related occupations also hold a significant portion of the labour force, about 30% (Statistics Canada, 2006). Occupational statistics for the Antigonish Subd. and the Province of Nova Scotia is shown below in **Table 7.5**.

Table 7.5: Occupations (Statistics Canada, 2006)

Occupation	Antigonish, Subd. A	Nova Scotia
Total experienced labour force 15 years and over	4,310	468,590
Management occupations	305	41,700

Occupation	Antigonish, Subd. A	Nova Scotia
Business, finance and administration occupations	595	79,440
Natural and applied sciences and related occupations	250	25,025
Health occupations	320	31,120
Occupations in social science, education, government service and religion	650	39,350
Occupations in art, culture, **recreation and sport**	90	12,740
Sales and service occupations	760	122,870
Trades, transport and equipment operators and related occupations	735	69,965
Occupations unique to primary industry	465	24,490
Occupations unique to processing, manufacturing and utilities	135	21,890

Land and Resources Used for Traditional Purposes by Aboriginal Persons

7.6.11 There are currently no specific Aboriginal land claims impacted by the Project Site.

7.6.12 The closest First Nation reserves to the Fairmont Project Area are the Pomquet and Afton Reserves and the Summerside Reserves located approximately 16 km to the southeast. Both reserves are part of the Paq'tnkek First Nations. The Tribal Council affiliated with this First Nation is the Confederacy of Mainland Mi'kmaq (CMM).

7.6.13 A Mi'kmaq Ecological Knowledge Study (MEKS) has been undertaken for the Project Area by the CMM. The purpose of a MEKS is to provide information on potential Mi'kmaq concerns and mitigation recommendations, within the environmental process.

7.6.14 The MEKS includes:

- A study of historic and current Mi'kmaq land and resource use;
- An evaluation of the potential impacts of the Project on Mi'kmaq use and occupation and constitutionally based rights;
- An evaluation of the significance of the potential impacts of the Project on Mi'kmaq use and occupation; and
- Recommendations to proponents and regulators that may include recommendations for mitigation measures, further study, or consultation with Mi'kmaq.

7.6.15 The completed MEKS is located in **APPENDIX K VOLUME 3**.

Land Use

7.6.16 The land use of the Greater Study Area can be described as mostly forestry and agricultural themed land use. A summary of the agricultural statistics for Antigonish, Subd. A and the Province of Nova Scotia is shown in **Table 7.6.**

Table 7.6: Agricultural Land Use (Statistics Canada, 2006)

Agricultural and Land Use Statistics	Antigonish, Subd. A	Nova Scotia
Total number of farm operators	155	5,100
Total number of farms	124	3,795
Land area (hectares)	93,300	5,291,700
Total area of farms (hectares)	16,019	403,044
Agricultural land use	17.2%	7.62%

7.6.17 Except for a few apple trees, the Project Land is not used for primary agricultural purposes and, aside from a clearing toward the back of the lot, is primarily covered by low brush and trees. The top crops and livestock grown in Antigonish Subd. A in 2006 were (Statistics Canada, 2006):

- Livestock; cattle and calves (5,036 ha)
- Tame hay and fodder crops (2,971 ha)
- Alfalfa (1,217 ha)
- Christmas tree area (559)
- Blueberries (323 ha)
- Barley (170 ha)

7.6.18 There is a gravel pit located approximately 2 km south of the Project Area just off of Cloverville road.

Population and Demographics

7.6.19 Statistics Canada completes a Population Census every five years. Population, employment and economic information from the 2001 and 2006 censuses provide valuable tools for assessing the potential effects of the Project on the local and provincial community and economy.

7.6.20 **Table 7.7** shows the most recent Population Census data for Antigonish, Subd. A and the Province of Nova Scotia.

Table 7.7: Population Statistics (Statistics Canada, 2006)

Population Statistics	Antigonish, Subd. A	Nova Scotia
Population in 2006	7,730	913,462

Population in 2001	7,702	908,007
2001 to 2006 population change (%)	0.4	0.6
Total private dwellings in 2006	3,697	425,681
Private dwellings occupied by usual residents	2,894	376,829
Population density per sq. km in 2006	8.3	17.3
Land area (sq. km) in 2006	927.79	52,917.46

Recreation

7.6.21 There are no recreational parks or areas on or adjacent to the Study Area. The closest municipal parks are located south of the proposed project in and around the town of Antigonish.

7.6.22 The Fairmont Ridge Hiking Trail managed by the Antigonish Hiking and Biking Association is close to the Project Area. The trail head is located just off route 337 and winds inland in a westerly direction, ending just east of Triton brook road approximately 3km northeast of the Project Area.

7.6.23 Other recreational activities associated with the forest themed land use in the area include hunting, snowmobiling, and ATV use. Several beaches are located approximately 7km east of the Project along the western portion St. Georges Bay adjacent to Route 337.

Vehicular Activity

7.6.24 The boundary roads surrounding the Project Area are Fairmont Road, Walsh Post Road, and Cloverville Road. Cloverville Road is the busier of the three roads which starts in downtown Antigonish and ends just south of Maryvale at highway 245. The other two bounding roads are partial dirt roads with infrequent traffic.

Visual Landscape

7.6.25 The rural landscape of the Project Area, and the County of Antigonish, is dominated by coniferous and deciduous forest. Several small agricultural fields are located at lower elevations near the Project Area. Residential houses, farm houses, barns, and other agricultural buildings and structures are common.

7.6.26 At night, depending on the viewer location, the light from the town of Antigonish is present in the viewscape, as well as lights from existing communication towers and nearby residential buildings.

7.6.27 Two communications towers and a fire observation tower are located approximately 1 km east of the Project Area.

7.6.28 Site photographs of the Project Land and the Study Area are shown in **FIGURE 2 VOLUME 3.**

Radio Communications, Radar, and Seismoacoustic Systems

7.6.29 A communications systems inventory was prepared by the Proponent sourcing data from Industry Canada Database (Industry Canada Database, 2008), and by consulting with the stakeholders listed in **SECTION 11**. The inventory was prepared based on recommendations of the Canadian Wind Energy Association (CanWEA) and Radio Advisory Board of Canada (RABC) guidance document *Technical Information and Coordination Process Between Wind Turbines and Radiocommunication and Radar Systems*.

7.6.30 Based on feedback from stakeholders, and the proposed turbines being located within the consultation zone determined by the CanWEA/RABC guidance document, the proponent had contracted Oldham Engineers Inc. to further study the impact the proposed turbines may have on existing communication towers.

7.6.31 The results of the study indicate that the wind turbines are not expected to significantly impact the performance of radio systems operating at the Project Site.

7.6.32 Further details of the radio communications systems impact assessment conducted by Oldham Engineers Inc. are located in **APPENDIX L VOLUME 3.**

8 ASSESSMENT OF ENVIRONMENTAL IMPACTS

8.1 INTRODUCTION

8.1.1 This section of the EIS/EA describes the likely effects of the Project on the environment, before and after mitigation. It also discusses the potential for accidents and malfunction as well as the likely effects of climatic fluctuations on the Project.

8.2 ASSESSMENT OF IMPACTS

8.2.1 The construction, operation, maintenance, and decommissioning phases of the Project all have the potential to affect the social, natural, cultural, financial and technical environment. Guidelines provided by NRCan (NRCan, 2003) follow a six step process that identifies the interactions between all project components and the environment. These are:

STEP 1: Describe the project activities.
STEP 2: Identify the environmental component(s) that will be affected.
STEP 3: Describe the impact between the environment and the Project.
STEP 4: Describe the mitigation measure(s).
STEP 5: Identify any effects after mitigation measures.
STEP 6: Determine the importance of the effects after mitigation.

8.2.2 Natural Resource Canada classifies each residual effect as High, Medium, Low, or Minimal, as described within **Table 8.1.** (NRCAN, 2003)**.**

Table 8.1: Level of Impact after Mitigation Measures

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

Valued Ecosystem Components

8.2.3 The following VECs have been identified as having the most potential for impact due to the Project.

- Air Quality
- Archaeology and Cultural Heritage
- Avian Species
- Bats
- Fauna (Non-Avian Species)
- Vascular Plants and Protected Areas
- Land and Resources used for Traditional Purposes by Aboriginal Persons
- Land Use
- Local Economy
- Local Traffic
- Noise
- Public Health and Safety
- Recreation (including Tourism)
- Surface and Groundwater.
- Radiocommunication, Radar, Internet, and Seismoacoustic Systems
- Visual Landscape

8.2.4 Individual impact assessment reports and surveys have been prepared for the more sensitive VECs including: avian, noise, shadow flicker, radiocommunication, bats, archaeology and cultural heritage. These reports discuss impacts and mitigation measures, and are presented in **VOLUME 3**. Photomontages used to assess the impact on the visual landscape are also considered. The assessments for different VECs are listed below in **Table 8.2.**

Table 8.2: List of VEC Impact Assessments

Description	Reference
Avian Survey Report	Appendix C, Volume 3
Pre-Construction Bat Monitoring Report	Appendix D, Volume3
Radio Communications Systems Impact Assessment.	Appendix L, Volume 3
Noise Impact Assessment Report	Appendix H, Volume 3
Shadow Flicker Report	Appendix I, Volume 3
Mi'kmaq Ecological Knowledge Study	Appendix K, Volume 3
Archaeological Assessment	Appendix J, Volume 3
Visual Landscape - Photomontages	Figures 8-9, Volume 2

8.3 ENVIRONMENTAL IMPACT – CONSTRUCTION

Surveying and Siting Operations

8.3.1 STEP 1: Project Activities

- Full details of these project activities are described in **SECTION 5.5**

8.3.2 STEP 2: Identification of VECs

- Archaeology and Cultural Heritage, and Noise.

8.3.3 STEP 3: Impact of Interactions between the Environment and Project

- Archaeological remains may be disturbed during excavation.
- Noise would be emitted by the excavators and drilling rigs used for geophysical investigation.

8.3.4 STEP 4: Mitigation Measures

- If any archaeological remains are encountered during the construction activities Davis MacIntyre & Associates Ltd and the Coordinator of Special Places at the Nova Scotia Heritage Division would be contacted immediately.
- Noise impact would be limited by restricting construction activities to daytime hours.

8.3.5 STEP 5: Identification of Residual Effects after Mitigation Measures

- There will be no residual environmental effects following mitigation.

8.3.6 STEP 6: Importance of Residual Effects after Mitigation Measures

- Minimal.

Site Access, Delivery of Equipment and Vehicle Movements

8.3.7 STEP 1: Project Activities

- Full details of these project activities are described in **SECTION 5.5.**

8.3.8 STEP 2: Identification of VECs

- Air Quality, Avian, Fauna, Land Use, Local Traffic, Noise, and Public Health and Safety.

8.3.9 STEP 3: Impact of Interactions between the Environment and the Project

- Local air quality maybe affected through the addition of dust, airborne particulate matter and tailpipe exhaust emissions (including CO_2, nitrous and sulphur oxides) through associated vehicle activities.
- There would be potential for the avian population to avoid the area during construction, due to an increase in human presence and noise from equipment operation.

- There would be potential for fauna to avoid the area during construction, due to an increase in human presence and noise from equipment operation.
- The potential area available for agricultural/forestry land use would be reduced through delivery of equipment and temporary equipment lay-down.
- During the two-month delivery period when the turbine components would be entering the site, transport vehicles may intermittently inconvenience the flow of traffic along Fairmont Road and Cloverville Road.
- Traffic management may be required when the wind turbines are being delivered to the site. This would consist of temporarily stopping traffic when any long vehicle carrying wind turbine components enters the site.
- Noise would be generated by vehicles delivering the equipment.
- The increase in vehicle movement on local roads would have the potential to affect public health and safety.

8.3.10 STEP 4: Mitigation Measures

- During dry weather conditions, the creation of dust and particulate matter would be controlled through the application of water.
- All vehicles and machinery used will comply with current emission standards and will be used efficiently, minimizing distances travelled whenever possible.
- During site access, existing access roads would be utilized whenever possible, in order to mitigate the potential negative effects on fauna.
- Financial compensation would be provided to landowners for any damage caused during site access, delivery of equipment and equipment lay-down.
- Local traffic increases would be limited by restricting associated activities to daytime hours.
- Noise would be limited by restricting associated activities to daytime hours.
- Public health and safety would be ensured by verifying that the chosen route for construction traffic is suitable and by obtaining suitable traffic escorts for unusual/wide loads.

8.3.11 STEP 5: Identification of Residual Effects after Mitigation Measures

- There will be no residual environmental effects following mitigation.

8.3.12 STEP 6: Importance of Residual Effects after Mitigation Measures

- Minimal.

Construction of Temporary Construction Compound and Parking Lot

8.3.13 STEP 1: Project Activities

- Full details of these project activities are described in **SECTION 5.5**

8.3.14 STEP 2: Identification of VECs

- Archaeology and Cultural Heritage, Avian, Fauna, and Noise.

8.3.15 STEP 3: Impact of Interactions between the Environment and the Project

- Archaeological remains may be disturbed during excavation activities.
- There would be a direct impact to avian habitat and avian habitat fragmentation during the construction activities.
- There would be potential for the avian population to avoid the area during this construction, due to an increase in human presence and noise from equipment operation.
- There would be potential for fauna to avoid the area during construction, due to an increase in human presence and noise from equipment operation.
- Noise levels would increase through the operation of trucks, excavators, graders and bulldozers.

8.3.16 STEP 4: Mitigation Measures

- If any archaeological remains are encountered during the construction activities Davis MacIntyre & Associates Ltd and the Coordinator of Special Places at the Nova Scotia Heritage Division would be contacted immediately.
- The wind farm has been designed to avoid any habitats which are attractive to nesting and staging birds.
- To reduce the potential negative impact on fauna, the location of the construction compound would be managed to reduce the amount of total land take up and the least environmentally sensitive location would be considered as part of the wind farm design.
- Topsoil removal would be stored in accordance with municipal and best practice guidance and later used to cover areas which have been backfilled. Ground material needed for backfill would be compacted and stored temporarily in a pile adjacent to the excavated areas until required.
- Remaining excavated material would be removed from site to an approved waste disposal facility. Any regulated materials would be disposed of in accordance with the Canadian Food Inspection Agency's restricted area regulations. Landowners would be consulted prior to any topsoil re-distribution.
- Noise would be limited by restricting associated activities to daytime hours.

8.3.17 STEP 5: Identification of Residual Effects after Mitigation Measures

- There will be no residual environmental effects following mitigation.

8.3.18 STEP 6: Importance of Residual Effects after Mitigation Measures

- Minimal.

Construction of Turbine Foundations

8.3.19 STEP 1: Project Activities

- Full details of these project activities are described in **SECTION 5.5**

8.3.20 STEP 2: Identification of VECs

- Archaeology and Cultural Heritage, Avian, Fauna, Land Use, Local Traffic, Noise, Surface and Groundwater

8.3.21 STEP 3: Impact of Interactions between the Environment and the Project

- Archaeological remains may be disturbed during excavation activities.
- There would be a direct impact to avian habitat and avian habitat fragmentation during the construction of access roads.
- There would be potential for the avian population to avoid the area during construction, due to an increase in human presence and noise from equipment operation.
- There would be potential for fauna to avoid the area during construction, due to an increase in human presence and noise from equipment operation.
- There would be a reduction of potential land use by approximately 0.1% through the construction of wind turbine foundations.
- During the foundation construction, the vehicles approaching and exiting the access point may intermittently inconvenience the flow of traffic along Fairmont Road and Cloverville Road
- Noise levels would increase through the operation of trucks, excavators graders, and bulldozers, and potentially rock chippers.
- There might be potential surface and ground water sedimentation and contamination through accidental release of wash water containing cement, concrete additives, and oil.

8.3.22 STEP 4: Mitigation Measures

- If any archaeological remains are encountered during the construction activities Davis MacIntyre & Associates Ltd and the Coordinator of Special Places at the Nova Scotia Heritage Division would be contacted immediately.
- The wind farm has been designed to avoid any habitats which are attractive to nesting and staging birds.
- To mitigate the potential impact on fauna, access to the land would use existing access roads, whenever possible.
- Topsoil removal would be stored in accordance with municipal and best practice guidance and later used to cover areas which have been backfilled. Ground material needed for backfill would be compacted and stored temporarily in a pile adjacent to the excavated areas until required.

- Any remaining excavated material would be removed from site to an approved waste disposal facility. Any regulated materials would be disposed of in accordance with the Canadian Food Inspection Agency's restricted area regulations. Landowners would be consulted prior to any topsoil re-distribution.
- Local traffic increases would be limited by restricting associated activities to daytime hours.
- Noise would be limited by restricting associated activities to daytime hours.
- Potential surface and ground water sedimentation and contamination would be mitigated through the use of siltation fences and erosion control measures would be adopted when necessary. Wash water used for cleaning concrete truck drums will be disposed of in sanitary works designed for that purpose.

8.3.23 STEP 5: Identification of Residual Effects after Mitigation Measures

- Reduction of land use by approximately 0.1% through the creation of turbine foundations.

8.3.24 STEP 6: Importance of Residual Effects after Mitigation Measures

- Low.

Wind Turbine Assembly and Installation

8.3.25 STEP 1: Project Activities

- Full details of these project activities are described in **SECTION 5.5.**

8.3.26 STEP 2: Identification and Description of Environmental Components

- Avian, Fauna, Land Use and Visual Landscape.

8.3.27 STEP 3: Impact of Interactions between the Environment and the Project

- There would be a direct impact to avian habitat during the assembly of the turbines.
- There would be potential for the avian population to avoid the area during construction, due to an increase in human presence and noise from equipment operation.
- There would be potential for fauna to avoid the area during construction, due to an increase in human presence and noise from equipment operation.
- Land use would be temporarily affected through the project activities.
- The visual landscape would be altered through the introduction of the wind turbines.

8.3.28 STEP 4: Mitigation Measures

- To mitigate the potential impact on fauna, access to the land would use existing access roads, whenever possible.

- To minimize the visual impact, several mitigation measures would be adopted.
- All wind turbines would be located approximately 1000 metres from residential dwellings.
- The safety lighting on the wind turbines will be kept to a minimum to which satisfies Transport Canada regulations regarding air navigation, as defined within **APPENDIX N, VOLUME 3.**

8.3.29 STEP 5: Identification of Residual Effects after Mitigation Measures

- Introduction of wind turbines to the visual landscape.

8.3.30 STEP 6: Importance of Residual Effects after Mitigation Measures

- Low

Wind Farm Electrical Work, Electrical Switchgear Enclosure Construction and Interconnection to Electrical Distribution System

8.3.31 STEP 1: Project Activities

- Full details of these project activities are described in **SECTION 5.5.**

8.3.32 STEP 2: Identification of VECs

- Archaeology and Cultural Heritage, Avian, Fauna, Land Use, Noise, and Visual Landscape.

8.3.33 STEP 3: Impact of Interactions between the Environment and the Project

- Archaeological remains may be disturbed during excavation activities.
- There would be a direct impact to avian habitat during the construction activities.
- There would be potential for the avian population to avoid the area during this construction, due to an increase in human presence and noise from equipment operation.
- There would be potential for fauna to avoid the area during construction, due to an increase in human presence and noise from equipment operation.
- Noise levels would increase through the operation of trucks, excavators, graders and bulldozers.
- The visual landscape would be slightly altered through the possible introduction of a small switchgear enclosure.

8.3.34 STEP 4: Mitigation Measures

- If any archaeological remains are encountered during the construction activities Davis MacIntyre & Associates Ltd and the Coordinator of Special Places at the Nova Scotia Heritage Division would be contacted immediately.

- The wind farm has been designed to avoid any habitats which are attractive to nesting and staging birds.
- To reduce the potential negative impact on fauna, the location of an electrical switchgear enclosure would be managed to reduce the amount of total land footprint and the least environmentally sensitive location would be considered as part of the wind farm design.
- Topsoil removal would be stored in accordance with municipal regulations and best practice guidance and later used to cover areas which have been backfilled. Ground material needed for backfill would be compacted and stored temporarily in a pile adjacent to the excavated areas until required.
- Any remaining excavated material would be removed from site to an approved waste disposal facility. Any regulated materials would be disposed of in accordance with the Canadian Food Inspection Agency's restricted area regulations. Landowners would be consulted prior to any topsoil re-distribution.
- Noise would be limited by restricting associated activities to daytime hours.
- Impact on the visual landscape would be minimized by selecting a colour for the switchgear enclosure which would not contrast sharply with the surrounding environment.

8.3.35 STEP 5: Identification of Residual Effects after Mitigation Measures

- Introduction of the switchgear enclosure into the visual landscape.

8.3.36 STEP 6: Importance of Residual Effects after Mitigation Measures

- Low.

Construction of Drainage Crossings, Internal Site Roads, and Crane Pads

8.3.37 STEP 1: Project Activities

- Full details of these project activities are described in **SECTION 5.5**

8.3.38 STEP 2: Identification of VECs

- Archaeology and Cultural Heritage, Avian, Fauna, Flora, Land Use, Noise, and Surface and Groundwater.

8.3.39 STEP 3: Impact of Interactions between the Environment and the Project

- Archaeological remains may be disturbed during excavation.
- There would be a direct impact to avian habitat and avian habitat fragmentation during the construction of access roads.
- There would be potential for avian populations to avoid the area during construction due to an increase in human presence and noise from equipment operation.

- There would be potential for fauna to avoid the area during construction, due to an increase in human presence and noise from equipment operation.
- There would be the potential for physical disturbance of flora when constructing a stream crossing on site.
- There would be a reduction of potential land use of approximately 1% through the creation and/or modification of existing/new access roads and crane pads.
- Noise levels would increase through the operation of trucks, excavators, graders, and bulldozers.
- There would be potential for surface water sedimentation and contamination when the project activities are located within the vicinity of streams or drainage ditches.

8.3.40 STEP 4: Mitigation Measures

- If any archaeological remains are encountered during the construction activities Davis MacIntyre & Associates Ltd and the Coordinator of Special Places at the Nova Scotia Heritage Division would be contacted immediately.
- The wind farm has been designed to avoid any habitats which are attractive to nesting and staging birds.
- To mitigate the potential impact on fauna, the location of access roads would be optimized to reduce the amount of total road footprint and the shortest and least environmentally sensitive routes would be considered as part of the wind farm design.
- To mitigate the potential impact on flora, the location of access roads would be optimized to reduce the amount of total land take up and the shortest and least environmentally sensitive routes would considered as part of the wind farm design.
- Topsoil removal would be stored in accordance with municipal and best practice guidance and later used to cover areas which have been backfilled. Ground material needed for backfill would be compacted and stored temporarily in a pile adjacent to the excavated areas until required.
- Any remaining excavated material would be removed from site to an approved waste disposal facility. Any regulated materials would be disposed of in accordance with the Canadian Food Inspection Agency's restricted area regulations. All landowners would be consulted prior to any topsoil re-distribution.
- Noise would be limited by restricting associated activities to daytime hours.
- Potential surface water sedimentation and contamination would be mitigated through the use of siltation fences and erosion control measures would be adopted when necessary.

8.3.41 STEP 5: Identification of Residual Effects after Mitigation Measures

- Reduction of land use by approximately 1% through the creation of new access roads.

8.3.42 STEP 6: Importance of Residual Effects after Mitigation Measures

- Low.

8.4 ENVIRONMENTAL IMPACT – OPERATION

Land Use

8.4.1 STEP 1: Project Activities

- Wind farm operation.

8.4.2 STEP 2: Identification of VECs

- Land Use, Local Economy, and Telecommunications

8.4.3 STEP 3: Impact of Interactions between the Environment and the Project

- Land use will be reduced by approximately 1-2% of total leased land through the introduction of access roads, wind turbines, crane pads, and an electrical switchgear enclosure. This would equate to approximately 2-4 acres of total land take up.
- The change in land use would have a positive impact on the local economy through the increased payment of taxes and income to local landowners.
- Telecommunication systems may be affected through the introduction of wind turbines.

8.4.4 STEP 4: Mitigation Measures

- Siting of all wind farm components would be done so in consultation with the landowner, therefore reducing the negative impact on existing land use.
- The potential negative impact of the wind turbines on telecommunication systems would be mitigated through appropriate consultation and compliance to RABC/CanWEA guidelines, CBC-Radio Canada Services guidelines, as well as through consultation with industry and government stakeholders.

8.4.5 STEP 5: Identification of Residual Effects after Mitigation Measures

- It is anticipated that the net residual effects following mitigation would be low.

8.4.6 STEP 6: Importance of Residual Effects after Mitigation Measures

- Low.

Visual Impacts

8.4.7 STEP 1: Project Activities

- Wind farm operation.

8.4.8 STEP 2: Identification of VECs

- Recreation and Visual Landscape.

8.4.9 STEP 3: Impact of Interactions between the Environment and the Project

- Due to the large size, the wind turbines would be seen by people residing, working and travelling in the area. **FIGURES 8-9, VOLUME 2** includes a number of photomontages - panoramic photographs which include computer generated predictions of what the wind farm may look like during the day.
- During the night time, turbine lighting will be seen atop some of the wind turbines, depending upon wind turbine layout. Specific lighting requirements are provided within the Transport Canada Lighting Regulations document found in **APPENDIX N, VOLUME 3.**
- For some residencies, shadow flicker may occur during certain weather conditions and times of the year.

8.4.10 STEP 4: Mitigation Measures

- The potential negative impact of the Project on recreation would be mitigated through compliance with all municipal land use planning policies.
- The potential negative effect of shadow flicker has been mitigated at the design stage through compliance with industry guidelines on shadow flicker. The complete report on shadow flicker can be found in **APPENDIX I, VOLUME 3**.
- The wind turbines would be located near wooded areas and be approximately 1000 meters from the nearest residential dwelling.
- The paint color of the wind turbines will be selected so that they do not contrast sharply with the surrounding environment
- The safety lighting on the wind turbines will be kept to a minimum to which satisfies Transport Canada regulations regarding air navigation and safety

8.4.11 STEP 5: Identification of Residual Effects after Mitigation Measures

- Occurrence of a limited amount of shadow flicker of no more than 30 hours per year, and 30 minutes per day based on the predicted actual exposure.
- Occurrence of minimal light perceived at ground level from safety navigation lighting located on the nacelle of 1 or 2 of the wind turbines.

8.4.12 STEP 6: Importance of Residual Effects after Mitigation Measures

- Low.

Noise Impacts

8.4.13 STEP 1: Project Activities

- Wind farm operation.

8.4.14 STEP 2: Identification of VECs

- Noise.

8.4.15 STEP 3: Impact of Interactions between the Environment and the Project

- Some local residents would be able to hear the wind farm during certain weather conditions, throughout the operational phase of the Project.

8.4.16 STEP 4: Mitigation Measures

- The potential negative impact of noise on the local community would be mitigated at the design stage through compliance with the Municipal bylaws and guidelines regarding noise and wind farms. The complete noise assessment can be found in **APPENDIX H, VOLUME 3**.

8.4.17 STEP 5: Identification of Residual Effects after Mitigation Measures

- A limited amount of noise would be generated by the wind turbines. However, this noise will be within the regulatory limits mandated by the Municipality and therefore the residual effects following mitigation would be low.

8.4.18 STEP 6: Importance of Residual Effects after Mitigation Measures

- Low.

Wildlife Disturbance

8.4.19 STEP 1: Project Activities

- Wind farm operation.

8.4.20 STEP 2: Identification of VECs

- Avian, Bats, and Fauna.

8.4.21 STEP 3: Impact of Interactions between the Environment and the Project

- Potential for the avian population to avoid the area due to the presence of wind turbines.
- Breeding and courtship behaviour of some avian populations may result in collision with the wind turbines.
- Avian collision and mortality may occur during spring and fall migration, particularly in poor weather conditions.

- Avian habitat fragmentation may occur through the introduction of wind turbines to the landscape.
- Bat collision and mortality may occur.
- Fauna may avoid the Project Land due to the presence of wind turbines.

8.4.22 STEP 4: Mitigation Measures

- Early site design and identification has mitigated the potential negative effects of the wind farm on the environment in a number of ways:
- The Project Area is not overlapping any provincially designated Protected Areas.
- The Project Area is not within any Important Bird Areas.
- Based on the guidance document from the Nova Scotia Department of Environment the Site Area has a Category 2 site ranking. Projects in this category present a moderate level or potential risk to wild species and their habitat.
- A full year of avian studies will be conducted pre-construction, and at least two years of post construction avian monitoring will be conducted.

8.4.23 STEP 5: Identification of Residual Effects after Mitigation Measures

- It is anticipated that the residual effects of these project activities following mitigation will be low.

8.4.24 STEP 6: Importance of Residual Effects after Mitigation Measures

- Low.

Safety Issues

8.4.25 STEP 1: Project Activities

- Wind farm operation.

8.4.26 STEP 2: Identification of VECs

- Public Health and Safety, and Recreation (including tourism).

8.4.27 STEP 3: Impact of Interactions between the Environment and the Project

- During extreme cold weather events, there is the potential for ice to build up and ice throw from the turbine blades.
- During extreme weather events, there is the potential for electrical fires within the turbine nacelle through lightning strikes.
- Potential aviation hazard to low flying aircraft and aircraft land.

8.4.28 STEP 4: Mitigation Measures

- Potential ice throw during extreme cold weather events would be mitigated through the wind turbines control system which would automatically detect ice build up on the blades and shut down if necessary.
- Hazards of turbine lightning strikes would be mitigated by the wind turbines lightning protection system.
- The wind farm will be equipped with aviation lighting which will satisfy Transport Canada regulations regarding air navigation and safety, as defined in the Transport Canada Lighting Regulations document referred to within **APPENDIX N, VOLUME 3**.

8.4.29 STEP 5: Identification of Residual Effects after Mitigation Measures

- It is anticipated that the residual effects of these project activities following mitigation will be low.

8.4.30 STEP 6: Importance of Residual Effects after Mitigation Measures

- Low.

8.5 ENVIRONMENTAL IMPACT – DECOMMISSIONING AND ABANDONMENT

Removal of Wind Turbines, Ancillary Equipment, Buildings, Waste and Site Remediation

8.5.1 STEP 1: Project Activities

- Full details of these project activities are described in **SECTION 5.7.**

8.5.2 STEP 2: Identification of VECs

- Avian, Fauna, Flora, Land Use, Local Traffic, Noise, Public Health and Safety, and Visual Landscape

8.5.3 STEP 3: Impact of Interactions between the Environment and the Project

- There would be potential for avian populations to avoid the area during decommissioning, due to an increase in human presence and noise from equipment operation.
- There would be potential for fauna to avoid the area during decommissioning, due to an increase in human presence and noise from equipment operation.
- There would be the potential for physical disturbance of flora during the decommissioning activities.
- There would be an increase of land use by approximately 1% through the removal access roads and crane pads.
- During the decommissioning phase, vehicles approaching and exiting the access point may intermittently inconvenience the flow of traffic along Fairmont Road and Cloverville Road.

- Noise levels would increase through the operation of trucks, excavators graders and bulldozers.
- The increase in vehicle movement on local roads would have the potential to affect public health and safety.
- The visual landscape would be altered through the removal of the wind turbines.

8.5.4 STEP 4: Mitigation Measures

- If decommissioning starts during the summer breeding season, a pre-decommissioning avian survey may be undertaken and any mitigation recommendations would be followed.
- Access onto the Project Land would be limited to areas of existing wind farm infra-structure whenever and wherever possible to mitigate the physical disturbance of flora and fauna.
- Local traffic increases would be limited by restricting associated activities to daytime hours.
- Noise would be limited by restricting associated activities to daytime hours.
- Public health and safety would be ensured by verifying that the chosen route for decommissioning traffic is suitable and by obtaining suitable traffic escorts for unusual/wide loads.

8.5.5 STEP 5: Identification of Residual Effects after Mitigation Measures

- There will be no residual environmental effects following mitigation.

8.5.6 STEP 6: Importance of Residual Effects after Mitigation Measures

- Minimal.

8.6 ELECTROMAGNETIC FIELD EMMISSIONS

8.6.1 Electromagnetic fields (EMF) can be described as "invisible lines of force that surround any electrical device. They are found everywhere electricity is used such as appliances, computers, office equipment, home wiring, and electric power facilities such as transmission & distribution lines. Electric fields are produced by voltage and magnetic fields result from the flow of current through a device" (HydroOne; 2011).

8.6.2 There are four potential sources of EMFs associated with the proposed Fairmount installation: the grid interconnection distribution power line; wind turbine generators; electrical transformers; and the underground collector network.

8.6.3 The turbine electrical equipment will be enclosed in its towers, with the exception of the transformer that may be located adjacent to the turbine. EMF test results from a similar turbine, the CNE wind turbine in Ontario, reveal that the MF generated in front of the wind turbine door was 0.4 mG and values 10 feet from the wind turbine

were 0.04 mG (Windrush; 2004). Research reveal that such EMF emissions are negligible that compare with EMF of other house hold devices.

8.6.4 The electrical cabling used to connect the generators (ie. collector network), will operate at approximately 27 kV and may be buried underground, minimizing EMF produced. If connection to the grid system is made above ground any potential MF emitted from the electrical cables is restricted to an area of several meters from the cable.

8.6.5 Overall, the anticipated EMFs produced by the Fairmount wind farm will not pose a threat to public health. Similar conclusions have been made by Health Canada and World Health Organization which state that "Wind turbines are not considered a significant source of EMF exposure since emissions levels around wind farms are low" (Chief Medical Officer of Health of Ontario Report; 2010).

8.7 POTENTIAL ACCIDENTS AND MALFUNCTION

8.7.1 Accidents and malfunctions can be best mitigated through safe and responsible design, construction, operation, and decommissioning of the wind farm, in addition to providing suitable and comprehensive training to all contractors and personnel involved in the Project.

8.7.2 There are a limited number of potential accidents and malfunctions which could occur during the operational phase of the wind farm, including tower collapse, blade breakage and mechanical component failure. These malfunctions could be attributed to:

- Aeronautical collisions
- Third party and accidental damage
- Local seismicity
- Extreme weather events
- Insufficient turbine service and maintenance programs

8.7.3 The low risk of aeronautical collisions would be mitigated through wind farm lighting which would adhere to the lighting requirements of Transport Canada. Additionally, the wind farm is located a significant distance away from all registered airfields, which would further mitigate the risk of collisions.

8.7.4 The possibility exists for farm or recreational equipment to collide with the wind turbines. However, due to the structural integrity of the wind turbines, significant damage is extremely unlikely.

8.7.5 The possibility exists for seismic activity to cause accidents and malfunctions, although the magnitude of such events is extremely small and as such is not anticipated to cause any damage to the turbine.

8.7.6 An appropriate turbine service and maintenance program will be adopted, based on manufacturer recommendations and best practice guidelines.

8.8 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Extreme Weather

8.8.1 Severe weather events could potentially damage wind turbines due to conditions exceeding the operational design of the wind turbines. High winds, extreme temperatures, and icing on blades all have the potential to shut down wind turbines.

8.8.2 Extreme weather events which could occur within the Nova Scotia region are listed in **Table 8.3**. In addition, the possible effect and mitigation associated with these events are presented.

Table 8.3: 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 turbine maintenance.
Heavy rain and flooding	None anticipated	None.
Heavy snow	Damage to turbine 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.
Lightning	Potential for fires within nacelle of turbine	Lightning protection system would conduct electrical surge away from nacelle.
Seismic activity	None anticipated	None.
Severe drought	None anticipated	None.

Turbine Icing

8.8.3 Ice accumulation on wind turbines 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 wind turbine blades, there are two types of risks possible: the first is ice throw from an operating wind turbine, and the second is ice fall from a wind turbine that is not in operation.

8.8.4 When a wind turbine is operating, 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 wind turbine blade varies 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.

8.8.5 Research performed (Seifert et al., 2003 and Seifert and Richert, 1997), including both observation and wind tunnel tests, have provided a simplified, empirical equation to estimate the maximum ice throw distance. For the Enercon E82 wind turbines, the maximum throwing distance would be approximately 243 meters.

8.8.6 In a Canadian study (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 wind turbine. The following parameters and assumptions were used:

- Rotor diameter of 80 meters
- Hub height of 80 meters
- Fixed rotor speed of 15 rotations per minute
- 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 mass of 1 kg and frontal area 0.01 square meters
- Wind speeds follow a Rayleigh distribution of 8 m/s
- All wind directions are equally likely
- Ever-present individual between 50 m and 300 m (donut shaped buffer around wind turbines), individual equally likely in any given 1 square meter within that area

8.8.7 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.

8.8.8 As with trees, power lines masts, and buildings, ice can accumulate on stationary wind turbines, and will 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). As with ice throw from operating wind turbines, an empirical equation can used to estimate the maximum falling distance. For the Enercon E82 wind turbines, and a wind speed of 25 m/s, the maximum throwing distance would be approximately 202 meters.

Potential Surface Water Impacts

8.8.9 Activities associated with the project which can impact surface water resources include the development of gravel pits, road construction, stream crossings, concrete use and disposal, and petroleum products from turbines and heavy ground moving equipment.

8.8.10 To mitigate such impacts a Spill Contingency Plan will be enforced, as well as the Environmental Management Plan which can be found in **APPEDIX B, VOLUME 2.**

8.9 SUMMARY OF IMPACTS

8.9.1 **Table 8.4** summarizes the environmental impacts, mitigation, and residual effects of the Project on the environment.

Table 8.4: Summary of Environmental Impacts

Project Activity and Report Section		VECs Affected	Impact	Mitigation	Residual Effects	Level of Residual Impact
Construction Phase						
8.3.1	Surveying and Siting Operations	Archaeology and Cultural Heritage	Archaeology remains maybe disturbed during excavation.	If archaeology remains are encountered, the relevant bodies would be contacted	None anticipated	Minimal
		Noise	Noise will be generated during excavation.	Excavation activities limited to daytime hours		
8.3.7	Site access, Delivery of Equipment and Vehicle Movement.	Air Quality	Dust maybe generated Tailpipe exhaust will be emitted by vehicles and machinery.	Dust would be controlled through the application of water. Vehicles and machinery used will comply with current emission standards and will be used efficiently.	None anticipated	Minimal
		Avian	Avian populations may avoid area.	Natural habitat and sensitive areas will be avoided during construction.		
		Fauna	Fauna may avoid area.	Natural habitat and sensitive areas will be avoided during construction.		
		Land Use	Some agricultural/ forestry land will be temporarily unavailable.	Financial compensation may be provided to landowners		
		Local Traffic	Local traffic will increase during delivery.	Vehicle activities will be limited to daytime hours.		
		Noise	Noise will be generated during delivery.	Delivery will be limited to daytime hours.		
		Public Health and Safety	Public health and Safety could be impacted through increased vehicle activity.	Routes for equipment delivery will be chosen to minimize impact on local residents and public.		

Project Activity and Report Section		VECs Affected	Impact	Mitigation	Residual Effects	Level of Residual Impact
8.3.13	Temporary Construction Compound and Parking Lot	Archaeology and Cultural Heritage	Archaeology remains maybe disturbed during excavation.	If archaeology remains are encountered, the relevant bodies would be contacted.	None anticipated	Minimal
		Avian	Avian habitat maybe disturbed or fragmented.	Wind farm design avoids habitat attractive to nesting and staging birds.		
			Avian populations may avoid area.	Natural habitat and sensitive areas will be avoided during construction.		
		Fauna	Fauna may avoid the area.	Access to the land will be restricted to access roads whenever possible.		
		Noise	Noise will be generated during construction.	Construction will be limited to daytime hours.		
8.3.25	Construction of Turbine Foundations	Archaeology and Cultural Heritage	Archaeology remains maybe disturbed during excavation.	If archaeology remains are encountered relevant bodies would be contacted.	Reduction of agricultural/forestry land	Low
		Avian	Avian habitat maybe disturbed or fragmented.	Wind farm location and design will avoid habitats attractive to nesting and staging birds.		
			Avian populations may avoid area.	Natural habitat and sensitive areas will be avoided during construction.		
		Fauna	Fauna may avoid area during construction.	Access to the land will be restricted to access roads whenever possible		
		Land Use	Some agricultural/ forestry land will be permanently used turbine foundations.	Financial compensation may be provided to landowners.		
			Soil would be disturbed during excavation.	Financial compensation may be provided to landowners.		

Project Activity and Report Section		VECs Affected	Impact	Mitigation	Residual Effects	Level of Residual Impact
		Local Traffic	Local traffic will increase during equipment delivery.	Vehicle activities will be limited to daytime hours.		
		Noise	Noise will be generated during construction.	Construction will be limited to daytime hours.		
		Surface and Groundwater	Surface and ground water may experience some sedimentation and contamination.	Siltation fences and soil erosion control would be adopted where necessary.		
8.3.31	Wind Turbine Assembly and Installation.	Avian	Avian habitat maybe disturbed or fragmented	Wind farm location and design will avoid habitats attractive to nesting and staging birds.	Introduction of wind turbines in to the visual landscape	Low
			Avian populations may avoid area.	Natural habitat and sensitive areas will be avoided during turbine installation.		
		Fauna	Fauna may avoid area during assembly and installation.	Access to the land will be restricted to access roads whenever possible.		
		Land Use	Land use will temporarily affected through the project activities.	Financial compensation may be provided to landowners.		
		Visual Landscape	Visual landscape will be altered through the introduction of wind turbines.	Wind turbines will be located approximately 1000 meters away from dwellings.		
				Paint color of the wind turbines will be chosen to reduce visibility.		
				Safety lighting will be as minimal as possible.		
8.3.37	Wind Farm Electrical Work, Electrical	Archaeology and Cultural Heritage	Archaeology remains maybe disturbed during excavation.	If archaeology remains are encountered, the relevant bodies would be contacted.	Introduction of electrical switchgear	Low

Project Activity and Report Section		VECs Affected	Impact	Mitigation	Residual Effects	Level of Residual Impact
	Switchgear Enclosure and Interconnection to Electrical Distribution System	Avian	Avian habitat maybe disturbed or fragmented.	Wind farm design avoids habitat attractive to nesting and staging birds.	enclosure into the visual landscape	
			Avian populations may avoid area.	Natural habitat and sensitive areas will be avoided during construction.		
		Fauna	Fauna may avoid area during construction activities.	Access to the land will be restricted to access roads whenever possible.		
		Land Use	Some agricultural/ forestry land will be permanently used for electrical switchgear station.	Financial compensation will be provided to landowners.		
			Soil would be disturbed during excavation.	Topsoil will be stored and reinstated appropriately.		
		Noise	Noise will be generated during construction.	Construction will be limited to daytime hours.		
8.3.37	Construction of Drainage Crossings, Internal Site Roads, and Crane Pads	Archaeology and Cultural Heritage	Archaeology remains maybe disturbed during excavation.	If archaeology remains are encountered, the relevant bodies would be contacted.	Reduction of agricultural/ forestry land	Low
		Avian	Avian habitat maybe disturbed or fragmented.	Wind farm design avoids habitat attractive to nesting and staging birds.		
			Avian populations may avoid area.	Natural habitat and sensitive areas will be avoided during construction.		
		Fauna	Fauna may avoid area during construction.	Location of access roads will be optimized to reduce land take up and avoid sensitive areas.		
		Land Use	Some land will be permanently used for roads and crane pads.	Financial compensation will be provided to landowners.		

Project Activity and Report Section		VECs Affected	Impact	Mitigation	Residual Effects	Level of Residual Impact
			Soil would be disturbed during excavation activities.	Topsoil will be stored and reinstated appropriately.		
			Drainage tiles maybe damaged during excavation activities.	Financial compensation will be provided to landowners.		
		Noise	Noise will be generated during construction.	Construction will be limited to daytime hours.		
		Surface and Groundwater	Surface and ground water may experience some sedimentation and contamination near drainage.	Siltation fences and soil erosion control would be adopted where necessary.		
Operational Phase						
8.4.1	Land use	Land Use	Agricultural/forestry land use will be temporarily reduced..	Financial compensation may be provided to landowners.	None anticipated	Minimal
				Wind farm components will be sited following consultation with the landowner.		
		Local Economy	Positive economic impact due to taxation and landowner income.	n/a		
		Radio Communi-cations, radar, and seismo-acoustic systems	Interference with radio, radar, or seismoacoustic systems.	Consultation with industry and government stakeholders in order to mitigate any impact. Site Design compliant with RABC guidelines regarding wind turbines		Minimal
8.4.7	Visual impacts	Visual Landscape	The wind turbines will impact the visual landscape.	Wind turbines will be located approximately 1000 meters away from dwellings.	Some shadow	Low

Project Activity and Report Section		VECs Affected	Impact	Mitigation	Residual Effects	Level of Residual Impact
				Paint colour of the wind turbines will be chosen to reduce visibility.	flicker	
				Safety lighting will be as minimal as possible.		
			Shadow flicker will occur during operation.	Compliance to industry standard guidelines on shadow flicker.		
		Parks and Recreation	The wind turbines may have negative effect on recreation and tourism in the region.	Adherence to local municipal land use planning policies.		
8.4.13	Noise impacts	Noise	Noise will be generated during operation.	Adherence to the noise limits and regulations outlined by the Municipality of the County of Antigonish	Some Turbine Noise	Low
8.4.19	Wildlife disturbance	Avian	Avian habitat maybe disturbed or fragmented.	Turbine locations have been placed on land away from natural areas and sensitive avian habitat.	Some avian and bat mortalities	Low
			Avian mortalities due to turbine collision may occur.	Follow up avian mortality surveys have been recommended to quantify effect of wind farm on avian population.		
		Bats	Bat habitat maybe disturbed or fragmented.	Turbine locations have been placed on land and away from known bat hibernacula's and sensitive habitat.		
			Bat mortalities due to turbine collision may occur.	The Project Area is not close to any water bodies, or major river systems.		
		Fauna	Fauna may avoid area.	The Project Area is not close to any natural areas.		
				Wind turbines should not impact land		

Project Activity and Report Section		VECs Affected	Impact	Mitigation	Residual Effects	Level of Residual Impact
				animals in the area.		
8.4.25	Safety Issues	Public Health and Safety	Cold weather events could cause ice throw to occur.	Control system would shut down turbine.	None anticipated	Minimal
			Lightning storms have the potential to cause fires within the nacelle.	Wind turbine lightning protection system would mitigate issue.		
			The wind turbines could cause an aviation hazard.	Compliance to regulated lighting requirements.		
Decommissioning Phase						
8.5.1	Removal of Wind Turbines, Ancillary Equipment, Buildings, Waste and Site Remediation	Avian	Avian populations may avoid area.	Dependent upon season, an avian survey will be conducted prior to construction activities and associated mitigation will be applied.	None anticipated	Minimal
		Fauna	Fauna may avoid area.	Access would be limited to existing wind farm roads.		
		Flora	Flora maybe disturbed.	Access would be limited to existing wind farm infrastructure.		
		Land Use	Land available for agricultural/forestry purposes would increase.	N/A		
		Local Traffic	Local traffic will increase during decommissioning.	Vehicle activities will be limited to daytime hours.		
		Noise	Noise will be generated during decommissioning.	Equipment delivery will be limited to daytime hours.		
		Public Health and Safety	Public health and Safety could be impacted through increased vehicle activity.	Routes for equipment delivery will be appropriately selected and traffic escorts will be obtained where necessary.		
		Visual Landscape	Visual landscape will be altered through the removal of wind turbines.	N/A		

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9 CUMULATIVE IMPACT

9.1 INTRODUCTION

9.1.1 This section of the EIS/EA describes the likely cumulative impacts of the Project on the environment. It identifies the scope of the assessment, the potential cumulative environmental effects, and associated mitigation measures required.

9.1.2 Based on the CEAA's reference guide: *Addressing Cumulative Environmental Effects* (CEAA, 2004); cumulative environmental effect is defined as:

9.1.3 "The effect on the environment which results from effects of a project when combined with those of other past, existing and imminent projects and activities. These may occur over a certain period of time and distance."

9.2 SCOPE OF CUMULATIVE IMPACT

9.2.1 The residual effects of the Project on the environment have been identified within **SECTION 8** of this volume. These residual effects have been used to determine which VECs should be included within the cumulative impact assessment. This determination is shown in **Table 9.1**

Table 9.1: Assessment of VECs and Cumulative Impact

Valued Ecosystem Component	Residual Impact after Mitigation	Considered in Cumulative Impact
Air Quality.	Minimal	
Archaeology and Cultural Heritage.	Minimal	
Avian.	Low	✓
Bats.	Low	✓
Fauna.	Minimal	
Flora.	Minimal	
Land and Resources used for Traditional Purposes by Aboriginal Persons.	Minimal	
Land Use.	Low	✓
Local Economy.	Low	✓
Local Traffic.	Low	✓
Noise.	Low	✓
Public Health and Safety.	Minimal	✓
Recreation	Minimal	
Surface and Groundwater.	Minimal	
Telecommunications (Including Television and Internet).	Minimal	
Visual Landscape.	Low	✓

9.2.2 The scoping boundaries identified are based on the key milestones and events during the project life cycle and include both construction and operation of the

Project. The decommissioning activities have not been considered within the potential cumulative effects of the project on the environment, due to the uncertainly of predicting twenty years into the future.

9.2.3 The time horizons for considering the cumulative impacts of the construction and operational phases have been identified as one year and five years respectively. The accuracy and certainty of projecting further than five years into the future reduces significantly and is therefore excluded from the scope of this assessment.

9.2.4 The spatial boundary for this assessment extends 10 kilometers from the Project Site. Cumulative effects beyond 10 kilometers are assumed to be negligible and are therefore excluded from the scope of this assessment.

Projects Considered

9.2.5 The Project is located on privately owned land typical of the Antigonish Highlands and therefore projects which may have an impact on the project cumulatively will also be rural in nature. The following potential impacts have been identified:

- The development of other wind power projects in the region.
- The construction and upgrades of roadways and bridges.
- The expansion of local communities and municipal infrastructure.

9.3 CUMULATIVE ENVIRONMENTAL EFFECTS – WIND FARM DEVELOPMENTS

9.3.1 One wind farm development is located within the Greater Study Area, the Maryvale Wind Farm approximately 8 kilometers from the Fairmont site. This consists of four wind turbines and has a nameplate capacity of 6 MW. The Glen Dhu Wind Farm, consisting of 30 wind turbines, located outside of the Great Study Area approximately 17.5 kilometers from the Fairmont site.

9.3.2 Although the Maryvale wind farm and the Fairmont Wind Farm will be visible from several vantage points within the Greater Study Area, it is anticipated that the level of cumulative impact of the two projects on the environment would be low.

Avian and Bats

9.3.3 Avian habitat fragmentation and habitat loss could occur, and avian and bat populations may avoid the area during construction and operational phases. During operation, the wind turbines would also create a potential collision hazard. These impacts are a function of the Project's land use footprint and therefore there may be a cumulative impact on the natural environment as it relates to avian and bat species.

9.3.4 As the additional wind farms are significantly setback from the Fairmont Wind Farm the mitigation measures identified in **SECTION 8** of this volume would continue to apply. Compliance to municipal setbacks and regulations would further mitigate the

potential cumulative effects of the projects. The level of cumulative impact of the projects on the environment would be low.

Land Use

9.3.5 Land use would be affected with the introduction of the wind farms and their associated components. This change would equate to a reduction in land use for other purposes which would increase cumulatively as the number of turbines increases. Typically this reduction amounts to only 1-2% of the land leased for a given Project Area.

9.3.6 The potential cumulative effects of these projects would be mitigated through financial compensation to landowners for lost agricultural/forestry potential and compliance to municipal setbacks and associated land use planning policies. The level of cumulative impacts of the projects on the existing use of land would be low.

Local Economy

9.3.7 The local economy would be affected positively during construction and operation of the Project. Employment opportunities would increase during the construction phase and during operation, economic activity due to tourism may also increase.

Local Traffic

9.3.8 Local traffic will be affected during the construction phase only. Although it is not anticipated that the project activities detailed in **SECTION 5.5** of this volume will occur at the same time as the other projects, if this scenario were to occur, the mitigation measures defined within **SECTION 8** would still apply. The level of cumulative impacts of the projects on the environment would be minimal.

Noise

9.3.9 During construction, traffic related noise may become cumulative as the volume of vehicle activity increases in line with increased project activities.

9.3.10 During the operational phase of the projects, cumulative impacts of noise would be negligible due to the distance between the project and routine scheduled site visits would not be frequent. The cumulative noise emissions from turbines have not been modeled due to the large separation distance between the Fairmont Wind Farm from the Maryvale and Glen Dhu Wind Farms.

Public Health and Safety

9.3.11 During construction, increased vehicle activity would contribute toward public health and safety concerns.

9.3.12 As the distance between the proposed wind farms is at least 5 kilometers, the mitigation measures identified in **SECTION 8** would still apply and the level of cumulative impact of the projects on public health and safety would be low.

Visual Landscape

9.3.13 During construction, cumulative impacts would be limited to construction works. During operation, cumulative impacts would be represented by the addition of wind turbines into the visual landscape.

9.3.14 Due to the distance between projects and the surrounding environment, it is anticipated that the cumulative impact of the projects would be low. The individual mitigation measures defined within **SECTION 8** remain applicable.

9.4 CUMULATIVE ENVIRONMENTAL EFFECTS – MUNICIPAL DEVELOPMENT

9.4.1 The Municipality of the County of Antigonish and urban centers close to the proposed Project are expected to grow within a number of areas. Due to municipal similarities, regional growth has been assumed as:

- Residential Subdivision growth
- Attraction of business related to the growing wind energy industry
- Agriculture and forestry related activities
- Tourism
- Enhanced communication networking and connection
- Small business development and attraction of new manufacturing enterprises
- Growth of the Municipality as a regional service centre
- Industrial park development

Avian and Bats

9.4.2 Avian habitat fragmentation and habitat loss could occur, and avian and bat populations may avoid the area during the construction and operational phases.

9.4.3 The significance of these impacts would be cumulative and a function of land take-up and land alteration. Mitigation would be most effective through compliance to appropriate municipal planning policies and associated setbacks, however further strategies have been outlined in **SECTION 5, APPENDIX B, VOLUME 3**.

Land Use

9.4.4 Land use may be change through the introduction of the Project, and the potential economic growth observed within the municipality. The significance of these impacts would be cumulative and a function of the amount of economic development observed within the area.

9.4.5 The Project is located approximately 6 kilometers away from the town of Antigonish which would allow for expansion of the community without increasing the potential for additional cumulative impacts. It is assumed that the economic development within the immediate vicinity the Project would continue to be forestry related, with minor residential development. The level of cumulative impact of the projects on the environment would be minimal.

9.4.6 Mitigation would be most effective through compliance to appropriate municipal planning policies and associated setbacks. The level of cumulative impact of the projects on the environment would be minimal.

Local Economy

9.4.7 The local economy would be affected positively during construction and operation of the Project. Employment opportunities would increase during the construction and operation phases since external contractors will be hired from the county of Antigonish.

Local Traffic

9.4.8 Local traffic could be impacted by the projects cumulatively during the construction phase only. Local traffic may increase due to increased economic development during the operational phase, but this increase is a function of economic development, and not the wind farm operation.

9.4.9 It is assumed that the economic development within the immediate vicinity the Project would continue to be agricultural in nature and therefore the cumulative impact would be minimal.

9.5 SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS AND CUMULATIVE EFFECTS

9.5.1 **Table 9.2** summarizes the information included in **SECTION 9.3** to **9.4** regarding the cumulative impacts of the Project on the environment.

Table 9.2: Summary of Cumulative Effects

VECs	Fairmont Wind Farm		Other Activities	Assessment of Cumulative Effect	Level of Cumulative Effect
	Construction	Operation			
Avian	✓	✓	Additional wind farm development. Municipal infrastructure expansion.	The mitigation measures identified within **SECTION 8** will still apply.	Low
Bats		✓		The mitigation measures identified within **SECTION 8** will still apply.	Low
Land Use	✓	✓		Appropriate land use policies and suitable land owner compensation will mitigate any potential cumulative impacts.	Minimal
Local Economy	✓	✓		The local economy will benefit through additional employment, landowner revenues, increased tax paid to the municipalities.	Net positive gain
Local Traffic	✓			Local traffic will increase temporarily during construction, although the mitigation measures identified within **SECTION 8** will still apply.	Minimal
Noise	✓	✓		The volume of noise will increase during construction, as well as during operation with increased economic development activity.	Low
Public Health and Safety	✓			An increase of vehicular traffic during construction	Low/Minimal
Visual Landscape	✓	✓		The visual landscape will be changed by the introduction of the wind farm and other developments although it is anticipated that the cumulative impact will be low.	Low

10 FOLLOW-UP MEASURES

10.1 INTRODUCTION

10.1.1 This section of the EIS/EA describes the potential follow-up programs and management plans required during the construction, operation and decommissioning phases of the Project.

10.2 POST-CONSTRUCTION MONITORING REQUIREMENTS

Avian

10.2.1 Referring to **SECTION 6.10**, the Project was assessed as having a Category 2 Level of Concern. As such a post-construction monitoring program will be required for at least two years and designed accordingly.

Bats

10.2.2 Referring to **SECTION 6.9**, the Project has been identified as having a low site sensitivity ranking. At least two years of post-construction monitoring will be required. Depending on the results of this monitoring, mitigation measures may also need to be designed and implemented.

Noise

10.2.3 Post-construction noise monitoring will not be required for the Project.

10.3 MANAGEMENT PLAN REQUIREMENTS

10.3.1 Throughout the life of the Project different contingency plans will be needed to address certain issues which may or may not be required and these are considered below. These plans will be developed and put in place prior to construction of the wind farm and will explicitly outline the steps taken for different project concerns.

10.3.2 It is anticipated that some or all of the following management plans will be required as the Project development matures, some of which will be required as part of the permitting process at the discretion of the Municipality

Management Plan Requirements

- Environmental Management Plan
- Erosion and Sedimentation Control Plan
- Spill Contingency Plan
- Decommissioning and Site Reclamation plan
- Public Complaint Plan
- Permitting

10.3.3 A number of provincial and municipal permits will also be required during pre-construction, all of which are listed in **SECTION 6.4**

11 STAKEHOLDER CONSULTATION

11.1 INTRODUCTION

11.1.1 This section of the EIS/EA describes the stakeholder consultation methodology adopted by Wind Prospect Inc., in addition to the related activities and stakeholder responses for the Project. All supporting documentation pertaining to consultation activities described in this section is included within **APPENDIX O, VOLUME 3**.

11.2 OBJECTIVES

11.2.1 Public consultation is mandated as part of the Environmental Assessment Process and is meant to engage all stakeholders. This includes, but is not limited to, landowners, government and non-government organizations, First Nations, residents, and local interest groups.

11.2.2 Stakeholder consultation is integral to the development process; since stakeholders, including members of the public, may have detailed local knowledge and interest in the Project, which are important design considerations. In order to gain stakeholder input and feedback, an extensive consultation process began for the Project in July 2009.

11.2.3 The primary objectives of stakeholder consultation are to:

- Facilitate communication between stakeholders and the proponent
- Provide a solid mechanism for stakeholder input and feedback
- Outline and address specific concerns, in terms of proper site design and implemented mitigation measures

11.3 STAKEHOLDER ENGAGEMENT

11.3.1 Consultation began in July 2009 through face to face, informal stakeholder discussions in an effort to foster quality relationships and gain local knowledge. More formal approaches were also adopted through the facilitation of a public meeting and a presentation to council.

11.3.2 Communication strategies were developed to facilitate stakeholder engagement that includes:

- A dedicated Project Manager
- Contact phone and fax numbers (including a toll free number)
- A dedicated project email address and website
- Project notices for all residents within several kilometers of the site
- Project newsletters distributed online and by mail
- Public meetings held at the commencement and conclusion of the environmental assessment phase of the project

- Stakeholder letters providing updates and progress

11.3.3 **Table 11.1** summarizes the consultation activities for the Project to date.

Table 11.1: Summary of Consultation

Activity	Date
Landowner discussions and project mail-outs	July 2009
General meetings and discussions, municipal planner, and Municipality of the County of Antigonish	July 2009
General meetings and discussions with agencies (federal and provincial)	March 2010 - Present
Formal presentation to the Municipality of the County of Antigonish	March 2010
Initial consultation with First Nations	April 2010
Public Meeting #1	April 2010
Public Meeting #1 follow-up	May 2010
Public Meeting #2 summary of findings and presentation of Draft Environmental Assessment	May 2011
Draft Environmental Assessment comments received and addressed	June 2011
Submission of Final EA for Approval	July 2011

11.4 PUBLIC MEETING #2

11.4.1 As part of the Environmental Assessment Process, the first public meeting was held at the St Andrews Junior School in Antigonish on Thursday, April 29, 2010. The St Andrews Junior School is located approximately 6 kilometers south of the project, and was held between the hours of 5:30pm – 8:30pm.

11.4.2 The meeting was run as an open house allowing visitors to view project specific information, material on Nova Scotia's energy policies, and wind energy in general. Wind Prospect Inc. staff was present to engage visitors on a one-on-one and group basis. Information presented includes:

- Informal introductions to Wind Prospect Inc.
- General wind energy information
- The importance of stakeholder input
- A broad overview of the Environmental Assessment Process
- Project activities to date
- Computer generated images of what the project may look like, if constructed.
- Map of Study Area, including preliminary turbine locations
- Potential environmental impacts including, noise, visuals, property values, flora, fauna and avian interactions
- Current project status and timeframe of future milestones and next steps

11.4.3 All of the public meeting material is shown in **APPENDIX O-1, VOLUME 3**

11.4.4 All visitors were requested to sign in upon arrival, and complete a questionnaire prior to leaving in order to provide feedback on the information presented. In total, 30 people signed in and 11 people completed a questionnaire. Additional visitors were present, although they chose not to sign in or complete the questionnaire.

11.4.5 The overall results of the questionnaires showed that wind energy is strongly supported by the attendees of the meeting. Personal details included in the questionnaires have not been published within this EIS/EA**.** However, all questions and concerns raised are included within **APPENDIX O-1, VOLUME 3. Table 11.2** summarizes several key questions asked within the questionnaire.

Table 11.2: Summary of Questionnaire Feedback

Questions	Yes	No	TOTAL
Do You Support Wind Energy In General?	9	0	9
Do You Support Wind Energy In this County?	9	1	10
Do You Support The Proposed Fairmont Wind Farm?	9	1	10
Was this Public Meeting Informative?	5	4	9

11.4.6 From the analysis of the questionnaire data, as well as from one-on-one discussions, local residents have raised concerns relating to the Project. These concerns have been incorporated and addressed in this EIS/EA. All issues raised at the public meeting and in the questionnaires are listed in **Table 11.3.** References are given to the appropriate sections of this report where the issues are addressed.

Table 11.3: Summary or Issues Raised

Issues Raised	Section(s)
Would like to see rare plants addressed in the Environmental Assessment.	6.9, 7.5, 8 and Appendix E
Would like to see further details on the Noise Impact Assessment.	8 and Appendix H
How will the project affect property values?	11.4
How will the project affect birds and bats?	6.9, 7.5, 8, 9.3, Appendix C & D
Concerns raised about the impact of project construction on the local environment.	5, 6.9, 7, 8, 9.3, 9.5
How will the project affect flora and fauna?	6.9, 7, 8.2, 8.9, Appendix C,D,E & G

Property Values

11.4.7 In a report published by the Renewable Energy Policy Project (Sterzinger et al., 2003), the effect of wind development on property value was investigated for various sites

across the United States. Of those sites, Bennington County is the most analogous to the Antigonish region and is used as a reference for comparison within this EIS/EA.

11.4.8 The geography of Bennington County is described as "as a non-metro area adjacent to a metro area, though not completely rural and with a population between 2,500 and 19,999" (Sterzinger et al., 2003). The wind farm, consisting of 11 turbines, is located in Bennington County and sits atop a ridge similar in geographical nature to the Fairmont Area. The view shed has a population of fewer than 4,000.

11.4.9 The average residential housing sales price over several years before and after the wind farm commissioning date were analyzed. The sales prices were compared to a similar community with no nearby wind farm. In both communities the trend in average house sales price showed an increase, both before and after commissioning, indicating that there is no significant evidence that the presence of the wind farms had a negative effect on the residential property values (Sterzinger et al., 2003).

11.4.10 Another independent research study on the effects of wind farms on house prices took place in New York State. The effect of a 20 turbine wind farm on house prices in Madison County, New York, was analyzed (Hoen, 2006). The research concluded that their "analysis of 280 home sales... failed to uncover any statistically significant relationship between either proximity to or visibility of the wind farm and the sale price of homes" (Hoen, 2006). Furthermore, the analysis "failed to uncover a relationship even when concentrating on homes within one mile."

11.5 FEDERAL CONSULTATION

Canadian Wildlife Service

11.5.1 Consultation with Canadian Wildlife Service (CWS) was initiated by Dillon Consulting Limited who liaised with CWS representatives in finalizing the Avian monitoring program protocol.

Transport Canada and NAV CANADA

11.5.2 Transport Canada and NAV CANADA were consulted prior to commissioning of the temporary 60m meteorological mast on site. Aeronautical Obstruction clearance was granted for the installation of the 60m mast.

11.5.3 The Aeronautical Obstruction approval process is currently underway for approval to erect turbines with the two authorities. Full approval is expected by July 2011.

11.6 PROVINCIAL CONSULTATION

Department of Natural Resources

11.6.1 Consultation began with DNR in February 2010. A meeting was held with the head Provincial Species at Risk Biologist in the Wildlife Division to introduce the Project and discuss potential environmental impacts.

11.6.2 Consultation with DNR has continued throughout the development phase of the Fairmont Wind Farm. Discussion mainly focused on the management protocols for Species of Concern including the Avian and Bat populations, the threatened Wood Turtle, and the endangered Mainland Moose.

NS Department of Environment and Labour – Environmental Assessment Branch

11.6.3 Consultation began with the Environmental Assessment Branch in January of 2010. The Project was presented to an environmental assessment officer and a general discussion followed regarding the provincial EA legislation for wind farm projects.

11.7 LOCAL AND MUNICIPAL CONSULTATION

The Municipality of the County of Antigonish

11.7.1 Wind Prospect Inc. made a formal presentation to Council on March 16th, 2010 which also facilitated the announcement of the public open house, scheduled for the 29th of April, 2010.

11.7.2 A project stakeholder list was compiled that included local municipal officials, councillors, public meeting attendees, regulator representatives, and other community members who had expressed interest in the project. The list is used as a way to keep the stakeholders up to date on project activities and upcoming events.

Eastern District Planning Commission

11.7.3 At the municipal level, initial consultation started in July 2010 with informal introductions between Wind Prospect Inc. and the Director of the Eastern District Planning Commission (EDPC). The EDPC acts as the planning authority for the Municipality of the County of Antigonish.

11.7.4 Consultation with the EDPC included discussion on the Land use by-laws applicable to wind farms, turbine setback requirements, and the overall planning approval process for the County of Antigonish.

Radiocommunication, Radar, and Seismoacoustic System Stakeholders

11.7.5 Consultation regarding radiocommunication, radar, and seismoacoustic interference was initiated in June 2009, and has been carried out by Wind Prospect, as well as retained consultant, Oldham Engineers Inc. The consultation included all stakeholders

identified in the RABC guidelines (RABC, 2007). The following companies and agencies have been consulted:

- Atlantic Broadcasters Ltd
- Bell Mobility
- Canadian Coast Guard
- CBC/Radio-Canada
- DND Military Air Defence
- DND Radio Communication
- Environment Canada, Meteorological Service of Canada
- Global Maritimes
- MTS Allstream
- Nova Scotia Power Inc.
- Nova Scotia Transportation and Infrastructure Renewal
- NRCan - Geological Survey of Canada
- Royal Canadian Mounted Police
- Rogers Wireless
- Saint Martha's Hospital
- Shoppers Drug Mart
- St. Francis-Xavier University
- Strait Regional School Board
- Telesat Canada
- Telus Mobility

11.7.6 The radio communication systems impact assessment prepared by Oldham Engineers Inc, which mainly focuses on the potential impact of the proposed turbines on radio communication towers within close proximity to the site can be found in **APPENDIX L, VOLUME 3**.

12 FIRST NATIONS CONSULTATION

12.1 INTRODUCTION

12.1.1 This section of the EIS/EA describes the First Nations consultation methodology adopted by Wind Prospect Inc., in addition to the related activities and correspondence.

12.1.2 Wind Prospect is following the recommended Environmental Assessment guidelines for First Nations engagement as outlined in the document *Proponents' Guide: Engagement with the Mi'kmaq of Nova Scotia*, published by the Nova Scotia Office on Aboriginal Affairs (NSOAA, 2009).

12.2 FIRST NATIONS CORRESPONDENCE

12.2.1 Although there are no specific First Nation land claims or First Nation Land within the Greater Study Area, Wind Prospect Inc. is actively consulting with First Nation communities.

12.2.2 On May 19th of 2010, Wind Prospect presented to the Office of Aboriginal Affairs and the Mi'kmaq Rights Initiative (KMK). This presentation served as an initial introduction of the Project to members of the Mi'kmaq community.

12.2.3 Wind Prospect has commissioned the Confederacy of Mainland Mi'kmaq (CMM) to undertake a Mi'kmaq Ecological Knowledge Study (MEKS) for the Project Area as recommended by the Nova Scotia Environmental Approvals Branch of the Department of Environment.

12.2.4 The purpose of a MEKS is to support the integration of Mi'kmaq knowledge of use and occupation of Mi'kma'ki, the Mi'kmaw homeland, into development decisions via the Environmental Assessment Process.

12.2.5 The scope of the MEKS includes:

- a study of historic and current Mi'kmaq land and resource use;
- an evaluation of the potential impacts of the Project on Mi'kmaq use and occupation and constitutionally based rights;
- an evaluation of the significance of the potential impacts of the Project on Mi'kmaq use and occupation; and
- recommendations to proponents and regulators that may include recommendations for mitigation measures, further study, or consultation with Mi'kmaq (CMM, 2011).

12.2.6 The Fairmont MEKS conducted can be found in **APPENDIX K, VOLUME 3.**

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15 CONCLUSION

15.1.1 Wind Prospect Inc wishes to develop the Fairmont Wind Farm with the intent of helping the Nova Scotia meet its renewable energy targets and diversifying its renewable energy sources.

15.1.2 This EIS/EA has been prepared in accordance with the guidelines set out by both the Canadian Environmental Assessment Agency (CEAA) and the Environmental Assessment and Approval Branch of the Nova Scotia Department of Environment. The scope of the EIS/EA was discussed in advance with the local Municipality and the Provincial EA body. Consequently, it is anticipated that this report meets all criteria outlined by the CEAA, the Department of Energy, and the Municipality of the County of Antigonish and be in compliance with all associated regulations.

15.1.3 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 Ecosystem Components have been identified. Consultation has been undertaken with a wide variety of local 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. Measures have been presented and adopted to mitigate the potential adverse effects of the Project on the environment, including any residual effects due to construction and operation. Cumulative effects of the Project on the environment due to other regional projects and activities have also been identified and considered

15.1.4 The following benefits would result due to the Fairmont Wind Farm, thus considered as advantages of the Project:

- Increased revenue for the local municipality through payment of annual property taxes by the Project proponent, without any financial burdens borne by the municipality;
- Increased revenue for local businesses due to both tourism and activities surrounding the construction, operation and decommissioning phases of the project;
- Creation of supplementary income and income diversity for local landowners;
- Creation of additional employment in the region during the entire project life; especially during the construction and decommissioning phases;
- Potential for increased tourism within the region;
- Production of emission-free energy, which will displace energy produced from fossil fuels in Nova Scotia;
- Introduction of clean, renewable energy in to the local environment, offsetting greenhouse gas emissions produced by traditional (carbon based) energy sources, therefore reducing our contribution to global climate change;

- Increased provincial security due to less volatile energy prices and decreases reliance on foreign and out-of-province electricity demands;

15.1.5 In conclusion, it is anticipated that there will be no significant environmental effects of the Fairmont Project in conjunction with successful mitigation strategies as defined within this EIS/EA and in **APPENDIX B, VOLUME 3**.

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17 COMPANY SIGNATURE

Table 17.1 below defines the concluding signature of this EIS/EA for Wind Prospect Inc.

Table 17.1: Signature Declaration

EIS/EA CONDUCTED BY:	Andy MacCallum, Wind Prospect Inc.
DATE:	July-2011
PROPONENT:	Wind Prospect Inc.
PROPONENT SIGNATURE:	 Austen Hughes, Senior Development Manager
DATE:	July 12 2011